

Ratings of Sovereign Debt during the Euro Crisis — An Empirical Assessment

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Introduction

While valid estimates of securities' default risk are a crucial ingredient for making appropriate investment decisions, the course of the European debt crisis has shown that it is difficult or even impossible to obtain such estimates for sovereign bonds. Rating agencies, which investors trusted to make informed judgments about a country's creditworthiness in the past, have been criticized for systematically underestimating default risk and misrating several European countries and securities prior to the crisis. By contrast, during the crisis several politicians and bureaucrats complained about downgrades that were—in their eyes—not justified by macroeconomic fundamentals. A recent example is given by Christian Noyer, the governor of the French central bank, who claimed that rating agencies have become “incomprehensible and irrational” in their assessments (Deen (2011)).

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In our paper “Welche Aussagekraft haben Länderratings? Eine empirische Modellierung der Ratingvergabe während der europäischen Staatsschuldenkrise”, we address this issue by examining the informational content as well as the reliability of country ratings for investment decisions. The aim of the paper is to show potential inconsistencies in the rating process of European countries in the period between 1995 and 2011.

Like other studies before us we first show that it is possible to replicate country ratings with a few—publicly available—macroeconomic variables.¹ Our simple model is able to explain more than 90% of the variation in country ratings and questions the necessity of agencies’ complex and nontransparent models. In a second step we show that the weight that rating agencies attribute to the individual macroeconomic factors is not consistent over time. In particular, the overall debt level of a country has a much greater impact on the rating since the beginning of the European debt crisis. Rating agencies seem to adjust the rating process in order to be in line with public perception, which questions the usefulness of ratings for long-term investment decisions. Our third result points into the same direction: We show that pre-period prices of Credit Defaults Swaps (CDS) can be used to predict changes in country ratings, while the opposite relationship does not hold. In a way, this result could be expected as agencies aim to provide long-term assessments of a debtor’s creditworthiness. However, one might ask the question about the added value of ratings if markets give corresponding signals before changes in ratings occur. As our final result we find no evidence of arbitrary downgrades of countries during the European debt crisis. All downgrades are justified by fundamentals. Hence, while agencies seem to adjust their

¹ For other studies that show that publicly available macroeconomic variables are often sufficient to replicate country ratings see e.g. Cantor and Packer (1996), Afonso (2003) or Butler and Fauver (2006). A study that is closely related to our own is the one by Gärtner, Griesbach, and Jung (2011), who show inconsistencies in the rating process during the European debt crisis.

methodology due to external influences, they apply the changed methodology in a similar way to all countries.

We proceed as follows: In the next two sections we briefly describe our data and methodology, before we summarize some of our main results in section 3 and conclude in section 4.

Data

In our study, we use panel data of European countries between 1995 and 2011 in order to analyze country ratings over time. In contrast to previous studies we use quarterly data to account for the short run dynamics in ratings that have been particularly striking in the recent financial turmoil. We employ two types of variables: firstly, risk measures such as ratings and bond returns, and secondly, risk explanatory variables such as government debt in percent of GDP, budget deficit, or inflation. Table 1 gives an overview of our explanatory variables.

Since our main dependent variable, the respective country rating, is published in letter categories typically ranging from AAA to D or C, we use a linear transformation to translate these ordered letter combinations into a scale from 21 (best rating) to 1 (worst rating). We collect rating histories from 1995 to 2011 for the three large agencies: Standard & Poor's, Moody's and Fitch Ratings. Since the different ratings follow the same trends, we use an average rating compiled from the three credit rating agencies for most parts of our analysis. Finally, we account for the short-term dynamics of the crisis by adjusting the average rating by +0.3, 0, or -0.3 respectively, depending on a positive, neutral, or negative outlook.

Methodology

We develop a simple macroeconomic model in order to explain variation in country ratings. Our main specification is a country fixed-effects regression of the

following form:

$$R_{it} = \alpha_i + X'_{it}\beta + \varepsilon_{it} \quad (1)$$

Index i ($i = 1, \dots, 15$) indicates the respective country while t ($t=1995q1, \dots, 2011q4$) stands for time. The dependent variable R_{it} is the linearly transformed and outlook-adjusted rating, while matrix X'_{it} contains macroeconomic explanatory variables. Unobserved heterogeneity in the model is absorbed by the country specific effect α_i . Lastly, ε_{it} is an error term with $\varepsilon_{it} \sim \mathcal{N}(0, \sigma^2)$. To account for heteroskedasticity and autocorrelation we use robust standard errors for the estimation of our model.

In order to examine whether ratings are consistent over time, we expand our model with time dummy variables and interaction terms. The dummy for the convergence-period from the introduction of the Euro until the outbreak of the financial crisis (1999q1–2007q4) is called “Euro”, the dummy for the current crisis period (2008q1 – 2011q4) is termed “Crisis”. Hence, we estimate the following extended model:

$$R_{it} = \alpha_i + \gamma Euro + \delta Crisis + X'_{it}\beta + (X_{it}xEuro)'\theta + (X_{it}xCrisis)'\eta + \varepsilon_{it} \quad (2)$$

Positive coefficients for interaction terms between macro variables and time dummies indicate a change in the rating methodology. Therefore, coefficients θ and η are of particular interest.

Results

Our main results are shown in Table 2. Column 1 starts with an estimation of our simple macroeconomic model specified in Equation (1). The influence of the

distinct variables is not surprising: While higher debt levels, higher unemployment, higher inflation and a greater budget deficit correspond to worse ratings on average, a higher GDP per capita or a more efficient bureaucracy tend to increase the country rating. The adjusted R-squared shows that our model is able to explain over 90% of the variation in country ratings.

In a second step we include dummy variables for the period following the introduction of the Euro (1999–2007) and the current crisis period (2008–2011) in order to test whether rating agencies change their methodology over time due to external influences. Somewhat surprisingly, the dummy variable for the crisis period is positive and significant at the 1%-level. This challenges the common perception of too harsh downgrades between 2008 and 2011. To the contrary, a potential explanation for our results is that positive ratings were maintained for too long during the crisis, and that downgrades should have occurred much earlier (see Tichy (2011)). The insignificant coefficient for the convergence period between 1999 and 2008 indicates that the introduction of the common currency did not have a positive impact on the country ratings per se, but that it was accompanied by an improvement in fundamentals that justified the upgrades in the ratings of currency union members.

Results in column 2 indicate that country ratings are not always consistent over time. The same set of fundamentals might induce different ratings at different points in time. To test whether agencies also change the weight attributed to the distinct variables we include interaction terms between the dummy variables and the macroeconomic variables in column 3. Interaction terms for the convergence period are mostly insignificant and smaller than for the crisis period, which is why we concentrate on the latter and report differences between the pre- and the post-crisis period in column 4. Results hint at a shift in the weighting of macroeconomic and fiscal variables. For example, it seems as if the rating agencies

put less emphasis on inflation rates and budget deficits and thus acknowledged the necessity of fiscal stimuli in the recent economic downturn. Conversely, the interaction term for the level of debt to gross domestic product has the same sign as the variable itself, indicating that this variable became more important during the crisis.

In the media as well as in academic publications (e.g. Gärtner, Griesbach, and Jung (2011)), rating agencies were harshly criticized for their treatment of Greece, Italy, Ireland, Portugal and Spain. It was suspected that the downgrades were arbitrary in the sense that they did not reflect the real economic situation but rather followed market sentiments. Our paper shows that this criticism is not valid. We examine the residuals produced by the fixed effects model with dummy and interaction terms and find that these are not systematically negative for the aforementioned countries in the crisis period. In other words, downgrades were justified by fundamental macroeconomic and fiscal data.

Conclusion

Summing up, our analysis suggests that rating agencies did not anticipate the deterioration of sovereign credit quality in the aftermath of the financial crisis and that their rating methodology was time inconsistent. However, we find no evidence that the GIIPS countries were subject to arbitrary downgrades. In the light of readily-available market assessments of default risk, such as CDS quotes, ratings appear increasingly redundant due to their delayed processing of viable information.

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Appendix

	Unit	Source	Frequency	Transformation
GDP per Capita	1000 € /Inhabitant	IMF	Anually	Cubic-Spline
Inflation	YoY in %	OECD	Quarterly	-
Unemployment	% annualized	OECD	Monthly	Average
Gross Public Debt	% of GDP	IMF	Anually	Linear Interpolation
Budget Deficit	% of GDP	IMF	Anually	Extrapolation
Government Effectiveness	-2.5 to + 2.5	World Bank	Semi- Annually	Linear Interpolation
10yr Government Bond Returns	%	ECB, Datastream	Monthly/ Daily	Average
CDS-Prices	Bps	Bloomberg, Datastream	Daily	Average

Table 1: *This table shows details for our set of variable (ratings are excluded here).*

	(1) Avg. Rating	(2) Avg. Rating	(3) Avg. Rating	(4) Avg. Rating
Gross Government Debt	-0.0142*** (0.003)	-0.0214*** (0.003)	-0.0207*** (0.004)	-0.0187*** (0.003)
GDP per Capita	0.0961*** (0.011)	0.0856*** (0.013)	0.0621*** (0.013)	0.0626*** (0.010)
Unemployment	-0.1851*** (0.017)	-0.1579*** (0.018)	-0.1694*** (0.017)	-0.1758*** (0.016)
Inflation	-0.3595*** (0.017)	-0.3502*** (0.017)	-0.4595*** (0.024)	-0.4130*** (0.018)
Primary Surplus	0.0407*** (0.010)	0.0578*** (0.010)	0.0734*** (0.028)	0.0357*** (0.013)
Government Effectiveness	0.3221*** (0.115)	0.5178*** (0.118)	0.4077*** (0.105)	0.4156*** (0.106)
Euro		-0.0390 (0.082)	-0.0441 (0.203)	
Crisis		0.4516*** (0.119)	0.6996*** (0.242)	0.6924*** (0.155)
Euro x Gross Public Debt			-0.0017 (0.002)	
Crisis x Gross Public Debt			-0.0176*** (0.003)	-0.0166*** (0.002)
Euro x Primary Surplus			-0.0418 (0.029)	
Crisis x Primary Surplus			-0.0957*** (0.031)	-0.0509*** (0.018)
Euro x Inflation			0.0858*** (0.028)	
Crisis x Inflation			0.3706*** (0.034)	0.3200*** (0.029)
Observations	831	831	831	831
Adjusted R-Squared	0.916	0.919	0.938	0.937
Country FE	YES	YES	YES	YES

Table 2: The table shows different specifications of Equations (1) and (2). Independent variable is the country's average rating (over the three agencies) within a certain period, adjusted by the outlook. Standard are errors in parantheses.

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.