

The Links between Sovereign Debt Spreads and Sovereign Rating Evaluations

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Abstract:

This article examines the effects over time of rating news on Eurozone sovereign debt securities and their spreads during the period January 2010 - June 2012. We found during this period that the three most important rating agencies announced 91 times rating changes or outlook revisions. We classified and analyzed the announcements by a temporal and geographical point of view.

The German ten years Bond is our benchmark. We analyzed the spreads of ten European Counties part of Eurozone. Through the Pooled Least Squares method, we found how many basis points on average are moved by a rating announcement.

We knew that sovereign rating downgrades have statistically and economically significant effects on the financial markets of sovereign bonds. We found that the spread of market influences the judgment of the rating agencies too, using e-views program.

This news was not attended because it was considered that the rating agencies analyze the sovereign bonds through the analysis of countries macroeconomic and fiscal indicators. It was assumed that the rating agencies were resistant to market speculation.

However, we also find evidence that the market has its own dynamic not closely linked to the outlook of the rating agencies because it is influenced by other variables too.

Key words: rating agencies, sovereign bond, market speculation, eurozone, spread.

1. Introduction

The European sovereign debt crisis has renewed the debate on the role credit rating agencies play during crises. This debt crisis has been the theater of sovereign credit rating downgrades, widening of sovereign bond spreads, compared to Germany taken as a benchmark. Interestingly, financial markets throughout the Euro zone have been under pressure although credit rating actions were concentrated in few countries such as Greece, Ireland, Portugal, Spain and Italy.

While the debate continues previous discussions during the Asian crisis of 1997-98, the degree of financial integration achieved in Europe over the past decade offers unique conditions to study the impact of rating news on financial markets¹. Since the Treaty of Rome in 1957, an uninterrupted series of deregulation measures in particular in the banking sector have been put in place to promote European financial integration. It already has been shown that the news about the sovereign rating, as downgrade, have spillove effects both between countries and markets in an economically integrated area as Europe².

The issue at stake in the present work is whether sovereign rating news are published before the widening of the spread between any Eurozone country and Germany or if the rumors of the financial market and the widening of spreads push or force rating agencies to change their judgment on sovereign bonds.

This clarification is necessary to understand who has the power to govern the cost and the fate of sovereign bonds.

We took and analyzed the Eurozone countries and the differences between their debt compared to the German debt.

¹ R. Arezki, B. Candelon, A. Sy (2011), "Sovereign Rating News and Financial Markets Spillovers: Evidence from the European Debt Crisis"

² Favero, C.A. and Giavazzi, F. (2002), "Is the International Propagation of Financial Shocks Non Linear? Evidence from the ERM"

We confronted ten-year bonds of each country compared with German ten-year Bund.

Some of the Euro countries do not have a daily price (quotation) of their debt so as a result they may be less useful for our research. These are small countries and their total amount of debt is negligible compared to the total debt of the Eurozone. These are six countries: Cyprus, Estonia, Slovakia, Slovenia, Malta and Luxembourg.

On the other hand, we have taken the ten most important countries of the Eurozone (apart from Germany) that have daily quotations. These countries are: Austria, Belgium, Finland, France, Greece, Ireland, Italy, Netherlands, Portugal and Spain.

As regard the temporal aspect of the analysis, we have taken the dates ranging from the beginning of January 2010 to the end of June 2012.

We decided to take 2010 as the starting date because, despite the financial and economic crisis broke out in September 2008, it is only at the beginning 2010 that the crises impacted on public budgets, increasing the deficit and the managing cost of public debt.

We will look before and after a rating change what happens to the spread of each country. We will notice (temporally speaking) if the rating agency is intervened after the increase in the spread between two countries or, on the other hand, the up / downgrading has consequently affected the spread.

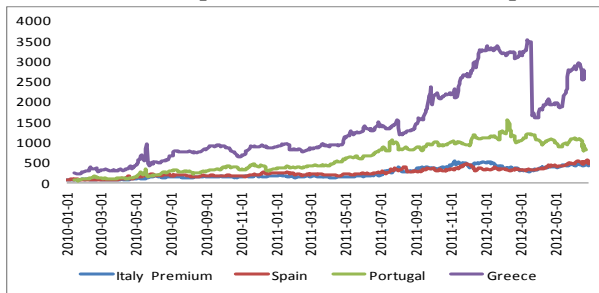
Whatever the outcome will be, the experts will continue to talk and discuss about the rating agencies/spread link.

In the event that it will prove that the rating agencies affect spreads or are strongly influent to the spreads, then it will open up issues related to the importance that rating agencies have over sovereign debt and about a potential conditioning power on the states. It will also bring questions

related to their assessment methodologies and their accountability.

In cases where it is shown that the rating agencies are forced to modify their reviews due to the persistent extreme evolutions in the spreads, then it will open up debates about the real utility of the rating agencies and their methodologies of the evaluation. Last but not least, the question arises whether the market or speculators who help to make the market may be able to provoke a country failure beyond the real capacity of a state to honor its debt.

Figure 1: 10 Y – Bond Spreads for Selected European Countries



2. The European Debt Crisis through the Lens of Credit Rating Agencies

We focus on the three major credit rating agencies³, i.e. Standard & Poors (S&P), Moody's and Fitch. The announcements of various types, namely rating changes (upgrades and downgrades), revision of outlook (positive and negative) and review for future rating changes. These different rating announcements can also occur simultaneously, even if rating agencies typically signal in advance their intention to consider rating changes. For example, Fitch, Moody's and S&P use a negative "outlook" notification to indicate the potential for

³ Afonso, D. Furceri and P. Gomes (2011), Sovereign Credit Ratings and Financial Markets Linkages Application to European Data. Working Paper Series, E.C.B. No 1347 / June 2011

a downgrade within the next two years (one year in the case of speculative-grade credits). They also use negative “watch” notifications to indicate that a downgrade is likely within the next 90 days. In this case, we will assign a number from 1 to 20 for each rating. The maximum number will be assigned to the best rating while the smallest to the worst one.

Table 1: S&P, Moodys and Fitch rating systems

	Moody's	Standard & Poor's	Fitch Ratings	Characterization of Debt and issuer:
Points	Long term			
20	Aaa	AAA	AAA	"Prime". Highest Quality
19	Aa1	AA+	AA+	High Quality
18	Aa2	AA	AA	
17	Aa3	AA-	AA-	
16	A1	A+	A+	Strong Payment Capacity
15	A2	A	A	
14	A3	A-	A-	
13	Baa1	BBB+	BBB+	Adequate payment capacity
12	Baa2	BBB	BBB	
11	Baa3	BBB-	BBB-	
10	Ba1	BB+	BB+	Likely to fulfil obligations, ongoing uncertainty
9	Ba2	BB	BB	
8	Ba3	BB-	BB-	
7	B1	B+	B+	High Credit Risk
6	B2	B	B	
5	B3	B-	B-	
4	Caa	CCC+	CCC	Very High Credit Risk
3	Ca	CCC		Near Default
2	C	CCC-		
1	/	D	DDD	Default
0.67	/		DD	
0.33	/		D	

Variables used

AGENCY_i agency name = "j", country rating= "i" (word)
 ANNOUN_i = outlook (negative , etc) in the country "i" (word)
 COUNTRY_i = name of the country "i" which refers to the rating (word)
 DJRATINGZ_i = change in the credit rating of the country "i" by one of the three agencies
 JRATINGZ_i_j = rating of the country "i" assigned by the agency " j" . The value of the rating remains the same as when it was given until it is changed (number)

MJRATINGZ_IT = is the average of the three JRATINGZ_i_ rating agency attributed to a certain country (number)
 NRATINGZ_i = dummy that takes value 1 in a rating day for the country (zero otherwise) (number)
 RATING_i = rating of the country "i" (word)
 RATINGZ_i_j rating numbered of the country "i" by agency "j" value "n.a." if there is no credit rating (number)
 UNSOL_i = there is a "*" if the rating is unsolicited (word)
 P_i = the yield spread of the country "i" compared to Germany

There were 91 rating announcements between January 2010 and June 2012 which constitutes the period of analysis for this paper. An exhaustive list of these news together with the countries subject to the rating announcement and the dates of occurrence is provided in Table 1 Table 2 summarizes the volume and type of rating announcements broken down by credit rating agencies. It shows that out of the 91 announcements there were 46 rating changes mostly downgrades, 45 outlook revisions.

S&P is the most frequent announcer (42 announcements), followed by Fitch (32 announcements) and Moody's (17 announcements).

Table 2: Rating Announcements

Nr	Country	Date	Rating	Rating Announcements	Rating Agency
1	Austria	12/05/2011	AAA	Watch Negative	S&P
2	Austria	1/13/2012	AA+	Negative	S&P
3	Belgium*	12/14/2010	AA+	Negative	S&P
4	Belgium	05/23/2011	AA+	Negative	Fitch
5	Belgium*	11/25/2011	AA	Watch Negative	S&P
6	Belgium*	12/05/2011	AA	Negative	S&P
7	Belgium	12/10/2011	Aa3	Negative	Moody's
8	Belgium	12/16/2011	AA+	Watch Negative	Fitch
9	Belgium*	01/13/2012	AA	Negative	S&P
10	Belgium	01/27/2012	AA	Negative	Fitch

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11	Finland	12/05/2011	AAA	Negative	S&P
12	Finland	01/13/2012	AAA	Watch Negative	S&P
13	France*	12/05/2011	AAA	Negative	S&P
14	France	12/16/2011	AAA	Negative	Fitch
15	France*	01/13/2012	AAA	Watch Negative	S&P
16	Greece	03/16/2010	BBB+	Negative	S&P
17	Greece	04/09/2010	BBB-	Negative	Fitch
18	Greece	04/10/2010	A3	Negative	Moodys
19	Greece	04/27/2010	BB+	Negative	S&P
20	Greece	06/10/2010	Ba1	Negative	Moodys
21	Greece	12/02/2010	BB-	Watch Negative	S&P
22	Greece	12/21/2010	BBB-	Watch Negative	Fitch
23	Greece	01/14/2011	BB-	Negative	Fitch
24	Greece	03/29/2011	BB-	Watch Negative	S&P
25	Greece	05/09/2011	B	Watch Negative	S&P
26	Greece	05/20/2011	B+	Watch Negative	Fitch
27	Greece	06/10/2011	Caa1	Negative	Moodys
28	Greece	06/13/2011	CCC	Negative	S&P
29	Greece	06/13/2011	CCC	Stable	Fitch
30	Greece	07/10/2011	Ca	Watch Negative	Moodys
31	Greece	07/27/2011	CC	Negative	S&P
32	Greece	09/05/2011	B	Watch Negative	S&P
33	Greece	02/22/2012	C	Stable	Fitch
34	Greece	02/27/2012	D	SD	S&P
35	Greece	03/09/2012	D	SD	Fitch
36	Greece	03/09/2012	C	Stable	Moodys
37	Greece	03/13/2012	B-	Stable	Fitch
38	Greece	05/02/2012	CCC	Negative	S&P
39	Greece	05/17/2012	CCC	Negative	Fitch
40	Ireland	07/10/2010	Aa2	Watch Negative	Moodys
41	Ireland	08/24/2010	AA-	Negative	S&P
42	Ireland	10/06/2010	A+	Negative	Fitch

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43	Ireland	11/23/2010	A	Watch Negative	S&P
44	Ireland	12/09/2010	BBB+	Stable	Fitch
45	Ireland	12/10/2010	Baa1	Watch Negative	Moodys
46	Ireland	02/02/2011	A-	Watch Negative	S&P
47	Ireland	04/01/2011	BBB+	Watch Negative	Fitch
48	Ireland	04/01/2011	BBB+	Stable	S&P
49	Ireland	04/10/2011	Baa3	Negative	Moodys
50	Ireland	04/14/2011	BBB+	Negative	Fitch
51	Ireland	07/10/2011	Ba1	Stable	Moodys
52	Ireland	12/16/2011	BBB+	Watch Negative	Fitch
53	Ireland	01/13/2012	BBB+	Negative	S&P
54	Italy*	05/20/2011	A+	Negative	S&P
55	Italy*	09/19/2011	A	Negative	S&P
56	Italy	10/07/2011	A+	Negative	Fitch
57	Italy	10/10/2011	A2	Negative	Moodys
58	Italy*	12/05/2011	A	Watch Negative	S&P
59	Italy	12/16/2011	A+	Watch Negative	Fitch
60	Italy*	01/13/2012	BBB+	Negative	S&P
61	Italy	01/27/2012	A-	Watch Negative	Fitch
62	Italy	02/10/2012	A3	Stable	Moodys
63	Netherlands*	12/05/2011	AAA	Watch Negative	S&P
64	Netherlands*	01/13/2012	AAA	Negative	S&P
65	Portugal	03/24/2010	AA-	Negative	Fitch
66	Portugal	04/27/2010	BB	Negative	S&P
67	Portugal	07/10/2010	A1	Watch Negative	Moodys
68	Portugal	11/30/2010	BBB-	Watch Negative	S&P
69	Portugal	12/23/2010	A+	Negative	Fitch
70	Portugal	03/10/2011	A3	Watch Negative	Moodys
71	Portugal	03/24/2011	BBB-	Negative	S&P
72	Portugal	03/24/2011	A-	Watch Negative	Fitch
73	Portugal	03/29/2011	BBB	Watch Negative	S&P
74	Portugal	04/01/2011	BBB-	Watch Negative	Fitch
75	Portugal	04/10/2011	Baa1	Negative	Moodys

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76	Portugal	07/10/2011	Ba2	Watch Negative	Moody's
77	Portugal	11/24/2011	BB+	Negative	Fitch
78	Portugal	12/05/2011	A-	Watch Negative	S&P
79	Portugal	01/13/2012	A-	Negative	S&P
80	Portugal	02/10/2012	Ba3	Stable	Moody's
81	Spain	04/28/2010	BBB+	Negative	S&P
82	Spain	05/28/2010	AA+	Stable	Fitch
83	Spain	03/04/2011	AA+	Negative	Fitch
84	Spain	10/07/2011	AA-	Negative	Fitch
85	Spain	10/13/2011	A	Negative	S&P
86	Spain	12/05/2011	AA-	Watch Negative	S&P
87	Spain	12/16/2011	AA-	Watch Negative	Fitch
88	Spain	01/13/2012	AA-	Negative	S&P
89	Spain	01/27/2012	A	Negative	Fitch
90	Spain	04/26/2012	AA	Negative	S&P
91	Spain	06/07/2012	BBB	Negative	Fitch

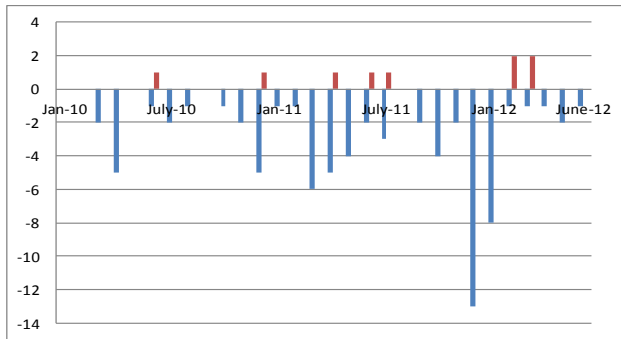
*unsolicited

Table 3: Rating Announcements by Rating Agency

	S&P	Fitch	Moody's	Total
Rating changes	17	17	12	46
of which upgrades	2	1	0	3
of which downgrades	15	16	12	43
Outlook revision*	25	15	5	45
of which positive	0	0	0	0
of which negative	25	13	5	43
of which maintained	0	2	0	2
*not rating changes				
Total	42	32	17	91

Figure 2 shows the number of rating announcements simply by distinguishing between positive and negative announcements. The graph shows a continuous announcements increase from January 2010 to January 2012.

Figure 2: Positive and Negative Announcements over Time (1/2010 - 6/2012)



The graph has been proposed despite refers to a period prior to the research.

This observation suggests that the rating agencies have not anticipated and they failed to predict the macroeconomic weaknesses of European economies consecutive to the financial crisis.

This certainly reflects the nature of the unresolved European debt crisis. The number of positive credit rating announcements were extremely small (revisions mostly positive outlook). These announcements came as a result of agreements between countries such as Ireland, Portugal and Greece and international institutions (IMF, WB, EU). This could also suggest that the credit rating agencies foresaw that these downgrades were temporary and that in future European countries have recovered to pre-crisis levels but today we can no longer believe in a quick recovery of public finances and the rating on the sovereign debts.

Credit rating announcements are not only concentrated over time but are also concentrated spatially. Table 4 describes the number of rating announcements by regions and for a selected number of European countries. It indicates that Southern Europe with 60 announcements has concentrated most of the announcements. We observe that 31 rating announcement were issued for Northern Europe countries.

Among individual countries, Greece followed by Portugal and Ireland has concentrated the highest number of rating announcements. Italy has the lowest number of rating announcements in Southern Europe and has been subject to relatively fewer rating downgrades than revisions of outlook.

Table 4: Geographical Origin of the Credit Rating News

	Rating changes	Outlook revisions	Total
Regions	46	45	91
South Europe	37	23	60
North Europe	9	22	31
Individual Countries			
Greece	17	7	24
Spain	6	5	11
Italy	3	6	9
Ireland	6	8	14
Portugal	11	5	16
Total	46	45	91

3. Empirical analysis

In the empirical analysis will show visually the spread of the daily situation of each country. The line of the figure is made up of 660/665 data for each country. These data are average daily spreads, or the difference that a country has against the cost of the German 10 Year Bond. On the line marked with the color blue, are reported the days when the rating agencies change the rating or outlook announce with a black dot. In the small graphs we can see what happens in the 10 days before and after an announcement. What can we expect after a downgrading is that the spread rises and vice versa. Through graphs however we can understand more. A rating agency assesses the ability of a country to repay its debt by many variables. Their assessment must be impartial, highly professional, based on data, indicators and surveys. Certainly their judgment affect markets. Are rating agencies influenced by market rumors and speculation? Bubbles spread that the market cause, leads the

agencies to change the rating these latter change their judgments only when change the economic indicators and political situations. Another question we want to answer is whether the markets are moved only by the news coming from rating agencies or they have their own history and autonomy.

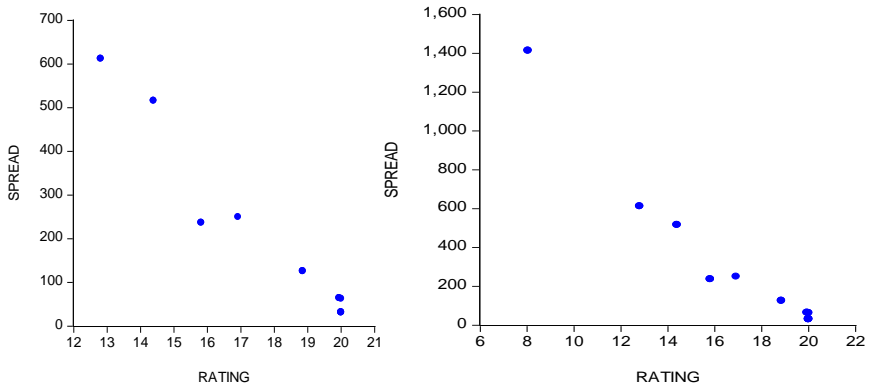
Dependent Variable: ABS (D(P?)) = absolute value of the daily variation in spreads across countries

Method: Pooled Least Squares
 Date: 09/12/13 Time: 17:28
 Sample (adjusted): 4/01/2010 29/06/2012
 Included observations: 648 after adjustments
 Cross-sections included: 10
 Total pool (unbalanced) observations: 6279

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Giorno del rating	5.516345	3.064533	1.800060	0.0719
1 giorno dopo	24.52207***	3.065363	7.999728	0.0000
2 giorni dopo	1.668021	3.082635	0.541102	0.5885
3 giorni dopo	2.734083	3.082819	0.886878	0.3752
4 giorni dopo	-0.583802	3.064557	-0.190501	0.8489
AUSTRIA	2.870413***	1.099288	2.611157	0.0090
BELGIUM	4.876387***	1.102220	4.424151	0.0000
FINLAND	1.110351	1.099288	1.010064	0.3125
FRANCE	2.940478***	1.097833	2.678439	0.0074
GREECE	28.97450***	1.122604	25.81008	0.0000
IRLAND	10.66358***	1.309414	8.143783	0.0000
ITALY	7.616188***	1.101334	6.915423	0.0000
NETHERLANDS	1.421496	1.099288	1.293107	0.1960
PORTUGAL	13.511107***	1.110050	12.17159	0.0000
SPAIN	8.028756***	1.104998	7.265853	0.0000
R-squared	0.091528	Mean dependent var		8.581621
Adjusted R-squared	0.089497	S.D. dependent var		29.27586
S.E. of regression	27.93510	Akaike info criterion		9.500031
Sum squared resid	4888237.	Schwarz criterion		9.516144
Log likelihood	-29810.35	Hannan-Quinn criter.		9.505614
F-statistic	45.07798	Durbin-Watson stat		1.742498
Prob(F-statistic)	0.000000			

The rating is assigned after the market closing. The increased market volatility due to the adjustment cause of the news runs out the next day and the adjustment is completed on that day. The market seems marginally "nervous" at the evening of the day of notification too. The variation after a rating announcement is 24,5 basis points on the average. Below the graphs show the linear relationship between the volatility 'and the rating and without Greece, considered here as an outlier.

Figure 3. Link between Rating and Spread Volatility with and without Greece



To give an answer for the questions of who influence whom, lets try a Causality Test. We will use the Pooled Least Squares Method and then the Wald Test. We have to remember that the rating is published in the evening of t., then the two equation to be tested are:

$$d(p) = c + dp(-1) + dp(-2) + \dots + DR(-1) + DR(-2) + \dots \quad (\text{DR means rating change})$$

$$DR = c + dp + dp(-1) + \dots + DR(-1) + DR(-2)$$

Dependent Variable: D(P?)
 Method: Pooled Least Squares
 Date: 12/01/14 Time: 18:23
 Sample (adjusted): 11/01/2010 27/06/2012
 Included observations: 643 after adjustments
 Cross-sections included: 9
 Total pool (unbalanced) observations: 5689

Variable	Coefficient	Std. Error	t-Statistic	Prob.
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C	0.340174	0.162277	2.096252	0.0361	C(1)
D(P?(-1))	0.185586	0.013281	13.97398	0.0000	C(2)
D(P?(-2))	-0.020704	0.013428	-1.541835	0.1232	C(3)
D(P?(-3))	-0.005065	0.013515	-0.374786	0.7078	C(4)
D(P?(-4))	-0.120192	0.013545	-8.873231	0.0000	C(5)
D(P?(-5))	0.026146	0.013361	1.956868	0.0504	C(6)
DJRATINGZ?(-1)	-2.809668	0.892398	-3.148446	0.0016	C(7)
DJRATINGZ?(-2)	1.513803	0.896715	1.688166	0.0914	C(8)
DJRATINGZ?(-3)	0.768169	0.896094	0.857242	0.3913	C(9)
DJRATINGZ?(-4)	-1.526799	0.894016	-1.707799	0.0877	C(10)
DJRATINGZ?(-5)	-1.752299	0.890788	-1.967133	0.0492	C(11)
<hr/>					
R-squared	0.051135	Mean dependent var	0.405971		
Adjusted R-squared	0.049464	S.D. dependent var	12.46293		
S.E. of regression	12.15079	Akaike info criterion	7.834598		
Sum squared resid	838310.2	Schwarz criterion	7.847449		
Log likelihood	-22274.51	Hannan-Quinn criter.	7.839073		
F-statistic	30.59907	Durbin-Watson stat	1.999744		
Prob(F-statistic)	0.000000				

The hypothesis that the rating coefficients are all zero is:

$$C(7)=C(8)=C(9)=C(10)=C(11)=0$$

Wald Test:

Pool: SPAHO_NOGR

Test Statistic	Value	df	Probability
F-statistic	3.959360	(5, 5678)	0.0014
Chi-square	19.79680	5	0.0014

Null Hypothesis: $C(7)=C(8)=C(9)=C(10)=C(11)=0$

Null Hypothesis Summary:

Normalized Restriction (= 0)	Value	Std. Err.
C(7)	-2.809668	0.892398
C(8)	1.513803	0.896715
C(9)	0.768169	0.896094
C(10)	-1.526799	0.894016
C(11)	-1.752299	0.890788

Restrictions are linear in coefficients.

The likelihood that all coefficients are zero is under 1% (0.0043 < 0.01). We reject the hypothesis that the rating change does not Granger-cause the variation in the spread, so the rating change cause the variation in the spread.

Now we will try the Causality Test to find if the spread variation can cause a Rating change.

Dependent Variable: DJRATINGZ?
 Method: Pooled Least Squares
 Date: 12/01/14 Time: 18:32
 Sample (adjusted): 8/01/2010 26/06/2012
 Included observations: 643 after adjustments
 Cross-sections included: 9
 Total pool (unbalanced) observations: 5703

Variable	Coefficient	Std. Error	t-Statistic	Prob.	
C	-0.008471	0.002407	-3.519875	0.0004	C(1)
D(P?)	-0.000390	0.000197	-1.979218	0.0478	C(2)
D(P?(-1))	0.000451	0.000199	2.265486	0.0235	C(3)
D(P?(-2))	-0.001216	0.000200	-6.085388	0.0000	C(4)
D(P?(-3))	0.000539	0.000201	2.679100	0.0074	C(5)
D(P?(-4))	-4.27E-05	0.000198	-0.215034	0.8297	C(6)
DJRATINGZ?(-1)	0.091172	0.013261	6.875001	0.0000	C(7)
DJRATINGZ?(-2)	-0.008080	0.013310	-0.607077	0.5438	C(8)
DJRATINGZ?(-3)	-0.029484	0.013268	-2.222199	0.0263	C(9)
DJRATINGZ?(-4)	-0.018557	0.013274	-1.397974	0.1622	C(10)
DJRATINGZ?(-5)	0.027432	0.013227	2.073968	0.0381	C(11)
R-squared	0.017244	Mean dependent var		-0.009293	
Adjusted R-squared	0.015517	S.D. dependent var		0.181824	
S.E. of regression	0.180408	Akaike info criterion		-0.585270	
Sum squared resid	185.2568	Schwarz criterion		-0.572446	
Log likelihood	1679.897	Hannan-Quinn criter.		-0.580805	
F-statistic	9.987477	Durbin-Watson stat		2.006790	
Prob(F-statistic)	0.000000				

The hypothesis that the spread variation coefficients are all zero is:
 $C(2)=C(3)=C(4)=C(5)=C(6)=0$

Wald Test:
 Pool: SPAHO_NOGR

Test Statistic	Value	df	Probability

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F-statistic	8.765172	(5, 5692)	0.0000
Chi-square	43.82586	5	0.0000

Null Hypothesis: C(2)=C(3)=C(4)=C(5)=C(6)=0

Null Hypothesis Summary:

Normalized Restriction (= 0)	Value	Std. Err.
C(2)	-0.000390	0.000197
C(3)	0.000451	0.000199
C(4)	-0.001216	0.000200
C(5)	0.000539	0.000201
C(6)	-4.27E-05	0.000198

Restrictions are linear in coefficients.

The probability that all coefficients are zero are under 1% (0.0000 <0.01). We reject the hypothesis that the spread variation does not Granger-cause the variation of the rating, so the variation spread cause a rating change too.

Lets consider a Rating change under the condition that it has not been previously modified.

Dependent Variable: D(P?)

Method: Pooled Least Squares

Date: 12/01/14 Time: 18:42

Sample (adjusted): 3/02/2010 27/06/2012

Included observations: 626 after adjustments

Cross-sections included: 9

Total pool (unbalanced) observations: 5536

Variable	Coefficient	Std. Error	t-Statistic	Prob.	
C	0.530748	0.220611	2.405805	0.0162	C(1)
P?(-1)	-0.000702	0.000657	-1.069236	0.2850	C(2)
D(P?(-2))	0.014786	0.013616	1.085934	0.2776	C(3)
D(P?(-3))	-0.011654	0.013995	-0.832727	0.4050	C(4)
D(P?(-4))	-0.122091	0.013957	-8.747790	0.0000	C(5)
D(P?(-5))	0.004573	0.013686	0.334154	0.7383	C(6)
DJRATINGZ?(-1)*(@MOVSUM(NRATING?(-2),22)=0)	-5.246616	1.329657	-3.945842	0.0001	C(7)
DJRATINGZ?(-2)	0.692317	0.918739	0.753551	0.4512	C(8)
DJRATINGZ?(-3)	1.039627	0.922049	1.127518	0.2596	C(9)

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DJRATINGZ?(-4)	-1.394573	0.919872	-1.516051	0.1296	C(10)
DJRATINGZ?(-5)	-2.062574	0.916795	-2.249764	0.0245	C(11)
R-squared	0.019535	Mean dependent var	0.381606		
Adjusted R-squared	0.017760	S.D. dependent var	12.61060		
S.E. of regression	12.49811	Akaike info criterion	7.891018		
Sum squared resid	863020.8	Schwarz criterion	7.904170		
Log likelihood	-21831.34	Hannan-Quinn criter.	7.895603		
F-statistic	11.00802	Durbin-Watson stat	1.641268		
Prob(F-statistic)	0.000000				

The hypothesis is the non relevance of previous Rating variations..

$$C(8)=C(9)=C(10)=C(11)=0$$

Wald Test:

Pool: SPAHO_NOGR

Test Statistic	Value	df	Probability
F-statistic	2.474741	(4, 5525)	0.0423
Chi-square	9.898966	4	0.0422

Null Hypothesis: C(8)=C(9)=C(10)=C(11)=0

Null Hypothesis Summary:

Normalized Restriction (= 0)	Value	Std. Err.
C(8)	0.692317	0.918739
C(9)	1.039627	0.922049
C(10)	-1.394573	0.919872
C(11)	-2.062574	0.916795

Restrictions are linear in coefficients.

The hypothesis is acceptable to 1% and by the way the only other significant rating coefficient is t-5 that appears to have no economic significance. Therefore we accept the hypothesis that a rating change is significant in t-1.

4. Conclusions

It was clear for a long time and through many studies, mentioned in the references, that between sovereign ratings

and sovereign spreads there is a direct link. What was not so clear was who influenced whom. An increasing the spread could force rating agencies to downgrade or was these latest to cause the increase of the spreads and speculative spirals. We used the Pooled Least Squares Method to enlight and clarify the answers of our questions.

The general features emerged by the analysis are as follows:

- The Rating change has a significant effect on the spread that changes by 24,5 bp on the average.
- Considering that the rating is issued during the evening, after the closing, the market is fully adjusted during the following day. As a consequence we can affirm that there is a full efficiency into the analysed markets.
- A spread higher than that corresponding with the rating has the tendency to shrink the next day until compatible values corresponding with the rating
- The downgrading and the corresponding increase in spreads is accompanied by a strong and persistent volatility.
- The increasing spreads influence the Rating agencies and push them to make negative announcements. The rating agencies does not resist to the pressure spreads and speculators. The Rating Agencies does not remain anchored to assessments based on macroeconomic and social indicators in each country. If you want to be good, we can affirm that the reasoning of the agencies follows is that the increase in the spread will cause an increase in interest on sovereign bonds. This forces governments to raise taxes or cut spending and causes a deterioration of macroeconomic indicators of the country.
- The spread although influenced by rating has its own autonomy because is conditioned by market rumors, statements from political and economic world, the provision of dialogue of social partners and trade unions, the unstable confidence that investors have to the country and is conditioned by speculators.

-Rating agencies have not warned the crisis but their work is still based on country indicators.

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