

## Louvain School of Management

# The Influence of sovereign credit ratings on corporate credit ratings

Research Master's Thesis submitted by  
**Liliane Umutoni**

With the view of getting the degree in  
**Master 120 crédits en sciences de gestion, à finalité spécialisée**

Supervisor(s)  
**Christophe Lejeune**  
**Jean-Yves Gnabo**

Academic Year 2016-2017

## **ACKNOWLEDGEMENT**

I would like to express my sincere gratitude to my academic supervisor Jean-Yves Gnabo for sharing his profound knowledge and for providing me clear guidance. I sincerely thank the International Business program academic tutor, Christophe Lejeune for his availability, advices and great support.

I would also like to thank Angelo Luisi, research and teaching assistant in Finance at the Louvain School of Management for his precious insights and advices.

Finally, I would like to thank my friends and family who provided me with tremendous encouragement. I will be forever grateful to my mother and my brother for their patience, understanding and continuous support.

## **ABSTRACT**

This thesis examines sovereign and corporate ratings to assess whether credit rating agencies consider sovereign ratings as important factors in evaluating the creditworthiness of private borrowers. The data sample comprises observations of non-financial companies from five countries known as the PIIGS - Portugal, Italy, Ireland and Spain, on the period of 2009-2016. The results of this thesis suggest that sovereign credit ratings are significant factors in assessing corporate credit ratings. More particularly, sovereign downgrades have a higher influence on corporate ratings than sovereign ratings upgrades. Finally, during the Eurozone debt crisis, sovereign ratings had a strong effect on corporate ratings.

## Table of content

INTRODUCTION .....	1
PART I: LITERATURE REVIEW .....	3
1. Background on credit ratings .....	3
1.1 Introduction.....	3
1.2 Credit rating agencies .....	3
1.3 Credit rating definitions .....	7
1.4 Rating assignment.....	8
1.5 Surveillance, Outlooks, Local currency and Foreign currency ratings.....	9
1.6 Criticisms of rating agencies.....	11
2. Sovereign and corporate ratings.....	12
2.1 Distinction between country risk and sovereign risk.....	13
2.2 Sovereign ratings determinants .....	13
2.3. Corporate ratings determinants.....	16
3. Links between sovereign ratings and corporations .....	20
3.1 Sovereign ratings and the financial market .....	20
3.2. Sovereign ratings and corporate ratings: The sovereign ceiling policy.....	22
3.3 Transfer risk.....	25
3.4 Transmission channels.....	27
3.5 Sovereign debt crisis.....	28
PART II: PRACTICAL PART .....	30
1. Problematic and research questions .....	30
2. Methodology .....	31
2.1. Empirical strategy.....	31
2.1.1. Review of the approaches used in the previous studies .....	31
2.1.2. Linear regression framework.....	32
2.1.3. Ordered probit framework.....	33
2.2. Data.....	35
2.3. Dependent and Independent Variables.....	37
2.3.1. Long-term foreign-currency corporate credit ratings.....	37
2.3.2. Long-term foreign-currency sovereign credit ratings .....	37
2.3.3. Other determinants of corporate rating .....	38
3. Analysis and results.....	42

3.1. Variables analysis .....	42
3.1.1. Descriptive statistics.....	42
3.1.2. Multicollinearity.....	43
3.2. Nonparametric analysis .....	45
3.3. Regressions.....	46
3.3.1. The influence of sovereign rating on corporate rating .....	46
3.3.2. Differences in the influence of sovereign ratings.....	49
3.3.3. Additional robustness checks .....	51
4. Discussion .....	53
4.1. Findings .....	53
4.2. Contributions .....	55
4.3. Limitations and further research.....	55
References.....	57
Appendix.....	66

## INTRODUCTION

Credit ratings have a key role in modern financial markets as they communicate crucial information on the creditworthiness of a debt issuer to investors and regulators. These credit ratings are mostly determined by three rating agencies, namely Standard & Poor's, Moody's and Fitch, even though, the credit rating industry counts a dozen of recognized rating agencies. Indeed, the three agencies have become the market leaders with a market share of 94.3% on the U.S market (Bloomberg, 2015) and 91,89% on the European credit market (ESME, 2015). Hence, these rating agencies have over time, gained attention and power fueled by the development of international financial markets. Every action taken by any of these three agencies creates a tremendous reaction at the global scale and draws an outstanding media coverage. Their influence on the world's economy has however generated various criticisms as the rating agencies were, in some cases, accused to not be accurate in their predictions and ratings.

Several studies have documented the critics on rating agencies and more particularly their involvement in the East-Asian crisis (Ferri et al., 1999; Claessens and Embrechts, 2002), the Subprime crisis (Langohr and Langohr, 2008; Ashcraft et al., 2011; Ryan, 2012) and Eurozone debt crisis (Bedendo and Colla, 2013; Augustin et al., 2016). With a growing amount of criticism came a growing number of questions and scrutiny of the reasons leading an agency to assign a certain rating, not to mention the increase of policies to regulate rating agencies' actions. Today, the rating agencies' methodologies are still not entirely transparent, however, some scholars have provided valuable insights on the rating assignment process (such as Gaillard, 2010). Among the literature that have explored the credit rating environment, this thesis joins those studying the determinants of corporate ratings and more precisely those examining sovereign rating as a determinant of corporate ratings (among them Borensztein et al., 2013, Almeida et al., 2014, Augustin et al., 2016).

The aim of this thesis is to determine whether sovereign ratings have a significant influence on corporate ratings and if this influence can be more important in a period of crisis. To this end, this thesis analyzes the relationship between sovereign and corporate ratings in five countries – Portugal, Italy, Ireland, Greece, and Spain (or the PIIGS) over the period of 2009 to 2015. Relying on Standard & Poor's ratings on this period, this thesis carries out a linear regression and an ordered probit analysis with industry, country and year fixed effects.

The results indicate that sovereign ratings had a significant influence on corporate ratings on the period of 2009-2016 and that this impact was greater during the years 2009-2012, corresponding to the Eurozone debt crisis.

The thesis is divided in two main parts, a literature review and a practical part. In the first part, section 1 gives a detailed background on the apparition of rating agencies, their role in the economy, as well as a thorough explanation of a credit rating and the important features around it. Section 2 explores the determinants of sovereign ratings and corporates ratings. This step is essential as it helps to get closer to the relationship between the two types of ratings. Section 3 presents the relation between sovereign ratings and corporate ratings through two main paths, the financial market and the sovereign ceiling policy. Additionally, this section summarizes the factors that explains this linkage through, the transfer risk, the transmission channels and the sovereign debt crisis.

The second part of this thesis concerns the empirical research, the results and the discussion. Section 1 presents the problematic of this thesis and the hypotheses to be tested. Section 2 displays the data and the appropriate methodology. Section 3 contains the different analyses and results. Section 4 is a discussion part on the findings, contribution, limits and propositions for further researches.

## **PART I: LITERATURE REVIEW**

### **1. Background on credit ratings**

#### **1.1 Introduction**

In the 19<sup>th</sup> century, three types of institutions were created to help investors make better investment decisions and to put pressure on issuers to meet their obligations - the specialized financial press (which described a business situation), the credit reporting agencies (which reported the ability of merchant to pay their debts), and the investment bankers (which analyzed securities) (Langohr and Langohr, 2008). The purposes of these activities were to analyze the quality of a company's operations, its ability to pay its debts and the efficiency of the management in the success of these.

In 1909, the first bond ratings were published in the Manual *Moody's Analyses of railroad Investments*, by John Moody and were exclusively tailored for railroad bonds. This bond rating agency was in a sense a fusion of the activities implemented by the three institutions (Sylla, 2002). According to Gaillard (2010), the birth of credit rating is the result of two factors. First, a booming U.S financial market, characterized by increasing borrowers and investors. Second, the several bankruptcies during the crisis of 1907 allowed to understand the importance of knowing the quality of investments. John Moody rapidly understood these factors, and created bond ratings. Over the years, he extended his business to industrial corporations then to service companies (public utilities).

In 1916, Poor's Publishing company was the second to enter the credit-rating market. Poor's was then followed in 1922 and 1924 by two firms, Standard Statistics and Fitch. By 1941, Poor's merged with Standard Statistics to form Standard & Poor's (S&P) and years later, several other mergers occurred. These mergers will result into the creation three main credit rating agencies: Moody's, Standards & Poor's, and Fitch.

#### **1.2 Credit rating agencies**

Moody's, Standards & Poor's, and Fitch are recognized as "*Nationally Recognized Statistical Ratings Organizations*" ("NRSRO") by the U.S Securities and Exchange Commission (SEC). NSRO is defined as a "*credit rating agency that issues credit ratings certified by qualified institutional buyers, [...] with respect to: (i) financial institutions, brokers, or dealers; (ii) insurance companies; (iii) corporate issuers; (iv) issuers of asset-backed securities [...]; (v) issuers of government securities, municipal securities, or securities*

issued by a foreign government; or (vi) a combination of one or more categories of obligors described in any of clauses [...]” (SEC, 2015).

In date of the 28th December 2015 seven other credit rating agencies were registered as NSROs in the U.S. Table 1 presents the ten agencies with their registration date and the location of their principal office. While the credit rating industry registers other rating agencies, the “Big Three” have been maintaining the grip of the credit rating business, turning the rating industry into an “oligopoly”.

**Table 1**

Rating agencies recognized as NSROs in 2015

<b>NRSRO / Categories of Credit Ratings</b>	<b>Registration Date</b>	<b>Principal Office</b>
A.M. Best Company, Inc. (“A.M. Best”) Categories (ii), (iii), and (iv)	September 24, 2007	U.S.
DBRS, Inc. (“DBRS”) Categories (i) through (v)	September 24, 2007	U.S.
Egan-Jones Ratings Company (“EJR”) <sup>5</sup> Categories (i) through (iii)	December 21, 2007	U.S.
Fitch Ratings, Inc. (“Fitch”) Categories (i) through (v)	September 24, 2007	U.S.
HR Ratings de México, S.A. de C.V. (“HR Ratings”) Category (v)	November 5, 2012	Mexico
Japan Credit Rating Agency, Ltd. (“JCR”) Categories (i), (ii), (iii), and (v)	September 24, 2007	Japan
Kroll Bond Rating Agency, Inc. (“KBRA”) Categories (i) through (v)	February 11, 2008	U.S.
Moody’s Investors Service, Inc. (“Moody’s”) Categories (i) through (v)	September 24, 2007	U.S.
Morningstar Credit Ratings, LLC (“Morningstar”) Category (iv)	June 23, 2008	U.S.
Standard & Poor’s Ratings Services (“S&P”) <sup>6</sup> Categories (i) through (v)	September 24, 2007	U.S.

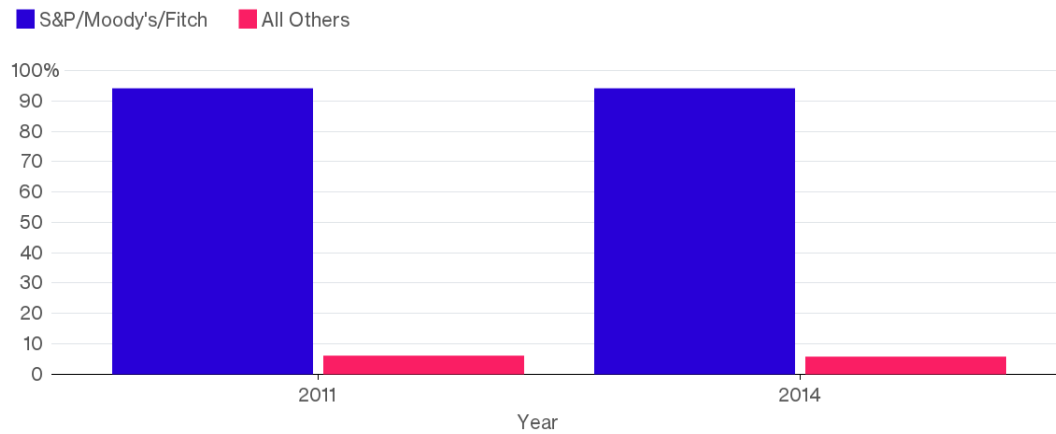
Note: This table contains the Nationally Recognized Statistical Ratings Organizations (“NRSRO”) and the date of their registration.

Source: U.S Securities and Exchange Commission(SEC), 2015).

Figure 1 shows the percentage of revenue generated by the ten rating agencies. In a total of \$5.9 billion of revenue, 94.3% is attributed to the “Big Three” (Bloomberg, 2015). As illustrated on Figure 1, the expansion in revenue of the trio has known only a small change in 2014.

**Figure 1**

Percentage of revenue generated by S&P, Moody's, Fitch compared to other small competitors on the U.S market



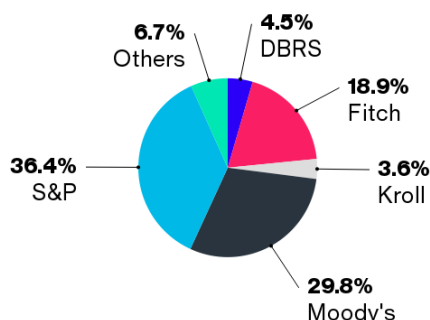
Source: U.S. Securities and Exchange Commission

Bloomberg

Note: On this figure, the competition within credit rating industry is reported for year 2011 and year 2014 measured by the percentage of revenue generated by the Big Three, compared to all the other rating agencies.

Figure 2 illustrates the repartition of market shares in the U.S credit ratings in 2014. Standard & Poor's, Moody's and Fitch had the largest market shares with respectively 36.4%, 29.8% and 18.9% of the market share excluding government securities (Bloomberg, 2015). In this line, a report from the European Securities and Markets Authority (ESMA) documented that in 2015, the market shares on the European market of Standard & Poor's, Moody's, and Fitch were respectively of 45%, 31.29% and 16.56 %, which in total accounted for 92,85% of the European credit industry (ESMA report, 2015). Hence, although being a very attractive industry given the power of Credit Rating Agencies (CRAs) (Nguyen and Zu Knyphausen-Aufseß, 2014), the credit rating market is highly concentrated. Indeed, the costs of collecting and analyzing data are still considerable which constitute a barrier to market competition (Host et al., 2012). Note that appendix 1 provides a calculation of the credit rating agencies' market share in the EU based on 2014 turnover from rating activities and ancillary services.

**Figure 2:**  
 Repartition of market shares in the U.S credit ratings in 2014 (excluding government securities)



Source: U.S. Securities and Exchange Commission  
 Others: Egan-Jones 3.5%, A.M. Best, 1.7%, , Morningstar 1%, Japan Credit Ratings, 0.5%

Bloomberg

Note: This figure displays the market shares of the main rating agencies.

As stated before, the role of credit rating agencies consists in reducing the asymmetry of information between investors and borrowers. These agencies provide an evaluation of the ability of an issuer to meet its financial obligations. Nguyen and Zu Knyphausen-Aufseß (2014) give three important features of what a credit rating is not: First, a rating is not an evaluation of an investment's performance. It is an assessment of the creditworthiness of an issuer. Second, a rating is not an absolute measure of intrinsic risk of a security. It is a relative measure, in the sense that it assesses the creditworthiness of an issuer compared to other issuers. Third, it is not a reflection of a default possibility for a certain short-term horizon, but is issued on a forward-looking perspective of the ability of the issuer to meet its obligation.

Investors, intermediaries, businesses and financial institutions or issuers are the four types of users given by S&P (2011a). They use ratings for their investment decisions as a mean to have information on an issuer and its credit quality. On the other side, professionals such as broker-dealers use ratings in their daily business transactions (Nguyen and Zu Knyphausen-Aufseß, 2014). Thus, a rating acts as a facilitator for debtors to raise money on the financial markets. However, in case of low ratings, issuers' ability to raise money may be constrained.

Nowadays, credit rating agencies have gained such importance that debtors pay rating agencies to be rated. In fact, at the origins of the credit rating industry, the business model adopted by rating agencies was such that investors paid for the ratings received ("investor-pays" model). However, since 1970s, rating agencies moved from the "investor-pays" model

to the “issuer pays” model. In other words, debt issuers pay a fee to the agency to grade their default risk. A rating mandate may cover several years, during which the credit rating agency provides monitoring services to the issuers (Ryan, 2012). This business model comes with potential conflict of interest related to the objectivity of rating agencies and has caused increasing interrogations and critics (Datz, 2004).

### 1.3 Credit rating definitions

*“A credit rating measures the relative risk that an entity or transaction will fail to meet its financial commitments, such as interest payments and repayment of principal, on a timely basis”* (IMF, 2010). In other words, a credit rating is an “opinion” of the creditworthiness of a debt issuer or financial instrument (Langohr and Langohr, 2008). Each rating agency has its narrowed definition of credit rating.

Standard and Poor’s defines credit rating as “an opinion of the general creditworthiness of an obligor, or the creditworthiness of an obligor with respect to a particular debt security or other financial obligation, based on relevant risk factors” (S&P, 2001). A Moody’s credit rating is *“an independent opinion about credit risk. It is an assessment of the ability and willingness of an issuer of fixed-income securities to make full and timely payment of amounts due on the security over its life”* (Moody’s, 2004). While Fitch seeks to provide *“an opinion on the relative ability of an entity to meet financial commitments [...]. Ratings are used by investors as indications of the likelihood of receiving their money back in accordance with the terms on which they invested [...]. Depending on their application, credit ratings address benchmark measures of probability of default as well as relative expectations of loss given default”* (Fitch Ratings, 2007).

A rating represents thus a relative measure of default risk, not an absolute one. It means that credit rating agencies do not guarantee an absolute prediction of the future. Ratings should be considered as judgments which are inherent with subjectivity, not as a certainty (ESME, 2008). In this line, a research led by the IMF shows that ratings are not the outcome of a specific model that determines quantitatively the likelihood of defaults. The subjective aspect in the assessment and the disposition to pay makes such models less effective (IMF, 1999).

## 1.4 Rating assignment

Ratings are assessed for corporations, financial institutions, municipalities and governments. As a reminder, the request for rating may come from a debt issuer or from the rating agency itself. Following the request, the agency starts gathering the required information to measure the credit risk of the entity. Agencies appoint an analytical team, that will meet issuers, make research and report a rating recommendation to a rating committee of rating officials. The committee discusses and takes the final decision in private (Sinclair, 2005). The final step of the rating process is the announcement of the rating in an official note via the press.

Issued ratings can be short term or long term. They are expressed on a rating scale and represented in alphanumeric identifiers. Each rating agency has its specific rating system, yet they contain similarities. The long-term ratings scale goes from A to C for Moody's, while it goes from A to D for Standard & Poor's and Fitch. The higher the rating attributed to a debt (the highest is AAA for S&P and Fitch, Aaa for Moody's), the lower is the likelihood of default of that issuer. On the other side, the lowest ranking (D for S&P and Fitch, C for Moody's) characterizes low credit quality or junk quality. Table 2 shows the rating categories of Standard & Poor's, Moody's and Fitch.

The long-term scale is divided in two categories, "investment grade" and "non-investment grade" (speculative grade or junk bonds). The investment grade constitutes the regulatory threshold. For example, pension funds have been constrained to only invest in securities rated at least in the category "investment grade" (Kruck, 2011). Short-term ratings are opinions on a debt issuer's ability to meet its financial obligations in the short run (Gaillard, 2010). These are generally assigned to issuers and obligations considered as short-term. An example of S&P's short term securities is the U.S obligations with an original maturity of no more than 365 days.

**Table 2**  
Credit rating scale of Standard & Poor's, Moody's and Fitch

S&P		Moody's		Fitch		Meaning
Long term grade	Short term	Long term grade	Short term	Long term grade	Short term	
Investment grade						
AAA	A1+	Aaa		AAA	F1+	Highest rating
AA+		Aa1		AA+		High rating
AA	A1	Aa2	P1	AA	F1	
AA-		Aa3		AA-		
A+		A1		A+		High capabilities of debt repayment
A	A2	A2	P2	A	F2	
A-		A3		A-		
BBB+		Baa1		BBB+		Sufficient capabilities of debt repayment
BBB	A3	Baa2	P3	BBB	F3	
BBB-		Baa3		BBB-		
Speculative grade						
BB+		Ba1		BB+		Speculative, credit risk rises
BB	B	Ba2		BB	B	
BB-		Ba3		BB-		
B+		B1		B+		Highly speculative, low possibilities of protection
B		B2	Second-class	B		
B-		B3		B-		
CCC+, CCC, CCC-, CC, C	C	Caa, Ca,		CCC, CC, C		High risk of default
D	D	C		RD/D	RD/D	Default

Source: Host et al., (2012).

## 1.5 Surveillance, Outlooks, Local currency and Foreign currency ratings

### Surveillance

Surveillance of issuer's financial position is central in credit rating agencies' work since creditworthiness can change over time. It concerns the potential evolution of a rating, whether it is short-term or long-term. The surveillance focuses on trends and events that could affect the assigned ratings. Thus, contrary to rating outlooks (explained below), surveillance is temporary and usually solved over a short period (Fitch Ratings, 2005).

Besides that, rating outlooks give investors the signal of a strong likelihood of a rating change. A surveillance, however, does not necessarily imply a rating change. Moreover, it does not have as intention to include all ratings. Rating changes may happen without the issuers having first being included in the surveillance process (S&P, 2016). The designation may be positive for probable upgrade, negative for a downgrade or evolving (Gaillard, 2010). Finally, surveillance takes a listing form, namely “Rating Watch” for Fitch, “Watchlist” for Moody’s and “CreditWatch” for Standard & Poor’s.

## **Outlooks**

Rating outlooks are assessed for long-term credit rating and provide an evolution of a rating over one to two periods (Six month to two years for Standard & Poor’s). Outlooks can be positive, stable or negative (Gaillard, 2010), and reflect financial or other economic developments that have not yet triggered a change in ratings, but which may lead to it, if they appear to become a reality. Positive or negative rating outlooks do not always lead to change. Likewise, stable rating outlooks can be raised or dropped without previous revision depending on the situation (Fitch Ratings, 2004). When an event includes stable, positive and negative components, an additional category is occasionally used, named “evolving” rating outlook.

## **Local currency and Foreign currency ratings**

There is a distinction between local currency ratings and foreign currency ratings. Rating agencies will issue two ratings when a borrower’s ability to meet its financial obligations, denominated in its local currency, differ from its ability to meet its foreign currency obligations. In this case, the entity’s local currency rating will differ from its foreign currency rating. For instance, *“in the case of foreign currency ratings, the risk of exchange controls being imposed by the government can obstruct the ability of an issuer to meet its debt in foreign currency”* (Almeida et al., 2014). In fact, foreign currency ratings consider the convertibility risk, which is the fact that a government could impose restrictions on the conversion of local currency into foreign currency (Capital Intelligence ratings, 2016).

The local currency rating, on the other side, *“measures the likelihood of repayment in the currency of the jurisdiction in which the issuer is domiciled and hence does not take account of the possibility that it will not be possible to convert local currency into foreign currency or make transfers between sovereign jurisdictions”* (Fitch, 2015).

## 1.6 Criticisms of rating agencies

The rating agencies, especially the Big Three, have been heavily criticized, since the eruption of the subprime crisis. In this section, the most debated subjects concerning the rating agencies are explained. The lack of competition in this market is one of the debates between scholars and regulators. In fact, the rating industry is highly concentrated due to the large barriers of entry and the need for economies of scale. The discussion is whether competition in this market must be increased or not. While regulators call for more competition to increase the veracity and consistency of credit ratings, scholars advocate that reducing competition should be fostered as it can help to ease the conflict of interest issue (Becker and Milbourn, 2011).

In fact, as mentioned before, the establishment of the “issuer-pays” model in 1909 arose potential conflicts of interest. This business model created strong incentives for “rating shopping”, meaning that if an issuer is not satisfied about its rating, the issuer can solicit and pay the agency to issue another one, shopping for good rating (Bolton et al., 2009). A rating agency may, on the other side, increase (inflate) the rating of an issuer to prevent the issuer from switching to another rating agency (White, 2010).

Prior studies affirm that rating agencies tend to issue more inflated ratings when they are confronted with competition pressure (Bolton et al., 2012; Deb and Liu, 2010). Thus, the lack of competition in the rating industry is considered as a good thing. Becker and Milbourn (2011), for instance, showed that increased competition from Fitch generated rating inflation in firms’ bond markets, because of conflicts of interest between credit rating agencies.

Besides that, the poor performance of rating agencies has brought discussions on the expertise of these agencies in assessing the creditworthiness of issuers. The East Asian crisis (1996-1998) triggered the debates on the rating agencies performance. Credit rating agencies were criticized for not being able to warn markets against the crisis (Ferri et al., 1999). Indeed, they were accused to fail in having the right reaction at the right time, by providing late downgrades. At the beginning of 1997, Indonesia, Korea, and Thailand were downgraded and assigned ratings under investment-grade (Claessens and Embrechts, 2002) (See Appendix 3). Hence, rating agencies gave excessive downgrades compared to what the economic situation of these countries would involve, which increased the cost of borrowing and triggered the departure of foreign capital. This, in turn, contributed in exacerbating the impact of the crisis (Ferri et al., 1999).

The subprime crisis of 2008 increased the critics on credit rating agencies. These agencies were accused of a lack of transparency in their rating process. There was, in fact, an opacity concerning the assumptions, the rating methodologies, the documents used, etc. to rate companies and sovereigns (Langohr and Langohr, 2008). Benmelech and Dlugosz (2009) argued that this lack of transparency suggests potential biases in ratings assignment. The rating agencies were judged to have failed to correctly rate financial products, contributing to the gravity of the collapse (Ryan, 2012). After the banking collapse in 2008, Ashcraft et al., (2011) stated that *“if subprime MBS [mortgage backed securities] had received lower credit ratings prior to the crisis, investors would have demanded a higher rate of return on these bonds, thereby reducing the supply of credit to borrowers, and muting the subprime boom and bust”*. Hence, according to the authors, those securities were subject to deterioration while being extremely rated by rating agencies. According to them, *“more than half of structured finance securities were rated AAA rating by Moody’s”*.

Recently, the charge against the credit rating agencies augmented with the Eurozone debt crisis. Rating agencies were accused for late and fast downgrades of Greece, Ireland, Italy and Portugal, which contributed to the precipitation and intensification of the Eurozone debt crisis. The criticisms increased even more after downgrades of France, Austria and other Eurozone countries by Standard & Poor’s. (Ryan, 2012). The author affirms that there is a need to reinforce the exactitude of ratings to reduce systemic risk (Ryan, 2012).

## **2. Sovereign and corporate ratings**

Credit rating agencies assess various factors affecting the ability and the willingness of an issuer to repay its debt. This section makes a distinction between the factors used to determine a sovereign’s rating and those used to assess a corporate’s rating. Understanding the features behind sovereign ratings is important as some may have a direct or indirect impact on private issuers and thus on their ratings. After that the literature on the determinants of corporate ratings is also reviewed to assess the other criteria that have been found significant and essential in rating firms. Some of these criteria will also be used in the empirical research of this thesis.

Before stepping into those factors, this section stresses on the distinction between a country credit risk and a sovereign credit risk as in this thesis, the focus is on the sovereign risk.

## 2.1 Distinction between country risk and sovereign risk

Although sovereign and country risk are closely connected, a distinction between these two concepts must be made. Country risk is a wider concept than sovereign risk. It is the risk of exposure to default in cross-border lending in a specific country, which is associated with factors that are, to some extent, controlled by the government but not by private corporates or individuals. This definition includes thus all forms of cross-border lending (government, banks, corporates or individuals). Sovereign risk on the other side is “*only restricted to the risk of lending to the government of a sovereign nation*” (Claessens and Embrechts, 2002).

Both risks are correlated, since default on the sovereign debt may have a negative effect on the capital flows for the country, as well as impact external debt (Canuto et al., 2012). However, evaluating a country’s risk does not only involve an evaluation of the ability of a state to meet its financial obligations but also an evaluation of other factors.

## 2.2 Sovereign ratings determinants

Sovereign rating assesses the risk that the government default on its financial obligations, thus the ability of the government to repay its debts. Cantor and Packer (1996) are the earliest in date to have studied the determinants and impact of sovereign ratings. This study was conducted on ratings assigned by Moody’s and Standard & Poor’s in September 1995 to 49 developed and developing countries using an ordinary least squares (OLS) analysis. Their results show that the following six factors are important determinants of sovereign ratings.

- *GDP growth*: A high rate of economic growth indicates that the government should have less difficulties to repay its debt.
- *Per capita income*: The higher the tax base of a country is, the higher should the capability of the government to repay its debt be.
- *Inflation*: A high inflation rate is an indicator of structural difficulties in the government’s finances and suggests a greater default risk.
- *External debt*: The more a government has debt, the riskier it is perceived.
- *Level of economic development*: When a government achieves a certain level of income or economic development, its default risk is considered as lower. The IMF gives a

classification of industrialized countries which specifies if a country has reached or not this minimal level of income of economic development.

- *Default history*: This factor captures the role of reputation in sovereign debt. A government will be considered as highly risky if it has defaulted in the recent past.

Table 3 contains a compilation of studies on the determinants of sovereign ratings. Besides Cantor and Packer (1996), other researchers such as Afonso (2003), Alexe et al. (2003), and Butler and Fauver (2006) have also used a linear regression to examine this subject. Afonso (2003) conducted a study on a cross section analysis on Standard & Poor's and Moody's ratings of 81 countries in June 2001 by using an OLS estimation. He found the same determinants of sovereign ratings as Cantor and Packer (1996), except for the per capita income. In addition, his study reports that GDP per capita is important for both developing and developed countries, while the external debt is mostly appropriate when assessing the rating of developing countries.

Alexe et al. (2003) analyzed Standard & Poor's ratings assigned to 69 countries in 1998. Their objective was to develop a transparent, consistent, self-contained and stable sovereign rating system. The method applied in this study is a non-recursive model in the sense that it does not rely on any information from lagged ratings. Their conclusion is that there is a high level of correlation between predicted and actual ratings. Using an OLS estimation, Butler and Fauver (2006) analyzed the determinants of sovereign ratings assigned by institutional investors to 86 countries in March 2004. The results of their study show that the quality of a country's legal and political institutions play a crucial role in determining its rating. These are measured by the country's rule of law, political stability, voice of the people, corruption control, government effectiveness, or regulatory quality.

Another strand of the literature has criticized the OLS estimation as being a biased model since it implies the assumption that the difference between two rating categories is equal for any two adjacent categories. Furthermore, even if this assumption was true, because of the presence of elements in the top and bottom categories, the estimates are biased, even in large samples (Afonso et al., 2011). As an alternative, other studies evaluate the determinants of sovereign ratings by using "ordered response models". These models determine the size of the differences between each category, as used by for instance Hu et al., (2002), Bissoondoyal-Bheenick (2005) and Bissoondoyal-Bheenick et al. (2006). Some differences can be noticed in the results from the two strands. As an example, in his study Bissoondoyal-Bheenick (2005) used ordered response of ratings assigned on 95 countries from December

1995 to December 1999. The countries were divided in three samples (all 95 countries, 25 low rated countries and 70 high rated countries). The results show that the economic variables have a low significance for the higher rated countries, while for the lower rated countries, in addition to GNP per capita and inflation, the current account balance and the level of foreign reserves have a critical role in determining sovereign ratings (Teker et al., 2013).

**Table 3**

Previous studies on the determinants of sovereign ratings

Author(s)	Data	significant variables	Methods
Cantor and Packer (1996)	1945, 49 countries	GDP growth, per capita income, Inflation, external debt, external debt, level of economic development, default history	OLS estimation
Haque et al. (1996)	1990-2006, 60 countries	CA Balance/GDP, International reserves/Imports, GDP growth & Inflation	Principal component analysis, Logit
Ferri et al. (1999)	1989-2006, 17 countries	GDP growth, budget deficit, external debt, current account balance, foreign exchange reserve, development level	-
Hu et al. (2002)	1981-1998, 71 countries	Previous year default dummy, Debt/Exports, Debt/GNP, Reserves/Imports, Inflation rate, Non- industrial countries dummy	Ordered probit on pooled data. Two scales: 1-8 and 1-14
Afonso (2003)	2001, 81 countries	GDP per capita, external debt to exports ratio, development indicators, Default indicators, GDP real growth rate & inflation rate	Linear, logistic and exponential transformation of the data. OLS estimation.
Alexe et al. (2003)	1998, 69 countries	Financial depth and efficiency, GDP per capita, Debt/GDP, Political stability & Government effectiveness	OLS estimation.
Borio and Packer (2004)	1996-2003, 66 countries	GDP per capita, GDP growth, inflation, Corruption perception index, political risk score, default history	OLS regression of average credit rating including year dummies as regressors.

Bissoondoyal-Bheenick (2005)	1995-1999, 95 countries	GNP per capita, Inflation, Government balance / GDP, debt / GDP, foreign reserve, net exports / GDP	Estimate an ordered probit with 9 categories
Bissoondoyal-Bheenick et al. (2006)	2001, 60 countries	GDP, Inflation, real interest rate, current account /GDP, technological development	Estimate an ordered probit using two scales 1-21 and 1-9 for each year individually.
Butler and Fauver (2006)	2004, 93 countries	GDP per capita, Inflation, Foreign debt / GDP, Legal environment, underdevelopment index, default history	OLS estimation.

Note: This table is a compilation of the findings of prior researches on sovereign ratings determinants. It displays the methodology and the main findings of these studies  
Source: own compilation of two studies –Afonso (2003) & Bernal et al. (2015).

### 2.3. Corporate ratings determinants

Several studies have analyzed the factors behind corporate ratings and have developed statistical models to explain and predict these ratings. The major studies are Horrigan (1966), West (1970, 1973), Pogue and Soldofsky (1969), Pinches and Mingo (1973 and 1975), and Altman and Katz (1976). More recent studies were conducted by Kamstra et al., (2001) and Hwang and Cheng (2008). Table 4 summarizes these studies' methodology and findings. The first study was conducted by Horrigan (1966), who studied 352 firms with stable ratings (201 firms rated by Moody's & 151 firms rated by Standard & Poor's) on the period of 1961 to 1964. He attempted to study the predictive power of accounting data and ratios regarding ratings of firms who received a new rating on the period 1961- 64, and firms whose previous rating had been modified during that period. He used a regression model with as dependent variable the bond rating categories. The independent variables were total assets, net worth to total debt, net operating profit to sales, working capital to sales, and sales to net worth. He also added the subordination status as an important variable determining bond ratings changeability. All together, these six independent variables were found to explain 65% of the variation of the bond rating.

This study was however criticized by West (1970) because of a focus on accounting variables as independent variables, a lack of theory supporting its assumptions, and a heavy reliance on one year's financial data in ratio form to predict bond ratings. West (1970) pursued

the methodology of Lawrence Fisher (1959) who had previously used accounting and non-accounting data to find risk premiums on corporate bonds. Out of the methodology of Fisher (1959), he extracted four independent variables – earnings variability (considering earnings from the nine previous years), reliability (number of years that the firm has been operating without forcing its creditors to have losses), capital structure (market value of a firm's stock to the par value of the firm's debt) and marketability (market value of publicly traded bonds). As dependent variable, West used bond rating categories similarly to Horrigan, but estimated them in a logarithmic form as Fisher did it with risk premiums. According to Fisher (1959), a logarithm relationship allows interaction effects between independent variable and the dependent variable. West claimed that the R squares found in his study were higher than those of Horrigan. However, since one study used a log form of the dependent variable and the other a linear form, Kaplan and Urwitz (1979) affirm that they are not comparable. Thus, both studies had the same predictive ability.

Pogue and Soldofsky (1969) studied how well can corporate bond ratings be explained by available financial and operating statistics using a regression-based approach. With a sample of bonds from 20 firms rated in the category Aaa, Aa, A and Baa, on the period 1961 to 1966, their study suggests that leverage, profitability (return on assets), size and earnings instability coefficients have an impact on corporate bond ratings. However, leverage and profitability have a more significant influence. The authors affirm that although intangible judgements are considered while assigning ratings, a significant degree of bond ratings is explained by financial and operating statistics.

Other researchers employed multiple discriminant analysis (MDA) such as Pinches and Mingo (1973) and Altman and Katz (1976). Pinches and Mingo (1973) analyzed 132 bonds and a control sample of 48 bonds in the five highest categories of Moody's bond ratings in 1967-68. They studied seven variables as potential determinants of bond rating: size, leverage, long-term and short-term capital intensity, return on investment, earnings stability and debt coverage. Their research excluded long and short-term capital as significant factors and added the subordination status (legal status of the bonds) as a dummy variable. Their results showed that the variables to consider when trying to replicate Moody's ratings are related to earnings stability (year of consecutive dividends), size (Issue size), debt and debt coverage stability (Net Income + Interest/Interest: Over 5 years), return on investment (Net income/Total Assets), along with subordination.

Altman and Katz (1976) also used MDA model to determine bond ratings of companies in the electric public utility industry. Their study showed that the significant

determinants of bond ratings are interest coverage ratio, earnings variability, interest coverage variability, return on investment, and maintenance and depreciation expense to operating revenues. Kaplan and Urwitz (1979) for their part studied the statistical techniques used to determine and predict bond ratings. They selected all Moody's rated industrial bonds with unchanged ratings in the 1971-72-time period. In addition to this sample, they used a second sample containing all new industrial issues rated by Moody's between 1970 and 1974, which led to a sample of 120 bonds (outstanding or seasoned) and 207 new issues. Their results showed that subordinate status, the size and the leverage (long-term debt/total assets) are important determinants of bond ratings for both samples, while the other leverage ratio (long-term debt/net worth) is not significant for new-issue sample. In addition, stability variables (coefficient of variation of total assets and coefficient of variation of net income) were found to be important factors. However, the profitability ratio (net income/total) was reported as insignificant in both samples, and similarly to Pinches and Mingo (1973), debt coverage variable was insignificant too.

Financial ratios were not the only determinants of corporate rating to be studied. Some researchers considered qualitative factors. Hawkins et al. (1983) reported that the bond rating process contains quantitative and qualitative data. The quantitative data relates to the financial position of the company which comprises its profitability, leverage, cash flow adequacy, liquidity and financial flexibility. The qualitative data incorporates the industry outlooks, the competitors, the economic environment, legal information, the type and quality of management, and the general business environment. Qualitative information include factors such as sovereign risk, industry-specific risk and entity-specific indicators as its positioning, type of management, strategy, risk management, etc. Industry specific factors involve growth forecast, volatility, technological evolution, and the degree and type of competition. In general, a lower industry risk may lead to a higher rating for an issuer in that industry. Ferri and Liu (2002) also reported that criteria used by Moody's and Standard & Poor's to assign ratings comprise both qualitative and quantitative indicators. They state that since qualitative determinants (such as the type of management, considered as very important) are difficult to quantify, hence, subjective judgments will play an essential role in this part of the rating process.

**Table 4**  
Previous studies on corporate ratings determinants

Author(s)	Data	Significant variables	Methods
Horrigan (1966)	From 1961 to 1964 352 firms	total assets, working capital to sales, net worth to total debt, sales to net worth, net operating profit to sales.	Linear Regression
Pogue and Soldofsky (1969)	From 1961 to 1966 113 firms	leverage, profitability, size and earnings instability coefficients have an impact on corporate bond ratings.	Linear regression  Ordered Logistic Regression  Ordered Logistic Regression
West (1970)	In 1927- 65 firms In 1932- 41 firms In 1937- 73 firms In 1949 - 77 firms	Earnings variability, period of solvency, equity/debt ratio, bonds outstanding	Linear regression
Pinches and Mingo (1973 and 1975)	1967 and 1968 180 firms	size, leverage, return on investment, earnings stability, debt coverage and subordination	Multiple discriminate analysis
Altman and Katz (1976)	-	Interest coverage ratio, earnings variability, interest coverage variability, return on investment, maintenance and depreciation expense to operating revenues.	Multiple discriminate analysis
Kaplan and Urwitz (1979)	1971 and 1972 1970 to 1974 327 firms	Subordination, size, leverage (long-term debt to total-assets), coefficient of variation of total assets and coefficient of variation of net income.	Ordered Probit Model  Model Linear Regression
Hawkins et al., (1983)	-	profitability, leverage, cash flow adequacy, liquidity and financial flexibility, industry outlooks, the competitors, the economic environment, legal information, the type and quality of management, and the general business environment.	-
Kamstra et al., (2001)	736 firms	Market driven variables, Long-term debt capital, cash flow, retained earnings on total assets.	Multiple discriminant analysis  Linear regression
Hwang and Cheng (2008)	In 2005 983 firms	Debt ratio, Return on assets, total assets, subordination status.	Ordered logistic regression

Note: This table is a compilation of the findings of prior researches on the determinants of corporate ratings. It displays the methodology and the main findings of these studies.

Source: Own compilation

### **3. Links between sovereign ratings and corporations**

The aim of this section is to understand how a company's credit risk is linked to its government's credit risk. In other words, how corporate ratings are related to the sovereign ratings. To this end, this section is divided in five parts. The first and second parts show how sovereign credit risk impact corporate credit risk and corporate ratings, through the financial market and the sovereign ceiling policy. The third part explains why, in general, sovereign default can lead to corporate default. The fourth part provides the transmission channels that favor the transfer of sovereign credit risk to corporates. Finally, the last part uses the Eurozone debt crisis as an illustration of how sovereign credit risk may expand to corporations.

#### **3.1 Sovereign ratings and the financial market**

Among the studies on the impact of sovereign default and ratings, some researchers have focused on their influence on the financial market. Ratha et al., (2007) studied sovereign ratings in developing countries and found that they are an important determinant of the volume and cost of capital flows. According to them, sovereign ratings influence the ability of private entities to have access to international markets. Indeed, as foreign investors use sovereign rating to have a thorough view of the risk of investing in a certain country, low sovereign ratings can discourage those investors. This was also confirmed by Bailey et al. (1999) who analyzed foreign investors demand for local stocks in 10 countries, considering sovereign ratings. According to them, foreign investments seem to be relying on foreign premiums (defined as the difference between unrestricted and restricted share prices, divided by the restricted share price). They affirm that good information such as a high sovereign rating are associated with higher foreign premiums. Thus, high ratings are drivers of foreign investment in local corporations' stocks.

This relation was confirmed by Kim and Wu (2008) who conducted a study on the impact of sovereign ratings on the financial sector development, using a sample of 51 emerging countries based on ratings of Standard & Poor's on the period 1995-2003. Their results provide a strong confirmation that sovereign ratings influence the financial sector and capital flows. They also noticed that long-term credit ratings (both local and foreign currency) stimulate financial development and capital flows in emerging economies, while short-term ratings delay these. Other researchers studied the relationship between sovereign risk and corporate creditworthiness on the bond or debt market. Durbin and Ng (1999) focused on this link using a cross-section analysis of 100 corporates bonds from several emerging countries

and by considering only foreign-currency denominated bonds. They reported that, in emerging countries, the price of corporate debt is tied to sovereign risk.

Similarly, Peter and Grandes (2006) conducted a study on the relationship between sovereign risk and corporate yield spreads, with a focus on domestic-currency denominated bonds. They analyzed only one emerging country, South Africa, compared to the previous study who analyzed several emerging countries. Their results show that in South Africa, sovereign risk is a significant driver of corporate bond spread, confirming the findings of Durbin and Ng (1999). Another study was carried out by Almeida et al. (2014) on the effect of credit risk on firms' investments and financial policy in both the developed markets and emerging markets. This study showed that in the month after a sovereign downgrade, yield spreads of firms increased and this deterioration of yield spreads amplified as days passed. This analysis provides evidence on the fact that sovereign rating downgrades increase the cost of debts for firms, which has as consequences a decrease in firms' investments, the use of long-term debts and the corporate liquidity.

Still on the financial market, another strand of literature examined the sovereign risk impact on equity market, Erb et al. (1996) are among the first scholars to have documented this relation. In their research, they reported that sovereign ratings are strong determinants of a country's stock market returns. According to Kaminsky and Schmukler (2002), a downgrade of sovereign bonds influence stock markets since governments may rise taxes to compensate the increase in interest rates on government bonds, which in turn impact companies' future profits. Martell (2005) assumed that the effects of sovereign downgrades should vary among firms. Larger firms involved in international lending should be more impacted by sovereign downgrades compared to other firms. After carrying out a study of returns of 1,281 firms following a change in sovereign ratings, he found strong evidence that larger firms, and firms involved in international trade experience greater stock price declines. In addition, his study showed that firms in developed countries experience minor stock price falls and thus are less impacted by sovereign downgrades.

Nguyen and Zu Knyphausen-Aufseß (2014) affirmed that although researchers have explained quite well the effect of sovereign ratings on the equity market, the literature would benefit from the expansion of two topics. The first topic relates to the reason behind stock prices changes. The classical approach namely the capital asset pricing model (CAPM) shows that stock prices are obtained by taking the outcome deducted by future cash flows. In such context, they stated that downgrades of a sovereign rating can trigger stock prices decrease since investors expect a decrease in future returns or use a higher discount rate. The second

topic is the supply and demand in equity market. In fact, the authors argued that most scholars believe sovereign ratings to be simply drivers of investors' inclination to buy companies' stocks in that country. They stated that this is principally pertinent in international situation, where foreigners refer to sovereign ratings as a quick and easy way to have information. Although Bailey et al. (1999) recognized that foreign premium can be both a supply and demand phenomenon, researchers should also analyze the impact of rating changes on firms' inclination to raise capital via equity issuances.

### **3.2. Sovereign ratings and corporate ratings: The sovereign ceiling policy**

The credit rating agencies have historically shown a disinclination to provide firms a higher credit rating than that of the sovereign in which they operate (Erb et al., 1996). This phenomenon has the name of "sovereign credit risk ceilings". The sovereign ceiling is a policy for which a corporate rating should not be above the sovereign rating of the country in which the company is domiciled (Almeida et al., 2014). According to Torres and Zelter (1998) "*The assumption is that a sovereign default will force all domestic issues to default*".

Until 1997, the sovereign ceiling policy was strictly applied by rating authorities. This implied that, following a sovereign downgrade, firms at the sovereign rating level were consequently downgraded, whereas, companies below the sovereign level were not always downgraded (Almeida et al. 2014). Standard & Poor's was the first to deviate from the sovereign ceiling policy in three countries: Argentina, Panama and Uruguay<sup>1</sup>. The reason behind that change was that governments would be less able to impose exchange restrictions in highly dollarized countries in case of default, therefore, the private sector would not be impacted by a sovereign default (Boreinsztein et al., 2007).

In a report conducted by Standard & Poor's in 2012, the agency affirms that sovereign ratings do not act as ceiling for corporate ratings but remain an important determinant of corporate ratings. Standard & Poor's argues that when an entity's rating is higher than the sovereign foreign currency rating, the agency considers that the entity's creditworthiness is satisfactory to resist a sovereign default. Put differently, a firm with a rating exceeding the sovereign rating should have a higher capacity to repay its debt than that of the sovereign. Williams et al. (2013) affirm however that, even if, this ceiling does not constitute a strict rule, corporate ratings above government's grade are still a rare situation.

---

<sup>1</sup> Fitch and Moody's followed suit in 1998 and 2001.

Various papers investigated on whether this ceiling was still noticeable even after being lifted. Ferri et al. (2001) conducted an analysis of the role of rating agency assessments in less developed countries. In this study, they argue that bank and corporate ratings in non-high income countries (NHI)<sup>2</sup> are strongly linked to sovereign ratings compared to high income countries. In another paper, Ferri and Liu (2002) worked on the contribution of sovereign risk to corporate ratings in emerging countries. Their study shows that sovereign risk has a particularly superior influence in developing countries compared to developed countries. Moreover, in emerging countries, private ratings are limited by sovereign ratings, and firms' information are mostly insignificant.

Grandes and Peter (2006) conducted a study on how the sovereign ceiling was reflected on the yields of South African local-currency-denominated corporate bonds, using a sample of 9 corporate bonds (4 industrial and 5 financial corporate). They reported that the sovereign ceiling (in local-currency terms) is noticeable in the spreads of most of the financial companies while it does not apply in the spreads of industrial multinational companies. Borensztein et al. (2013) examined the impact of sovereign ratings on corporate ratings by including developed and developing countries. Their results show that sovereign ratings have a significant and robust impact on private sector, even when controlling a country's individual macroeconomic factors and firm's performance parameters. Their central explanation was that, if the country faces a difficult financial situation or default, this could lead to potential defaults in private sector due to restraining measures.

Additionally, their results indicated that this influence is mainly important in countries with capital account restrictions and political risk. Compared to Ferri and Liu (2002), they stated that corporate-specific financial factors also have an impact on corporate ratings, besides sovereign ratings. Borensztein et al. (2013) continued by claiming that sovereign ceiling also has an influence on low-rated companies. They stated that "*the sovereign ceiling would tend to push down the whole scale of private ratings rather than affecting only those firms that are right against the constraint*" (p.16). Their findings suggested that sovereign ceiling is more noticeable in emerging countries compared to developed countries and for firms whose cash flows are denominated in domestic currency.

In contrast to these studies affirming that the ceiling rule is still in use, other papers have shown that in some situations that rule was violated. Durbin and Ng (2005) analyzed the sovereign ceiling through bonds spreads in emerging markets. Their results show that in some

---

<sup>2</sup> Non-high-income countries include high middle-income, middle-income, and low-income countries as categorized by the World Bank.

cases bonds spreads were lower than those of government bonds. However, this was only observed for companies who have considerable export earnings and/or entities who have a close relationship with a foreign firm or government. These results were also affirmed by Arteta and Hale (2008) who found that exporting firms are less affected by sovereign ratings compared to non-exporting firms. These findings suggest that multinational companies are less linked to sovereign ratings. This is also in line with the paper of Ferri and Liu (2002) who suggested that companies with a large part of their income coming from the local market are the most limited by a sovereign rating.

According to Standard & Poor's, for a corporate to be rated above the sovereign rating, it must pass a "hypothetical sovereign foreign currency default stress test". The test is applied to the foreign currency rating of the sovereign to which the corporate has the most material, single-country exposure. Indeed, if the firm succeed the stress test for countries in which it has the highest exposure, it will also pass it for countries where it is the least exposed (S&P, 2013). When the sovereign is unrated, Standard & Poor's applies the stress test on its view of the sovereign creditworthiness. The stress test can also be used for more than one country if the agency considers that the corporate is exposed to more than one country. If the entity fails at this stress test, it will be rated at the lowest rating of the country for which it failed the test. The Standard & Poor's material threshold of exposure is approximatively 25% of an entity's total exposure. If an entity passes the stress test, it is likely that it would not be in default.

In conclusion, even though sovereign ceiling policy has been lifted, some entities are still very sensitive to country risk and sovereign rating. As an example, Standard & Poor's still classify corporate regarding their sensitivity to country risk in two categories, "High" or "Moderate" sensitivity. This classification is made based on "*historical sensitivity of sectors and asset types to economic volatility, and to potential changes in the legal and regulatory environment*". Life insurers are classified as a high sensitivity sector, since their business is highly impacted by the pace of wealth accumulation in a certain country and by the fact that a considerable part of assets is invested in home government debt and banks (S&P, 2012).

Besides life insurers, other companies such as: financial institutions, real estate firms, non-exporting corporates, etc. are also classified as highly sensitive to sovereign risk. Exporting companies are characterized as having a moderate sensitivity. Exporters of products such as steel, chemicals, autos, cement and capital goods are still impacted by sovereign measures (e.g. export duties or quotas...) even though, the demand for their products is not directly linked to the home country situation (S&P, 2013). This report

classifies as sectors in the moderate sensitivity category, entities such as non-life insurers, infrastructure companies, telecommunication companies, food retailer, etc.

### **3.3 Transfer risk**

Durbin and Ng (2005) have provided two principal justifications of the logic behind the sovereign ceiling policy. Firstly, local firms operate in the same macro environment as their governments, therefore an economic decline will affect the creditworthiness of both private entities and governments. As an example, a currency devaluation will create difficulties in repaying foreign currency for the government as well as for domestic firms. Secondly, a government has the power to impose tax to firms, foreign exchange regulations, or confiscate the company's resources. Indeed, if the government fails in repaying its debt, it may use one of these means, which will impact and decrease the firm's ability to repay their debt. This is called the "transfer risk". Claessens and Embrechts (2002) define the transfer risk as the incapacity of private borrowers to meet their obligations due to government activities. For instance, private borrowers may have difficulties to make payments due to strict exchange restrictions set by the government. According to them, a transfer risk event involves a situation in which the government decides to restrict the transfer of resources from borrowers in a country to foreign creditors.

Borensztein et al. (2013) also gave three main reasons explaining the transfer of governments distress to domestic firms. First, there are country-specific macro-level factors that affect both. As an example of such factors, external shocks (through international trade for instance) may increase the variance of firms' profits and tax receipts for government, leading to a higher probability of default. Second, spillover effects from sovereign default to private entities explains the positive correlation between sovereign and corporate ratings. In fact, government in distress may decide to undertake inflationary financing or rise tax, representing both examples of spillovers. Hence, spillover effects imply that firms in countries with a risky government should be more exposed to default than those in less risky governments. The third reason for the positive correlation is that when a government default (or is near-default) it imposes capital or other administrative controls, restricting companies to service their debt obligations. In fact, Borensztein et al. (2013) affirm that if a government default, private entities may also default since they cannot have access to the money needed and/or get it out of the country.

Claessens and Embrechts (2002) affirm that in some cases, rating agencies may judge a firm to be less exposed to transfer risk, and thus grant a higher rating than its government.

They developed five factors witnessing this: “(i) the likelihood of a generalized suspension in the case of default by central governments; (ii) the total of the debt considering the guarantees given; (iii) the conditions involved to access to foreign currency; (iv) the integration with global production and supply arrangements and (v) the significance of the corporate or corporates involved, compared to the domestic economy and international markets”. The main direct and indirect links between sovereign and corporate credit risk developed in the literature are summarized in table 5.

**Table 5**

Main arguments on the link between Corporate and Sovereign credit risk

Argument for a direct link	Argument for an indirect link
<ul style="list-style-type: none"> <li>▪ Governments in financial distress may impose foreign currency payment restrictions on corporations (Borensztein et al., 2007; Durbin and Ng, 1999; Durbin &amp; Ng, 2005; Peter and Grandes, 2005).</li> </ul>	<ul style="list-style-type: none"> <li>▪ Financial distress of a government usually coincides with changes in macroeconomic conditions (e.g., currency depreciation, high inflation, high interest rates) that also affect corporations ‘creditworthiness (Arteta and Hale, 2008; Borensztein et al., 2007; Durbin and Ng, 1999; Durbin and Ng, 2005; Peter and Grandes, 2005).</li> </ul>
<ul style="list-style-type: none"> <li>▪ Governments may expropriate private assets or impose higher taxes on corporations to compensate for higher sovereign borrowing cost, thereby reducing corporations ‘ability to serve their debt (Borensztein et al., 2007; Durbin &amp; Ng, 1999; Durbin and Ng, 2005, Kaminsky and Schmukler, 2002)</li> </ul>	<ul style="list-style-type: none"> <li>▪ Downgrades in sovereign ratings generally increase the borrowing cost for domestic corporations (especially in cases when the sovereign ceiling holds), thereby decreasing their profits and diminishing their ability to undertake investments for the future, which can be expected to translate into lower stock prices (Li et al., 2007; Martell, 2005)</li> </ul>
<ul style="list-style-type: none"> <li>▪ Governments can implicitly or explicitly render financial support to private borrowers in distress, i.e., grant payment guarantees (Kim and Wu, 2008)</li> </ul>	<ul style="list-style-type: none"> <li>▪ Investors rely on sovereign ratings in their valuation of foreign investment opportunities (including stock) and management of international portfolios; this might hold especially considering high information asymmetry restricting the access to more specific risk measures, as in emerging markets (Brooks et al., 2004; Erb et al., 1995; Martell, 2005)</li> </ul>

Source: Nguyen and Zu Knyphausen-Aufseß (2014)

### 3.4 Transmission channels

Bedendo and Colla (2013) documented transmission channels of credit risk from sovereign to private corporations, through three channels: the government guarantees, the domestic demand, and the credit squeeze. First, they argued that governments tend to control strategically important firms such as public utilities. These companies generally benefit from debt guarantees from the government. However, when the risk of default of a government appears, government guarantees rapidly lose sense, thus taking away the creditworthiness of government-owned corporates. Consequently, these companies are more susceptible to be the target of restrictive actions if the government must find funds to fuel its budget.

Moreover, when a government's financial conditions deteriorate, firms for which sales are exclusively attributable to the domestic demand suffer more from reduced income, and are subject to an increase in default risk. This point joins the argument of Arteta and Hale (2008) who argue that non-exporting companies are more exposed to a drop in profits and net worth, when the sovereign risk increases. Borensztein et al. (2007) also demonstrated a higher impact of sovereign risk on firms in the non-tradable sector compared to firms in the tradable industry.

The third channel is related to a study by Borensztein and Panizza (2008), who documented that sovereign defaults often lead to disruption in the home market such as "domestic banking crises", that additionally weaken investments initiatives. In this line, Ejsing and Lemke (2011) found a significant augmentation of bank credit swap defaults after a rise in government credit default swap. Bedendo and Colla (2013) developed a twofold explanation of this effect. First, guarantees granted by the government to the financial system disappear when the government default risk increases. Second, since banks usually detain large quantity of government bond, when the sovereign risk becomes sizeable, their value falls and the banks' financing costs grow subsequently. This leads banks to make an important deleveraging of its bank sheets, which has a direct influence on non-financial corporations through a reduction of bank loan possibilities.

### 3.5 Sovereign debt crisis

In 2009, after the global financial crisis, the Eurozone area was plunged in a sovereign debt crisis. Starting in Greece, the crisis rapidly expanded to other Eurozone countries, principally to Ireland, Italy, Portugal, and Spain (namely the GIIPS countries). The Eurozone debt crisis has attracted the attention of scholars, with most of them, documenting linkage between sovereign default and the banking system. As an example, Archarya et al., (2014) found that, during the Eurozone debt crisis, the deterioration in sovereigns' credit quality expanded to the financial sector by reducing the value of the domestic sovereign bonds held by banks. Consequently, bank lending known a substantial drop, especially, in the PIIGS countries.

Moreover, the authors affirm that the deterioration of the banking sector, in turn, worsened the sovereign insolvency. Particularly, they show that the announcement of bailouts in the financial sector provoked an upward trend in sovereign credit default swap (CDS). These findings are confirmed by another study conducted by Arezki et al. (2011). The scholars documented the impact of sovereign rating downgrades on the European financial markets during the debt crisis. According to them, sovereign ratings impacted the financial market in various ways. As an example, they argue that sovereign ratings downgrades have impacted the holding of sovereign debt by domestic banks, thus reducing their profitability.

Contrary to the financial industry, there are less studies on the transmission of sovereign credit risk to firms, in the non-financial sector, during the Eurozone crisis. Among the few studies, is the research of Augustin et al. (2016). The scholars attest that while it may be assumed that the proofs of the relationship between sovereigns and financial companies extends to non-financial institutions, there are evidence that this linkage is not obvious. As a matter of fact, the authors argue that in a report carried out by Fitch Ratings in 2012, on the Eurozone crisis, the agency affirmed: “[...] *The market broadly agrees with a level of credit separation between Eurozone sovereigns and corporates.*”

To verify this statement, Augustin et al. (2016) studied the sovereign-to-corporate credit risk spillover during the Eurozone debt crisis. To analyze these spillover effects, they used the Greek government bailout which occurred on April 11, 2010. Indeed, on this date, Greek requested a financial support- bail out aid- from the European authorities, to be able to repay its debt. Their research reported that prior the Greeks bailout, a positive but insignificant relationship between non-financial companies and sovereign credit default swap

could be noticed. While after the bailout, the relationship observed was positive and significant. In fact, their study shows that a rise of one percent in the sovereign credit default swap was linked on average with a rise of 0.11 percent in the domestic non-financial companies' credit risk. Moreover, they report that firms headquartered in the financially distressed countries, the PIIGS countries, suffered more from the shift in sovereign risk than the firms outside the PIIGS.

## **PART II: PRACTICAL PART**

### **1. Problematic and research questions**

The aim of this thesis is to empirically document the influence of sovereign ratings on corporate ratings. As seen in the literature review, when a government default, it can easily transfer its financial distress on the domestic economic and particularly to domestic corporations, whether directly or indirectly (see table 5). Consequently, credit rating agencies consider the creditworthiness of a sovereign to assess the ability of domestic companies to repay their debts. Put differently, a corporation credit rating may depend on its sovereign credit rating. However, even though, a government default may impact corporates' financial situation, rating agencies tend to overestimate sovereign risk effects on firms (Ferri and Liu, 2002). As a matter of fact, the assumption behind the sovereign ceiling policy is that private borrowers cannot be better issuers than their sovereign. Even if, this policy was officially shifted in 1997, its effects are still noticeable and reported by some scholars (such as Borensztein et al., 2013; Almeida et al., 2014).

While the impact of sovereign ratings on corporate ratings was mostly reported in developing countries and confirmed to be strong, less studies have focused on developed markets. To reinforce the current literature on the influence of sovereign ratings on corporate ratings in developed countries, this thesis focuses on the Eurozone area, to answer the following questions: Are sovereign ratings important determinants of corporate ratings? Are corporate ratings in the Eurozone constrained by their sovereign ratings? In line with these questions, the main hypothesis is that the sovereign credit ratings are significant factors in explaining corporate credit ratings. The assumption is that if sovereign ratings are modified, the corporate ratings are likely to be modified as well.

Moreover, this thesis focuses on the Eurozone debt crisis period to understand the influence that sovereign ratings could have played in the situation of non-financial companies within this area. While scholars highly documented the sovereign credit risks tremendous spillover effects across financial markets (Arezki et al., 2011), less studies have focused on non-financial corporations. This study is interested about knowing if sovereign credit ratings also had a strong impact on non-financial corporate ratings during the Eurozone crisis. Based on the literature, the second hypothesis of this thesis, is that the sovereign credit ratings have greater effects on non-financial corporate ratings during the years of crisis. The assumption is

that in periods of government insolvency, sovereigns are likely to impose more strict restrictions to companies, that could hinder their credit quality, compared to a non-crisis period.

## **2. Methodology**

This section discusses the data and empirical strategy used in analyzing the impact of sovereign credit ratings on corporate credit ratings. Section 1 relates to the appropriate modelling approach for analyzing credit ratings. This section begins with a discussion of the most used methodologies in the literature. Then, based on the literature, the following subsection presents the types of frameworks chosen for this thesis. Section 2 contains the data, an explanation of their particularity and the sources used to collect them. Section 3 presents in a more detailed way the dependent variable and independent variables.

### **2.1. Empirical strategy**

#### **2.1.1. Review of the approaches used in the previous studies**

While the approaches of modelling credit ratings differ among scholars, two approaches are found to be the most used: the ordinary least squares (OLS) regression models (Cantor and Packer, 1996; Afonso, 2003; Butler and Fauver, 2006; Borensztein et al., 2013) and the ordered regression models (Kaplan and Urwitz, 1979; Hu et al., 2002; Bissoondoyal-Bheenick et al., 2006). The distinctive aspect of credit ratings is, according to Langhor and Langhor (2008), the inherent order in the different categories. In fact, a credit rating is a qualitative and discrete measure with ordering specifications assessing the creditworthiness level of the issuer (ex: AAA is the highest, AA+ is the second highest, etc.). Thus, when choosing of the appropriate modelling method, the nature of credit ratings should be considered.

The ordinary least squares regression is quite straightforward and allows the estimation to have a suitable predictive power (Afonso et al., 2007). However, it has been criticized by some researchers. Indeed, Kaplan and Urwitz (1979) qualified the ordinary least squares as non-adequate in modelling credit ratings in a study where the authors examine bond ratings. Using ordinary least regression implicitly assumes a key hypothesis on the distance between two ratings (rating notches), which is that the interval between ratings is equivalent. The interval scale assumption does not consider the ordinal aspect of ratings. In

fact, as stated by Cheung (1996), an ordinary least squares regression would treat a change in ratings from AAA to AA+ as the same as from AA+ to AA in OLS, which is according to the author, inadequate.

Nevertheless, some scholars advance that OLS is a suitable model. As Eliasson (2002) states, since there are many categories of ratings, one can consider the credit rating as a continuous variable and apply different quantitative transformations to tackle the critiques of the ordinal nature of ratings. Indeed, logistic (as used by Reisen and Maltzan, 1999), exponential or both transformations can be applied on ratings (Afonso, 2003). Mora (2006); Monfort and Mulder (2000) also argue that adopting an OLS with numerical disposition of ratings is quite easy and permits a direct generalization to panel data by including fixed or random effects models.

The other type of estimation is the ordered probit estimation, used to tackle the issues of the OLS regression. Cheung (1996) argues that the appropriate way of modelling credit ratings is to use an ordered probit model estimation, as this model considers the existence of an order. Moreover, the ordered probit considers the size of the difference among two contiguous ratings as known but unimportant in the analysis, on the contrary of usual linear regression models. The ordered probit regression is, however, also considered as not being entirely adequate. Indeed, as argued by Afonso et al. (2007), its asymptotic properties are not suitable for a small sample and, on the other side, using too many observations also creates some difficulties. These scholars affirm that if the sample used when estimating the determinants of credit ratings in a cross-section of countries is small, there will be too few observations. The solution of increasing the number of observations will, conversely, make it more complicated to perform robustness analysis. According to them, the use of ordered probit model on panel data is not always straightforward, due to country-level specific effects.

### 2.1.2. Linear regression framework

Based on the previous studies, a possible path in estimating the impact of sovereign credit ratings on corporate credit ratings would be to use an OLS. Consider a linear regression model for firm  $i = 1, \dots, N$  observed at different time periods  $t = 1, \dots, T$

$$R_{it} = \gamma + \beta X_{it} + \alpha_i + \varepsilon_{it} \quad (1)$$

Where  $R_{it}$  is the credit rating of the firm  $i$  in year  $t$ , achieved by a linear transformation,  $X_{it}$  is a vector of time variant independent variables,  $\beta$  is a vector of the coefficient of the independent variables,  $\gamma$  is the intercept,  $\varepsilon_{it}$  accounts for the unobserved effects, independent across firms and across time while  $\alpha_i$  denotes country specific effects.

The equation (1) can be estimated in three different ways: random effects, fixed effects and pooled OLS. The ranking of those three methods is that random effects are preferred to fixed effects, which are preferred to pooled OLS. This ranking is based on the “normal condition” and under these conditions, all the parameters estimated are consistent. The normal condition relates to the correlation between the unobserved firm specific factors and the independent variable or not. The normal condition is met and the estimators are consistent when the unobserved country specific effects are uncorrelated with the independent variables  $E(\alpha_i|X_{it}) = 0$ . If this is true, the random effects are preferred to fixed effects and pooled OLS. If this condition is violated, fixed effects estimations should be chosen as pooled OLS and random effects provide inconsistent estimators (Alfonso *et al.*, 2007).

In this study, it is more apparent that the country specific effects and the regressors are correlated. Nevertheless, to be sure of this statement, Alfonso *et al.* (2007) suggest performing the Hausman (1978) test to assess whether a fixed or a random effects estimation should be used. The authors affirm, however, that even if there is a correlation between the country specific factors and the regressors, random effects can be used. For example, using an instrumental variable (IV). An instrumental variable is a variable that satisfies two conditions: (i) a relevance condition – the variable must be highly correlated with the instrumented variable (here sovereign ratings) and (ii) an exclusion restriction – the variable must be uncorrelated with the error term (Bernal *et al.*, 2015). Determining the right instrument is an arduous task and is never free of criticisms, which requires to be very careful.

### 2.1.3. Ordered probit framework

The alternative framework of modelling the impact of sovereign credit ratings on corporate credit ratings consists in using an ordered response framework. As we have seen before, the ordered probit model considers the discrete and ordinal aspects of credit ratings. Consider  $R_{it}$  as the credit rating of a firm  $i$ , during the period  $t$ . The ordered probit model consists in two steps. The first step is to map the observed credit rating  $R_{it}$  into a scale of unobserved latent variable  $R_{it}^*$ :

$$R_{it} = \begin{cases} 1 & \text{if } R_i^* \leq \mu_1 \\ 2 & \text{if } \mu_1 < R_{it}^* \leq \mu_2 \\ 3 & \text{if } \mu_2 < R_{it}^* \leq \mu_3 \\ 4 & \text{if } \mu_3 < R_{it}^* \leq \mu_4 \\ 5 & \text{if } \mu_4 < R_{it}^* \leq \mu_5 \\ 6 & \text{if } \mu_5 < R_{it}^* \leq \mu_6 \\ 7 & \text{if } R_i^* > \mu_6 \end{cases} \quad (2)$$

Where  $\mu_r; r=1,2,3\dots,7$  are the thresholds (or cut points) to be estimated, representing the credit rating level. For instance, a company  $i$  with S&P rating of AAA( $R_{it}$ ) will be assigned a score of 7, etc.

The second step concerns  $R_{it}^*$ , the unobserved variables and the explanatory variables that may impact the credit rating of a firm  $i$ , at period  $t$ .

$$R_{it}^* = \gamma + \beta X_{it} + \alpha_i + \varepsilon_{it} \quad (3)$$

Where  $X_{it}$  is a vector of independent variables at  $t$  year,  $\beta$  is a vector of the coefficient of the independent variables,  $\gamma$  is the intercept,  $\alpha_i$  is the country-specific effects and  $\varepsilon_{it}$  is the independent unobserved effects, independent. In the ordered probit model,  $\varepsilon$  is normally distributed with the mean equal to 0 and the variance equal to 1. With the vector of coefficient and the threshold, the probability of a firm rating to be equal to  $r$  can be estimated as follows:

$$P(R_i=1) = \Phi(\mu_1 - \beta X_i)$$

$$P(R_i=2) = \Phi(\mu_2 - \beta X_i) - \Phi(\mu_1 - \beta X_i)$$

...

$$P(R_i=6) = \Phi(\mu_6 - \beta X_i) - \Phi(\mu_5 - \beta X_i)$$

$$P(R_i=7) = 1 - \Phi(\mu_6 - \beta X_i)$$

Where  $\beta X_i$  is a vector of specific values of  $X$  for the parameters  $\beta$  and the cut points values  $\mu$ 's.

Generalizing the ordered probit model to panel data, as it has been mentioned, is not an easy task. Indeed, using panel data poses the challenge of controlling the influence of unobserved factors, to obtain valid estimators. Consequently, several scholars have worked on finding ways to tackle this challenge. Wooldridge (2002) advocates two methods to estimate an ordered probit. One way is to assume that there is only one error term that is consecutively

correlated within countries. Under this hypothesis, a normal ordered probit regression can be estimated with the consecutive correlation accounted in robust variance-covariance matrix. Another way is to use an ordered probit with random effects, with both errors  $\alpha_i$  and  $\varepsilon_{it}$  normally distributed. This last approach is reported by Afonso *et al.* (2007) as being the most adequate.

Hsiao (2007) affirms that the heterogeneity can either be treated as random variables, fixed variables or as a mix of these two models. As in the OLS estimation, random effects imply an orthogonality assumption, meaning that the unobserved individual effects are uncorrelated with the explanatory variables included in the model. The fixed effects specification, on the other side, relaxes this condition. As stated before, for this study, it seems more obvious that the fixed effects approach is more appropriate. Nevertheless, one of the issues of computing ordered probit models with fixed effects is that there is no sufficient statistic available to condition the fixed effects out this model (Greene and Hensher, 2009). Indeed, fixed effects in ordered probit are achieved by making some changes in the equation (3). These changes will be discussed in section 3.

## 2.2. Data

The period selected to study the relationship between sovereign credit ratings and corporate credit ratings are collected on the period of 2009 to 2016. The data contains listed non-financial corporations across five Eurozone countries. The choice of selecting this time-period is threefold:

1. The data period of seven years, from 2009 to 2016, covers the sovereign debt crisis. This represents an interesting period as during these years significant variations have been noticed in the sovereign and corporate ratings.
2. The period 2009-2016 enables to have more recent observations. By having recent data, this thesis offers an update of earlier studies on the determinants of corporate ratings, especially in period of crisis.
3. This period also allows to have more data available. Since we are only covering Standard & Poor's rated companies and only non-financial companies in five countries, the sample can quickly be reduced. Hence, by increasing the number of years, more ratings can be included.

This thesis investigates the effects of sovereign ratings on corporate ratings in Portugal, Italy, Ireland, Greece and Spain, namely the PIIGS countries. The PIIGS are

referred to as the countries that were the most impacted by the Eurozone debt crisis. In these countries, only non-financial firms are selected. Indeed, the financial companies are excluded as the factors used to assess their creditworthiness are specific to their industry. Thus, using only non-financial companies allows to compare companies based on the same factors.

The non-financial companies selected were mostly from five main industries- utilities, telecommunication, transportation, oil & gas and consumer goods. They were, consequently, regrouped by industry to account for industry fixed effects. Thus, allowing industry-level characteristics to be controlled, in addition, to country-level characteristics.

In terms of the credit ratings, as mentioned above, this study focuses on Standard and Poor's credit ratings. This agency is known as the market leader for sovereign credit ratings (Bernal *et al.*, 2015). Being the market leader suggests that this entity rates more issuers and have more data available. Thus, choosing Standard and Poor's enabled to gather more information and ratings.

In gathering the data on the non-financial companies located in the PIIGS countries, some firms were found to have missing financial data. This issue was tackled by using the methodology of interpolation to impute missing values. Moreover, companies with more than 15% of financial missing data were removed from the analysis. Indeed, the threshold of 15% of missing data was chosen.

Besides the financial data, some companies were found to not have been rated by Standard & Poor's on the period considered. Here, the ratings of Moody's and Fitch were used, after being converted in the Standard & Poor's rating scale, as it can be assumed that these agencies have approximately the same scale. After computing these changes, the sample of data accounts 69 non-financial firms and 552 observations in total. Note that the companies who were not rated by Standard & Poor's were tracked. After the elimination of companies with too many missing data, only two of the non-S&P rated companies were still in the sample.

To gather all the different data, three main sources were used:

1. Companies financial information for the period 2009-2016 were extracted from BLOOMBERG. This data base was also used to collect the firms and countries credit rating over the period of 2009-2013.
2. Countries macro-economic indicators were found on the IMF online data base.
3. The companies rated by Standard and Poor's were collected using the agency's online website.

Finally, the quantitative analyses were carried out using STATA econometric software. STATA has the benefits of being flexible to use, while providing robust estimations.

## **2.3. Dependent and Independent Variables**

### **2.3.1. Long-term foreign-currency corporate credit ratings**

The central dependent variable of this thesis is the corporate long-term foreign currency issued by Standard & Poor's. S&P (2001) describes a foreign-currency credit rating as "an opinion of a borrower's ability to repay its foreign-currency-denominated financial obligations. Alike the local currency credit ratings, a Standard & Poor's foreign-currency rating considers firms' individual credit risk, country and economic risk factors. But, contrary to the local currency ratings, it measures the risks associated to sovereign actions that could directly have an impact on the foreign exchange necessary for the borrower to timely meet its financial obligations. The risks behind such ratings include the possibility that the government impose foreign exchange controls or other constraints on the repayment of foreign debt (Borensztein et al., 2013).

Following the method used in the previous literature (such as Bernal et al., 2015), the Standard & Poor's rating scale is transformed in numerical values, by assigning to each rating a score. The score goes from with 7 (AAA) the highest rating of S&P rating scale to 1 (CCC and lower) the lowest category. This facilitates to integrate credit ratings in an econometric model. Table 6 provides a description of the ratings and the corresponding numerical values.

### **2.3.2. Long-term foreign-currency sovereign credit ratings**

The principal independent variable in this study is the long-term foreign currency sovereign credit rating, as measuring the likelihood that a government default on its financial obligations. Standard and Poor's (2014) explains a default as (i) a missed payment (delay of payment for more than 30 days) or (ii) a distressed debt exchange. As seen in the literature, Cantor and Packer (1996) reported that the most important variables explaining a sovereign's rating are GDP growth, per capita income, inflation, external debt, level of economic development and default history.

**Table 6**  
Scale of Standard and Poor's long-term foreign currency credit rating

Interpretation	Rating	Assigned value
<i>Investment-grade ratings</i>		
Highest quality	AAA	7
High quality	AA+	6
	AA	
	AA -	
Strong payment capacity	A+	5
	A	
	A-	
Adequate payment capacity	BBB+	5
	BBB	
	BBB-	
<i>Noninvestment-grade ratings</i>		
Likely to fulfill obligations, ongoing uncertainty	BB+	3
	BB	
	BB-	
High-risk obligation	B+	2
	B	
	B-	
Currently vulnerable nonpayment obligation	CCC+	1
	CCC	
	CCC-	
Highly vulnerable to nonpayment	CC/C	
Default	SD/D	

Note: This table contains the credit ratings scale and the corresponding numerical value. The scale is mapped into 7 numerical values.

### 2.3.3. Other determinants of corporate rating

Other variables are also added in the model, and serve as control variables. These variables are related to the firm and the macroeconomic factors. As seen in the theoretical part, ratings contain qualitative and quantitative data, however, because of the difficulty of quantifying qualitative data, this study only focuses on quantitative factors affecting firms' financial risk. More precisely five variables were chosen to analyze the firm's default probability based on the findings of Altman, 2000; Ferri and Liu, 2002; Borensztein et al., 2013: "EBIT/ Total Asset", "Retained earnings/ Total Assets", "Total equity/ Total capital",

“Working capital/ Total Assets”, “EBIT/ Interest rate” and Size. These variables were selected in accordance to the previous literature on the determinants of corporate ratings. They are described below and reported in table 7:

1. EBIT/ Total asset: measures the productivity of a firm’s assets, free from any leverage or tax factors (Altman, 2000). This ratio is one of the measures of the profitability of a company and is expected to have a positive impact on corporate credit ratings.
2. Retained earnings/ Total assets: This ratio measures the cumulative profitability of a firm over time. Companies with a high ratio of retained earnings to assets are considered to have financed their assets by using more their retained profits and contracting less debts. The impact of this ratio on corporate ratings is thus expected to be positive.
3. Total equity/ Total capital: represents the leverage of a company. In the previous studies, it has been found as having a positive impact on corporate ratings.
4. Working capital/ Total assets: this ratio denotes the liquidity of a firm, i.e its ability to meet its short-term obligations. An increase of the working capital to assets is expected to have a positive impact on corporate ratings.
5. EBIT/ Interest rate: This ratio measures the ability of a firm to pay the interests associated to its debts. It is thus understandable that, as a corporate credit rating assesses the ability of an issuer to repay its debts, this ratio should have a positive correlation with the rating of a company.
6. Size: is measured by the total assets of a company and is expected to be positively correlated with corporate credit ratings. In fact, it can be assumed that a firm with more resources available will have less difficulties to meet its financial obligation compared to a smaller firm.

This thesis recognizes that financial factors alone may not fully represent the credit risk of a corporation at a point in time. As presented in the literature, various studies have shown that credit rating comprises more information than that contained in the firms’ financial ratios. Borensztein et al., (2013) state that corporate and sovereign ratings are correlated when the risk of private and public debt is intensified by macroeconomic factors. Hence, in addition to the financial ratios, the following country’s macroeconomic variables are included, to control bias arising from potential omissions:

7. GDP growth: is expected to have a positive impact on corporate ratings, as a higher growth in the GDP reduces the probability of default of a government, thus, the probability that the government will impose restrictions to domestic companies.
8. GDP per capita: A growth in the GDP per capita is a positive sign for the economic situation of a country and thus for the domestic corporations.
9. Inflation: the impact of the inflation is uncertain. It can be positive, as it lowers the real stock of remaining government debt in domestic currency. Thus, leaving more resources for the government to pay foreign debt. This reduces the probability of a government to default, which is positive for domestic corporations. It can also be negative, as it reveals structural problems within the country (Afonso et al., 2007).
10. Current account balance: represents a government's current account deficit, and it is expected to be negatively correlated with companies' credit ratings (Borensztein et al., 2013).

**Table 7**  
Description of the variables

Variable	What it measures	Unit	Source	Expected sign
Corporate rating	The creditworthiness of a firm	Long-term foreign currency	Bloomberg	/
Sovereign rating	The creditworthiness of a sovereign	Long-term foreign currency	Bloomberg, S&P ratings	+
EBIT/ Total assets	Profitability	Percent	Bloomberg	+
Retained earnings/Total Assets	Profitability	Percent	Bloomberg	+
Equity/Capital	Leverage	Percent	Bloomberg	-
Working Capital/Total assets	Liquidity	Percent	Bloomberg	+
EBIT/Interest Coverage	Debt coverage	Percent	Bloomberg	+
Size	Total assets	USD	Bloomberg	+
GDP growth	Annual GDP growth of a county	Percent	IMF	+
GDP per capita	GDP per capita, current price, dollars	Percent	IMF	+
Inflation	Annual consumer price inflation rate in a country	Percent	IMF	+/-
Current account	Current account relative to a country's GDP	Percent	IMF	-

Note: This table gives an overview of all the important information on the variables used in this thesis: How they are measured, the unit of measurement, the source and the expect signs.

### 3. Analysis and results

#### 3.1. Variables analysis

##### 3.1.1. Descriptive statistics

Table 8 reports a summary of the main statistics for the empirical model of this thesis. It can be noticed that, on the period of 2006-2009 in the PIIGS countries, sovereigns had on average a higher credit rating than corporates. In fact, on the period analyzed, the highest rating granted by S&P to a sovereign was 7, while for firms, the maximum granted to a firm was 6. On average sovereign ratings were granted higher ratings than corporations. The average sovereign rating is one point higher than the average corporate rating.

**Table 8**  
Descriptive statistics

Summary statistics	Mean	Std. Dev.	Min	Max
Corporate rating	3.594643	1.106966	1	6
Sovereign rating	4.808929	1.167965	1	7
EBIT / Assets	0.0504177	0.0850375	-1.557024	0.2382354
Retained earnings/ Assets	0.0245533	0.6591343	-8.030118	0.9237994
Equity /Capital	0.2583576	0.4032372	-4.26275	0.9682635
Working capital/ Assets	0.0123445	0.2138617	-2.1209	0.5420363
EBIT/Interest Coverage	13.27363	89.57582	-254.4078	1092.854
Size	23725.17	42632.97	212.6105	232766.4
GDP per Capita	29760.47	4567.641	18007.79	38334.68
GDP growth	0.4350379	5.253379	-9.132494	26.27606
Inflation	0.7483791	1.873273	-5.256131	4.879074
Current account	-0.1883387	3.039264	-10.88277	10.20984

Note: This table reports the summary statistics of the variables used in the analysis. The mean, standard deviation, minimum and maximum values are displayed.

### 3.1.2. Multicollinearity

Multicollinearity happens when two or more independent variables are highly correlated. In case of perfect multicollinearity, meaning that one variable is perfectly correlated with the others, a problem will arise as it will not be possible to estimate all the coefficients of the model (Brooks, 2009). The use of various financial ratios and macroeconomic variables present the probability of having highly correlated variables. Thus, before stepping into the main regressions, this thesis assesses the presence of multicollinearity by analyzing the correlation between each variable. This step is important as in the presence of perfect multicollinearity, STATA will eliminate the variable perfectly correlated with others. This thesis analysis the multicollinearity in two ways. First by using the correlation matrix and second by the computation of the VIF.

Table 9 reports the results of the correlation matrix estimated in STATA and the coefficient of correlation among the independent variables can help as a first step to detect the presence of multicollinearity. The multicollinearity becomes problematic when the simple correlation coefficient is higher than the general rule thumb of 0.8 or 0.9 (Midi et al.,2013). The highest correlation coefficient observed is between the retained earnings to assets ratio and the equity to assets ratio at 0.75. This correlation is close to the threshold but it does not reach the threshold, the variables are maintained in the model. While the correlation matrix can help in examining the correlation among variables, it can be considered as limited. Indeed, the pairwise correlations can be minor, and yet several variables together can be linearly dependent.

The Variance inflation factor (VIF) allows in this case to have better diagnostics. Craney and Surles (2002) affirm that the VIF considered in most studies must be less or equal to 10 to be at acceptable level. This thesis follows this benchmark in assessing the multicollinearity among independent variables. The results of the VIF are reported in Table 10. The levels of VIF observed suggest that there is no severe collinearity problem in our variables, as the results are all below the threshold of 10.

**Table 9**  
Correlation matrix

	Corporate rating	Sovereign rating	EBIT/ Assets	Retained earnings/ Assets	Equity/ Assets	Working capital/ Assets	EBIT /Interest coverage	Size	GDP per capita	GDP growth	Inflation	Current account
Corporate rating	1											
Sovereign rating	0.322	1										
EBIT/Assets	0.252	0.066	1									
Retained earnings/ Assets	0.331	0.071	0.304	1								
Equity/Assets	0.34	0.129	0.238	0.749	1							
Working capital/ Assets	0.226	0.130	0.183	0.572	0.711	1						
EBIT/Interest coverage	0.063	-0.042	0.110	0.084	0.039	0.072	1					
Size	0.281	0.034	0.050	0.106	0.067	0.014	0.030	1				
GDP per capita	0.265	0.455	0.073	0.191	0.219	0.158	0.043	0.188	1			
GDP growth	0.124	0.189	0.053	0.002	0.065	0.104	-0.041	0.019	0.215	1		
Inflation	-0.027	0.061	-0.046	0.011	-0.034	-0.037	0.029	0.063	0.108	0.194	1	
Current account	0.131	0.108	-0.027	0.035	0.090	0.077	0.018	-0.006	0.004	0.460	0.112	1

Note: This table reports the correlation level between each variable used in the regressions.

**Table 10**  
Variance inflation factors

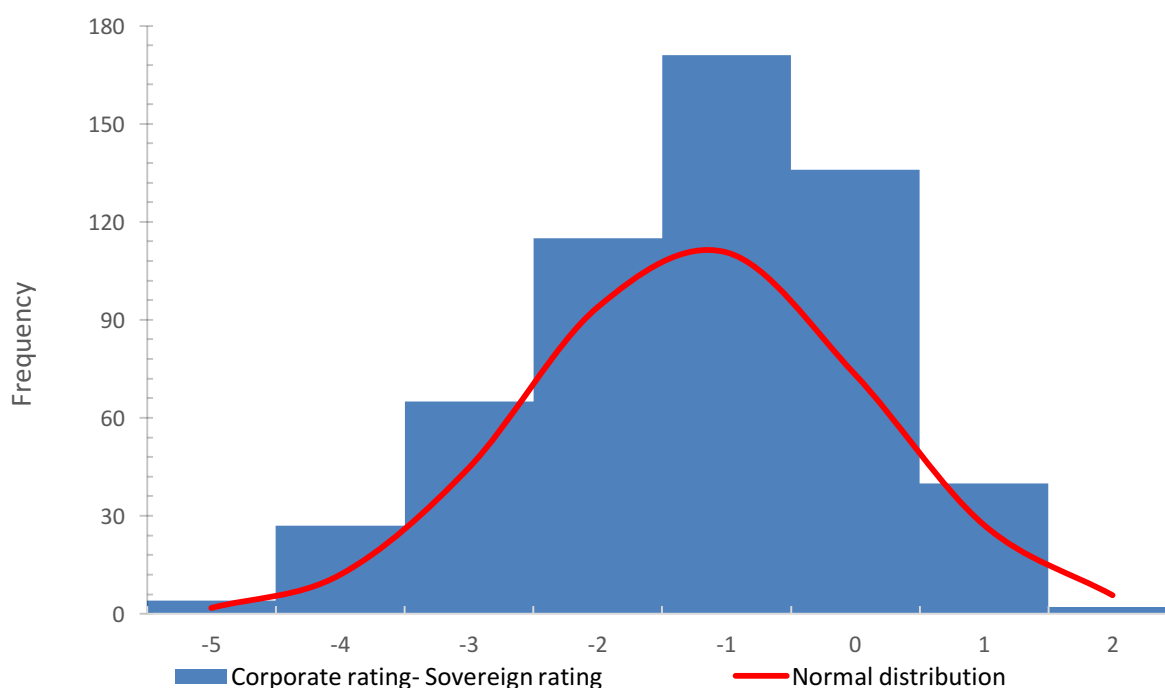
Variable	VIF
Sovereign credit rating	6.55
Retained earnings/Assets	4.98
Working capital/Assets	2.12
GDP per capita	1.63
GDP growth	1.61
Sovereign credit rating	1.46
Current account/ Assets	1.3
EBIT/ Asset	1.13
Inflation	1.1
Size	1.06
Debt coverage	1.04

Note: This table shows the results of the VIF estimation.

### 3.2. Nonparametric analysis

One of the questions of this thesis is to know if sovereign ratings constrain corporate credit ratings. To verify this, this thesis uses the methodology adopted by Borensztein et al., (2013). The authors performed a nonparametric test, by using frequency distribution of corporate and sovereign credit ratings, to determine whether the sovereign ceiling policy is still in application even after being shifted in 1997 by Standard and Poor's. The nonparametric test here consists in examining if sovereign ratings bind the corporate ratings. If this is the case, corporate ratings should be grouped around sovereign ratings. If on the other side, corporate ratings are not constrained by sovereign ratings, then these should be well distributed. Figure 3 shows the histogram of the distribution of the gap between firms and sovereign credit ratings for the period of 2009- 2016. This figure shows the largest concentrations at -1 and 0. These results that in most cases, corporates are still attributed the same or lower ratings than their sovereigns. This provides evidence that the ceiling rule is still considered, but not strictly applied. In fact, on the right side of the figure, it can be noticed that a small number of companies escapes from that rule, with a rating higher than that of their sovereign.

**Figure 3**  
Rating gap distribution between corporate and sovereign rating



Note: This figure displays the distribution gap between corporate credit ratings and sovereign credit ratings in the PIIGS countries, for the period from 2009-2016.

### **3.3. Regressions**

This section explores the factors determining the private credit ratings, with a focus on the coefficient of the sovereign credit rating. The two methodological approaches developed earlier are used to ensure a comparability among the results and to assess which model provides the best results in line with the literature. All the analysis will first be conducted using a linear regression estimations. The Hausman (1978) test is carried out to determine which approach is more appropriate between fixed effects and random effects. The outcome of the Hausman test suggests that random effects are the suitable approach in this case. Henceforth, this thesis estimates the linear regression with industry, country and year fixed effects by using the dummy variables method to account.

All the analysis will also be conducted with the use of an ordered probit model. While for the linear model, the Hausman test was used to choose between fixed and random effects, this test is reported as non-appropriate for nonlinear model (Greene (2003)). This thesis assumes that it is important to account for the country and industry effects that could possibly affect the results. Therefore, fixed effects are accounted in the ordered probit model, by using the dummy variables method, as for the linear regression model.

The section is organized as follows. First, an estimation of the effect of sovereign ratings on corporate ratings is conducted on the sample period of 2009-2016. Second, this section evaluates whether sovereign rating upgrade and downgrade have the same effect on firms rating. Moreover, the difference between the effect of sovereign ratings during the Eurozone debt crisis and after the crisis is assessed. Finally, this section presents the additional robustness tests.

#### **3.3.1. The influence of sovereign rating on corporate rating**

The key results are summarized in Table 11 that concerns the determinants of corporate ratings with as main explanatory variable, the sovereign rating. Both the linear regression and ordered probit estimations are carried out with country, year and industry fixed effects, while clustering errors for robustness. Each regression, first, include firm-level factors as control variables. Second, macroeconomic factors are included in the model as additional control variables. Column 1 and column 2 represents the linear regression while column 3 and 4 reports the result of the ordered probit.

The estimations suggest that sovereign ratings are important determinants of corporate ratings. Indeed, the coefficient of the sovereign rating is positive and significant at 0.01%,

providing support for the first hypothesis. Hence, corporations located in countries with a high rating tend to be attributed higher ratings than those companies located in low rated countries. Put differently, a company's rating is likely to be disadvantaged if the probability of its government to default increases, *ceteris paribus*.

The results also provide evidence that firm-level factors are important indicators of the rating level of a corporate, some appearing consistently significant in every estimation, others not, such as the leverage or equity ratios. Particularly, the estimators of the profitability ratio (Retained earnings to assets) and the size of the company are reported as significant and positive. The sign of the coefficients of firm level factors are consistent with the literature, except for the estimators of the liquidity, the leverage and the debt coverage ratios.

Concerning the macroeconomic determinants, the signs of the estimators are all consistent with the literature. Out of the four factors GDP per capita has the most significant and positive correlation with corporate ratings, while the current account significance is not consistent in both estimations.

Overall, the results remain approximately similar whether by including macro factors or by excluding them. However, the linear and ordered probit regressions exhibit some varieties especially in terms of the significance level of the variables. Hence, the ordered probit seems to provide more significant results, than the OLS.

**Table 11**  
Sovereign and corporate credit ratings

	(1)	(2)	(3)	(4)
Sovereign rating	0.477***	0.382***	0.642***	0.523***
EBIT/Assets	2.004	1.921	7.042***	6.885***
Retained earnings/Assets	0.402**	0.459***	0.563**	0.628**
Equity/Assets	0.221	0.118	1.174**	1.016*
Working capital/ Assets	-0.107	-0.152	-0.860	-0.952*
EBIT/Interest coverage	-0.000697**	-0.000736**	-0.00114**	-0.00117**
Size	0.00000501***	0.00000481***	0.00000658***	0.00000643***
GDP growth	-	0.00689	-	0.0140
GDP per capita	-	0.0000248*	-	0.0000306*
Inflation	-	-0.0277	-	-0.0379
Current Account	-	0.0336*	-	0.0367
N	552	552	552	552
Industry fixed effects	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes

Note: This table shows the relationship between sovereign credit ratings and corporate ratings while using linear regression and ordered probit estimations with industry, country and year fixed effects, and controlling for firm-level financial indicators and macroeconomics factors.

\*Significant at the 5% level

\*\* Significant at the 1% level

\*\*\* Significant at the 0.1% level

### 3.3.2. Differences in the influence of sovereign ratings

The previous analysis indicated that sovereign ratings have a significant influence on the corporate ratings. It is also interesting to assess the magnitude of this influence is the same, when sovereign ratings are upgraded or downgraded. Hence, as a further analysis, this thesis examines the effects of sovereign downgrades and upgrades on corporate ratings. To complete this estimation, the first differences method is used. This method allows to distinguish the positive and negative change of sovereign credit ratings. A dummy variable is thus included, that takes the value of 1 in case of sovereign ratings upgrades. The results are displayed in table 12. The negative sign of the interaction term shows that sovereign upgrades have a lower influence on corporate ratings than sovereign downgrades. This correlation is reported to be significant, providing strong evidence of the asymmetric impact of upgrades and downgrades impacts.

Finally, this thesis evaluates the effect of sovereign ratings on the corporate ratings during the Eurozone debt crisis. Indeed, as the sovereign credit risk increased in that period, it can be assumed that consequently corporates were more impacted by sovereign credit ratings. This is based on the earlier findings suggesting that sovereign ratings downgrades have more influence on corporate ratings than sovereign rating upgrades.

Following the study of Baum et al. (2016), the effect of the sovereign debt crisis can be measured on the period of 2009 -2012. Moreover, Augustin et al. (2016), point out that the first Greek bailout (on April 11, 2010) accelerated the transfer of Greece credit risk to the other Eurozone countries. Hence, in this thesis it is assumed that the crisis started in 2009 (coinciding with the first downgrades in the Eurozone) and that the situation became more dramatic in 2010. Obviously, these effects may have lasted longer than 2012; however, it can be assumed that in 2013, the situation was not as critical as it was during the years of 2009 to 2012. Consequently, the sample period is separated in a crisis period (2009 -2012) and non-crisis period (2013- 2016), by including an interaction term for the sovereign rating during the Eurozone crisis. Indeed, a dummy variable is created that takes the value of 1 for the crisis period.

Table 12 summarizes the results. The sign of the interaction term of sovereign ratings during the crisis shows that sovereign ratings had a higher impact on corporate ratings during that period, compared to the non-crisis period. The estimator of the interaction term is significant in three of the four observations, providing support for the second hypothesis of this thesis.

**Table 12**  
Asymmetric impact of the sovereign credit rating

	(1)	(2)	(3)	(4)
Sovereign rating	0.584***	0.501***	0.803***	0.693***
<i>Sovereign rating upgrade</i>	-0.514*	-0.438	-0.746**	-0.698*
<i>Sovereign rating* Crisis</i>	0.192	0.224*	0.279*	0.311*
EBIT/Assets	2.050	1.960	7.180***	7.000***
Retained earnings/Assets	0.421**	0.476***	0.596**	0.660**
Equity/Assets	0.177	0.0813	1.160**	1.005*
Working capital/ Assets	-0.135	-0.172	-0.951*	-1.029*
EBIT/Interest coverage	-0.000777**	-0.000790**	-0.00126***	-0.00126***
Size	0.00000486***	0.00000480***	0.00000643***	0.00000647***
GDP growth	-	0.00459	-	0.0135
GDP per capita	-	0.0000177	-	0.0000200
Inflation	-	-0.0218	-	-0.0327
Current account	-	0.0427*	-	0.0485*
N	552	552	552	552
Industry fixed effects	Yes	Yes	Yes	Yes
Country fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes

Note: This table displays the results of the difference between the impact of sovereign ratings on corporate ratings, by including interaction terms for sovereign rating upgrade and for the sovereign rating during the Eurozone crisis. By using linear regression and ordered probit estimations with industry, country and year fixed effects, and by controlling for firm-level financial indicators and macroeconomics factors.

\* Significant at the 5% level

\*\* Significant at the 1% level

\*\*\* Significant at the 0.1% level

### 3.3.3. Additional robustness checks

This sub-section presents two sets of estimations to test the robustness of the principal model. Table 13 reports the results. First, the lagged specification is used and reported in columns (1) and (2). The lagged specification is based on the one-year lagged values of the explanatory variables. This allows to account for the backward-looking process of the rating agencies in estimating the credit ratings. The underlying assumption is that rating agencies may use past information to assess the level of creditworthiness of an issuer. The outcomes of the lagged estimations are qualitatively comparable to the specifications in table 11. The results confirm the key observations described in the first sets of regressions (in section 3.3.1) and especially the fact that corporate ratings tend to be positively and significantly influenced by sovereign ratings

Second, one instrumental variable is added to the estimation, that capture the rule of law index of the country. According to the World Bank (2017), the rule of law “*captures perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence*”. The unit of this variable is the rank of the country, in the rule of law index global ranking at certain year. This instrument is in line with Ferri and Liu (2002), who argue that sovereign ratings are not only assessed based on their tangible ability to repay debts but are also assessed on their institutional quality. Hence, their results show that a country with high ranking, for the rule of law, will be more likely to have a higher credit rating compared to a low ranked country. In Table 13, columns (5) and (6) report the results from the IV-2SLS model instrumenting the sovereign rating with the rule of law. While this instrument is considered as satisfying the relevance condition, it may be considered as poorly satisfying the exclusion condition. Thus, the results reported as used as benchmarks to test the results of table 11. The p-value of the F-test (0.000), reported on appendix 4, indicates that this instrument is highly correlated with sovereign ratings. In can be noticed that, even after including the rule of law as an instrument, the results remain similar. Importantly, the influence of sovereign ratings on corporate ratings remain significant and positive.

**Table 13**  
Robustness checks

	(1)	(2)	(3)	(4)	(5)	(6)
Sovereign rating	0.480***	0.325***	0.629***	0.423***	0.374***	0.451***
EBIT/Assets	1.747	1.632	6.595***	6.443***	1.944***	1.818***
Retained earnings/Assets	0.378**	0.479***	0.484*	0.618**	0.203	0.2
Equity/Assets	0.619*	0.459	1.607***	1.397***	0.412	0.414
Working capital/Assets	-0.422	-0.462	-1.128*	-1.281**	-0.172	-0.188
EBIT/Interest coverage	-0.000729*	-0.000757*	-0.00111**	-0.00114**	-0.000845	-0.00079
Size	0.0000044 1***	0.0000041 3***	0.0000055 6***	0.0000053 8***	0.0000061 6***	0.0000060 0***
GDP growth	-	0.0106	-	0.0199	0.0000036 5	-
GDP per capita	-	0.0000295 *	-	0.0000379 *	0.00367	-
Inflation	-	-0.0451	-	-0.0558	-0.00605	-
Current Account	-	0.0630***	-	0.0812***	0.0264	-
N	482	482	482	482	552	552
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes

Note: This table results of the estimates of the robustness tests, by controlling for firm-level and macroeconomic factors, with country, industry and year fixed effects.

\* Significant at the 5% level

\*\* Significant at the 1% level

\*\*\* Significant at the 0.1% level

## 4. Discussion

### 4.1. Findings

The goal of this thesis is to assess the influence of sovereign credit ratings on corporate credit ratings, by taking the case of five Eurozone countries on the period 2009-2017. Consequently, two hypotheses were formulated. The first and main hypothesis states that sovereign credit ratings are significant factors in explaining corporate credit ratings. The second hypothesis is that sovereign credit ratings have a more important effect on corporate ratings in a period of crisis.

The findings of this thesis point for a positive and strong relationship between sovereign credit ratings and corporate credit ratings. The descriptive statistics showed that on the entire period studied, on average, sovereign credit ratings were superior to those of corporates. The average rating for sovereigns is 4.8, while it is 3.6 for corporations. Out of the nonparametric test, the gap distribution indicates that corporates are still in general granted lower or the same rating as their sovereign. Some companies succeed in attracting a higher rating than the sovereign rating. However, these firms are still in a small number, providing evidences of the persistence of the sovereign ceiling rule. This is consistent with the findings of Borensztein et al., (2013) who affirm that although the ceiling policy does not constitute a strict rule, cases of corporations receiving a higher rating than their government are still rare in the developed countries.

In all the regressions conducted, the coefficient of sovereign rating remains consistently significant and positive, by controlling for industry, country, and year specific effects. The results confirm the first hypothesis that the sovereign credit rating is a significant factor in explaining corporate credit ratings. This suggests that to assess corporations credit risk, credit rating agencies take into consideration their sovereigns credit risk in the Eurozone countries. These results are largely supported by the literature. Borensztein et al. (2007) explain the reliance of rating agencies on sovereign ratings that a sovereign may transfer its credit risk to private issuers, for instance, through the imposition foreign currency payment restrictions. Moreover, the study of Augustin et al. (2016) on the sovereign risk spillover to companies in the Eurozone countries confirm the remaining effects of the sovereign ceiling.

This thesis also found that the effect of sovereign rating on corporate rating is more important when sovereign ratings are downgraded. Moreover, the sovereign ratings were found to have had a higher correlation with the corporate ratings during the Eurozone crisis compared to the non-crisis period. This is thus explained by the fact that during the crisis, the

PIIGS countries ratings were highly downgraded. These results suggest that rating agencies may rely more on sovereign risk to evaluate corporates' credit risk in crisis periods, confirming the second hypothesis of this thesis.

These results join the findings of previous studies. Indeed, as explained by Arteta and Hale (2008) and Borensztein, et al. (2007) financial distress of a government is usually linked with changes in macroeconomic conditions (e.g., currency depreciation, high inflation, high interest rates) that also affect corporations' creditworthiness and thus their credit ratings. According to Augustin et al. (2016), firms headquartered in the financially distressed countries, namely Portugal, Italy, Ireland, Greece and Spain (PIIGS) suffered more from the shift in sovereign risk than the firms outside the PIIGS. All in all, it can be understood that rating agencies tend to over rely on sovereign ratings to rate corporate ratings in periods of financial turmoil, as they consider that in those periods sovereigns and corporates will be affected in the same manner, hence their credit ratings must be consistent. This may also explain why the sovereign ceiling effects were observed in the analysis.

Concerning the other determinants of corporate credit ratings, the results show that firm-level factors are important indicators of the rating level of a corporate. Especially, the profitability ratio (Retained earnings to assets) and the size of the company appear in all the regressions to have a significant and positive correlation with corporate ratings. Surprisingly, the debt coverage ratio is significant but the sign of the estimator diverges from the one found in previous studies. The other financial ratios appear to not be consistently significant. Among the macroeconomic factors, the GDP growth is significantly and positively correlated with corporates ratings, in the first estimation. While in the second estimation, the only current account is reported to have a significant and positive effect on corporate ratings. Note that the signs observed for macroeconomic factors' estimators are all consistent with the literature.

Overall, the analyses conducted provided consistent results and the additional robustness checks helped in confirming the validity of the results. When comparing the two models used, the ordered probit regression provides the most significant results. Moreover, those results are in line with the literature. This is in line with the statements of Cheung (1996), who argues that the ordered probit model is the most appropriate model for credit ratings, and goes against the studies who used OLS estimation such as Borensztein et al., (2007 and 2013).

## **4.2. Contributions**

This thesis contributes to the existing body of knowledge on credit ratings in two ways. It serves as an update of the empirical research on the relationship between sovereign ratings and corporate ratings. This thesis perfectly relates to the current situation in the credit rating industry thanks to the period selected. By employing the period 2009- 2016, it captures the Eurozone crisis, contributing to the recent discussions on the impact of sovereign ratings during this crisis.

Moreover, while most of the previous studies on the same topic emphasize on the emerging countries, this thesis provides a different point of view by focusing on developed countries and more specifically on the Eurozone countries. This allows a comparability of the results seen in this thesis to those in emerging markets, especially for the sovereign ceiling effects, reported in the literature as most noticeable in emerging countries. This thesis can thus be considered as an attempt to fill the gap in these two areas.

## **4.3. Limitations and further research**

Alike all the experiments, this thesis is subject to limitations that may have impacted the results. One limitation of this study is the small number of observations of this study compared to other studies on the same topic. The small sample was expected as this thesis distinctive part is to analyze a precise case in terms of the period and the country selected. This consisted in a tradeoff between the sample size and the specificity of the case study. An important aspect that can also explain the number of countries chosen is that this study needed a certain variability among credit ratings to carry out the estimations. It was thus imperative to choose countries that faced significant changes in their ratings.

The other limitation concerns the exclusive use of Standard and Poor's. Even though S&P is the leader among the Big Three credit ratings agencies and even if the ratings actions of these agencies may be sometimes similar, it can be restrictive to choose only one agency as representative of the entire rating industry.

Looking forward, the future researches on the influence of sovereign credit ratings could extend the analysis to financial institutions and compare the influence of sovereign ratings on non-financial corporations and financial corporations. Moreover, it can be interesting to see whether the sovereign ceiling rule is also noticeable for financial corporations or in other developed countries. These studies could also integrate the ratings of

the other two other rating agencies to assess if on the period of 2009-2016, the actions of those agencies were correlated and to see if the findings remain the same.

## References

- Alexe, S., Hammer, P.L., Kogan, A. and Lejeune, M.A. (2003). *A non-recursive regression model for country risk rating*. RUTCOR-Rutgers University Research Report RRR, 9, 1–40.
- Almeida, H., Cunha, I., Ferreira, M. and Restrepo, F. (2014). The Real Effects of Credit Ratings: The Sovereign Ceiling Channel. *Journal of Finance*, 523(1).
- Altman, E., and Katz, S. (1976). Statistical bond rating classification using financial and accounting data. In Michael Schiff and George Sorter (eds.), *Proceedings of the Conference on Topical Research in Accounting*. New York: New York University Schools of Business.
- Afonso, A. (2003). Understanding the determinants of sovereign debt ratings: Evidence for the two leading agencies. *Journal of Economics and Finance*, 27(1), 56–74.
- Afonso, A., Gomes, P.M. and Rother, P. (2007)., What 'Hides' Behind Sovereign Debt Ratings? ECB Working Paper, 711.
- Afonso, A., Gomes, P.M. and Rother, P. (2011). Short and long-run determinants of sovereign debt credit ratings. *International Journal of Finance & Economics*, 16(1), 1–15.
- Augustin, P., Boustanifar, H., Breckenfelder, J. and Schnitzler, J. (2016). Sovereign to corporate spillovers. *European Central Bank, working paper series*, No 1878.
- Aurifeille, J-M., and Deissenberg, C. (1998). *Bio-Mimetic Approaches in Management Science*. Kluwer Academic Publishers.
- Archarya, V. V., Eisert, T., Eufinger, C. and Hirsch, C. (2014). Real effects of the sovereign debt crisis in europe: Evidence from syndicated loans, CEPR Discussion Paper No. DP10108.
- Ashcraft, A., Goldsmith-Pinkham, P., Hull, P., and Vickery, J. (2011). Credit ratings and security prices in the subprime mbs market. *American Economic Review* 101, 115–19.
- Arteta, O., and Hale, G. (2008). Sovereign debt crises and credit to the private sector. *Journal of International Economics*, 74, 53-69.
- Arezki, R., Candelon, B. and Sy, A.N.R. (2011). Sovereign rating news and financial markets spillovers: Evidence from the European debt crisis. IMF Working Paper 11/68.
- Bae, K.H., Kang, J.K and Wang, J. (2013). Does Increased Competition Affect Credit Ratings? A Reexamination of the Effect of Fitch's Market Share on Credit Ratings in the Corporate Bond Market, *Journal of Financial and Quantitative Analysis (JFQA)*.
- Bailey, W., Chung, P., and Kang, J. (1999). Foreign Ownership Restrictions and Equity Price Premiums: What Drives the Demand for Cross-Border Investments. *Journal of Financial and Quantitative Analysis* 34(4), 489-511.
- Baum, C. F., Karpava, Schafer, D. and Stephan, A. (2016). Credit Rating Agency Downgrades and the Eurozone Sovereign Debt Crisis, *Journal of financial stability*,

117–131.

- Becker, B., and Milbourn, T. (2011). How Did Increased Competition Affect Credit Ratings? *Journal of Financial Economics*, 101, 493-514.
- Bedendo, M., and Colla, P. (2013). Sovereign and corporate credit risk: spillover effects in the eurozone, *Journal of Corporate Finance*.
- Benmelech, E., and Dlugosz, J. (2009). The credit rating crisis. Working Paper 15045, National Bureau of Economic Research.
- Bernal, O., Girard, A. and Gnabo, J. (2015). The Importance of Conflicts of Interest in Attributing Sovereign Credit Ratings. Center for Research in Finance and Management (CeReFiM), University of Namur.
- Bolton, P., Preixas, X. and Shapiro, J. (2012). The Credit Ratings Game. *Journal of Finance*, 67, 85-111.
- Borensztein, E., K. Cowan, and P. Valenzuela. (2007). “Sovereign ceilings’ lite’? The impact of sovereign ratings on corporate ratings in emerging market economies.” IMF Working Paper 07/75, International Monetary Fund.
- Borensztein, E., Cowan, K., and Valenzuela, P. (2013). “Sovereign ceilings ‘lite’? The impact of sovereign ratings on corporate ratings”, *Journal of Banking & Finance*, 37(11).
- Bryman, A. (2012), *Social Research Methods*, Oxford university press, Oxford.
- Bissoondoyal-Bheenick, E. (2005). An analysis of the determinants of sovereign ratings. *Global Finance Journal*, 15(3), 251-280.
- Bissoondoyal-Bheenick, E., Brooks, R., and Yip, A.Y.N. (2006). Determinants of sovereign ratings: A comparison of case-based reasoning and ordered probit approaches. *Global Finance Journal*, 17(1), 136–154.
- Brooks, C. (2009). *Introductory Econometrics for Finance*. Cambridge: Cambridge University Press.
- Butler, A.W. and Fauver, L. (2006). *Institutional environment and sovereign credit ratings*. *Financial Management*, 35(3), 53–79.
- Capital intelligence (2016). *Foreign currency and Local currency*. Retrieved from <http://www.ciratings.com/page/rating-definitions/foreign-local-currency-ratings>. Consulted on July 7<sup>th</sup>, 2016.
- Camanho, N., Deb, P. and Liu, Z. (2010). Credit Rating and Competition. Working paper, London School of Economics.
- Canuto, O., Dos Santos, P. and Porto, P. (2012). Macroeconomics and sovereign risk ratings. *Journal of International Commerce, Economics and Policy (JICEP)*, 3(2), 1250011-

25.

Cantor, R. and Packer, F. (1996). Determinants and impact of sovereign credit ratings. *Federal Reserve Bank of New York review*, 2(2), 37-51.

Catao, L., and Sutton, B. (2002). Sovereign defaults: The role of volatility. Technical report, IMF Working Paper.

Cavallo, E.A., and Valenzuela, P. (2010). The Determinants of Corporate Risk in Emerging Markets: An Option Adjusted Spread Analysis. *International Journal of Finance and Economics* 15, 59–74.

Claessens, S., and Embrechts, G. (2002). Basle II, sovereign ratings and transfer risk external versus internal ratings. University of Amsterdam and Radobank International.

CFO Magazine (2013). Corporate, sovereign debt ratings closely linked: S&P.

Cheung, S. (1996) Provincial Credit Ratings in Canada: An Ordered Probit Analysis Working Paper 96-6, Bank of Canada.

Craney, T.A., and Surlles, J.G. (2002). Model-dependent variance inflation factor cutoff values, *Quality Engineering*, 14:3, pp. 391-403.

Datz, G. (2004). Reframing Development and Accountability: The Influence of Sovereign Credit Ratings on Policy Making in Developing Countries. *Third World Quarterly* 25:2, 303–318.

De Moor, L., Prabesh, L., Sercu, P. and Vanpee, R. (2017). Subjectivity in Sovereign Credit Ratings. Faculty of Economic and Social Sciences and Solvay Business School, Vrije Universteit Brussel, Faculty of Economics and Business, KU Leuven.

Depken, C., LaFountain, C., and Butters, R. (2007). Corruption and Creditworthiness: Evidence from Sovereign Credit Ratings. Working Papers 0601, University of Texas at Arlington, Department of Economics.

Dittrich, F. (2007). The Credit Rating Industry: Competition and Regulation. University of Cologne-Department of Economics.

Dubois, E. (2009). La notation financière, Une convention au cœur des turbulences. Institut d'études politiques.

Durbin, E., and Ng, D. (2001). The Sovereign Ceiling and Emerging Market Corporate Bond Spreads, unpublished paper. St. Louis and Ithaca: Olin School of Business and Cornell University.

Durbin, E. and Ng, D. (2005). The Sovereign Ceiling and Emerging Market Corporate Bond Spreads. *Journal of International Money and Finance*, 24:4:631–649.

- Ederington, L.H. (1985). Classification models and bond ratings. *The financial review*, 20 (4), 237-262.
- Eliasson, A.C. (2002). Sovereign credit ratings. *Deutsche Bank Research, Research notes in economics & statistics* 02(1).
- Ejsing, J. W., and Lemke, W. (2011). The Janus-headed salvation: Sovereign and bank credit risk premia during 2008-2009, *Economics Letters*, 110, 28-31.
- Erb, C., Harvey, C., and Viskanta T. (1996). Expected returns and Volatility in 135 countries. *The journal of Portfolio Management*. 46-58.
- ESME (2008). *Role of Credit Rating Agencies*. ESME's report to the European Commission. Retrieved from [http://ec.europa.eu/finance/securities/docs/agencies/report\\_040608\\_en.pdf](http://ec.europa.eu/finance/securities/docs/agencies/report_040608_en.pdf). Consulted on June 22<sup>th</sup>, 2016
- ESMA (2015). *Competition and choice in the credit rating industry*. Retrieved from [https://www.esma.europa.eu/sites/default/files/library/2016-1662\\_cra\\_market\\_share\\_calculation.pdf](https://www.esma.europa.eu/sites/default/files/library/2016-1662_cra_market_share_calculation.pdf). Consulted on July 22<sup>nd</sup>, 2017.
- Fitch ratings. *International Issuer and Credit Rating Scales*. Retrieved from <https://www.fitchratings.com/site/definitions/internationalratings>. Consulted on July 17<sup>th</sup> 2016.
- Ferri, G., Liu, L. and Giovanni, M. (2001). The role of rating agency assessments in less developed countries: Impact of the proposed basel guidelines. *Journal of Banking and Finance* 25, 115–148.
- Ferri, G. and Liu, L. (2002). Do global credit rating agencies think globally? The information content of firm ratings around the world. University of Bari and Asian Development Bank Institute, Tokyo, Japan.
- Ferri, G., Liu, L. and Stiglitz, J.E. (1999), The Procyclical Role of Rating Agencies: Evidence from the East Asian Crisis, *Economic Notes*, (28) 3, pp335-356.
- Fisher, L. (1959). Determinants of risk premiums on corporate bonds. *Journal of Political Economy* 67: 217-37.
- Fitch Ratings (2007). Fitch ratings definitions: Introductions to rating. *Resource Library*, 1–4, p1.
- Fitch ratings. *International Issuer and Credit Rating Scales*. Retrieved from <https://www.fitchratings.com/site/definitions/internationalratings>.

- Frost, C. (2007). Credit Rating Agencies in Capital Markets: A Review of Research Evidence on Selected Criticisms of the Agencies. *Journal of Accounting, Auditing & Finance*, Vol.22, Issue 3 (summer) pp.469-492.
- Gaillart, N. (2010). *Les agences de notation*. Paris: Ed.La Découverte.
- Gartner, M., Jung, F. and Griesbach, B. (2011). Pigs or Lambs? The European Sovereign Debt Crisis and the Role of Rating Agencies, U. of St. Gallen Law & Economics Working Paper 2011: 06. Retrieved from <https://ssrn.com/abstract=1816582> , consulted on May 21<sup>st</sup>, 2017.
- Greene, W. and Hensher, D. (2009). Ordered Choices and Heterogeneity in Attribute Processing, *Journal of Transport Economics and Policy*. 44:3, 331– 364.
- Haque, N. U., Kumar, M. S., Mark, N. C. and Mathieson, D. J. (1996). The economic content of indicators of developing country creditworthiness. Technical report, IMF Working Papers
- Hwang, C.L., and Cheng, K.F. (2008). *On multiple-class prediction of issuer credit ratings*. Applied Stochastic Model in Business and Industry, Wiley Interscience.
- Hawkins, F.D., Brown, B.A and Campbell, W.J. (1983). Rating Industrial Bonds, in: Sinclair, T.J. (2005). *The new masters of capital: American bond rating agencies and the politics of creditworthiness*, Cornell University press, Ithaca and London, p.31.
- Horrigan, J. O. (1966). The determination of long-term credit standing with financial ratios. Empirical Research in Accounting 1966, *Journal of Accounting Research* 4 (suppl.): 44-62.
- Brooks, R., Faff, R.W, Hillier, D. and Hillier, J. (2004). The national market impact of sovereign rating changes. *Journal of Banking and Finance* 28:1:233–250.
- Hausman, J.A (1978). Specification Tests in Econometrics, *Econometrica*, 46:6, 1251-71.
- Host, A., Cvecic, I. and Zaninovic, V. (2012). Credit rating agencies and their impact on spreading the financial crisis on the Eurozone. Faculty of Economics Rijeka.
- Hu, Y.T., Kiesel, R. and Perraudin, W. (2002), *The estimation of transition matrices for sovereign credit ratings*. *Journal of Banking & Finance*, 26(7), 1383–1406.
- IMF (1999). International Capital Markets developments, prospects, and key policy issues. *World economic and financial surveys*.
- IMF (2010). The uses and abuses of sovereign credit ratings, *IMF Global Financial Stability Report*, p.88.
- Jeon, D-S. and Lovo, S. (2013). Credit rating industry: A helicopter tour of stylized facts and recent theories. *International Journal of Industrial organization*, 31, 643-651.

- Chiang, T. C., Jeon, B.N. and Li, H. (2007). Dynamic correlation analysis of financial contagion: Evidence from Asian markets. *Journal of International Money and Finance* 26:7, 1206–1228.
- Kamstra, M., Kennedy, P. and Suan, T.K. (2001). Combining bond rating forecasts using logit. *The Financial Review*, 37, 75-96.
- Kaminsky, G. and Schmukler, S.L. (2002), "Emerging Markets Instability: Do Sovereign Ratings Affect Country Risk and Stock Returns?" mimeo, World Bank.
- Kaplan, R. S. (1978). Information content of financial accounting numbers: a survey of empirical evidence. In A. Rashad Abdel-Khalik and Thomas Keller (eds.), *The Impact of Accounting Research on Practice and Disclosure*. Durham, N.C.: Duke University Press.
- Kennon, J. (2016). *what does deleveraging mean ?*, Retrieved from <https://www.thebalance.com/what-does-deleveraging-mean-357641>. Consulted on August 9<sup>th</sup>, 2016.
- Kruck, A. (2011). *Private Ratings, Public Regulations*. Retrieved from <http://www.palgraveconnect.com/pc/doifinder/10.1057/9780230307384ESME>. Consulted on July 28<sup>th</sup>, 2016.
- Langhor, H. and Langhor, P. (2008). *The rating agencies and their credit ratings: What They Are, How They Work, And Why They Are Relevant*. Wiley Finance series, John Wiley & Sons Ltd., Chichester.
- Lawrence, J.W. (2010). Markets: The credit rating Agencies. *The journal of Economic research*. Vol 24-2, pp.211-226.
- Martell, R. (2005). The effect of sovereign credit rating changes on emerging stock markets. Retrieved from [http://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=686375](http://papers.ssrn.com/sol3/papers.cfm?abstract_id=686375). Consulted on May 20<sup>th</sup>, 2017.
- Midi, H., Sarkar, S. and Rana, S. (2010). Collinearity diagnostics of binary logistic regression model. *Journal of Interdisciplinary Mathematics*, 13:3, 253-261.
- Monfort, B., Mulder, C.B. (2000), *Using Credit Ratings for Capital Requirements on Lending to Emerging Market Economies: Possible Impact of a New Basel Accord*. IMF Working Paper No.00/69.
- Moody's (2004). Guide to Moody's ratings, rating process, and rating practices, Moody's Investors Service, Report 87615, 1–48, 9.
- Mora, N. (2006), 'Sovereign credit ratings: Guilty beyond reasonable doubt?', *Journal of Banking & Finance* 30(7), 2041–2062.

- Nguyen, J.M., and zu Knyphausen-Aufseß, D. (2014). The Impact of Sovereign Credit Ratings on Corporations: A Literature Review and Research Recommendations (August 2014). *Financial Markets, Institutions & Instruments*, 23 (3).
- Pinches, G., and Mingo, K. 1973. A multivariate analysis of industrial bond ratings. *Journal of Finance* 28: 1-18.
- Pogue, T.F., Soldofsky, R.M., (1969). What's in a bond rating? *Journal of Financial and Quantitative Analysis*, 4,201-228.
- Ratha, D., Nose, M., Mohapatra, S. (2007). Impacts of Sovereign Rating on Sub-Sovereign Bond Ratings in Emerging and Developing Economies, World Bank Group policy research working paper, 7618.
- Ratha, D., De, P., and Mohapatra, S. (2011). Shadow sovereign ratings for unrated developing countries. *World Development* 39:3:295–307.
- Reisen, H. and Von Maltzan, J. (1999). Boom and bust and sovereign ratings. OECD Working Paper No. 148, Organisation for Economic Co-operation and Development.
- Ross, I. (1976). Higher stakes in the bond-rating game. *Fortune* (April): 133-42.
- Ryan, J. (2012). *The negative Impact of credit rating agencies and proposal for better regulation*. SWP working paper FG 1, 01.
- Scully, M. (2015). *Three Big credit raters maintain dominance of grading business*. Retrieved from Bloomberg: <http://www.bloomberg.com/news/articles/2015-12-28/three-big-credit-raters-maintain-dominance-of-grading-business>. Consulted on August 10<sup>th</sup>, 2016.
- Sylla, R. (2002). A historical primer on the business of credit Ratings. Department of Economics, Stern School of Business.
- SEC (2015). *Annual Report on Nationally Recognized Statistical Rating Organizations*. Retrieved from <https://www.sec.gov/files/2016-annual-report-on-nrsros.pdf>. Consulted on August 10<sup>th</sup>, 2016.
- Sinclair, T.J. (2005). The new masters of capital: American bond rating agencies and the politics of creditworthiness, Cornell University press, Ithaca and London, p.31.
- S&P (2001a). Corporate Ratings Criteria. [www.standardandpoors.com/](http://www.standardandpoors.com/)
- S&P (2001b). Rating Methodology: Evaluating the Issuer. [www.standardandpoors.com/](http://www.standardandpoors.com/)
- S&P Global ratings (2011). *Understanding ratings*. Retrieved from [http://www.spratings.com/en\\_US/understanding-ratings#secondPage](http://www.spratings.com/en_US/understanding-ratings#secondPage), consulted on May 15<sup>th</sup>, 2016.

- S&P's Rating Services, (2012). *Corporate and government ratings that exceed the sovereign rating*.
- S&P Global ratings (2014). *Corporate Rating Methodology and Utility Key Credit Factors*. Retrieved from [https://secure.csfb.com/conferences/dealogic/2014\\_global\\_energy\\_london/standard\\_p\\_oors\\_pres.pdf](https://secure.csfb.com/conferences/dealogic/2014_global_energy_london/standard_p_oors_pres.pdf) . Consulted on August 15<sup>th</sup> , 2016.
- S&P Ratings Direct (2014). *Request for Comment: Rating Government-Related Entities: Methodology and Assumptions*. Retrieved from [https://www.standardandpoors.com/ja\\_JP/delegate/getPDF?articleId=1494566&type=COMMENTS&subType=CRITERIA](https://www.standardandpoors.com/ja_JP/delegate/getPDF?articleId=1494566&type=COMMENTS&subType=CRITERIA) . Consulted on July 18<sup>th</sup>, 2017.
- S&P Global ratings (2015). *General Criteria: Principles of Credit Ratings*. Retrieved from <https://www.standardandpoors.com>. Consulted on 21<sup>st</sup>, July 2016.
- S&P Global Ratings (2016). *Definitions*. Retrieved from [https://www.standardandpoors.com/en\\_US/web/guest/article/-/view/sourceId/504352](https://www.standardandpoors.com/en_US/web/guest/article/-/view/sourceId/504352). Consulted on 21<sup>st</sup>, July 2016.
- Kim, s. and Wu, E. (2008). Sovereign credit ratings, capital flows and financial sector development in emerging markets, *Emerging Markets Review*, 9, (1), 17-39.
- Sylla, R., (2002). An historical primer on the business of credit ratings, in *Ratings, Rating Agencies and the Global Financial System*, edited by Levich, R., Majnoni, G., and Reinhart, C. Boston: Kluwer, 19–40, p 23.
- Teker, D., Pala, A., and Kent, O., (2013). Determination of Sovereign Rating: Factor Based Ordered Probit Models for Panel Data Analysis Modelling Framework. *International Journal of Economics and Financial Issues* Vol. 3, No. 1, 2013, pp.122-132
- Torres, G. and Zelter, J. (1998). Rating securitizations above the sovereign ceiling. Fitch IBCA.
- West, R. R., (1970). An alternative approach to predicting corporate bond ratings. *Journal of Accounting Research*, 7:118-27.
- West, R. R., (1973). Bond ratings, bond yields and financial regulation: some findings. *Journal of Law and Economics*, 16: 159-68.
- White, L. J. (2010). Markets: The Credit Rating Agencies. *Journal of Economic Perspectives*, 2, 211–26.
- Williams, G., Alsakka, R. and ap Gwilym, O. (2013). The impact of sovereign rating actions on bank ratings in emerging markets, *Journal of Banking & Finance*, Vol. 37 No. 2, pp. 563-577.

World Bank Group (2017). Metadata glossery. Retrieved from <http://databank.worldbank.org/data/glossarymetadata/source/1181/concepts/series> ,  
Consulted on July 1<sup>st</sup>, 2017.

## Appendix

### Appendix 1

Market share calculation based on 2014 turnover from credit rating activities and ancillary services at group level in the EU

Registered Credit Rating Agency	Market share
AM Best Europe-Rating Services Ltd. (AMBERS)	0.79%
ARC Ratings, S.A.	0.02%
ASSEKURATA Assekuranz Rating-Agentur GmbH	0.21%
Axesor S.A.	0.61%
BCRA-Credit Rating Agency AD	0.02%
Capital Intelligence (Cyprus) Ltd	0.12%
CERVED Group S.p.A.	1.20%
Creditreform Rating AG	0.50%
CRIF S.p.A.	0.33%
Dagong Europe Credit Rating Srl	0.02%
DBRS Ratings Limited	1.47%
Euler Hermes Rating GmbH	0.20%
European Rating Agency, a.s.	0.00%
EuroRating Sp. Zo.o.	0.00%
Feri EuroRating Services AG	0.64%
Fitch Group <sup>9</sup>	16.80%
GBB-Rating Gesellschaft für Bonitätsbeurteilung mbH	0.32%
ICAP Group SA	0.55%
INC Rating Sp. Zo.o. <sup>10</sup>	0.00%
ModeFinance S.A. <sup>11</sup>	0.00%
Moody's Group <sup>12</sup>	34.67%
Rating-Agentur Expert RA GmbH <sup>13</sup>	0.00%
Scope Credit Rating GmbH	0.14%
Spread Research SAS	0.11%
Standard & Poor's Group <sup>14</sup>	40.42%
The Economist Intelligence Unit Ltd	0.87%
<b>TOTAL</b>	<b>100</b>

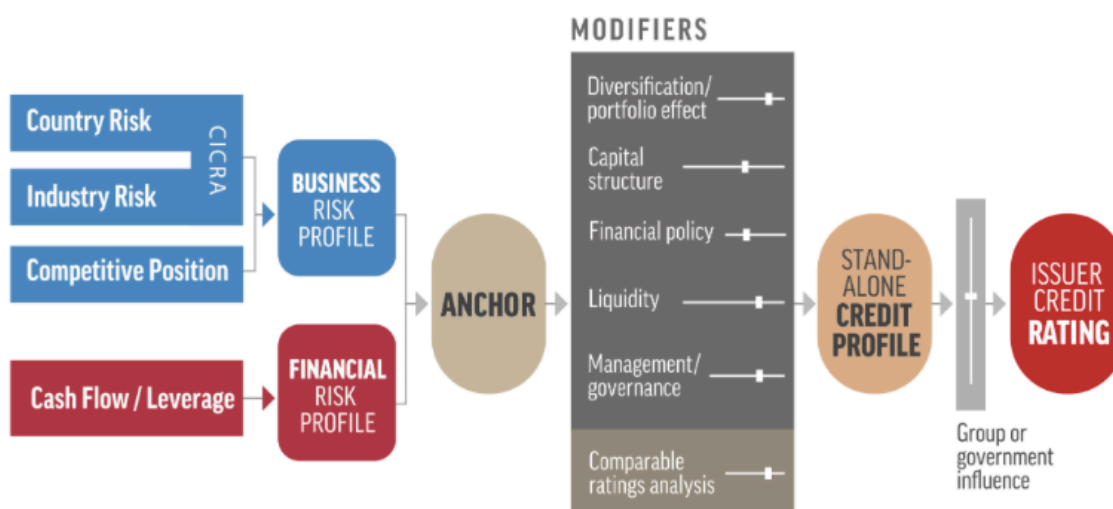
Source: ESMA

Note: This table reports all the credit rating agencies registered with their respective market share.

Source: ESMA (2015)

## Appendix 2

S&P's framework for corporate rating methodology



**Note:** This table shows the factors assessed by Standard and Poor's to estimate private credit ratings.

**Source:** S&P's rating services (2014)

## Appendix 3

Sovereign rating history in the East Asian crisis

Year	Indonesia			Korea			Malaysia		Thailand							
	Moody's	S&P	Fitch	Moody's	S&P	Fitch	Moody's	S&P	Moody's	S&P						
1986				A2	Nov											
1988					A+	Oct										
1989							Baa1	Dec	A-	Mar	A2	Aug	A-	Jun		
1990				A1	Apr		A3	Dec								
1992		BBB-	Jul				A2	Nov								
1993	Baa3	Mar							A+	Dec			A	Dec		
1994																
1995					AA-		A1	March								
1996		BBB	Jul			AA-										
1997	Ba1	Dec	BBB+	Dec	BBB-	Jun	A3	Nov	A+	Dec	A3	Apr	A-	Sep		
			BB+	Dec	BB+	Dec	Ba1	Dec	A-	Nov	Ba1	Oct	BBB	Oct		
									B-	Dec	Ba3	Nov				
											Ba1	Dec				
1998	B2	Jan	B	Jan	BB-	Jan		BB+/B	Aug		Baa2	Jul	A-/A-2	Apr	A-3/BBB-Jan	
	B3	Mar	B-	Mar							Baa3	Sep	A-2/BBB+Jul		BBB-	Aug
			CCC+	May									A-3/BBB-Sep			

**Note:** This table gives an overview of the sovereign rating assigned by the S&P, Moody's, and Fitch, to Indonesia, Korea, Malaysia and Thailand from 1986 to 1998.

**Source:** Claessens and Embrechts (2002)

## Appendix 4

**F-statistic**

First-stage regression summary statistics

Variable	R-sq.	Adjusted R-sq.	Partial R-sq.	F(1,540)	Prob > F
sov_rating	<b>0.5450</b>	<b>0.5357</b>	<b>0.3378</b>	<b>275.514</b>	<b>0.0000</b>

Note: This table report the F-test statistic for the IV-2SLS model