

# **Credit Rating Changes in European Countries during Crisis: Market Reaction and Information Transfers**

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## **Abstract**

This paper examines how credit rating announcements affect yield and volatility in five European markets (Greece, Portugal, Ireland, Italy, and Spain). More specifically we examine whether country rating changes convey new information to market participants and whether rating announcements in one market affects yield changes and yield volatility in another market. Our findings indicate that, on average, downgrades by rating agencies convey more information to investors than upgrades. Also there are spill-over effects of credit rating announcements to countries with fiscal imbalances; however, the magnitude of the effect during the crisis period is not as pronounced as suggested by previous studies on the issue and seems to be confined mainly within the three countries that received bailout packages (Greece, Portugal, Spain).

Keywords: European financial crisis, credit rating, information spill-overs,  
bond markets

JEL Classifications: G12, G14, G15

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## 1. Introduction

During the spring of 2010 one of the major Credit Rating Agencies (CRAs), Standard & Poor's, downgraded the rating of Greece to BB+ and downgraded its view of Portugal. A few days earlier Greece admitted it was facing a major fiscal crisis and requested a major bailout package by the European Union and the International Monetary Fund (EU/IMF). The package (110 billion euro loan) was provided within the year. This, however, and despite a series of austerity measures that were imposed throughout European countries with fiscal problems, did not calm financial markets which were in turmoil. A few months later an aid package for Ireland (85 billion euro) was agreed and by the early summer of 2011 Portugal followed (78 billion euro).

The fiscal measures and the bailout packages did not succeed in reassuring nervous market participants and yield spreads (the difference between a country's 10-year Bond yield and the German 10-year Bond yield) rose significantly: the 10-year Greek spread rose to 12% while the spreads for Ireland and Portugal rose to around 6% (see Figure 1). The turmoil spread to other European countries, such as Italy and Spain (their spreads rose to nearly 2%), amid fears that they may be the next countries that will face fiscal imbalances. At the same time the major CRAs were downgrading the creditworthiness of the aforementioned countries (see Table 7). Many observers and EU officials suggested that downgrades only added to speculation in the market and suggested that CRAs have an anti-Europe bias.<sup>1</sup>

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<sup>1</sup> See the press conference of the President of the European Commission José Barroso on the downgrade of Portugal in 2011 (<http://www.reuters.com/article/2011/07/06/eurozone-ratings-barroso>).

Note that this is not the first time it has been suggested that CRAs play a part in the deepening of a crisis. For example, Ferri, Liu, and Stiglitz (1999) argue that CRAs behave pro-cyclically and aggravated the 1997-1998 East Asian crisis; first by failing to predict it and then by being excessively conservative by downgrading countries more than what the economic fundamentals could justify. This is perhaps to be expected to some extent since, as Cantor and Packer (1994) point out, investors and financial market regulators have come to rely significantly on the opinions of the CRAs. For example, before the subprime crisis investors relied on CRAs to rate instruments such as mortgage bonds and asset back commercial paper (ABCP) issued by entities such as the structured investment vehicles (SIVs) or monolines which insure municipal bonds and structured credit products such as tranches of CDOs (see for details, Crouhy, Jarrow, and Turnbull, 2008). As a result, many observers criticized the role of CRAs during the subprime crisis.<sup>2</sup>

Note that, the empirical literature on the spillover effects of credit rating changes is sparse (Arezki, Candelon, Sy, 2011). For example, Kaminsky and Schmukler (2002) is the first study to examine whether changes in a country's credit rating impacts on the financial stability of another country. They study a number of emerging markets and find that credit rating changes affect not only the financial markets of the country that is being rated but also that there is cross-country contagion. This effect is more pronounced during crisis periods and for neighbor countries. Arezki, Candelon, and Sy (2011) employ a VAR methodology to examine the spillover effects of rating changes in European markets for the period 2007-2010 and find that downgrades have

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<sup>2</sup> See for example, "First Subprime, Now Europe: Revenge of the Rating Agencies" *Spiegel Online International*, by Marc Pitzke, 2010, available at: <http://www.spiegel.de/international/business/first-subprime-now-europe-revenge-of-the-rating-agencies-a-692007.html>.

statistically and economically significant spillover effects both across countries and financial markets. Recently, Alsakka and Gwilym (2013) examine the reaction of the foreign exchange market to credit changes for the period between 2000 and 2010, and find strong spillover effects to neighboring countries exchange rates; these effects are more pronounced during financial crises.

Motivated by the above discussion, this paper examines how CRA announcements affect yield and volatility in five European markets with fiscal imbalances during the recent financial crisis; the countries are the three countries that first received financial aid packages (Greece, Portugal, Ireland) and two larger markets (Italy and Spain) that have also been under stress but that have not been hit as hard by the financial crisis. More specifically we ask three questions: *firstly*, do country rating changes convey new information to market participants? If announcements by CRAs convey new information we should observe a positive (negative) and statistically significant market reaction around or at the announcement day of an upgrade (downgrade). To this end, we use an event study methodology in order to examine changes in benchmark bond yields around CRA announcements. *Secondly*, do country rating changes convey information not only for the rated country but for other markets as well? In other words, is there a spill-over effect of a rating announcement to the other markets? To investigate this issue, we use regression analysis where the dependent variable is changes in a country's bond yield and the explanatory variables include dummy variables that capture the effect of upgrades and downgrades in other countries. *Thirdly*, do country rating changes affect not only yield volatility for the rated country but for other markets as well? We use a GARCH(1,1) model to model yield volatility for each market and then regression analysis in order to estimate the

effects of a rating change. Previous studies on the issue tend to concentrate on bond or stock prices and ignore volatility. The rest of this paper is organized as follows: Section 2 discusses the data and the methodology, section 3 presents the results, and section 4 concludes the paper.

## 2. Data and Testing Methodology

For the empirical estimations we employ data on daily yields and CRAs rating announcements for Greece, Portugal, Ireland, Spain, and Italy. In order to estimate the impact of a credit rating change on bond yields we first employ an event study methodology. That is, we first calculate daily changes in benchmark 10-year bond yields for the sample markets. Then we estimate the mean change in country's  $i$  bond yield ( $i$ = Greece, Portugal, Ireland, Italy, Spain) for rating upgrades and downgrades. All data are collected for Datastream and cover the period 2001 – 2011. The sample is also split in two sub-periods: the before-crisis period (2001-2008) and the crisis period (2009-2011).

We next compute the Cumulative Return (CR, i.e. cumulative yield change) for the days following the rating change for each event and the Average Cumulative Return (ACR, i.e. cumulative change in yield) for each country with (1):

$$ACR_{it} = \frac{1}{N} \sum_{n=1}^N CR_{it} \quad (1)$$

The statistical significance is evaluated with the  $t$ -statistic:  $t = \frac{\overline{ACR}}{\sigma / \sqrt{N}}$ , where  $\sigma$  is the standard deviation of the CRs and  $N$  is the number of CRs from which the ACR is estimated.

In order to examine whether changes in credit ratings affect the bond prices of the countries that are being rated and whether there is information transfer to the bond prices of other countries we estimate the following regression:

$$DY_{i,t} = \alpha + \beta_1 DY_{i,t-1} + \beta_2 D_{GR,t} + \beta_3 D_{POR,t} + \beta_4 D_{IR,t} + \beta_5 D_{IT,t} + \beta_6 D_{SP,t} + \varepsilon_{i,t} \quad (2)$$

In (2)  $DY_{i,t}$  is the daily change in the yield of country  $i$  at day  $t$ ,  $DY_{i,t-1}$  is the change in the yield of country  $i$  at time  $t-1$ ,  $D_{GR,t}$ ,  $D_{POR,t}$ ,  $D_{IR,t}$ ,  $D_{IT,t}$ ,  $D_{SP,t}$ , are dummy variables that take the value of (1) in the case of an upgrade, (-1) in the case of a downgrade, and zero otherwise, at day  $t$ , for Greece ( $GR$ ), Portugal ( $POR$ ), Ireland ( $IR$ ), Italy ( $IT$ ), Spain ( $SP$ ), respectively. If upgrades and downgrades in country  $X$  affect bond prices in country  $Y$ , then the dummy variable regression coefficient of country  $X$  should be statistically significant when the dependent variable is the yield change of country  $Y$ . Note that we estimated similar regressions in a pair-wise specification, i.e. with pairs of countries, and we obtained similar results as with regression (2). Thus, in order to save space we only report the results from (2).

To examine whether changes in credit ratings in one country affect yield volatility in another country we use autoregressive conditional heteroscedasticity (ARCH) models (Engle, 1982). Instead of assuming constant variance this specification allows the

conditional variance to vary over time. More specifically, in the ARCH( $q$ ) model the conditional variance is a function of past squared innovations ( $u_t$ ) in the mean of some other stochastic process:

$$y_t = \beta' x_t + u_t \quad (3)$$

$$u_t / \Omega_{t-1} \sim N(0, h_t) \quad (4)$$

$$h_t^2 = \omega + \sum_{i=1}^q a_i u_{t-i}^2 \quad (5)$$

In (3), (4), and (5),  $x_t$  is a vector including the information set  $\Omega_{t-1}$ ,  $u_t$  is a random error, and  $h_t^2$  is the conditional volatility of the stochastic process  $y_t$ . A more general process is the Generalised ARCH (GARCH) process (see, Bollerslev, 1986). This process captures leptokurtosis, skewness and volatility clustering. In the GARCH( $q,p$ ) model, the conditional volatility is specified as in (5) with the addition of its past squared values:

$$h_t^2 = \omega + \sum_{i=1}^q a_i u_{t-i}^2 + \sum_{i=1}^p c_i h_{t-i}^2 \quad (6)$$

Since most financial series tend to follow a GARCH(1,1) process (see Bollerslev et al, 1992), we use this specification to estimate yield volatility ( $V$ ) for each sample market. We then estimate regression (7) below, where  $V_{i,t}$  is the volatility of country  $i$  at day  $t$ , and the rest of the variables as defined above:

$$V_{i,t} = \alpha + \beta_1 D_{GR,t} + \beta_2 D_{POR,t} + \beta_3 D_{IR,t} + \beta_4 D_{IT,t} + \beta_5 D_{SP,t} + \varepsilon_{i,t} \quad (7)$$

### 3. Results

#### 3.1. Information Content of Rating Changes

Table 1 presents the mean reaction (mean change in yield) on a day of a rating change (day 0). Note that in the case of an upgrade in no country there is a statistically significant reaction, at the 5% level. There is weak evidence, at the 10% level, that for Greece ( $t$ -statistic: -1.8333) and Spain ( $t$ -statistic: -1.7582), the mean reaction is statistically significant. The negative sign, -0.0027 for Greece and -0.0030 for Spain, indicates that following an upgrade there is a drop in yields (i.e. increase in bond prices). Downgrades seem to surprise only investors in Portuguese bonds, on average ( $t$ -statistic: 2.368); the positive sign (0.0159) indicates that there is an increase in yields following a downgrade.

Table 2 presents the Average Cumulative Return (ACR) following an upgrade/downgrade, and the respective  $t$ -statistics for the five days after the event. As can be seen from Table 2, for all countries following a downgrade there are positive and statistically significant (at the 5% level) cumulative yield change at various levels of significance, with the exception of Ireland. In other words, yields tend to rise following a downgrade, suggesting that downgrades do convey information for investors, who react on this information within the week following the announcement. The results for up to ten days after the event are not statistically significant and thus are not reported here (available upon request); they are, however, presented graphically in Figures 2 and 3. Following an upgrade, yields change in a statistically



significant manner only for Portugal and have an unexpected positive sign, indicating a drop in prices following an upgrade. As above the results for up to ten days are not statistically significant and thus are not reported here (available upon request). The results for the days preceding the rating change are presented in Table 3. Note that, before downgrades, there is a statistically significant increase in yields only for Spain, while before upgrades there are only a couple of days with statistically significant (at the 5% level) yield changes for Italy and Ireland.

Overall, the findings in this section indicate that, on average, downgrades by rating agencies convey more information to investors than upgrades, and that investors tend to react within the trading week following a rating change, or within the week preceding the rating change. This result is consistent with previous studies on different markets that report significant investor reaction following downgrades but not upgrades (see, Dichev and Piotroski, 2001; Goh and Ederington, 1993; Hand, Holthausen, and Leftwich, 1992; Steiner and Heinke, 2001; Wansley, Glascock, and Clauretje, 1992, among others).

### **3.2. Information Transfer of Rating Changes**

The results from running regression (2) for the full sample (2001-2011) are presented in Table 4 (Panel A) and suggest that current yield changes are significantly affected by yesterday's yield changes for all countries; this result is statistically significant for all markets at the 5% level. Note that rating announcements for Portugal tend to have a statistically significant (at the 5% and 10% level) impact on yields for Greece ( $t$ -statistic: -1.80508), Ireland ( $t$ -statistic: -4.661), Italy ( $t$ -statistic -1.7953), and of

course Portugal itself ( $t$ -statistic: -4.7623). Rating announcements for Greece affect yield in Greece ( $t$ -statistic: -1.6244), and Ireland ( $t$ -statistic: -2.7878). Also announcements for Ireland affect yields in Portugal ( $t$ -statistic: 2.1431). The results for the first sub-period (Table 5, Panel A) indicate that it is mainly the yields in Ireland that are affected by rating changes in Portugal ( $t$ -statistic: -4.5413) and Spain ( $t$ -statistic: -2.6400); there is also weak evidence that yields in Spain are also affected by the rating changes in Portugal ( $t$ -statistic: 1.6091). During the crisis period (Table 6, Panel A) the results indicate that credit rating changes in Portugal affect yields in Portugal ( $t$ -statistic: -2.8796) and Ireland ( $t$ -statistic: -2.7856), while credit rating changes in Greece affect yields in Ireland at the 10% ( $t$ -statistic: -1.7235) and credit rating changes in Ireland affect yields in Portugal ( $t$ -statistic: 1.6950). Overall, the results presented in this section suggest that during the 2001-2011 period there are spill-over effects of credit rating announcements to countries with fiscal imbalances; however, the magnitude and the statistical significance of the effect during the crisis periods is not as pronounced as suggested by previous studies on the issue (Kaminsky and Schmukler, 2002; Arezki, Candelon, and Sy, 2011; Alsakka and Gwilym, 2013) and the spill-over effects seems to be confined mainly within the three countries that received bailout packages (Greece, Portugal, Spain).

### **3.3. Impact on Volatility**

The results on the effects of rating announcements on yield volatility (regression (7)) are also presented in Tables 4, 5, 6, in Panel B. Note that credit rating announcements in Greece seem to affect significantly daily volatility in Ireland ( $t$ -statistic: -5.5528) and Spain ( $t$ -statistic: -1.7534), announcements in Portugal seem to affect volatility in

Portugal (*t*-statistic: -5.0539), Ireland (*t*-statistic: -1.6505), Spain (*t*-statistic: -1.6618), announcements in Spain seem to affect volatility in Greece (*t*-statistic: -2.8738), Ireland (*t*-statistic: -4.9797), Spain (*t*-statistic: -1.7085). Also announcements in Italy seem to affect volatility in Greece (*t*-statistic: -5.5614). The results in Tables 5 and 6 (Panel B) for the period before and during the crisis indicate that before the crisis announcements in Portugal and Ireland affect volatility in Ireland, Spain and Italy, while during the crisis the results are less pronounced. For example, the only statistically significant (at the 5% level) is the effect of announcements in Italy for the volatility in Greece (*t*-statistic: -4.8251) and the effect of announcements in Portugal for the volatility in Portugal (*t*-statistic: -3.0687).

## **6. Conclusion**

This paper examines how CRA announcements affect yield and volatility in five European markets (Greece, Portugal, Ireland, Italy, and Spain). More specifically we examine whether country rating changes convey new information to market participants and whether there are CRA information spill-overs to countries other than the rated country; in other words, we examine whether rating announcements in one market affects bond yield changes and bond volatility in another market. Our findings indicate that, on average, downgrades by rating agencies convey more information to investors than upgrades, and that investors tend to react within the trading week following a rating change. Also during the 2001-2011 period there are spill-over effects of credit rating announcements to countries with fiscal imbalances; however, the magnitude and the statistical significance of the effect during the crisis period is not as pronounced as suggested by previous studies on the issue and the spill-over

effects seems to be confined mainly within the three countries that received bailout packages (Greece, Portugal, Spain).

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**Table 1**  
**Mean Reaction on Rating Change Days**

	Upgrades			Downgrades		
	Mean R(0)	t-statistic	No of upgrades	Mean R(0)	t-statistic	No of downgrades
<b>ITALY</b>	0.0017	0.6061	4	0.0003	0.1671	12
<b>SPAIN</b>	-0.0030**	-1.7582	7	0.0028	0.8488	13
<b>IRELAND</b>	0.0014	0.5970	10	0.0015	0.4307	17
<b>GREECE</b>	-0.0027**	-1.8333	12	0.0046	0.9784	25
<b>PORTUGAL</b>	0.0018	0.7448	6	0.0159**	2.3680	15

*Notes to Table 1*

\* denotes significance at the 5% level, \*\* denotes significance at the 10% level.

**Table 2**  
**Investor Reaction Following a Rating Change**

	<b>ITALY</b>	<b>SPAIN</b>	<b>IRELAND</b>	<b>GREECE</b>	<b>PORTUGAL</b>
	<b>Cumulative Yield Changes Following a Downgrade</b>				
<b>R-1</b>	0.0036	0.0034	0.0058	0.0082	0.0286*
<b>t-test</b>	1.8741**	1.0740	1.1569	1.5464	2.4943
<b>ACR-2</b>	0.0046	0.0114**	0.0103	0.0138**	0.0313**
<b>t-test</b>	1.1134	1.7806	1.5418	1.9255	1.7210
<b>ACR-3</b>	0.0070	0.0207*	0.0100	0.0150**	0.0088
<b>t-test</b>	1.4742	2.3498	1.2260	1.8492	0.3944
<b>ACR-4</b>	0.0108*	0.0326*	0.0051	0.0117	0.0082
<b>t-test</b>	2.0031	2.8752	0.5060	1.2161	0.3310
<b>ACR-5</b>	0.0125*	0.0340*	-0.0010	0.0091	0.0134
<b>t-test</b>	2.1295	2.7682	-0.1100	1.2019	0.5353
	<b>Cumulative Yield Changes Following an Upgrade</b>				
<b>R-1</b>	-0.0023	0.0002	-0.0000	-0.0024	0.00221
<b>t-test</b>	-0.6409	0.1039	-0.0136	-0.9084	1.6568
<b>ACR-2</b>	0.0004	-0.0011	-0.0032	-0.0022	0.0033
<b>t-test</b>	0.0800	-0.2405	-0.7181	-0.7750	1.3770
<b>ACR-3</b>	0.0009	-0.0051	0.0013	-0.0029	0.0044**
<b>t-test</b>	0.1267	-0.9901	0.2382	-0.6495	2.1712
<b>ACR-4</b>	-0.0007	-0.0076	0.0064	-0.0046	0.0045**
<b>t-test</b>	-0.1036	-1.4503	1.0532	-0.7617	1.9645
<b>ACR-5</b>	-0.0058	-0.0079	0.0072	-0.0067	0.0063**
<b>t-test</b>	-0.9983	-1.0204	0.7221	-1.2519	1.8666



**Table 3**  
**Investor Reaction Preceding a Rating Change**

	<b>ITALY</b>	<b>SPAIN</b>	<b>IRELAND</b>	<b>GREECE</b>	<b>PORTUGAL</b>
	<b>Cumulative Yield Changes Preceding a Downgrade</b>				
<b>R-1</b>	0.0014	0.0109*	-0.0022	-0.0035	-0.0034
<b>t-test</b>	0.5744	2.5402	-0.4410	-1.1741	-0.5876
<b>ACR-2</b>	-0.0042	0.0149*	-0.0054	-0.0002	-0.0061
<b>t-test</b>	-1.2721	2.9705	-0.6295	-0.0325	-0.5795
<b>ACR-3</b>	-0.0033	0.0241*	-0.0073	-0.0005	-0.0039
<b>t-test</b>	-1.1089	4.4597	-0.6824	-0.0522	-0.3438
<b>ACR-4</b>	-0.0050	0.0280*	-0.0105	0.0031	0.00440
<b>t-test</b>	-1.035	3.9408	-0.7514	0.2249	0.32589
<b>ACR-5</b>	-0.0037	0.0308*	-0.0100	0.0078	0.0198
<b>t-test</b>	-0.7248	3.4276	-0.7847	0.4844	1.2133
	<b>Cumulative Yield Changes Preceding an Upgrade</b>				
<b>R-1</b>	0.0037*	0.0017	-0.0012	0.0016	-0.0029
<b>t-test</b>	3.3535	0.4791	-0.4266	0.4383	-0.8141
<b>ACR-2</b>	0.0038**	-0.0026	-0.0025	0.0019	-0.0040
<b>t-test</b>	1.7460	-0.5790	-0.6268	0.5545	-0.7467
<b>ACR-3</b>	0.0002	-0.0011	-0.0076*	-0.0003	-0.0068
<b>t-test</b>	0.04463	-0.1863	-2.1772	-0.0312	-1.2087
<b>ACR-4</b>	0.00212	-0.0018	-0.0101*	-0.0053	-0.0046
<b>t-test</b>	0.2277	-0.2960	-2.0066	-1.6350	-1.2026
<b>ACR-5</b>	0.0039	-0.0053	-0.0087	-0.0080	-0.0028
<b>t-test</b>	0.6002	-0.8817	-1.4451	-1.0252	-0.5059

**Table 4**  
**Rating Change Information Transfer: 2001- 2011**

	<b>Panel A</b> <b>Information Transfer: Yield Changes</b>				
	<b>GREECE</b>	<b>PORTUGAL</b>	<b>IRELAND</b>	<b>SPAIN</b>	<b>ITALY</b>
<b>Constant</b>	0.0074*	0.0021	0.0003	0.0001	0.0004
<b>t-statistic</b>	2.2095	1.3163	0.2218	0.1185	0.3992
<b>DY<sub>i,t-1</sub></b>	0.2064*	0.1987*	0.2426*	0.1635*	0.1206*
<b>t-statistic</b>	11.084	10.560	12.806	8.4245	6.2029
<b>D<sub>Greece</sub></b>	-0.0506**	-0.0007	-0.0393*	-0.0121	-0.0103
<b>t-statistic</b>	-1.6244	-0.0460	-2.7878	-1.2950	-1.1030
<b>D<sub>Portugal</sub></b>	-0.0798**	-0.0995*	-0.0891*	-0.0157	-0.0227
<b>t-statistic</b>	-1.8508	-4.7623	-4.6611	-1.2452	-1.7953**
<b>D<sub>Ireland</sub></b>	0.0176	0.0408*	0.0004	0.0172	0.0174
<b>t-statistic</b>	0.44670	2.1431	0.0223	1.4499	1.4645
<b>D<sub>Spain</sub></b>	0.0094	0.0019	-0.0054	-0.0114	-0.0178
<b>t-statistic</b>	0.21456	0.0906	-0.2721	-0.8575	-1.3313
<b>D<sub>Italy</sub></b>	-0.0983**	0.0259	-0.0022	0.0075	-0.0079
<b>t-statistic</b>	-1.6709	0.9106	-0.0853	0.4367	-0.4586
	<b>Panel B</b> <b>Information Transfer: Volatility</b>				
	<b>GREECE</b>	<b>PORTUGAL</b>	<b>IRELAND</b>	<b>SPAIN</b>	<b>ITALY</b>
<b>Constant</b>	0.0337*	0.0045*	0.0058*	0.0026*	0.0027*
<b>t-statistic</b>	10.054	2.7413	21.8350	35.727	26.697
<b>D<sub>Greece</sub></b>	-0.0279	0.0014	-0.0135*	-0.0011**	-0.0011
<b>t-statistic</b>	-0.8900	0.0935	-5.5528	-1.7534	-1.2023
<b>D<sub>Portugal</sub></b>	-0.0246	-0.1064*	-0.0049**	-0.0012*	-0.0018
<b>t-statistic</b>	0.5714	-5.0539	-1.6505	-1.6618	-1.4403
<b>D<sub>Ireland</sub></b>	0.0138	0.0385*	-0.0110*	-0.0016**	-0.0007
<b>t-statistic</b>	0.3516	2.0032	-3.5487	-1.9386	-0.6606
<b>D<sub>Spain</sub></b>	-0.1266*	0.0001	-0.0174*	-0.0016**	-0.0018
<b>t-statistic</b>	-2.8738	0.0058	-4.9797	-1.7085	-1.3831
<b>D<sub>Italy</sub></b>	-0.3315*	0.0223	-0.0049	-0.0017	-0.0019
<b>t-statistic</b>	-5.6414	0.7769	-1.1062	-1.3822	-1.1007

**Table 5**  
**Rating Change Information Transfer: 2001- 2008**

<b>Panel A</b> <b>Information Transfer: Yield Changes</b>					
	<b>GREECE</b>	<b>PORTUGAL</b>	<b>IRELAND</b>	<b>SPAIN</b>	<b>ITALY</b>
<b>Constant</b>	0.0001	-0.0004	-0.0001	-0.0004	-0.0005
<b>t-statistic</b>	0.1246	-0.5372	-0.1665	-0.5073	-0.6582
<b>DY<sub>i,t-1</sub></b>	0.0357	0.0233	0.1020*	0.0350**	0.0392**
<b>t-statistic</b>	1.5881	1.0207	4.70281	1.6020	1.7902
<b>D<sub>Greece</sub></b>	-0.0203	-0.0179	-0.0102	0.0040	-0.0073
<b>t-statistic</b>	-1.2060	-0.9885	-0.7703	0.3264	-0.5444
<b>D<sub>Portugal</sub></b>	0.0094	0.0107	-0.1163*	-0.0386**	-0.0231
<b>t-statistic</b>	0.2288	0.2657	-4.5413	-1.6091	-0.9799
<b>D<sub>Ireland</sub></b>	-0.0586	-0.0522	-0.0189	0.0186	0.0024
<b>t-statistic</b>	-1.4266	-1.2869	-1.1288	1.1825	0.1606
<b>D<sub>Spain</sub></b>	-0.0039	-0.0031	-0.0522*	-0.0195	-0.0187
<b>t-statistic</b>	-0.1922	-0.1537	-2.6400	-1.0522	-1.0257
<b>D<sub>Italy</sub></b>	0.0075	0.0101	0.0063	0.0081	0.0031
<b>t-statistic</b>	0.4115	0.5584	0.3227	0.4396	0.1720
<b>Panel B</b> <b>Information Transfer: Volatility</b>					
	<b>GREECE</b>	<b>PORTUGAL</b>	<b>IRELAND</b>	<b>SPAIN</b>	<b>ITALY</b>
<b>Constant</b>	0.0019*	0.0015**	0.0022*	0.0018*	0.0019*
<b>t-statistic</b>	62.381	1.6656	54.881	82.865	79.633
<b>D<sub>Greece</sub></b>	0.0010**	-0.0183	-0.0002	0.0001	0.0001
<b>t-statistic</b>	1.7866	-1.0107	-0.3627	0.3218	0.3324
<b>D<sub>Portugal</sub></b>	0.0006	0.0112	-0.0041*	-0.0013**	-0.0009**
<b>t-statistic</b>	0.4451	0.2781	-3.8373	-2.2063	-1.6962
<b>D<sub>Ireland</sub></b>	-0.0004	-0.0500	-0.0024*	-0.0018**	-0.0012*
<b>t-statistic</b>	-0.3434	-1.2332	-3.4108	-4.7753	-3.0892
<b>D<sub>Spain</sub></b>	0.0009	-0.0024	-0.0011	-0.0006	-0.0003
<b>t-statistic</b>	1.3425	-0.1222	-1.3670	-1.3666	-0.7943
<b>D<sub>Italy</sub></b>	0.0000	0.0098	0.0001	0.0000	0.0000
<b>t-statistic</b>	-0.1332	0.5423	0.1295	-0.0046	0.0356

**Table 6**  
**Rating Change Information Transfer: 2008- 2011**

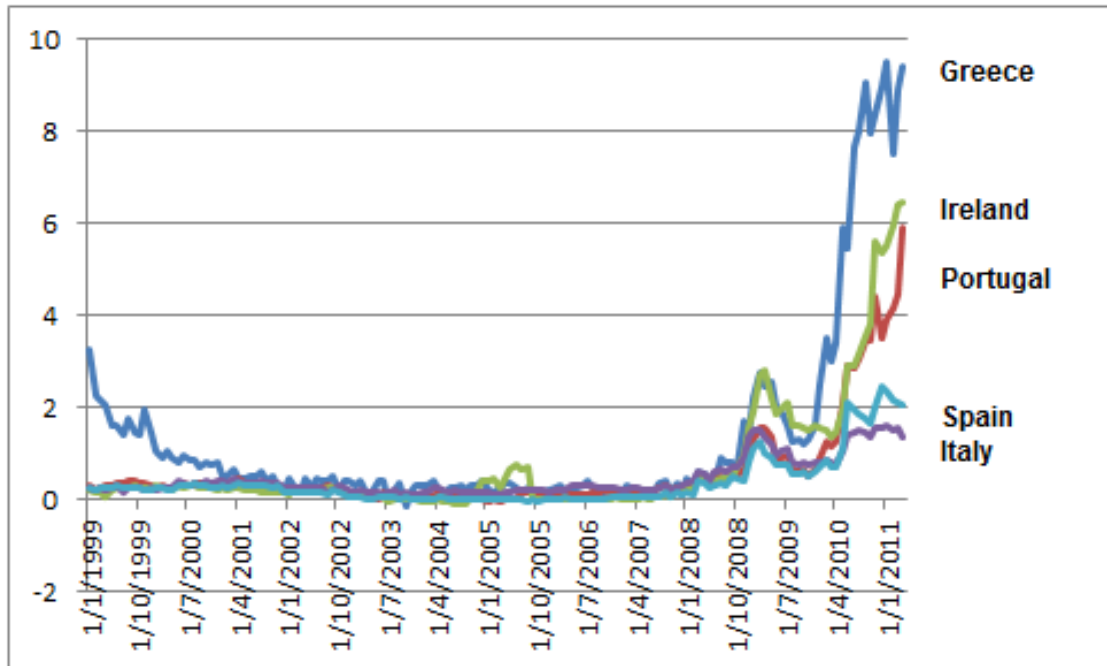
<b>Panel A</b> <b>Information Transfer: Yield Changes</b>					
	<b>GREECE</b>	<b>PORTUGAL</b>	<b>IRELAND</b>	<b>SPAIN</b>	<b>ITALY</b>
<b>Constant</b>	0.0308*	0.0078*	0.0009	0.0011	0.0017
<b>t-statistic</b>	2.2720	1.6050	0.2061	0.4450	0.6372
<b>DY<sub>i,t-1</sub></b>	0.2069*	0.2274*	0.2898*	0.2631*	0.1808*
<b>t-statistic</b>	5.5345	6.8735	8.4290	7.5085	5.0960
<b>D<sub>Greece</sub></b>	-0.0419	0.0083	-0.0449**	-0.0107	-0.0080
<b>t-statistic</b>	-0.5764	0.2987	-1.7235	-0.7527	-0.5599
<b>D<sub>Portugal</sub></b>	-0.0765	-0.1017*	-0.0911*	-0.0152	-0.0225
<b>t-statistic</b>	-0.8180	-2.8796	-2.7856	-0.8409	-1.2230
<b>D<sub>Ireland</sub></b>	0.0461	0.0512**	0.0023	0.0192	0.0196
<b>t-statistic</b>	0.5488	1.6950	0.0804	1.1670	1.1758
<b>D<sub>Spain</sub></b>	0.0618	0.0074	-0.0070	-0.0094	-0.0135
<b>t-statistic</b>	0.5604	0.1836	-0.1862	-0.4552	-0.6394
<b>D<sub>Italy</sub></b>	-0.2207	0.0530	-0.0131	0.0065	-0.0232
<b>t-statistic</b>	-1.2668	0.7558	-0.2020	0.1814	-0.6361
<b>Panel B</b> <b>Information Transfer: Volatility</b>					
	<b>GREECE</b>	<b>PORTUGAL</b>	<b>IRELAND</b>	<b>SPAIN</b>	<b>ITALY</b>
<b>Constant</b>	0.0975*	0.0115*	0.0156*	0.0048*	0.0050*
<b>t-statistic</b>	10.059	2.3207	18.986	20.846	14.936
<b>D<sub>Greece</sub></b>	0.0212	0.0121	-0.0080*	0.0002	0.0004
<b>t-statistic</b>	0.3674	0.4321	-1.8261	0.2256	0.2247
<b>D<sub>Portugal</sub></b>	0.0228	-0.1098*	0.0026	0.0003	-0.0001
<b>t-statistic</b>	0.3102	-3.0687	0.4791	0.2251	-0.0569
<b>D<sub>Ireland</sub></b>	0.0708	0.0497	-0.0026	0.0002	0.0011
<b>t-statistic</b>	1.0588	1.5290	-0.5197	0.1567	0.5669
<b>D<sub>Spain</sub></b>	-0.0636	0.0072	-0.0112	0.0002	0.0001
<b>t-statistic</b>	-0.7505	0.1764	-1.5478	0.1214	0.0646
<b>D<sub>Italy</sub></b>	-0.7056*	0.0422	-0.0039	-0.0023	-0.0027
<b>t-statistic</b>	-4.8251	0.5949	-0.3578	-0.7385	-0.5954



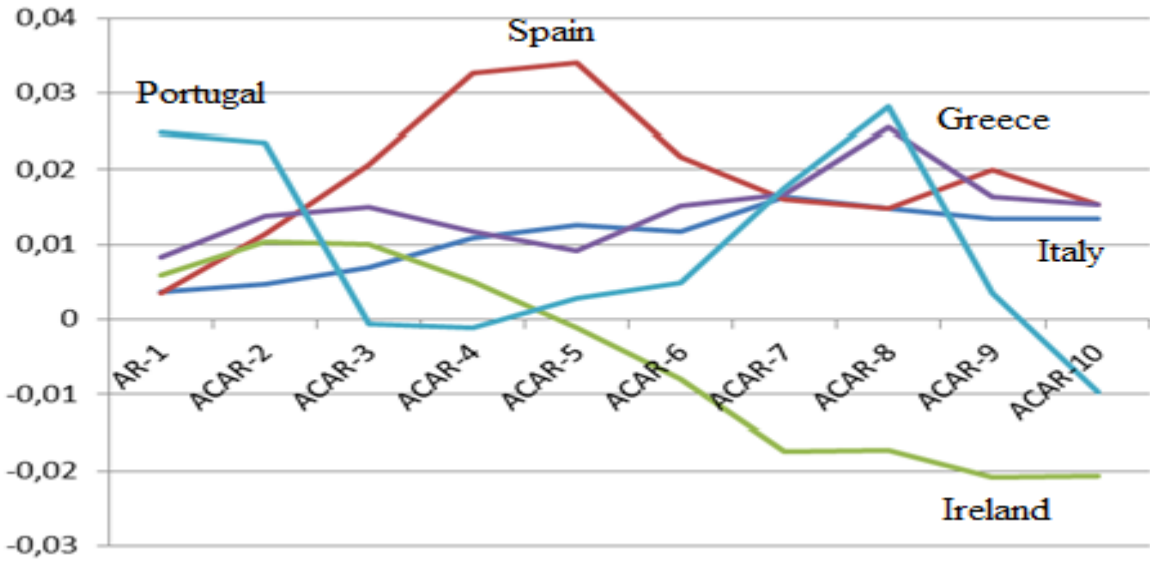
**Table 7  
Ratings by S&P and Moody's**

PORTUGAL			GREECE			IRELAND			SPAIN			ITALY		
DATE	RATE	AGENCY	DATE	RATE	AGENCY	DATE	RATE	AGENCY	DATE	RATE	AGENCY	DATE	RATE	AGENCY
18/11/1986	A1	Moody's	7/12/1992	BBB-	S&P	15/7/1987	Aa3	Moody's	3/2/1988	Aa2	Moody's	10/10/1986	Aaa	Moody's
7/12/1992	AA+	S&P	24/5/1994	Baa3	Moody's	27/11/1989	AA-	S&P	1/8/1988	AA	S&P	1/7/1991	Aa1	Moody's
26/5/1993	AA-	S&P	4/11/1996	Baa3	Moody's	24/6/1994	Aa3	Moody's	2/10/1992	Aa2	Moody's	13/8/1992	Aa3	Moody's
10/8/1994	AA-	Fitch	23/12/1996	Baa1	Moody's	31/8/1994	Aa2	Moody's	9/12/1992	Aa2	Moody's	7/12/1992	AA+	S&P
24/1/1997	A1	Moody's	20/2/1998	Baa1	Moody's	3/5/1995	AA	S&P	31/3/1999	AA+	S&P	25/2/1993	Aa3	Moody's
10/2/1997	Aa3	Moody's	7/5/1998	Baa1	Moody's	27/1/1997	Aa2	Moody's	19/9/2001	Aa2	Moody's	1/3/1993	AA	S&P
18/3/1998	Aa3	Moody's	30/11/1998	BBB-	S&P	13/2/1997	Aa1	Moody's	13/12/2001	Aaa	Moody's	5/5/1993	A1	Moody's
4/5/1998	Aa2	Moody's	14/7/1999	A2	Moody's	18/3/1998	Aa1	Moody's	13/12/2004	AAA	S&P	1/5/1996	A1	Moody's
15/12/1998	AA	S&P	24/11/1999	A-	S&P	4/5/1998	Aaa	Moody's	12/1/2009	AAA	S&P	12/6/1996	A1	Moody's
27/6/2005	AA-	S&P	13/3/2001	A	S&P	6/5/1998	AA+	S&P	19/1/2009	AA+	S&P	3/7/1996	Aa3	Moody's
13/1/2009	AA-	S&P	4/11/2002	A1	Moody's	3/10/2001	AAA	S&P	28/4/2010	AA	S&P	15/5/2002	Aa2	Moody's
21/1/2009	A+	S&P	10/6/2003	A+	S&P	30/3/2009	AA+	S&P	10/6/2010	Aaa	Moody's	7/7/2004	AA-	S&P
27/4/2010	A-	S&P	17/11/2004	A	S&P	17/4/2009	Aaa	Moody's	30/9/2010	Aa1	Moody's	19/10/2006	A+	S&P
5/5/2010	Aa2	Moody's	9/1/2009	A	S&P	8/6/2009	AA	S&P	15/12/2010	Aa1	Moody's	17/2/2011	A+	S&P
13/7/2010	A1	Moody's	14/1/2009	A-	S&P	2/7/2009	Aa1	Moody's	10/3/2011	Aa2	Moody's	17/6/2011	Aa2	Moody's
30/11/2010	A-	S&P	29/10/2009	A1	Moody's	19/7/2010	Aa2	Moody's	29/7/2011	Aa2	Moody's	19/9/2011	A	S&P
21/12/2010	A1	Moody's	7/12/2009	A-	S&P	24/8/2010	AA-	S&P	13/10/2011	AA-	S&P	4/10/2011	A2	Moody's
15/3/2011	A3	Moody's	16/12/2009	BBB+	S&P	5/10/2010	Aa2	Moody's	18/10/2011	A1	Moody's			
24/3/2011	BBB-	S&P	22/12/2009	A2	Moody's	23/11/2010	A	S&P						
24/3/2011	A-	Fitch	16/3/2010	BBB+	S&P	17/12/2010	Baa1	Moody's						
29/3/2011	BBB-	S&P	22/4/2010	A3	Moody's	2/2/2011	A-	S&P						
5/4/2011	Baa1	Moody's	27/4/2010	BB+	S&P	1/4/2011	BBB+	S&P						
5/7/2011	Ba2	Moody's	14/6/2010	Ba1	Moody's	15/4/2011	Baa3	Moody's						
			2/12/2010	BB+	S&P	12/7/2011	Ba1	Moody's						
			16/12/2010	Ba1	Moody's									
			7/3/2011	B1	Moody's									
			29/3/2011	BB-	S&P									
			9/5/2011	B1	Moody's									
			9/5/2011	B	S&P									
			1/6/2011	Caa1	Moody's									
			13/6/2011	CCC-	S&P									
			25/7/2011	Ca	Moody's									
			27/7/2011	CC-	S&P									

**Figure 1**  
**Bond Yields (2000-2011)**



**Figure 2**  
**Cumulative Changes in Yields Following a Downgrade (1-10 days)**





**Figure 3**  
**Cumulative Changes in Yields Following an Upgrade (1-10 days)**

