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European versus Anglo-Saxon Credit View: Evidence from the Eurozone Sovereign Debt Crisis*

Abstract

We analyse whether different levels of country ties to Europe among the rating agencies Moody's, S&P, and Fitch affect the assignment of sovereign credit ratings, using the Eurozone sovereign debt crisis of 2009-2012 as a natural laboratory. We find that Fitch, the rating agency among the "Big Three" with significantly stronger ties to Europe compared to its two more US-tied peers, assigned on average more favourable ratings to Eurozone issuers during the crisis. However, Fitch's better ratings for Eurozone issuers seem to be neglected by investors as they rather follow the rating actions of Moody's and S&P. Our results thus doubt the often proposed need for an independent European credit rating agency.

Keywords: credit rating agencies, sovereign debt crisis, rating splits, Eurozone

JEL Classification: F65, G01, G14, G18, G24, H12

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1. Introduction

The predominant presence in the international rating market of the "Big Three", the credit rating agencies (CRAs) Moody's Investor Services (Moody's), Standard and Poor's (S&P), and Fitch Ratings (Fitch), has been highly criticized during the sovereign debt crisis in Europe. For example, European Commission President Jose Manuel Barroso claimed in July 2011, following a Moody's downgrade of Portugal, that the US-based "Big Three" rating agencies were anti-Europe biased and argued that their actions fueled the speculation about the Eurozone's financial stability (Reuters, 2011).[1] Additional public outrage was provoked by a warning of S&P in December 2011, ahead of an important EU summit, when S&P announced to consider downgrading 15 of 17 Eurozone countries. Many leading European politicians criticized in particular the timing of the announcement, putting additional pressure on EU leaders to come up with a convincing strategy to create fiscal stability (Spiegel Online, 2011). Former German economic minister Rainer Brüderle even went so far as to insinuate a plot of American rating agencies and fund managers against the Eurozone (The Guardian, 2012).

In response to the evoked criticism, a strong talking point was the idea of launching a globally active European rating agency to challenge the Anglo-Saxon dominance in the rating market (The Financial Times, 2010). Luxembourg's Prime Minister and then chairman of the group of Euro-area finance ministers, Jean Claude Juncker, argued that a European based rating agency could provide more accurate assessments of the creditworthiness of European countries as such an agency "would be more in tune with reform programs undertaken by governments in the region" (Bloomberg, 2011).

[1] This line of argumentation is similar to Ferri et al. (1999) who examine East Asian crisis countries during the Asian crisis in the late 1990s.

With this paper, we want to address two distinct questions that the before mentioned critique regarding the "Big Three" rating agencies implies. First, depending on their geographical location and cultural distance to Europe: is there evidence that the market leaders in sovereign rating are biased when they assess the creditworthiness of Eurozone countries during the sovereign debt crisis? We make use of the fact that the rating agency Fitch has stronger ties to Europe compared to its peers due to the fact that it is dual headquartered (New York City and London) and was majority-owned by the French Fimalac group during the crisis.[2] Fitch's link to Europe via its ownership structure might be relevant, as there is evidence that CRAs can be influenced by the economic interests of their shareholders. For example, Kedia et al. (2015) show that Moody's assigns more favorable ratings to corporate bonds issued by its large investors relative to the ratings assigned by S&P. Second, if such a bias exists, how do investors react to any observable rating difference among the "Big Three" depending on geographical and cultural distance? The answer to both questions should indicate whether the establishment of a European CRA could positively change the risk perception of investors towards the creditworthiness of financially more fragile Eurozone countries.

The academic literature provides various studies indicating that decisions can be affected by geographical and cultural distance. For example, French and Poterba (1991) present evidence that investors expect higher returns from investments in their domestic equity market than from investments in foreign equity markets. Similarly, Chan et al. (2005) show that mutual funds allocate a larger fraction of their investments in domestic stocks, thereby not exploiting all diversification opportunities. Degryse and Ongena (2005) find that geographical distance between

[2] In contrast, Moody's and S&P are both headquartered solely in the US and are subsidiaries of US domiciled entities, e.g., S&P is a subsidiary of McGraw Hill Financial and Moody's major shareholders are US based companies such as Berkshire Hathaway Inc.

firms and lending banks has an increasing effect on bank loan rates if the distance between the firm and the lending bank or the distance between the firm and competing banks increases. Guiso et al. (2009) find that bilateral trust, dependent on cultural aspects, geographical distance and language commonality, affects economic exchange between countries and provide evidence that lower bilateral trust leads to lower levels of trade.

As to whether geographical and cultural distance can influence a CRA's rating decision, the literature offers no clear picture. For example, Ferri et al. (1999) show that US based rating agencies assigned more conservative ratings to East Asian crisis countries given what their macroeconomic situation justifies, thereby potentially contributing to further financial instability in the region. In contrast, Ammer and Packer (2000) find that US and non US based non-financial corporations received ratings that were consistent with their default risk, showing that US firms were not benefiting from more favourable ratings. These results were corroborated by Gupta and Metz (2014) after comparing the performance of ratings for countries culturally close to the US, using proxies such as a country's legal origin and language against those with non-Anglo-Saxon roots. Fuchs and Gehring (2015) and Bartels and Weder di Mauro (2013) find that the home country of the rating agency plays a significant role in the rating process. While Fuchs and Gehring (2015) indicate that the home country of the rating agency receives on average a more favourable credit rating, all else equal, Bartels and Weder di Mauro (2013) come up with contradictory evidence as they show that European countries receive more conservative ratings from the European rating agency Feri AG, relative to its US based peers, Moody's, S&P and Fitch.

We contribute to the rating bias literature by using the European sovereign debt crisis as a natural laboratory, characterized by an intense rise in credit spreads and numerous rating downgrades for Eurozone countries. We exploit institutional differences among the "Big Three"

that translate into heterogeneous ties to Europe. Our findings indicate that Fitch, the rating agency among the "Big Three" with considerably stronger ties to Europe, rates Eurozone crisis countries on average between 0.25 and 0.59 rating notches more favourable during the sovereign debt crisis than its two fully US domiciled peers, Moody's and S&P. We present evidence that the difference in ratings is the result of a lagging behaviour by Fitch, as usually Moody's and S&P are the CRAs that initiate a sequence of downgrade events during the crisis. Our approach differs from Fuchs and Gehring (2015) and Bartels and Weder di Mauro (2013), as we concentrate on rating differences for Eurozone members among the "Big Three" rating agencies only. Since the sovereign rating market is dominated by those three major agencies and smaller CRAs only play a minor role, we believe it is more informative to concentrate on factors explaining observed rating differences among those most influential rating agencies.

In the next step, building on our first findings that Fitch assigned more favorable ratings to Eurozone countries during the crisis, we use Fitch as a role model for a European domiciled CRA in order to see if Fitch is able to influence markets' risk perception with its more optimistic view. Therefore, we look at daily changes in bond yield spreads of Eurozone countries relative to German government bonds surrounding rating events for each of the "Big Three" rating agencies separately. Various researchers have taken a similar approach (e.g., Hand et al. (1992), Cantor and Packer (1996), Afonso et al. (2012)) and show evidence that credit rating announcements influence the borrowing costs for sovereigns.[3] Significant spread reactions to rating changes by Fitch and no significant impact of Moody's and S&P during the crisis would support the idea to establish a European CRA as investors would rather consider Fitch's more favourable view towards Eurozone

[3] For instance, Afonso et al. (2012) conclude that that there is a significant response of sovereign bond yield spreads to changes in sovereign debt ratings and outlooks, especially for the case of negative announcements. Several other studies come up with similar findings (Reisen and von Maltzan (1999); Norden and Weber (2004); Kräussl (2005)).

crisis countries. At the same time, if investors disregard Fitch and rather follow the more conservative rating assessments by Moody's and S&P, this would be evidence that a European agency might not be able to influence the investor's view about the creditworthiness of Eurozone countries with its more favourable assessment.

Overall, our findings suggest that Fitch's rating actions have no significant influence on bond yield spreads during the crisis whereas investors generally react strongly and significantly to rating changes by Moody's and S&P. Our results thus doubt the often proposed need for an independent European CRA as investors would rather follow the more conservative view of Moody's and S&P.

2. Institutional Background

While all of the "Big Three" rating agencies' US presence reaches back to the very beginning of their business operations, the three share neither the same historical background nor do they have the same group structure.[4] Fitch stands out, as it possesses two links that make it not only a more European company, but also a less Anglo-Saxon one compared to its two main rivals. Whereas Moody's and S&P both maintain their headquarters in New York City, Fitch is a company with two headquarters in New York City and in London following the merger of Fitch with IBCA Limited, a British CRA, in 1997. Further, Moody's and S&P's group structure consists of almost exclusively US based parent companies or major equity holders. Fitch on the other hand has a key shareholder, Fimalac, which is a French holding company listed in Paris. Fimalac owned 80% of Fitch group in 2007 and continued being a major shareholder in 2012 owning up to 50%. On

[4] See White (2010) and Gaillard (2014) for an extensive overview on rating agencies' origins.

December 12, 2014, Fimalac group announced to sell a further 30 % of Fitch group to Hearst (Fimalac, 2015) and owns 20% of Fitch group as of March 2015.[5]

Political pressure can be one driver for observing differences in published ratings among the "Big Three" as stronger European ties can make a company more exposed to regulatory and political risk in Europe. Recent cases such as S&P accusing the US government of retaliation for downgrading America's debt in 2011 as well as an SEC investigation on the American rating agency Egan Jones after the downgrade of US government bonds may suggest a sign of government retaliation to negative rating actions. At the same time, political pressure can arise through the sovereign ceiling hypothesis. A sovereign downgrade in e.g. Spain, may cause further rating cuts and therefore additional lending costs for Spanish corporations or banks that are close to the sovereign ceiling in this country (Borensztein et al., 2013). Familiarity can be another reason why stronger ties to Europe lead to a different opinion regarding the creditworthiness of a Eurozone country. For example, Wang et al. (2011) conduct a survey on risk perceptions for investment products and show that investors perceive the financial products they are more familiar with as less risky. Therefore, rating agencies who are more familiar with certain issuers may be more likely to assign better ratings.

3. Data

For our analysis, we obtain the complete rating history of all foreign currency long term rated sovereigns from the respective websites of Moody's, S&P and Fitch along with outlook and watchlist information. We translate the ordinal rating categories into numerical values, ranging from 1 (very low default risk) to 17 (very high default risk), i.e. 1 = Aaa, AAA and 17 = CCC+ or

[5] See Fimalac group annual reports for further information.

below, Caa1 or below as similarly described in Afonso et al. (2012).[6] Appendix A1 shows the exact mapping table implemented for the numerical transformation of the different rating scales. We divide our sample into three sub-periods: a pre-crisis period which ranges from January 2006 to September 2009, a crisis period that lasts from October 2009 to July 2012 and into the QE period, ranging from August 2012 to December 2014. QE stands for the quantitative easing policy of the European Central Bank that was introduced with the intent to tranquilise the financial market turmoil in Europe.[7] The policy subsequently led to a strong decline in bond yield spreads for Eurozone crisis countries though the crisis has yet not been resolved.

Overall, our analysis comprises 104 sovereigns, 77 of them were rated by all three agencies and 27 were rated by at least Fitch and a second agency, either Moody's or S&P.[8] For 80 countries, our sample includes sovereign ratings over the full time period. In addition, we collect daily 10-year government bond yield data for 51 countries from Datastream. They include all Eurozone countries with the exception of Cyprus, Estonia and Luxembourg. Our set of macroeconomic control variables comes from the IMF World Economic Outlook database (WEO).

4. Empirical Approach

4.1. Rating Differences

In order to test our hypothesis that Fitch, due to its stronger European ties, comes up with a different assessment of Eurozone countries' creditworthiness compared to its peers, we begin by

[6] Our results remain qualitatively the same as shown in Table A3 of the appendix, where we consider a 21 numerical notch rating scale as used in Kedia et al. (2014).
[7] We take October 2009 as the beginning of the crisis, since on this date, Greece Prime Minister George Papandreou disclosed Greece's severe fiscal problems. Such a crisis period definition has already been discussed in the literature as seen in De Santis (2012), Afonso et al. (2012), Lane (2012), Baur and Löffler (2016), etc. For the end of the crisis period we use July 2012, when Mario Draghi, the president of the ECB, states publicly that "the ECB is ready to do whatever it takes to preserve the Euro" (Bloomberg, 2012).
[8] See Table A2 in the Appendix for an overview of the countries included in our analysis.

constructing a rating panel on the country-agency-month level. The identification challenge is to rule out any other effect that can influence the assignment of sovereign credit ratings by the "Big Three" rating agencies during our sample period, except for the agencies' different linkage to Europe (the *cross sectional difference*). We then focus on the time series difference of the cross section difference during the crisis and in the QE period by using the following linear fixed effect model:

$$Rating_{i,j,t} = a_{i,t} + a_{j,t} + a_{i,j} + b_1\left(Fitch_j * Euro_i * Crisis_t\right) + b_2\left(Fitch_j * Euro_i * QE_t\right) + u_{i,j,t}$$

The variable $Rating_{i,j,t}$ is the foreign currency long term sovereign rating assigned to country *i,* by rating agency *j,* in month *t*. The terms $a_{i,t}$, $a_{j,t}$, and $a_{i,j}$ denote country by month, agency by month and country by agency fixed effects, respectively. $Fitch_j$ is a dummy variable that equals 1 if the rating is assigned by Fitch and zero otherwise, $Euro_i$ is a dummy variable that equals 1 if the country belongs to the Eurozone and zero otherwise, $Crisis_t$ is a dummy variable that equals one for months between October 2009 and July 2012 and zero otherwise, while QE_t is a dummy variable that equals 1 for months between August 2012 and December 2014, and zero otherwise. To identify the rating difference between Fitch and its peers with respect to Eurozone members during the crisis and QE period, we concentrate on the coefficients b_1 and b_2. A negative and significant coefficient will imply that Fitch assigned on average a more favourable rating to Eurozone members relative to the average rating of Moody's and S&P during the crisis and QE period, respectively.

Including the three sets of fixed effects enables us to account for possible heterogeneity on various levels that could drive the assignment of sovereign credit ratings. First, with the use of country by month fixed effects, $a_{i,t}$, we control for any time series change within countries that can influence any change in the country's credit risk. As a result, time-varying controls for country

fundamentals such as GDP growth, inflation, and/or public debt are no longer needed, as these effects are already saturated by the country by month fixed effects. Second, we use CRA by month fixed effects, $a_{j,t}$, to account for any unobserved time variant rating differences that apply to all rated sovereigns simultaneously. And third, we add country by CRA fixed effects, $a_{i,j}$ to control for any heterogeneity at this level, e.g., such as CRA specific ties to a given country. Thus, the coefficients b_1 and b_2 of the interaction terms $Fitch_j * Euro_i * Crisis_t$ and $Fitch_j * Euro_i * QE_t$ indicate how Fitch's ratings towards Eurozone countries differ from its peers during the crisis and QE period respectively.

A potential concern regarding the interpretation of our results could be raised, if a rating agency would have changed its rating policy or process towards one or several Eurozone countries during the crisis or QE period. Such a change in behavior is not controlled for by our sets of fixed effects. We have talked to several rating analysts including a VP Senior Credit Officer in Sovereign Risk for Moody's during the time of the Eurozone sovereign debt crisis. Overall, we have heard no indications that such a behavior has occurred.

4.2. Leader-Follower Analysis

In a next step, we run a Leader-Follower analysis as we want to find out who among the "Big Three" agencies is more likely to initiate a cycle of rating changes for Eurozone countries and who rather acts as a rating follower. Our analysis is similar to the approach of Bartels and Weder di Mauro (2013) and Hill and Faff (2010). We restrict our analysis to rating downgrades, as we observe only a small number of upgrades during our sample period and to those Eurozone countries, that were rated by all three agencies. We consider a rating event as a "Leading Event" if no other rating agency has changed the rating of country *i* to the same or to a less favourable level. A rating change is considered a "Following Event" if a rating change follows a previous

change of another agency in the same direction to the same or a more favourable level. For both event types, we look at a time frame of three calendar months before a rating downgrade has occurred and consider both the whole sample period and the crisis period separately. We calculate the fraction of leading and following events by dividing the number of events by the number of monthly observations in our panel to run a *t*-test against the null that the number of leading and following events is the same between Fitch and Moody's on the one hand and Fitch and S&P on the other. We expect Fitch to be a rating follower, i.e., Fitch should be more reluctant to downgrade Eurozone countries while Moody's and S&P should be more likely to initiate a cycle of downgrades. Significantly different numbers of leading and following events between Fitch and its peers would be evidence in favour of the hypothesis that Fitch has a biased view towards Eurozone countries. At the same time, this could be interpreted as a first indication that Fitch might have a limited influence on the bond market as rating followers tend to carry less new information to the market.

4.3. Market Reactions to Rating Changes

Finally, we compare Moody's, S&P's and Fitch's relative impact on the bond market to address the idea of establishing a European rating agency. Credit ratings in their purest form are relative assessments of the creditworthiness of a borrower and imply a likelihood that the borrower will default on its obligations. Therefore, the establishment of a European CRA would only be effective if potentially more favourable ratings would translate into more favourable credit spreads. Given our findings that Fitch rates Eurozone countries more favourably during the crisis due to its stronger European ties, we want to use Fitch as a role model for a European domiciled CRA and compare Fitch's impact on the bond market relative to its peers. In a first univariate analysis, we look at the effect of rating downgrades on observed daily bond yield spreads between country-

specific 10-year government bonds and 10-year German government bonds for Eurozone countries during our sample period.[9] These spread changes serve as our measure for the market's perception of the change in credit risk. In particular, we analyse a five-day window around the time of the rating event where the event occurs on day *t*. To avoid overlapping event windows, we exclude rating downgrades if there is a rating event of a peer agency within the event window, i.e., between day *t*-2 and day *t*+2.

We then run a multivariate regression analysis following a similar approach as Afonso et al. (2012):

$$\begin{aligned}\Delta Spread_{i,t} = a_i &+ b_1 \Delta Fitch_{i,t} + b_2(\Delta Fitch_{i,t} * Euro_i * Crisis_t) + b_3(\Delta Fitch_{i,t} * Euro_i * QE_t) \\ &+ b_4(\Delta Fitch_{i,t} * Euro_i) + b_5(\Delta Fitch_{i,t} * Crisis_t) \\ &+ b_6(\Delta Fitch_{i,t} * QE_t) + b_7 \Delta Moodys_{i,t} + b_8(\Delta Moodys_{i,t} * Euro_i * Crisis_t) \\ &+ b_9(\Delta Moodys_{i,t} * Euro_i * QE_t) + b_{10}(\Delta Moodys_{i,t} * Euro_i) \\ &+ b_{11}(\Delta Moodys_{i,t} * Crisis_t) + b_{12}(\Delta Moodys_{i,t} * QE_t) + b_{13} \Delta SP_{i,t} \\ &+ b_{14}(\Delta SP_{i,t} * Euro_i * Crisis_t) + b_{15}(\Delta SP_{i,t} * Euro_i * QE_t) + b_{16}(\Delta SP_{i,t} * Euro_i) \\ &+ b_{17}(\Delta SP_{i,t} * Crisis_t) + b_{18}(\Delta SP_{i,t} * QE_t) + b_{19}(Euro_i * Crisis_t) \\ &+ b_{20}(Euro_i * QE_t) + b_{21} Euro_i + b_{22} Crisis_t + b_{23} QE_t + X_{i,t} + u_{i,t}\end{aligned}$$

where $\Delta Spread_{i,t}$ is the two-day change of the spread from day *t*-1 to day *t*+1, with the spread being the difference between the 10-year government bond yield of country *i* and Germany. We use the two-day spread change to account for rating changes that occur after the market close of day *t* given that we find (see Section 5.4) notable spread changes on day *t*+1.

$\Delta Fitch_{i,t}$, $\Delta Moodys_{i,t}$, and $\Delta SP_{i,t}$ are the changes in the numerical rating of the respective agency for country *i* from day *t*-1 to *t*. A positive rating change implies a downgrade while a negative change indicates an upgrade of country *i* by the respective agency. The regression will only include days on which there is a rating change by one of the three rating agencies. The variables $Euro_i$, $Crisis_t$, and QE_t are dummy variables defined as stated in the previous section

[9] Note that there are not enough upgrades during that time to warrant a separate analysis.

and $X_{i,t}$ is a vector of macroeconomic variables which include real GDP growth, the unemployment rate, real GDP per capita, the inflation rate, current account balance to GDP and gross debt to GDP on an interpolated monthly basis, to account for mid- to long-term macroeconomic trends and their effects on credit spreads. To control for time invariant effects, we add region dummies a_i (Europe, Americas, Asia & Pacific, and Africa & Middle East) to our regression. We focus on the coefficients of the triple interaction terms as they capture the agencies' impact on bond yield spreads for Eurozone countries during the crisis- and QE-period. For example, a positive and significant coefficient b_2 (for $\Delta Fitch_{i,t} * Euro_i * Crisis_t$) would indicate that investors were demanding higher spreads from the Eurozone country *i* during the crisis if Fitch downgraded this country. At the same time, insignificant results for b_2 would indicate that investors neglect Fitch's opinion during the crisis for Eurozone countries. The same interpretation applies for the triple interaction terms involving Moody's and S&P rating changes.

5. Empirical Results

5.1. Univariate Rating Differences Analysis

Figure 1 shows the average rating for all Eurozone countries by rating agency during our sample period. We can see that the numerical ratings are steadily increasing until they reach their high point at the beginning of 2014. Initially, we see no significant difference among the "Big Three" rating agencies, over time, Fitch ends up assigning on average the most favourable ratings. In Figure 2, we can see how the average rating difference between Fitch and its two more Anglo-Saxon peers develops during our sample period. The graph includes the rating difference for the Eurozone, for the Eurozone without GIIPS and for the GIIPS countries only. A negative rating difference suggests that Moody's and S&P assigned on average more conservative ratings to the underlying group of issuers compared to Fitch. While in the beginning, there is hardly any rating

difference among the "Big Three", the difference is apparent during the crisis and slowly starts to peak off around the start of the second half of 2012. What we can also see from the graph is that the GIIPS countries seem to be the main drivers for the observed rating difference in the Eurozone as their rating difference appears to be particularly large.

Table 1 presents in more detail what we can see graphically in Figures 1 and 2.[10] In Panel A we observe that during the pre-crisis period, all three agencies assigned on average very similar ratings. Then, during the crisis- and QE period, we see significant rating differences between Fitch and its peers. For the crisis period, we observe a difference of -0.22 notches for Eurozone countries, an increase of -0.16 notches from the pre-crisis- to the crisis period for the Eurozone subsample, both statistically significant at the 5% level.[11] For the QE period, the gap is further increasing to a rating difference of -0.61 notches, an increase of -0.55 notches which is statistically significant at the 1% level. For the GIIPS countries, we generally find rating differences of a higher magnitude, as the average rating difference increases by -0.35 and -0.87 notches during the crisis- and QE period, statistically significant at the 5% and 1% level, respectively. For non-Eurozone countries, our findings show that the average rating difference remains statistically insignificant with a tendency that Fitch now assigns slightly more conservative ratings for non-Eurozone countries compared to its peers as displayed by the increase of 0.11 notches to the crisis period, statistically significant at the 10% level.

These first univariate results indicate, in accordance with our hypotheses, that Fitch has assessed the risk of default during the crisis among Eurozone members less drastically than its peers, observing especially larger differences among the agencies when it comes to the GIIPS

[10] The rating difference is calculated as follows: $DiffRating_{it} = Fitch\_Rating_{it} - 1/2(S\&P\_Rating_{it} + Moody's\_Rating_{it})$ where *i* denotes the country (group of countries) and *t* the month.
[11] We run univariate regressions and cluster standard errors at the country level.

countries.[12] At the same time, the rating agencies seem to agree when it comes to non-Eurozone countries with a tendency that Fitch is slightly more pessimistic. In Panel B of Table 1, we conduct the same aforementioned analysis, restricting our sample to those countries for which we have 10-year government bond yield data. Overall, the results in Panel B remain qualitatively the same as in Panel A.

Figure 3 shows the development of the government bond yields during our sample period. We can see that for the GIIPS countries, there was a strong increase in yields during the crisis followed by a decrease to a level that was even beyond the pre-crisis level at the end of 2014. At the same time, we see a steady decrease in yields for the rest of the Eurozone countries and for the non-Eurozone countries included in our sample. Table 1 also includes information about the yields in our Eurozone subsample: the average yield increases from 4.24 to 5.26 from pre-crisis to crisis period and decreases to 3.39 in the QE period. The average yield of 6.47 in our non-Eurozone subsample starts out to be significantly higher than for Eurozone countries during the pre-crisis period, the yield then however decreases to 6.19, emphasizing the different development in the bond market due to the financial market turmoil in Europe, while in the QE period, the level is again significantly higher with an average yield of 5.34.

5.2. Multivariate Rating Differences Analysis

Table 2 displays our baseline results running our linear fixed effect model. Our variables of interest are the triple interaction terms $Fitch_j * Euro_i * Crisis_t$ and $Fitch_j * Euro_i * QE_t$. We can see that the coefficients are negative and highly significant across the board. In our most saturated specification (column 4), when we include agency by time, country by time and agency

[12] We also run the same analysis by adjusting the ratings using outlook and watchlist information to account for private information conveyed in these additional rating indicators. Our results become stronger for Eurozone issuers and remain qualitatively the same for non-Eurozone countries.

by country fixed effects, we find that Fitch assigns on average between -0.25 and -0.59 of a notch more favourable ratings to Eurozone members during the crisis- and QE period, respectively. Our baseline results are in line with our hypothesis and generally confirm what we have seen in the univariate analysis.

As a robustness check for our crisis period definition, we run our most saturated specification and expand the crisis period until March 2013 (column 5), using the development of sovereign bond yields for the GIIPS countries as an indicator to determine the end of the crisis period. As can be observed in Figure 3, with the start of the quantitative easing policy by the ECB, bond yields began to fall drastically until levelling off close to a pre-crisis level in March 2013. Using the expanded crisis period definition, we observe a slightly elevated rating difference for the crisis period (-0.34) and a slightly lower rating difference for the QE period (-0.54).

In all our specifications, we cluster standard errors on two dimensions, country and month, in order to correct for correlation within country and between countries since we observe credit ratings for the same country over time and ratings of group of countries at the same point in time (Thompson, 2011). Our results remain qualitatively the same if we run the same specifications clustering only at the country level.

In Table 1, we observe that the rating differences between agencies seem to be larger for countries in the periphery (GIIPS). Thus, in Table 3 we test whether this difference is persistent even after controlling for unobserved covariates. We proceed as in Table 2 and can confirm that the GIIPS countries seem to be the main driver for the occurring rating differences among the "Big Three" rating agencies as the coefficients of the triple interaction terms $Fitch_j * GIIPS_i * Crisis_t$ and $Fitch_j * GIIPS_i * QE_t$ are negative, generally larger than in Table 2 and significant at the 1% level across the board.

5.3. Leader-Follower Analysis

The results of our leader follower analysis indicate that Fitch acts mainly as a rating follower, while Moody's and S&P are often the rating agencies that initiate a sequence of downgrades for Eurozone countries. When we consider the full sample period, we count 16 rating downgrades from Moody's that qualify as a leading event, 28 from S&P and only 4 from Fitch. When we look at the number of following events, we see a different picture. In this case, we count 8 following events from Fitch and only 5 from Moody's and 3 from S&P. To see if the differences among the "Big Three" are statistically significant, we calculate the fraction of events with respect to the number of observations (1532) and perform a *t*-test of the null hypothesis that the fractions are equal. We find that there is a statistically significant difference at the 1% level for the fraction of leading events between both Fitch and Moody's and Fitch and S&P. For the fraction of following events, these differences remain statistically insignificant. Our results remain qualitatively the same when we restrict our sample to the crisis period only. During the pre-crisis and QE period, we observe only very few and no downgrades respectively, which is why we refrain from reporting those results in Table 4.

5.4. Yield Spread Changes of Eurozone Countries Surrounding Rating Downgrades

Table 5 displays a univariate analysis of bond yield spread reactions to rating cuts between 10-year government bonds of Eurozone country *i* and German 10-year government bonds. We strictly focus on rating downgrades, as those seem to have the strongest effect on market reactions as shown in Afonso et al. (2012) and Michaelides et al. (2015). In addition, during our sample period, downgrades make up the vast majority of rating changes. We analyse a short time window of five days around the rating event to avoid any contamination issues and we drop any rating downgrade if there is a rating event of a peer agency within the time window to avoid overlapping

events. Table 5 shows that between January 2006 and December 2014, 96 rating downgrades by the "Big Three" fulfil the aforementioned criteria. Our analysis suggests that the market's main reaction takes place between the interval of the rating event day and the subsequent day, with the most immediate reaction to a Moody's downgrade, as we find an average spread reaction of 18 basis points, significant at the 5% level, while the results for both S&P and Moody's remain insignificant. During our whole time window, we observe that spreads seem to react more strongly to rating downgrades by S&P and Moody's, i.e. rating downgrades coincide with an increase in bond yield spreads of 15 to 27 basis points respectively, statistically significant at the 5% level. Fitch downgrades and bond yield spreads seem to be positively correlated as well with a point estimate of 7 basis points, however, this change is statistically insignificant. This preliminary test suggests that market participants react more strongly to S&P and especially Moody's rating actions than to downgrades by Fitch and underline our findings in the Leader-Follower analysis because acting mostly as a rating follower would be expected to add only little information to the market.

5.5. The Perception of Split Ratings

Table 6 reports the results of our linear fixed effect model regarding rating changes for the whole sample of countries with 10-year government bond yield data. Given our results in the univariate analysis where we find that the strongest spread changes seem to take place within one day after the rating event, we look at two-day spread changes around the rating event, controlling for region fixed effects and macroeconomic variables.

First, we run a specification where we look at each agency individually over the whole sample period not including the interaction terms. The results in columns 1 and 2 suggest a strong influence on bond markets for rating changes by Moody's and S&P, while investors generally neglect the opinion of Fitch. Column 2 results imply that a one notch rating change of each

Moody's and S&P is associated with a change in bond yield spreads of around 11 basis points, both estimates are significant at the 1% level.

In columns 3 and 4, we employ the specification from Section 4.3 which includes interaction terms to capture the effect of a rating change for Eurozone countries during the crisis and QE period. The results seem to partly confirm what we have seen in the univariate analysis, and suggest that during the crisis and QE period, investors rely mainly on the rating provided by Moody's and neglect both S&P and Fitch. The estimates for the coefficient b_8 ($\Delta Moodys_{i,t} * Euro_i * Crisis_t$) suggest a spread reaction of 25 basis points to a one notch rating change by Moody's for Eurozone countries during the crisis period.

During the QE period, our results indicate that rating changes have no significant influence on bond yield spread changes from neither of the rating agencies. A reason could be that the commitment of the ECB to the Euro and the introduction of its quantitative easing policy somehow disentangled the interaction between rating changes and bond yields. In addition, Dimitrov et al. (2015) show that after the passing of the Dodd-Frank Wall Street Reform and Consumer Protection Act in July 2010, CRAs became less influential on bond and stock markets as they were generally issuing lower ratings and more false warnings.

Overall, our findings provide evidence that during the Eurozone sovereign debt crisis, the on average more favourable ratings of Fitch had no significant influence on the market's perception of the creditworthiness of Eurozone countries as investors rather follow the more conservative ratings of S&P and Moody's.[13] Our results are in line with Vu et al. (2015) who find little evidence that Fitch ratings have any impact on credit market and who show that in case of a split rating, there is no evidence that Fitch ratings have any effect on market events by Moody's and S&P,

[13] We find qualitatively similar results if we repeat the analysis with the five-day event window [-2;2].

using a panel for split rated sovereigns from September 2000 to December 2012. Fitch's lack of influence in the market is also reflected by the low market share in Europe. As of 2014, Fitch has a significantly lower market share (16.80 %) for credit rating activities in the EU compared to Moody's (34.67%) and S&P (40.42%).[14] As a newly set up and independent European based rating agency would find itself in a comparable position in the rating market, we conclude that such an agency may find it difficult to convince investors of a more favourable view on the creditworthiness of European countries. We thus doubt that the establishment of a European rating agency would have the desired consequences laid out by several leading European politicians.

5.6. Robustness Checks and Further Results

We run several robustness checks to validate our results. First we run the same specification as in Table 2 using a 21 notch rating scale. As can be seen in Table A3 of the appendix, the results remain qualitatively the same.

Further, we use adjusted ratings in our baseline analysis, which accounts for the outlook and watchlist information provided by the rating agencies. The adjusted rating is calculated as follows: it increases the variable rating by one notch if the rating outlook is negative, minus one if the outlook is positive, plus two if it is under watch for downgrade and minus two if it is under watch for upgrade. We follow the same procedure as explained in Cantor and Hamilton (2005) and in Alsakka and Gwilym (2011). Given our ordinal rating scale transformation, the adjusted rating theoretically ranges between 0 and 19. For ease of comparison with our baseline results, we truncate the data to only include the numerical values ranging from 1 (very low default risk) to 17 (very high default risk).[15] As we can observe by looking at the results in Table A4, the gap between

[14] ESMA/2015/1879 - Competition and choice in the credit rating industry.
[15] Results are qualitatively the same if we use the full range from 0 to 19.

Fitch and its peers seems to further increase as we measure rating differences between -0.44 and -0.65 of a notch (column 4) for our most saturated specification in the crisis- and QE period respectively, both significant at the 1% level.

Table A5 shows the same specification as Table 2 excluding the GIIPS countries from our sample. We can observe diminishing rating differences as we measure differences between -0.16 and -0.48 of a notch for the crisis- and QE period, respectively. In addition, our results are generally weaker when we exclude the GIIPS countries. The results underline our findings in Table 3, suggesting that the main drivers of the observed rating differences among Eurozone countries are the GIIPS countries.

6. Conclusion

We use a dataset on the country-agency-month level to identify rating deviations among the three largest CRAs, Moody's, S&P, and Fitch during the Eurozone sovereign debt crisis of 2009-12. Our findings indicate that Fitch, the rating agency with significantly closer ties to Europe than its two more US tied peers, holds a more optimistic view towards the creditworthiness of Eurozone issuers during and in the aftermath of the sovereign debt crisis. Having controlled possible agency, time and country effects through a highly saturated fixed-effect model, the only obvious explanation for the observed differences is that Fitch has stronger country ties to Europe. We present evidence that the observed rating difference is the result of a lagging behaviour in the credit risk assessment process on behalf of Fitch and show that investors were more susceptible to the credit risk assessment by S&P and Moody's as investors seem to neglect Fitch's more optimistic view. Our findings indicate that in case we had a so called "European rating agency", investors probably follow a similar pattern and conclude that such an agency may find it difficult

to change the perception of investors regarding the idiosyncratic risk observed among Eurozone members.

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Figure 1: Rating average by agency for Eurozone countries

Figure 1 shows the monthly average rating for Eurozone countries by agency. Rating ranges from 1 (AAA) to 17 (CCC+ and below) as explained in Table A1. The time period is January 2006 to December 2014.

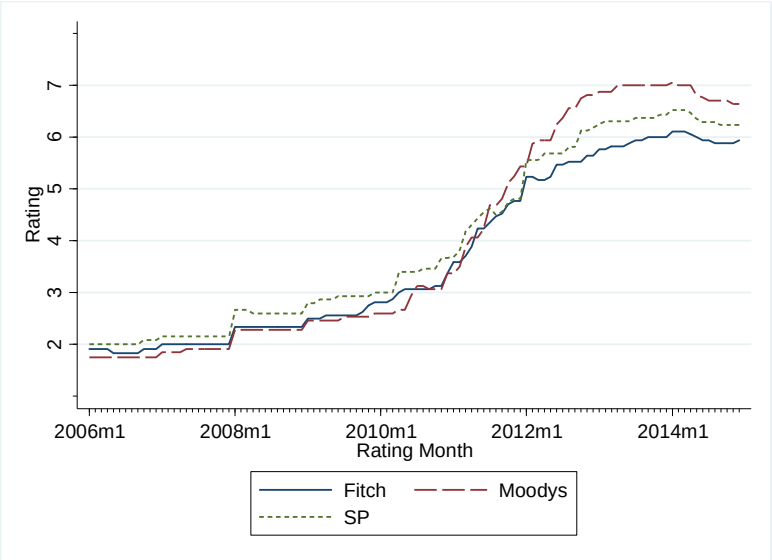

Figure 2: Rating differences

Figure 2 denotes the rating difference between Fitch and the average rating between Moody's and S&P in month *t* for the set of countries *i*. Rating ranges from 1 (AAA) to 17 (CCC+ and below) as explained in Table A1. $DiffRating_{it}$ is calculated as $Fitch\_Rating_{it} - 1/2\ (S\&P\_Rating_{it} + Moody's\_Rating_{it})$. The time period is January 2006 to December 2014.

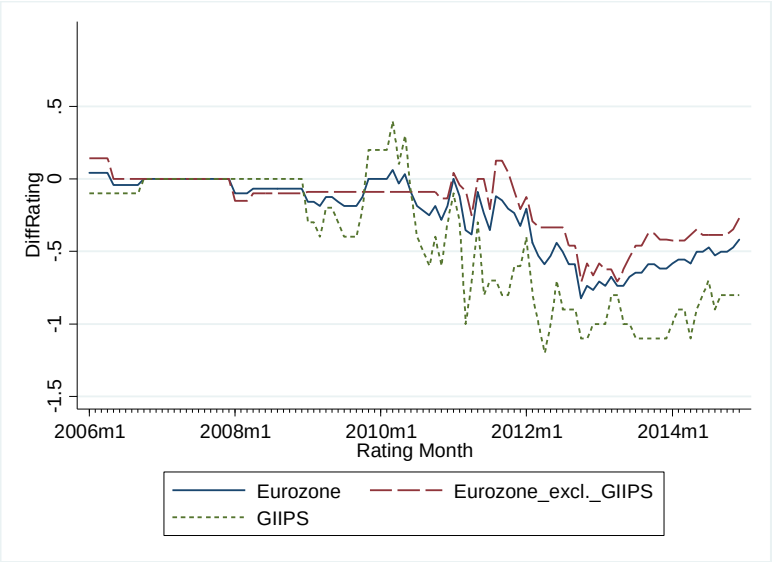

Figure 3: Average 10-year sovereign bond yield

The figure below displays the average 10-year government bond yield on a monthly basis for Eurozone countries (excluding GIIPS), for GIIPS and the non-Eurozone countries in our sample. The yields (y-axis) are in percentage points. The time period is January 2006 to December 2014.

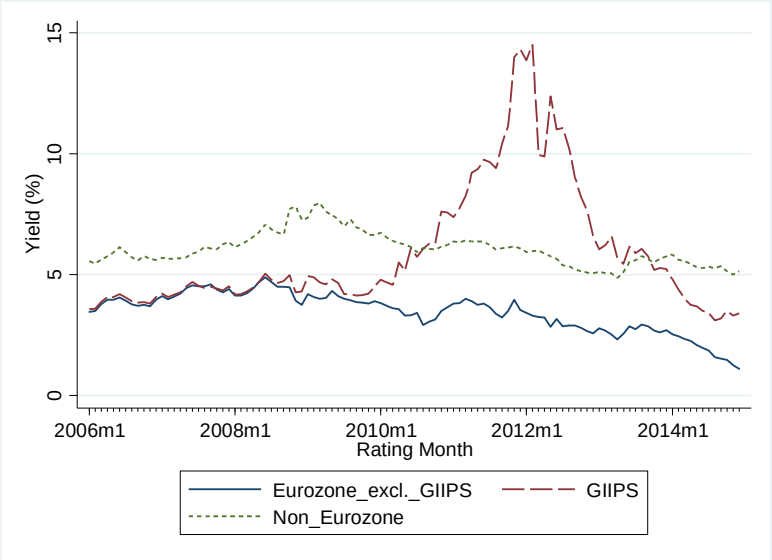

Table 1: Rating differences between Fitch and Moody's/S&P

This table shows the average rating difference between Fitch and its two peers, Moody's and S&P. A negative difference indicates that Fitch assigns better ratings relative to its counterparts. We divide our sample into three sub-periods. The first sub-period (I) denotes the time before the Euro debt crisis, the second sub-period (II) covers the time of the crisis and the third sub-period (III) covers the time after the introduction of the ECB's quantitative easing policy. In Panel B we restrict our sample to those countries for which we obtained 10-year government bond yield data. We run univariate regressions and cluster standard errors at the country level. ***, **, * correspond to the coefficient being significant at the 1%, 5%, and 10% level, respectively.

	(I) 01.2006 - 09.2009	(II) 10.2009 - 07.2012	(II) - (I)	(III) 08.2012 - 12.2014	(III) - (I)
Panel A: All available observations					
Eurozone					
Rating difference	-0.060	-0.217**	-0.157**	-0.606***	-0.546***
Observations	624	563	1,187	505	1,129
GIIPS					
Rating difference	-0.084	-0.438**	-0.354**	-0.952***	-0.867***
Observations	225	170	395	145	370
Non-Eurozone					
Rating difference	-0.033	0.079	0.112*	0.008	0.041
Observations	3,529	2,684	6,213	2,282	5,811
Panel B: Only countries with bond yield data					
Eurozone					
Rating difference	-0.045	-0.248**	-0.203***	-0.733***	-0.688***
Yield	4.239	5.263	1.024	3.392	-0.847
Observations	554	476	1,030	418	972
GIIPS					
Rating difference	-0.084	-0.438**	-0.354**	-0.952***	-0.867***
Yield	4.346	8.431	4.085	5.360	1.014
Observations	225	170	395	145	370
Non-Eurozone					
Rating difference	0.069	0.095	0.026	0.064	-0.005
Yield	6.465	6.193	-0.272	5.340	-1.125
Observations	1,757	1,450	3,207	1,264	3,021

Table 2: Fitch's rating difference regarding Eurozone countries

This table reports coefficient estimates from the following linear fixed effect model:

$$Rating_{i,j,t} = a_{i,t} + a_{j,t} + a_{i,j} + b_1\left(Fitch_j * Euro_i * Crisis_t\right) + b_2\left(Fitch_j * Euro_i * QE_t\right) + u_{i,j,t}$$

Rating denotes the credit rating assigned to country *i*, by agency *j*, in month *t* and ranges from 1 (AAA) to 17 (C) as explained in Table A1. *Fitch* equals 1 if Fitch assigned the credit rating and zero otherwise. *Euro* equals 1 if the rated country is a member of the Eurozone and zero otherwise. Crisis is equal to 1 from October 2009 to July 2012 and zero otherwise, QE is equal to one from August 2012 to December 2014 and zero otherwise. We gently add country by time fixed effects ($\alpha_{i,t}$), agency by time fixed effects ($\alpha_{j,t}$), and country by agency fixed effects ($\alpha_{i,j}$). The analysis uses monthly data covering the period January 2006 to December 2014. In column (5), we expand the crisis period until March 2013. Standard errors are shown in parentheses and are clustered at the country and time level. ***, **, * correspond to the coefficient being significant at the 1%, 5%, and 10% level, respectively.

	(1)	(2)	(3)	(4)	(5)
Fitch*Euro*Crisis	-0.230*	-0.281***	-0.286***	-0.249**	-0.344***
	(0.137)	(0.0933)	(0.0951)	(0.0952)	(0.0991)
Fitch*Euro*QE	-0.704***	-0.609***	-0.595***	-0.592***	-0.537***
	(0.218)	(0.151)	(0.150)	(0.141)	(0.149)
Fitch*Euro	-0.471**	-0.0343	-0.0400		
	(0.181)	(0.0912)	(0.0934)		
Euro*Crisis	1.833***				
	(0.546)				
Euro*QE	4.232***				
	(0.955)				
Fitch*Crisis	0.0819	0.113*			
	(0.0934)	(0.0623)			
Fitch* QE	0.0716	0.0453			
	(0.139)	(0.0815)			
Euro	-6.429***				
	(0.697)				
Crisis	0.0418				
	(0.150)				
QE	0.0855				
	(0.223)				
Agency FE	Yes	Yes	No	No	No
Country-Time FE	No	Yes	Yes	Yes	Yes
Agency-Time FE	No	No	Yes	Yes	Yes
Agency-Country FE	No	No	No	Yes	Yes
Observations	28,103	28,103	28,103	28,103	28,103
Adj. R-squared	0.160	0.986	0.986	0.992	0.992

Table 3: Fitch's rating difference regarding GIIPS countries

This table reports coefficient estimates from the following linear fixed effect model:

$$Rating_{i,j,t} = a_{i,t} + a_{j,t} + a_{i,j} + b_1\left(Fitch_j * GIIPS_i * Crisis_t\right) + b_2\left(Fitch_j * GIIPS_i * QE_t\right) + u_{i,j,t}$$

Rating denotes the credit rating assigned to country *i*, by agency *j*, in month *t* and ranges from 1 (AAA) to 17 (C) as explained in Table A1. *Fitch* equals 1 if Fitch assigned the credit rating and zero otherwise. *Euro* equals 1 if the rated country is a member of the Eurozone and zero otherwise. Crisis is equal to 1 from October 2009 to July 2012 and zero otherwise, QE is equal to one from August 2012 to December 2014 and zero otherwise. We gently add country by time fixed effects ($\alpha_{i,t}$), agency by time fixed effects ($\alpha_{j,t}$), and country by agency fixed effects ($\alpha_{i,j}$). The analysis uses monthly data covering the period January 2006 to December 2014. In column (5), we expand the crisis period until March 2013. Standard errors are shown in parentheses and are clustered at the country and time level. ***, **, * correspond to the coefficient being significant at the 1%, 5%, and 10% level, respectively.

	(1)	(2)	(3)	(4)	(5)
Fitch*GIIPS*Crisis	-0.400***	-0.440***	-0.450***	-0.439***	-0.524***
	(0.129)	(0.110)	(0.112)	(0.116)	(0.0801)
Fitch*GIIPS*QE	-0.823***	-0.844***	-0.836***	-0.827***	-0.806***
	(0.142)	(0.0880)	(0.0904)	(0.0978)	(0.114)
Fitch*GIIPS	-0.521**	-0.0562	-0.0560		
	(0.219)	(0.157)	(0.157)		
GIIPS*Crisis	4.117***				
	(1.025)				
GIIPS*QE	7.895***				
	(0.859)				
Fitch*Crisis	0.0461	0.0858			
	(0.0877)	(0.0556)			
Fitch* QE	-0.0439	-0.0231			
	(0.136)	(0.0770)			
GIIPS	-4.839***				
	(0.944)				
Crisis	-0.00860				
	(0.121)				
QE	0.247				
	(0.246)				
Agency FE	Yes	Yes	No	No	No
Country-Time FE	No	Yes	Yes	Yes	Yes
Agency-Time FE	No	No	Yes	Yes	Yes
Agency-Country FE	No	No	No	Yes	Yes
Observations	28,103	28,103	28,103	28,103	28,103
Adj. R-squared	0.037	0.986	0.986	0.992	0.992

Table 4: Leader-follower analysis for Eurozone countries

This table reports the number of rating downgrades by agency as rating leader and as rating follower for Eurozone countries. A rating downgrade is considered as a "Leading Event" if no other rating agency has changed the rating of country *i* to the same or to a worse rating in the last three months. A rating downgrade is considered a "Following Event" if a rating downgrade follows a previous downgrade of another agency in the same direction to the same or to a better rating within the last three months. The fraction of leading and following events is calculated by dividing the number of events by the number of monthly observations in the panel. ***, **, * correspond to the *t*-test being significant at the 1%, 5%, and 10% level, respectively.

	(I) (Moody's)	(II) (S&P)	(III) (Fitch)	(I-III) t-test	(II-III) t-test
Full Sample Period					
Monthly observations: 1,532					
Leading Events	16	28	4		
Fraction of Leading Events	0.0104	0.0183	0.0026	0.0078***	0.0156***
Following Events	5	3	8		
Fraction of Following Events	0.0033	0.0020	0.0052	-0.0020	-0.0033
Leader-Follower Ratio	3.20	9.33	0.50		
Crisis Period					
Monthly observations: 499					
Leading Events	13	16	4		
Fraction of Leading Events	0.0261	0.0321	0.0080	0.0180**	0.0075***
Following Events	4	3	6		
Fraction of Following Events	0.0080	0.0060	0.0120	-0.0040	-0.0060
Leader-Follower Ratio	3.25	5.33	0.67		

Table 5: Yield spread reactions for Eurozone countries surrounding rating downgrades

This table shows a univariate analysis of yield spread reactions for Eurozone countries surrounding rating downgrades by agency *j*. We analyze daily 10-year government bond data for the period January 2006 to December 2014. We calculate the daily change of the spread of 10-year government bonds between country *i* and Germany during the event window [-2; 2], where the event takes place on day *t*=0. For instance, -2 denotes the change of the spread from day *t*-3 to *t*-2, while 0 denotes the change of the spread from day *t*-1 to *t*. The Eurozone countries included in the sample are Austria, Belgium, Finland, France, Greece, Ireland, Italy, Latvia, Malta, Netherlands, Portugal, Slovenia and Spain. We exclude rating downgrades if there is another rating event of a peer agency during the time of the event window to avoid overlapping. **, **, * correspond to the coefficient being significant at the 1%, 5%, and 10% level, respectively.

	Days around event						No. of Events
	-2	-1	0	1	2	[-2;2]	
Fitch	0.0440	-0.0158	-0.0213	0.0468	0.0245	0.0781	30
	(0.0403)	(0.0188)	(0.0252)	(0.0351)	(0.0224)	(0.0841)	
Moody's	0.0092	0.0193	0.0325	0.1770**	0.0322	0.2700**	32
	(0.0331)	(0.0510)	(0.0220)	(0.0726)	(0.0343)	(0.1160)	
S&P	0.0478**	0.0041	0.0221	0.0809	-0.0091	0.1460**	34
	(0.0228)	(0.0217)	(0.0178)	(0.0593)	(0.0188)	(0.0621)	
All	0.0337*	0.0029	0.0120	0.1020***	0.0152	0.1660***	96
	(0.0185)	(0.0194)	(0.0126)	(0.0340)	(0.0149)	(0.0516)	

Table 6: Rating changes explaining changes in bond yield spreads

This table reports coefficient estimates from the following linear fixed effect model:

$$\begin{aligned}\Delta Spread_{i,t} = a_i &+ b_1 \Delta Fitch_{i,t} + b_2(\Delta Fitch_{i,t} * Euro_i * Crisis_t) + b_3(\Delta Fitch_{i,t} * Euro_i * QE_t) \\ &+ b_4(\Delta Fitch_{i,t} * Euro_i) + b_5(\Delta Fitch_{i,t} * Crisis_t) + b_6(\Delta Fitch_{i,t} * QE_t) + b_7 \Delta Moodys_{i,t} \\ &+ b_8(\Delta Moodys_{i,t} * Euro_i * Crisis_t) + b_9(\Delta Moodys_{i,t} * Euro_i * QE_t) \\ &+ b_{10}(\Delta Moodys_{i,t} * Euro_i) + b_{11}(\Delta Moodys_{i,t} * Crisis_t) \\ &+ b_{12}(\Delta Moodys_{i,t} * QE_t) + b_{13} \Delta SP_{i,t} + b_{14}(\Delta SP_{i,t} * Euro_i * Crisis_t) \\ &+ b_{15}(\Delta SP_{i,t} * Euro_i * QE_t) + b_{16}(\Delta SP_{i,t} * Euro_i) + b_{17}(\Delta SP_{i,t} * Crisis_t) \\ &+ b_{18}(\Delta SP_{i,t} * QE_t) + b_{19}(Euro_i * Crisis_t) + b_{20}(Euro_i * QE_t) + b_{21} Euro_i + b_{22} Crisis_t \\ &+ b_{23} QE_t + X_{i,t} + u_{i,t}\end{aligned}$$

where $\Delta Spread_{i,t}$ is the two-day change of the spread from day t-1 to day t+1, with the spread being the difference between the 10-year government bond yield of country i and Germany. $\Delta Fitch_{i,t}$, $\Delta Moodys_{i,t}$, and $\Delta SP_{i,t}$ are the changes in the numerical rating of the respective agency for country i from day t-1 to t (see Table A1). The regression will only include days on which there is at least one rating change. *Euro* equals 1 if the country is a member of the Eurozone and zero otherwise. *Crisis* equals 1 from October 2009 to July 2012 and zero otherwise, *QE* equals 1 from August 2012 to December 2014 and zero otherwise. Region fixed effects, α_i, include the regions Europe, Americas, Asia & Pacific, Africa & Middle East. X_{it} denotes a set of macroeconomic variables that capture country specific characteristics. The analysis uses daily data for the period January 2006 to December 2014. Standard errors are clustered at the country level. ***, **, * correspond to the coefficient being significant at the 1%, 5%, and 10% level, respectively.

	(1)	(2)	(3)	(4)
ΔFitch	0.0172	0.0351	0.0004	-0.0057
ΔFitch*Euro*Crisis			0.0891	0.0749
ΔFitch*Euro*QE			0.0851	0.0132
ΔFitch*Euro			0.0526	0.0877*
ΔFitch*Crisis			-0.0671*	-0.0656
ΔFitch*QE			-0.00368	0.0236
ΔMoodys	0.0893***	0.108***	0.0251*	0.0329
ΔMoodys*Euro*Crisis			0.259***	0.253***
ΔMoodys*Euro*QE			0.164**	0.149
ΔMoodys*Euro			-0.142***	-0.139***
ΔMoodys*Crisis			0.0126	0.0199
ΔMoodys*QE			0.0281	0.0269
ΔSP	0.0813***	0.108***	0.0661	0.0649
ΔSP*Euro*Crisis			0.148	0.159
ΔSP*Euro*QE			0.0679	0.0652
ΔSP*Euro			0.00134	-0.00903
ΔSP*Crisis			-0.0239	-0.00307
ΔSP*QE			-0.0565	-0.0383
Euro*Crisis			-0.101	-0.127
Euro*QE			-0.139**	-0.138**
Euro	0.00895	0.0984	0.0641***	0.131
Crisis	0.0307	0.0182	-0.0143	-0.00548
QE	-0.0276	-0.0675**	0.0103	-0.0157
Region FE	No	Yes	No	Yes
Macro controls	No	Yes	No	Yes
Observations	287	287	287	287
Adj. R-squared	0.129	0.163	0.133	0.159

Appendix

Table A1: Numerical rating transformation

This table shows the numerical rating transformation of the rating tables of all three rating agencies.

S&P	Moody's	Fitch	Numerical Transformation
Investment grade			
AAA	Aaa	AAA	1
AA+	Aa1	AA+	2
AA	Aa2	AA	3
AA-	Aa3	AA-	4
A+	A1	A+	5
A	A2	A	6
A-	A3	A-	7
BBB+	Baa1	BBB+	8
BBB	Baa2	BBB	9
BBB-	Baa3	BBB-	10
High - yield			
BB+	Ba1	BB+	11
BB	Ba2	BB	12
BB-	Ba3	BB-	13
B+	B1	B+	14
B	B2	B	15
B-	B3	B-	16
CCC+	Caa1	CCC+	17
CCC	Caa2	CCC	
CCC-	Caa3	CCC-	
CC	Ca	CC	
C	C	C	
SD		DDD	
D		DD	
		D	

Table A2: Countries included in our rating and spread analysis

This table shows the list of countries that were included in our rating and spread analysis. The number of observations is relevant for our rating difference analysis (Section 4.1). The "x" in the Yield column indicates that the country is also part of our spread analysis (Section 4.3).

Country	Observations	Yield	Country	Observations	Yield
ABU DHABI	270		KOREA	324	x
ANGOLA	112		KUWAIT	226	
ARGENTINA	324		LATVIA	324	x
ARUBA	160		LEBANON	324	
AUSTRALIA	324	x	LIBYA	46	
AUSTRIA	324	x	LITHUANIA	324	x
AZERBAIJAN	146		LUXEMBOURG	284	
BAHRAIN	216		MACEDONIA	216	
BANGLADESH	10		MALAYSIA	324	x
BELGIUM	324	x	MALI	62	
BENIN	146		MALTA	324	x
BERMUDA	246		MEXICO	324	x
BOLIVIA	324		MOLDOVA	90	
BRAZIL	324	x	MONGOLIA	216	
BULGARIA	324	x	MOROCCO	279	
CAMEROON	216		MOZAMBIQUE	216	
CANADA	324	x	NETHERLANDS	324	x
CAPE VERDE	146		NEW ZEALAND	324	x
CHILE	324	x	NIGERIA	214	x
CHINA	324	x	NORWAY	324	x
COLOMBIA	324	x	PANAMA	324	
COSTA RICA	324		PAPUA NEW GUINEA	98	
CROATIA	324	x	PARAGUAY	48	
CYPRUS	324		PERU	324	
CZECH REPUBLIC	324	x	PHILIPPINES	324	x
DENMARK	324	x	POLAND	324	x
DOMINICAN REPUBLIC	324		PORTUGAL	324	x
ECUADOR	324		REPUBLIC OF CONGO	30	
EGYPT	324		ROMANIA	324	x
EL SALVADOR	324		RUSSIA	324	
ESTONIA	233		RWANDA	74	
ETHIOPIA	16		SAUDI ARABIA	251	
FINLAND	324	x	SERBIA	216	
FRANCE	324	x	SINGAPORE	324	x
GABON	172		SLOVAKIA	216	x
GEORGIA	231		SLOVENIA	324	x
GERMANY	324	x	SOUTH AFRICA	324	x
GHANA	216		SPAIN	324	x
GREECE	324	x	SRI LANKA	267	
GUATEMALA	321		SURINAME	216	
HONG KONG	324	x	SWEDEN	324	x
HUNGARY	324	x	SWITZERLAND	324	x
ICELAND	324		TAIWAN	324	x
INDIA	324		THAILAND	324	x
INDONESIA	324	x	TUNISIA	192	
IRELAND	324	x	TURKEY	324	x
ISRAEL	324	x	UKRAINE	324	
ITALY	324	x	UNITED KINGDOM	324	x
JAMAICA	303		UNITED STATES	324	x
JAPAN	324	x	URUGUAY	324	
KAZAKHSTAN	256		VENEZUELA	324	
KENYA	170	x	VIETNAM	324	x

Table A3: Fitch's rating difference regarding Eurozone countries using a 21 numerical notch rating scale

This table reports coefficient estimates from the following linear fixed effect model:

$$Rating21_{i,j,t} = a_{i,t} + a_{j,t} + a_{i,j} + b_1\left(Fitch_j * Euro_i * Crisis_t\right) + b_2\left(Fitch_j * Euro_i * QE_t\right) + u_{i,j,t}$$

*Rating*21 denotes the credit rating assigned to country *i*, by agency *j*, in month *t* and ranges from 1 (AAA) to 21 (CCC+ and below). *Fitch* equals 1 if Fitch assigned the credit rating and zero otherwise. *Euro* equals 1 if the rated country is a member of the Eurozone and zero otherwise. Crisis is equal to 1 from October 2009 to July 2012 and zero otherwise, QE is equal to one from August 2012 to December 2014 and zero otherwise. We gently add country by time fixed effects ($\alpha_{i,t}$), agency by time fixed effects ($\alpha_{j,t}$), and country by agency fixed effects ($\alpha_{i,j}$). The analysis uses monthly data covering the period January 2006 to December 2014. In column (5), we expand the crisis period until March 2013. Standard errors are shown in parentheses and are clustered at the country and time level. ***, **, * correspond to the coefficient being significant at the 1%, 5%, and 10% level, respectively.

	(1)	(2)	(3)	(4)	(5)
Fitch*Euro*Crisis	-0.236	-0.280**	-0.282**	-0.241*	-0.350**
	(0.175)	(0.136)	(0.138)	(0.137)	(0.136)
Fitch*Euro*QE	-0.793***	-0.693***	-0.672***	-0.667***	-0.618***
	(0.256)	(0.186)	(0.181)	(0.161)	(0.164)
Fitch*Euro	-0.524***	-0.0929	-0.101		
	(0.187)	(0.117)	(0.118)		
Euro*Crisis	1.910***				
	(0.595)				
Euro*QE	4.358***				
	(1.016)				
Fitch*Crisis	0.0344	0.0618			
	(0.110)	(0.0873)			
Fitch* QE	0.0386	0.0119			
	(0.142)	(0.0878)			
Euro	-6.444***				
	(0.699)				
Crisis	0.0407				
	(0.150)				
QE	0.0992				
	(0.228)				
Agency FE	Yes	Yes	No	No	No
Country-Time FE	No	Yes	Yes	Yes	Yes
Agency-Time FE	No	No	Yes	Yes	Yes
Agency-Country FE	No	No	No	Yes	Yes
Observations	28,103	28,103	28,103	28,103	28,103
Adj. R-squared	0.156	0.982	0.982	0.990	0.990

Table A4: Fitch's rating difference regarding Eurozone countries using adjusted ratings

This table reports coefficient estimates from the following linear fixed effect model:

$$Adj\_Rating_{i,j,t} = a_{i,t} + a_{j,t} + a_{i,j} + b_1(Fitch_j * Euro_i * Crisis_t) + b_2(Fitch_j * Euro_i * QE_t) + u_{i,j,t}$$

Adj_Rating denotes the adjusted credit rating assigned to country *i*, by agency *j*, in month *t*. The adjusted rating ranges from 1 to 17 and is calculated as follows: it increases the variable rating, as explained in Table A1, by one notch if the rating outlook is negative, minus one if the outlook is positive, plus two if it is under watch for downgrade and minus two if it is under watch for upgrade. *Fitch* equals 1 if Fitch assigned the credit rating and zero otherwise. *Euro* equals 1 if the rated country is a member of the Eurozone and zero otherwise. *Crisis* is equal to 1 from October 2009 to July 2012 and zero otherwise, *QE* is equal to one from August 2012 to December 2014 and zero otherwise. We gently add country by time fixed effects ($\alpha_{i,t}$), agency by time fixed effects ($\alpha_{j,t}$), and country by agency fixed effects ($\alpha_{i,j}$). The analysis uses monthly data covering the period January 2006 to December 2014. In column (5), we expand the crisis period until March 2013. Standard errors are shown in parentheses and are clustered at the country and time level. ***, **, * correspond to the coefficient being significant at the 1%, 5%, and 10% level, respectively.

	(1)	(2)	(3)	(4)	(5)
Fitch*Euro*Crisis	-0.766**	-0.489***	-0.488***	-0.442***	-0.568***
	(0.320)	(0.115)	(0.117)	(0.112)	(0.122)
Fitch*Euro*QE	-0.889**	-0.688***	-0.663***	-0.651***	-0.493**
	(0.348)	(0.219)	(0.219)	(0.205)	(0.217)
Fitch*Euro	-0.383	-0.0872	-0.0983		
	(0.231)	(0.131)	(0.132)		
Euro*Crisis	2.260***				
	(0.625)				
Euro*QE	4.401***				
	(0.956)				
Fitch*Crisis	0.131	0.106*			
	(0.104)	(0.0615)			
Fitch* QE	-0.0709	0.00531			
	(0.156)	(0.0934)			
Euro	-6.349***				
	(0.687)				
Crisis	0.118				
	(0.165)				
QE	0.262				
	(0.228)				
Agency FE	Yes	Yes	No	No	No
Country-Time FE	No	Yes	Yes	Yes	Yes
Agency-Time FE	No	No	Yes	Yes	Yes
Agency-Country FE	No	No	No	Yes	Yes
Observations	27,851	27,851	27,851	27,851	27,851
Adj. R-squared	0.153	0.983	0.983	0.989	0.989

Table A5: Fitch's rating difference regarding Eurozone countries excl. GIIPS

This table reports coefficient estimates from the following linear fixed effect model:

$$Rating_{i,j,t} = a_{i,t} + a_{j,t} + a_{i,j} + b_1\left(Fitch_j * EuroNoGIIPS_i * Crisis_t\right) + b_2\left(Fitch_j * EuroNoGIIPS_i * QE_t\right) + u_{i,j,t}$$

Rating denotes the credit rating assigned to country *i*, by agency *j*, in month *t* and ranges from 1 (AAA) to 17 (CCC+ and below) as explained in Table A1. *Fitch* equals 1 if Fitch assigned the credit rating and zero otherwise. *EuroNoGIIPS* equals 1 if the rated country is a member of the Eurozone excl. *GIIPS* and zero otherwise. *Crisis* is equal to 1 from October 2009 to July 2012 and zero otherwise, *QE* is equal to one from August 2012 to December 2014 and zero otherwise. We gently add country by time fixed effects ($\alpha_{i,t}$), agency by time fixed effects ($\alpha_{j,t}$), and country by agency fixed effects ($\alpha_{i,j}$). The analysis uses monthly data covering the period January 2006 to December 2014. In column (5), we expand the crisis period until March 2013. Standard errors are shown in parentheses and are clustered at the country and time level. ***, **, * correspond to the coefficient being significant at the 1%, 5%, and 10% level, respectively.

	(1)	(2)	(3)	(4)	(5)
Fitch*EuroNoGIIPS*Crisis	-0.0512	-0.200**	-0.203**	-0.161*	-0.259**
	(0.159)	(0.0953)	(0.0962)	(0.0958)	(0.107)
Fitch*EuroNoGIIPS*QE	-0.473*	-0.485***	-0.477***	-0.477***	-0.412**
	(0.259)	(0.181)	(0.179)	(0.167)	(0.176)
Fitch*EuroNoGIIPS	-0.438**	-0.0190	-0.0250		
	(0.181)	(0.0797)	(0.0833)		
EuroNoGIIPS*Crisis	0.880***				
	(0.315)				
EuroNoGIIPS*QE	2.683***				
	(1.003)				
Fitch*Crisis	0.0823	0.112*			
	(0.0932)	(0.0622)			
Fitch*QE	0.0717	0.0452			
	(0.139)	(0.0815)			
EuroNoGIIPS	-6.909***				
	(0.674)				
Crisis	0.0414				
	(0.150)				
QE	0.0854				
	(0.225)				
Agency FE	Yes	Yes	No	No	No
Country-Time FE	No	Yes	Yes	Yes	Yes
Agency-Time FE	No	No	Yes	Yes	Yes
Agency-Country FE	No	No	No	Yes	Yes
Observations	26,483	26,483	26,483	26,483	26,483
Adj. R-squared	0.167	0.987	0.987	0.993	0.993

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