

# Sovereign Credit\_Rating Disclose and Bond Liquidity under Sovereign Debt Crisis

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## Abstract

This study examines the effect of the informational content of local credit rating announcements in emerging markets on the liquidity of their bond markets. We analyze the bond liquidity markets across five countries such as Poland, Greece, Spain, Hungary and Turkey. The sample includes daily data about sovereign bonds over the period ranging from July 2009 to January 2014. We mainly focus on the period before and after the sovereign debt crisis. We note that the bond liquidity is affected due to the sign of the rating granted by the rating agencies for each country.

**Keywords:** liquidity, Sovereign bond markets, credit ratings

**JEL Classification:** G15, C34.

## 1. Introduction

The information extracted from the changed notes has been an appropriate issue in recent years. The ratings disclosed by the rating agencies do not contain complete information being able to help investors. Unlike these agencies, the informational content is disclosed while transferring assessments without providing specific details to the public. Thus, the agencies actions will have some effects on the market returns and asset prices (Chen, Chen, Chang, & Yang, 2016).

Previous studies, such as of Fridson and Sterling (2006), show that the credit rating agencies will summarize public information, and that the changes in bond ratings do not transmit any new information to the market.

Recent studies have shown that negative rating announcements, especially reviews about decommissioning and downgrades, do not actually reflect information relevance to the pricing of shares, bonds and credit default swap spreads (CDS) (Chodnicka, 2017; Wengner et al, 2015). Overall, most of this literature estimate the price and / or returns.

In this paper, we have moved further away from the traditional analysis of prices through looking into the effects of the rating agencies announcement on the liquidity of the emerging bond markets (Pilar et al, 2015).

During the recent years, sovereign ratings have been in the interest of research in the sovereign euro-zone, including Greece and Spain having experienced a drop in their ratings by Standard & Poors (S & P) in August 2011 (Andreasen and Valenzuela (2016)). The IMF, in its report of 2010, showed that the sovereign credit risk is one of the main obstacles to the global economic stability. Consistent with this, Duggar & al. (2009) found that 71% of business failures and under-rated sovereigns in the emerging markets have been improving during the sovereign crises (Gwion et al, 2013).

A recent literature has proved that the changes in the sovereign rating and outlook / watch signals affect equity and emerging debt markets, respectively. It has also indicated that these effects are not only significant at the national level since the sovereign rating is assigned to influence markets in other countries. In particular, the bad news have a negative impact as the new sovereign rating brings about a significant action on the equity and bond markets of other

countries, whereas the good news have a negligible effect (e.g. Benjamin and Zabel, 2015). Banier and Hirsch (2010) evince that these instruments are valued for providing a considerable economic benefit. Ahmet et al, (2015) analyze the behavior of asset ratings issued by companies, and find out that these issuers have a higher probability of a rating change in the direction indicated.

In fact, Alsakka and ap Gwilym (2009) investigate the dynamics of the sovereign ratings for six rating agencies in the emerging economies, including status monitoring. They observe that the assets placed under scrutiny have a higher probability of a rating change in the direction indicated by the status within 12 months after being placed on the watch list. Several studies prove that the sovereign ratings represent approximations of the ability and willingness of governments so as to regard highly their financial conditions. They also substantiate that these ratings capture the dynamics of capital markets, and influence the capital cost.

Binici and Huttchison (2017) point out that the degradations of sovereign asset ratings have a large negative effect on the stock markets. Gande and Parsley (2005), and Ferreira and Gama (2007) reveal that the degradations of sovereign bonds ratings-mainly during times of crisis-aggregate stock returns of other countries, especially in the emerging economies and neighboring countries, while the progressions of ratings have a ridiculous impact. Ismailescu and Kazemi (2010), and Sovbetov and Saka (2018) study the relationship between CDS of the emerging markets and changes in the sovereign notation, and realise that the spread of CDS responds to the changes in sovereign ratings. These authors also come up with the idea that the positive signals add new information to markets, thus affecting the CDS spreads. These results are contradictory to those found in the previous studies having stated that the negative signals of negative ratings have more effect on CDS spreads. For instance, Norden and Weber (2004), and Salvador (2017) mention that the negative signals greatly expand CDS spreads for issuers of investment grade, while the strong positive signals significantly expand CDS spreads for speculative grade issuers.

Owing to the role of credit rating agencies in the sovereign debt crisis in the financial phase (2007-2008) of the current crisis, as in the Asian crisis of 1997, many criticisms are made due to the sovereign debt crisis, notably from investors affected by the performance of certain financial assets having the best ratings. For structured products, lots of tranches rated AAA have thus experienced large losses because of the shortcomings of the methodology of some agencies. Since the beginning of the public debt crisis, a variety of questions about the practices of these agencies has been raised. They focus mainly on the amplifying effects of their decisions, and even on their legitimacy to record sovereign debts (Alsakka et al, 2014).

Several proposals have been made to address the above-mentioned problems, especially in Europe where the sovereign debt crisis has been aggravated by the accentuation of ratings on certain economic trends such as the indebtedness of Member States.

To meet our objectives, our study expresses the impact of changes in sovereign credit ratings on the liquidity of financial markets in emerging economies, mainly during the sovereign debt crisis.

The rest of the paper is organized as follows. Section 2 reviews the relevant literature. Sections 3 discuss the data and methodology. Section 4 presents the empirical results and Section 5 concludes the paper.

## **2. Literature Review**

Generally, the role of rating agencies, as expressed by the new notes, could be a factor of price volatility of sovereign bonds (Voorhees 2012). A recent literature has shown that the role of rating agencies is to provide information on the market through the publication of a note attributed to the situation of an investor (e.g. Deb & al, 2011; De Haan & al, 2011; Schroeter, 2011).

The rating is considered as a new information transmission channel on the market since it reduces the information asymmetry so that asset prices in the market are moving in the direction of the appreciation expressed (e.g. Pagano et al, 2010; Deb et al, 2011; Freixas and Laux, 2011).

Deb et al (2011) give proof that the information extracted from the assigned ratings could affect the future behavior of the sovereign issuer whose choice of economic and financial policies can be either confirmed or amended according to whether the rating is positive or negative (Huong et al, 2015).

The area of credit rating has increased in line with the regulations of supply and demand (He and Xiong 2012). According to De Haan & al, (2011) and Schroeter (2011), this process has addressed more than 150 rating agencies that are widespread all over the world. They think that about 140 agencies are in one country and / or in one oriented sector, while around five to 10 ones based in Japan, the United States and Canada provide new assessments whether as a country or industry. The global markets are dominant by three major agencies, namely Standard & Poors and

Moody's, and Fitch. These agencies are dominant in the market with an estimated share of 40% referring to Standard & Poor's, Moody's and 15%, referring to Fitch. In addition, the number of issuers rated by Standard & Poors increases from 1386 in 1981 to 5860 in 2009, with a significant increase in revenues. The emergence of new notes is carried away by the strong investor demand in the financial markets for information about issuers of shares and bonds. Schroeter (2011) shows that the novel score gives new information on the situation of the issuer of the bond, and that the issuer many face these engagements.

The ratings of sovereign debt by the rating agencies are considered as assessments of the defaults probability of the public debt. Indeed, these agencies use economic and political factors to make a qualitative and quantitative assessment of the asset. Through this process, the change in rating sovereign debt may give new information on the financial situation of a country requiring considerable externalities to the private sector of the country, which can be convenient for the investors to keep assets.

Sovereign ratings are those of the ability and willingness of governments to deal with their financial markets. These ratings affect the dynamics of capital markets and the capital cost. Brooks & al, (2004) indicate that the degradations of ratings have a negative impact on the stock markets.

Gande and Parsley (2005), and Ferreira and Gamma (2007) denote that the sovereign downgrades have introduced new valuable information for the spreads of sovereign bonds and aggregate stock returns of other countries, especially in the emerging economies, countries and neighbors.

Ismailescu and Kazemi (2010) point out, in their study on the swap market, that positive signals affect the price of CDS. However, Norden and Weber (2004) find the results quite inconsistent. All these authors notice that negative scoring signals have more effect on CDS spreads, but they note that negative signals significantly expand CDS spreads for issuers of investment grade. The positive effects show lower impacts (Gwion and al, 2013).

Kim and Wu (2008) attempt to examine the role of attractive sovereign ratings S & P international capital. They consider that the new sovereign rating is an important incentive for the three types of international capital flows (Salvador, 2017). Similarly, they remark a great evolution of the bond market after the improvement of sovereign ratings. Borensztein & al., (2013) view that the sovereign ratings generally represent a measure of a country's credit risk.

A great deal of literature, Seghal et al (2013), has shown that the ratings issued by credit rating agencies have an impact on different segments of the financial system. As a matter of fact, previous studies have realized very significant relationships between the bad news provided by the agencies, stock market returns, currency, bond spreads, CDS spreads, and volatility in asset prices. However, the good news have an insignificant or limited impact (e.g. Kaminsky and Schumkler, 2002; Afonso & al, 2012; ap Gwilym Alsakka et al, 2012).

Afonso et al. (2014) show that when the stock exchange yields, currencies and sovereign bonds are highly correlated with the new credit quotes, particularly the bad ones. Several studies have proved that the sovereign ratings granted by the rating agencies generate cross-border effects (Gande and Parsley, 2005; Ferreira and Gama, 2007; De Santis, 2012), and others have produced evidence that there is a cross-country correlation in the stock and bond markets (Christopher & al, 2012; Huong et al, 2015).

Investors on the market have to distinguish between the credit ratings granted by the different credit rating agencies. However, Afonso & al. (2012) produce proof, in their study comparing the rating agencies, that the obligations of credit spreads react significantly with S & P announcement, whereas for Moody's and Fitch, advertisements limit the information content on the market. Moreover, Alsakka and ap Gwilym, (2012) observe that a number of empirical studies has put to the proof that the prospect signals are less important than the current rating changes in terms of the impact on financial markets.

### **3. Data**

#### *3.1 Data Selection*

This paper examines the impact of changes in sovereign credit rating on the liquidity of the Greece and Spain bond markets. The sample includes daily data on about sovereign bonds over the period ranging from July 2009 until January 2014. We use daily data extracted from the Datastream database. These data are historically limited by the data availability on the Bid-Ask spread. We obtain the assessments of these bonds from the Fitch's ratings agency. Then, we convert the ratings assigned to numbers of 23 (AAA) to 1 (D). For the remaining variables, data are extracted from the database Datastream.

Table 1. Descriptive statistics of the sample

Variable	Mean	Std. Dev.	Min	Max
<b>Liq</b>	-0.0257058	0.320645	-2.23924	1.023867
<b>Cr</b>	17.3497	3.861531	8	23
<b>Vol</b>	0.0236286	0.0435627	0.0001576	0.9374187
<b>Age</b>	7.023585	7.24137	-10.9116	37.0422
<b>Coup</b>	10.07584	5.437586	-1.9871	17.7465
<b>Ir</b>	7.462716	10.60874	0.015	74.3

### 3.2 Methodology

This study aims to study the sources of liquidity problem of sovereign bonds issued by these two countries. Our database consists of daily data across five countries such as Poland, Greece, Spain, Hungary and Turkey, for the period ranging from July, 2009 to January, 2014. Panel data are collected from the Datastream database.

In order to determine the factors according for the lack of liquidity in the Greece and Spain bond markets, we have used panel data as a technique of econometric analysis. Indeed, Greene (2003) defines panel data as a technique using cross-sectional data from the time domain to predict economic relations.

Similarly, Wooldridge (2002) shows that the panel data use the effects of time and those of cross-sections. Thus, the analysis makes use of data having both time and the number of bonds. Among the reasons, why this technique is preferred over other techniques is that the technology allows us to control the hidden effects that may be related to the parameters in the liquidity model. In addition, we expect that the financial data modeling is used so that it will have the dimensions of both time and bond number, leading us to more accurate results (Bayrakdaroglu et al, 2013).

As a matter of fact, using panel data is preferable to using time-series data and the cross for many reasons. First, in the panel data analysis, we do not meet the compliance-deficiency problem common in many time series analyses and sections. In addition, Sun and Parikh (2001) express that the observations collected during a period are arranged, and their number increases.

Similarly, Hsiao (1999) clarifies that the data range reduces the interaction between the variables and parameters, which will be more reliable. This improves the variation and the flow of information. Moreover, Gujarati (2003) indicates that the panel data could be used to analyze an infinite number of complex models with respect to the time series and cross-section analyses. However, Balestra (1992) and Baltagi (2001) corroborate that using panel data reduces several estimation problems such as autocorrelation accurate (Bayrakdaroglu and al., 2013).

Hausman's specification test is used to choose between the analyses methods of the fixed-effect model or random-effect model. Regarding this, hypothesis  $H_0$  states that random effects exist, and hypothesis  $H_1$  states that random effects do not exist. In fact, if the probability is less than 5% is used, we use the fixed effects. Otherwise, we use random effects.

Indeed, the results presented in table 4 show that hypothesis  $H_0$  is rejected for most models with 1% level of significance. Thus, we will use the fixed effect for most estimates. In other words, hypothesis  $H_1$  expressing the fixed-effect model is more effective than random-effect model. Furthermore, the fixed effects model in this study analyzes regression panel data.

### 3.3 Model

$$Liq_{it} = \alpha_0 + \alpha_1 CR_{it} + \alpha_2 Vol_{it} + \alpha_3 Coup_{it} + \alpha_4 Age_{it} + \alpha_5 IR_{it} + \varepsilon_t$$

**Liq<sub>it</sub>**: Bond liquidity i at time t

**CR<sub>it</sub>**: Credit rating announcement of bond i at time t

**Vol<sub>it</sub>**: Volatility of bond price i at time t

**Coup<sub>it</sub>**: Bond coupon

**Age<sub>it</sub>**: Age of the obligation

**IR<sub>it</sub>**: Interest rate

### 3.4 Definition of Variables

#### Liquidity:

Liquidity is considered of the greatest importance to the functioning of the financial markets. Indeed, structural changes in the financial systems having been ongoing for some time have increased the weight of market liquidity.

The literature provides a menu of measures and considers proxies to estimate the liquidity of the emerging markets. Lesmond (2005) reveals five different proxies for the liquidity measure. The first one expresses the bid-ask spread costs and the commission. This measure is stated as follows:

$$Quoted\ Spread_Q = 1/2[(AQ-BQ)/(AQ+BQ)/2 + (AQ-1-BQ-1)/(AQ-1+BQ-1)/2]$$

Saadaoui and Boujelbene (2014) posit this measure differently.

$$Liq = [(At-Bt)/(At+Bt) + (At-1-Bt-1)/(At-1+Bt-1)]$$

The second measure is enunciated by turnover. It is expressed as follows:

$$1/D_Q \sum_{t=1}^Q Volume_t / ShareOuts\ tan\ ding ,$$

Where  $D_Q$  is the number of days in the quarter,  $Q$ .

The third one expresses Amihud's measurement. In fact, the measure is expressed as follows:

$$1/D_q \sum_{t=1}^Q |R_t| / (Price_t * Volume_t)$$

The fourth one that explains the extent of Roll (1984). Eventually, the fifth one is an extent of LOT (1999).

Indeed, we try to use another measure used by Dastidar and Phelps (2009), and expresses the cost of liquidity score. It is presented as follows:

$$LCS = \begin{cases} (Bid - Ask)spread * OASD \longrightarrow if - bond - is - spread - quoted \\ (Ask Price - Bid Price) / Bid Price \longrightarrow if - bond - is - price - quoted \end{cases}$$

#### Credit rating

This explanatory variable account for the quality of the borrower. Several measures for this variable differ from one author to another. It is expressed by the rating reflecting the credit quality of the borrower in the form of notations differing from one agency to another. The three main rating agencies are the following: Standard and Poor's, Moody's, and Fitch. The notations used by these three agencies are as follows. They are transformed linearly in a digital form, as shown in Cantor and Packer (1996). After the transformation, the ratings are as follows (table 2)

Table 2. Numerical conversion of the sovereign credit rating

	23	22	21	20	19	18	17	16	15	14	13	12
<b>S&amp;P</b>		AAA	AA+	AA	AA-	A+	A	A-	BBB+	BBB	BBB-	BB+
<b>Moody's</b>				Aaa	Aa1	Aa2	Aa3	A1	A2	A3	Baa1	Baa2
<b>Fitch</b>	AAA	AA+	AA	AA-	A+	A	A-	BBB+	BBB	BBB-	BB+	BB
	11	10	9	8	7	6	5	4	3	2	1	0
<b>S&amp;P</b>	BB	BB-	B+	B	B-	CCC+	CCC	CCC-	CC	C	SD	D
<b>Moody's</b>	Baa3	Ba1	Ba2	Ba3	B1	B2	B3	Caa1	Caa2	Caa3	Ca	C
<b>Fitch</b>	BB-	B+	B	B-	CCC+	CCC	CCC-	CC	C	DDD	DD	D

The rating provided by the three main rating agencies, Standard and Poor's (S&P), Moody's, and Fitch, is converted into a numerical scale from 0 to 23, where 0 indicates the worst rating and 23 the best rating.

## Volatility

Since volatility is considered as the basis of the risk measurement, it is by definition a measure of the amplitude of fluctuations in the price of a financial asset. Thus, the higher the volatility of an asset is, the higher the investment is. As this asset is considered risky, more hope of gain or risk of loss will be high. In contrast, a risk-free asset -or a very low risk (e.g. Treasury)-, has a very low volatility because its reimbursement is virtually certain. As matter of fact, the volatility of a bond corresponds to the trend in response to a 1% change in the interest rates (Cizel, 2013).

## Age

It is the age of the bond  $i$  at time  $t$ , and considered as one of the main characteristics of the bond. It can range from a few months to fifty years before the capital is repaid. Over this period, the risk is greatly high as there is more chance that the bond will be sold before maturity if it is remote.

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## Coupon

The issuer offers interest to the investor as a compensation for the duration of the loan. It is expressed as a percentage of per-value. In principle, the amount of the coupon is high when the loan quality is low in the long run. On the contrary, the amount of the coupon is low when the loan quality is high in the short term.

The coupon may be fixed or variable. It is mostly paid on an annual basis, but bonds may pay coupons that are more regular on half-yearly or quarterly basis, for example. The coupon will depend on the duration of the obligation, and the quality of the issuer. There are also obligations that do not pay coupons during the period of the loan. This is called "zero-coupon" bonds.

## Interest Rate

The interest rate is regarded to be among the essential characteristics of the obligation. This is the rate used to assess the performance of each obligation. It is usually fixed and valid for the entire duration of the loan, but some bonds are "variable rate". There are also inflation-indexed bonds: their value and return keep track of price trends, and provide an effective safeguard against the loss of purchasing power if the prices skyrocket.

A fixed-rate bond can receive a constant rate (coupon) throughout the holding period of the product. The interest rate is in the wording of the obligation and the date. Through multiplying it by the amount of the nominal (the displayed value of the bond), we get the coupon.

In the case of a floating\_rate note, the income received by the borrower (the bondholder) varies every three months, every six months or every year depending on the rate of return at the market. If these rates rise, the bondholder receives a higher remuneration. If they fall, incomes go down.

## 4. Empirical Results

This paper examines the effect of Credit\_rating announcement on the bond liquidity, using the panel\_data methodology over 2009-2014 across 5 countries such as Poland, Greece, Spain, Hungary and Turkey. Table 3 below presents results derived from this analysis.

Table 3. Credit\_rating announcement and bond liquidity

	CR	VOLA	AGE	COUP	IR
<b>POLAND</b>	(0.0653267) 0.0000***	(0.245643) 0.019**	(0.093613) 0.0002***	(0.05391) 0.0001***	(0.0631521) 0.384
<b>GREECE</b>	(-0.0624657) 0.0001***	(0.272897) 0.000***	(-0.0034) 0.000***	(0.00256) 0.000***	(0.0039118) 0.000***
<b>SPAIN</b>	(-0.0008925) 0.021**	(-0.034) 0.423	(-0.0023) 0.0000***	(0.00159) 0.0001***	(-0.000325) 0.296
<b>HUNGARY</b>	(0.054382) 0.000***	(0.02145) 0.059*	(0.08767) 0.0000***	-	(0.016955) 0.0000***
<b>Turkey</b>	(0.0283256) 0.0000***	(1.2142) 0.000***	(0.021674) 0.398	(0.00162) 0.442	(-0.061423) 0.0000***

Significativity level: \*\*\*, 1%; \*\*5%;\* 10%

According to our results, we observe that the information value of the credit\_rating agency is a contentious and indeterminative issue. We also find that the change in ratings has a significant effect on the liquidity of bonds. These results are in line with previous researches' findings like those of Weinstein, (1977); Pinches and Singleton (1978); Kaplan and Urwitz (1979); and Wakeman (1981).

Several empirical studies on the significance of credit notifications on bond or equity returns have found out antonymous results. Some of them have investigated the change in the price of corporate bonds during the period around the announcement of a rating change, and implied that the stock market has no significant reaction to these notifications. Other studies have put into evidence that credit notifications provide a market information value.

We have attempted to account for the impact of credit notifications on the liquidity of emerging bond markets, essentially in the post-crisis period. The tables above show that credit notifications have a substantial effect on the liquidity of bonds. This significant effect may be positive or negative, depending on the sign of the rating awarded by the rating agencies. The negative effect is explained by the degradation of the rating attributed by the rating agency and this is explored in the results found relating to Greece and Spain where we notice the change in notations to a negative and significant effect at 1% level. These negative effects can be explained by the critical situations that Greece and Spain have gone through since the beginning of 2010. They can also be accounted for the economic and financial problems that have occurred in these two countries, leading to the intervention of the European Union to stabilize the financial and economic situation of Greece. These results confirm to the real situation these two countries have gone through, essentially in this period possibly explaining the informational content of the notifications granted by the rating agencies. Our results give proof show that rating agencies have taken into account the criticisms expressed by several market participants regarding their strategies, and the indicators used in the ratings given to financial assets.

Liquidity is a concept strongly dependent on information transparency. Indeed, the presence of information asymmetry between investors makes trading unclear, and results in a liquidity reduction in the market (Bagehot, 1971; Myers and Majluf, 1984). This theoretical observation may have an impact on the quality of the information disclosed by the various rating agencies compulsorily showing a practical interest for the managers of these agencies. They are capable of seizing the opportunity to improve their information disclosure policy for the aim of reducing information market asymmetries, increasing investors' trust, and widening the number of transactions in bond securities. As a matter of fact, our outcomes clearly account for this positive relationship between information asymmetry, and the liquidity of bonds.

Our results uphold Petersen's and Plenborg's work (2006) denoting that the high quality of disclosed announcement decreases information asymmetries on the market, increases investors' authority, and appreciates the liquidity of securities. This is explained by the weighty effect of the information asymmetry on the liquidity of the bond markets. Indeed, the more relevant and reliable the quality of the information disclosed by rating agencies is, the greater the liquidity of the securities is.

Our results also evince that the control variables used in our model, and representing the main characteristics of the bonds have a substantial impact on the liquidity of the bonds, and essentially on the interest rate. The latter clearly expressing the investors' financial behavior on the market suggests that the two factors, price and actuarial rate of return, are linked. Indeed, the reality of the market imposes that investors opt for the most profitable investments. Therefore, if interest rates rise, the investor will have an interest in selling his bond so as to invest in another. Moreover, when interest rates fall, the bond price increases. The bond age can indicate its liquidity level. In fact, this characteristic is negatively related to liquidity. Thus, the older a bond is or the longer it has been issued, the less liquid there will be. This is well-expressed in our outcomes for Greece and Spain in the period of the sovereign debt.

## 5. Conclusion

Due to the role of credit\_rating agencies in the sovereign debt crisis in the financial phase (2007-2008) of the current crisis, a great deal of criticism is voiced against rating agencies, and investors are affected by the performance of certain financial assets having the best ratings. This work examines the information value of local sovereign credit\_rating announcements in emerging countries. We analyze the effect of sovereign bond ratings on the liquidity of emerging bond markets.

The results of the empirical study indicate that ratings are comparable to signals, conveying information to investors on the bond market. Indeed, our results show that the notifications provided by the rating agencies send signals on the liquidity of the bonds; and the rating is a means for investors to convince the market, to attract the providers of

funds and to finance at a lower cost. Similarly, our results prove that the agencies give scores on a standardized scale; and the informational content of the signals issued depends on the nature of the advertisement and its intensity.

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