Euro Area Sovereign Ratings: An Analysis of Fundamental Criteria and Subjective Judgement

This paper studies the drivers of sovereign ratings for euro area countries and finds that judgement is applied to varying degrees, and thus recommends that rating agencies increase their methodological transparency.

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Abstract

This paper studies the sovereign ratings of the current 19 euro area Member States from 2005 to 2015. It disentangles the rating drivers into a 'fundamental' and 'subjective' component using Moody's methodology, and explores which variables explain the 'subjective' component, that is Moody's judgement. The main results show that judgement is applied to varying degrees, both across countries and over time. We find that past judgement as well as the 10-year government yield spread to the Bund are accurate predictors of the 'subjective' rating component. Our results suggest that Credit Rating Agencies should increase their methodological transparency and publish two ratings for each sovereign issuer, namely, i) a quantifiable, 'fundamental' rating which policymakers and market participants can replicate, and ii) a final rating, which includes agencies' judgement.

Keywords: Credit rating agencies, sovereign risk, sovereign ratings, euro area crisis
JEL codes: F34, G15, G24, H63

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1 Introduction

Sovereign ratings matter. They are the Credit Rating Agencies' (CRA) synthesized assessment of a central government's ability and willingness to service its non-official debt in full and on time, in accordance with the conditions agreed with the creditors at the time of issuance. These assessments, which inherently require a certain degree of subjectivity (Canuto et. al. 2004), guide about USD 50 trillion in outstanding sovereign debt (Vernazza and Nielsen, 2015). In addition, as CRAs usually apply 'sovereign ceilings' to their assessment of local securities or entities (local governments, financial institutions, corporates and structured finance products), sovereign ratings serve as a benchmark for all other credit ratings, and thus, their relevance and systemic effect for the capital markets goes beyond the sovereign debt markets (ESRB 2015). The importance of sovereign ratings is further amplified by their use in legislation, regulations and supervisory policies as well as the over-reliance on ratings by market participants (Sy 2009; Financial Stability Board 2010; European Commission 2010).

Against this background, the drivers and impact of sovereign ratings as well as the structure and regulation of the ratings industry are of interest to policymakers, market participants and the research community. For the purpose of this paper however, we focus exclusively on the research related to the drivers of sovereign ratings. To date, and to the best of our knowledge, the literature has focused on explaining sovereign ratings via linear and ordered response models. For instance, using S&P's and Moody's ratings on 49 countries as of September 1995, Cantor and Packer (1996) find that sovereign ratings can be explained by per capita income, GDP growth, inflation, external debt, the level of economic development and the default history. Using both a linear and a logistic transformation of the rating scales, Afonso (2003) confirms that these variables explain sovereign ratings well. Similarly, Mellios and Paget (2006), who use a principal component analysis, conclude that sovereign ratings are mostly influenced by per capita income, government income, real exchange rate changes, the inflation rate and default history as well as corruption levels, as measured by Transparency International's Corruption Perceptions Index. These findings are further corroborated by Afonso et. al (2007) who, using panel estimation and random effects ordered probit approaches, conclude that the relevant explanatory variables for a country's credit rating are GDP per capita, GDP growth, government debt, government effectiveness indicators, external debt, external reserves, and default history. Extending this analysis Afonso et. al (2010) find that changes in GDP per capita, GDP growth, government debt, and the government balance have a short-run impact on a country's credit rating, while government effectiveness, external debt, foreign reserves, and default history are important long-run determinants.

Our analysis contributes to this stream of literature, and in particular, the research focused on the importance of judgement in the assessment of sovereign ratings. Specifically, we disentangle the drivers of sovereign ratings into a 'fundamental' and 'subjective' component. However, contrary to the fundamental benchmarks derived in the literature to date, which are strictly a good explanation of ratings, though not necessarily a reflection of what rating agencies actually do, we derive the 'fundamental' component exclusively from reverse-engineering Moody's methodology based on a real-time dataset of the quantitative credit metrics cited in the agency's methodology. We focus on Moody's as it provides the most 'transparent' quantitative assessment of the 'fundamental' component when compared to the other two major rating agencies[4].

[4] To the best of our knowledge it is not possible to reverse-engineer the 'fundamental' ratings of S&P and Fitch. S&P does not publish the weights or thresholds it attributes to its variables and while Fitch publishes the weights it attributes to the overall four pillars of their methodology, the importance of each variable and the thresholds (if any) within that pillar are not known. Fitch aims to publish a revised (more transparent) methodology in 2016.

To the best of our knowledge this is the first study to use this approach. The main advantage of our methodology is that the 'fundamental' assessment, which is the most relevant component of the final rating, is built by tracking the approach established by Moody's. The sensitivity of the rating to changes in macro variables can be assessed mechanically without using regression based methods which, conditional to the fact that one selects the right explanatory variables, are subject to an estimation error. Conversely, we rely on the traditional approach used in the literature and identify macro and financial determinants to explain the 'subjective' component.

The main results show that for our sample of 19 euro area Member States from 2005 to 2015, the 'subjective' rating component has been applied to varying degrees, both across countries and over time. Specifically, and being mindful of the credit events of Greece and Cyprus, as well as the latter's introduction of capital controls, we identify 'Crisis Countries' whose actual ratings deviated meaningfully from our derived 'fundamental' rating. In particular, this difference was positive before the crisis for Italy, Portugal and Spain, negative during the crisis for Portugal, Slovenia and Spain, and remains negative after the crisis for Cyprus, Portugal and Slovenia. Ireland's rating appears to have been broadly in line with that suggested by its 'fundamentals', although we do observe that the deteriorating 'fundamental' rating led the actual rating in the years prior to the crisis.

Other countries appear to benefit from more benign views, in particular, Finland but also Austria and Luxembourg, while for Belgium, Germany, France, the Netherlands, Estonia, Lithuania, Latvia, Malta and Slovakia, we find that ratings were broadly in line with the 'fundamentals' throughout the entire 10-year period. Our results also illustrate that a sovereign's creditworthiness is not mechanistically reflected in the 'fundamental' rating once the most extreme threshold of a variable is reached or exceeded. This limitation points to the benefit of any model to be complemented with judgement.

In addition, we show that the differences in the 'subjective' rating component can be explained by the 'subjective' component lagged by one period, as well as the 10-year government yield spread to the Bund. This suggests that the idiosyncratic country-specific factors as well as the agency's expectations of future creditworthiness-related developments, are in fact closely related to, or at least do not deviate largely from, the market's perception of a sovereign's creditworthiness. Indeed, combining the 'fundamental' with our model-implied 'subjective' rating component allows us to closely replicate Moody's sovereign ratings for 10 euro area Member States over the 10-year horizon. Finally, while our results are based on Moody's methodology only, the similarity of the agencies' methodologies in terms of the assessed fundamental criteria as well as the high correlation of sovereign ratings among the CRAs, suggests they could also apply to Fitch and S&P.

The rest of the paper is organised as follows: Section 2 provides a literature review as well as a brief overview of the sovereign rating methodologies of Moody's, S&P and Fitch. Section 3 explains our approach of disentangling the drivers of sovereign ratings into a 'fundamental' and 'subjective' component based on Moody's methodology. Section 4 analyses differences and possible rating biases in Moody's 'subjective' assessment of countries as well as over time. Section 5 explores the determinants of the 'subjective' component. Section 6 provides a robustness check and section 7 concludes with policy recommendations.

2 Literature Review and CRAs' Methodologies

Given their systemic importance, it is not surprising that a vast field of research has developed around the drivers and impact of sovereign ratings as well as the structure and regulation of the ratings industry.[5] In addition to examining the macro-economic and institutional variables explaining sovereign ratings referred to in the introduction, the literature has also focused on the importance of subjective judgement as a driver of sovereign ratings. In this brief, review we focus on these studies as well as the agencies' sovereign methodologies as they are the most relevant for our analysis.

In response to the East Asian crisis, Ferri, Liu and Stiglitz (1999) use an econometric model to compare the model-generated ratings for 17 countries from 1989 to 1998 with the actual ratings assigned by the rating agencies. In a resounding critique of the agencies, they conclude that agencies tend to use their idiosyncratic judgement to modify the ratings generated by the economic fundamentals. Specifically, they state that before the East Asian financial crisis, the actual ratings assigned to the four high-growth dynamic East Asian economies were consistently higher than the economic fundamentals would warrant and further, that after the crisis, the actual ratings dropped much more sharply than the model-predicted ratings, implying that rating downgrades were larger than the economic fundamentals would suggest. The authors posit that rating agencies attached higher weights to their qualitative judgement than they gave to the economic fundamentals both in pre- and post-crisis rating assignment, thereby exhibiting a pattern that when the economy is booming, economic fundamentals are ignored and when the economy is deteriorating, economic fundamentals are also disregarded. In doing so, they critique that rating agencies may behave in a manner that may potentially generate pro-cyclical sovereign ratings, which might have exacerbated the already worsening economic fundamentals by hastening capital outflows and causing future capital inflows to evaporate.

Investigating these views, Mora (2006) suggests a more cautious take: When not including country fixed effects, ratings are found to be sticky rather than excessively procyclical. While she presents support for the Ferri, Liu and Stiglitz (1999) finding that predicted ratings were lower than assigned ratings for the period prior to the crisis, ratings are not found to be predicted higher than assigned during the crisis period. Importantly, the study finds no evidence of procyclicality or stickiness when including country fixed effects and further, that ratings react to non-macroeconomic factors such as lagged spreads and a country's default history. Therefore, the study concludes, it is questionable that ratings exacerbate the boom-bust cycle as they are simply reacting to news, whether macroeconomic or market-related.

More recently, Gärtner et. al (2011) examine whether rating agencies played a passive role or were an active driving force during Europe's sovereign debt crisis. Using annual data for 26 OECD countries for the period 1999-2010, they decompose actual ratings into a predicted part that can be attributed to economic and structural variables and an unexplained or arbitrary remainder. They find that Portugal, Ireland, Greece and Spain were not only rated worse during the crisis compared to all other countries in their sample, but that the rating markdown due to the

[5] Studies have looked at the impact of sovereign ratings (and changes thereof) on i) the level and change in bond yields and/ or CDS spreads (among others please see Cantor and Packer (1996), Reisen and von Maltzan (1999), Gande and Parsley (2005), Ismailescu and Kazemi (2010), Jaramillo and Tejada (2011), Afonso et. al (2011), Bussiere and Ristiniemi (2012)) and ii) financial market (in)stability (among others please see Kaminsky and Schmukler (2002), Kräussl (2005), Arezki et. al (2011), De Santis (2012)). With regard to the industry, overviews of the structure, business, power and politics of rating agencies are provided by Langohr and Langohr (2008) and Sinclair (2005). A detailed overview of the rating process as well as the changes to and limitations of the sovereign methodologies is provided by Gaillard (2011). Rating-reliance in financial regulation is explored by the FSB (2010) and EC (2010).

unexplained remainder in itself resulted in significantly higher interest rates on government bonds, thus aggravating the European debt crisis.

Similarly, focusing on the euro area crisis, Vernazza and Nielsen (2015) decompose the sovereign ratings of the 'Big Three' rating agencies into an 'objective' component (the fitted value from an OLS regression of ratings on 10 explanatory variables) and a 'subjective' component (the corresponding residuals) using data for advanced and emerging economies over the period 1996–2013. Their main finding is that, while the 'objective' component has explanatory power to predict defaults both in the short and long-term, the 'subjective' component does not help to predict defaults over a horizon of one year or more. In particular, analysing the probability of default within three years, they find the 'subjective' component is biasing default predictions in the wrong direction. According to their study, the biggest casualty of this was the euro area periphery, which was downgraded far too heavily during the 2009–2011 sovereign debt crisis as the rating committees repeatedly overruled the signal coming from fundamentals.

Turning to the methodologies of the three rating agencies, we note that in assessing sovereign creditworthiness, they look at a combination of macro-economic, public and external finance as well as institutional factors. Even though the methodological approaches, variables and the weights are not the same, and further, even though the rating assessment of agencies varies between an estimate of the probability of default (S&P and Fitch) and the expected loss (Moody's), the key factors analysed by Moody's, S&P and Fitch are very similar[6]. They are summarized in Table 1.

Table 1: Stylized Sovereign Rating Methodologies

Moody's (2013)	S&P (2014)	Fitch (2014)
Economic strength	Institutional and governance effectiveness and security risks	Macroeconomic performance, policies and prospects
Institutional strength	Economic structure and growth prospects	Structural features
Fiscal strength	External liquidity and international investment position	Public finances
Susceptibility to event risk	Fiscal performance and flexibility as well as debt burden	External finances
	Monetary flexibility	

Source: Credit rating agencies.

The details of the methodologies can of course be found in the agencies' publications, while an in-depth discussion of the sovereign rating process is provided by Bhatia (2002), Canuto et. al (2004) and Gaillard (2011). However, two points are important for the purpose of our analysis:

First, adjustments and judgement play a vital role in determining the final rating. Indeed, Fitch (2014) states that *'the actual rating determined by the sovereign rating committee can and does differ from that implied by the rating model'* while S&P (2014) argues that the final rating results from '*factoring in supplemental adjustments, when applicable, and after considering trends and other factors*' to its indicative rating. Similarly, Moody's (2013) states that *'the four rating factors in the scorecard may not in all cases constitute an exhaustive treatment of the considerations that are important for a particular sovereign rating, and the rating may differ from the one implied by the scorecard range.'*

[6] In Appendix A we show that the rating actions between the three agencies on the euro area sovereigns are closely aligned despite the fact that CRAs have different methodological approaches. In addition, and as expected, we also observe a high correlation of the rating levels over the time period.

Second, in one way or another, CRAs claim that their ratings are forward-looking which inherently necessitates judgement. Specifically, Moody's (2013) states that their '*rating analyses incorporate forward-looking expectations*', while S&P (2014) argues that their *'supplemental adjustment factors are based on a forward-looking analysis'*, whereas Fitch (2014) defines its ratings as *'a forward-looking assessment of a sovereign's capacity and willingness to honour its existing and future obligations in full and on time'*.

Based on this review, it thus seems appropriate to disentangle sovereign ratings into a 'fundamental' and 'subjective' rating component.

3 Methodology

As discussed in section 2, CRAs do not rely solely on quantitative metrics of creditworthiness but instead, adjustments to the scorecard and in addition judgements in Rating Committees, contribute to the ultimate rating outcome. In this section we explain how we reverse-engineer Moody's scorecard-implied ratings, which we refer to as the 'fundamental' rating component. This is possible as Moody's (2013)[7] has the most transparent methodology of the three rating agencies. The agency has published the weights and respective thresholds[8] of its 15-point scale, ranging from 'Very High (+)' to 'Very Low (-)', for the quantitative variables of its sovereign methodology. The 'subjective' component, reflecting Moody's scorecard adjustments and opinions by the Rating Committee (which we cannot observe), is the difference between the actual and our derived 'fundamental' rating. A stylised depiction of Moody's scorecard (without the adjustments) can be seen below:

Figure 1: Moody's Stylised Scorecard

Factor	Sub-Factor	Input	Assessment
F1: Economic Strength	Avg. Real GDP Growth (t-4 to t+5)	--	--
	Volatility Real GDP Growth (St. Dev. t-9 to t)	--	--
	WEF Global Competitiveness Index (t)	--	--
	Nominal GDP (US $ bn)t-1	--	--
	GDP per Capita (PPP, US $)t-1	--	--
	Overall F1 Score without Adjustments		**--**
F2: Institutional Strength	WB Government Effectiveness	--	--
	WB Rule of Law	--	--
	WB Control of Corruption	--	--
	Inflation Level (t-5 to t+4)	--	--
	Inflation Volatility (St. Dev. T-9 to t)	--	--
	Overall F2 Score without Adjustments		**--**
Economic Resiliency (F1 x F2)			**--**
F3: Fiscal Strength	General Govt Debt/ GDP	--	--
	General Govt Debt/ Revenues	--	--
	General Govt Interest Payments/ Revenue	--	--
	General Govt Interest Payments/ GDP	--	--
	Overall F3 Score without Adjustments		**--**
Government Financial Strength (Economic Resiliency x F3)			**--**
F4: Susceptibility to Event Risk	Political Risk		**N/A**
	Domestic Political Risk		
	Geopolitical Risk		
	Government Liquidity Risk		**--**
	Gross Borrowing Requirements/ GDP	--	--
	Non-Resident Share of General Government Debt	--	--
	Market Implied Ratings	N/A	
	Banking Sector Risk		**N/A**
	Average Baseline Credit Assessment	N/A	
	Total Domestic Bank Assets/ GDP	--	--
	Banking System Loan-to-Deposit Ratio	--	--
	External Vulnerability Risk		**--**
	(Current Account Balance + FDI Inflows)/ GDP	--	--
	External Vulnerability Indicator	N/A	
	Net International Investment Position/ GDP	--	--
	Overall F4 Score (Maximum)		**--**
Indicative Rating			**--**

Source: Moody's, own depiction. t refers to annual data.

[7] All technical details can be found in Moody's methodology.

[8] Moody's does not provide the details on the underlying economic principles justifying its cut-off values.

Each variable is assessed on a scale of 'Very High (+)' to 'Very Low (-)', with a higher assessment being an indicator of credit strength. The factors 'F1: Economic Strength' and 'F2: Institutional Strength' are weighted equally to provide an assessment of a sovereign's 'Economic Resilience' which is then combined with 'F3: Fiscal Strength' following a non-linear function to indicate a country's 'Government Financial Strength'. In a final step, 'F4: Susceptibility to Event Risk' – which is assessed in reverse order (ie. 'Very High (+)' indicates low credit strength), and, in addition, follows a maximum function whereby as soon as one of the four areas of risk warrants an assessment of elevated risk, the country's overall F4 factor is scored at that specific, elevated risk – serves as a constraint, which can only lower the indicative rating with increasing severity as the F4 risk assessment rises. Importantly, the scorecard-implied 'fundamental' rating refers to a +/- one-notch rating range. We refer the reader to further details of the mechanics of the calibration of our 'fundamental' rating to Moody's methodology.

Before delving into the analysis, it is important to clarify why it is at all adequate to compare the 'fundamental' with the actual rating. After all, Moody's (2013) states: *'The scorecard is a summary, and as such, does not include every rating consideration. The weights shown for each factor and sub-factor in the scorecard represent an approximation of their importance for rating decisions, but actual importance may vary significantly. In addition, the illustrative quantification of various factor and sub-factor variables is generally derived from historical data, while our rating analyses also consider forward-looking expectations. As a result, the scorecard-indicated rating ranges may not include the actual rating of each entity.'* This is precisely the point. Disentangling the ratings into a 'fundamental' and a 'subjective' component allows us to i) analyse whether Moody's uses the 'subjective' rating component differently between countries as well as over time and ii) explore possible variables explaining the agency's judgement.

3.1 Data

To obtain a 'fundamental' rating, free of adjustments and opinion, we reverse-engineer Moody's scorecard-implied ratings using the IMF's semi-annual World Economic Outlook (WEO) publications.[9] Using this dataset allows us to calibrate the relevant credit metrics for each WEO publication. We thus obtain two scorecard-implied ratings per year per country (one in April, the other one in September/ October depending on the date of the WEO publication) based on the data available at that time (i.e. real-time dataset without the benefit of data revisions).

As data availability has improved over the years, early WEO dataset publications are complemented with the earliest available IMF WEO data series, keeping the value constant for each WEO edition of that year. We conduct a robustness check for the selected data series using Moody's published annual country statistics in section 6.

The sample is semi-annual and covers the period April 2005 – April 2015. The starting date is selected for data availability reasons; in particular, the World Economic Forum's Competitiveness Index used in the analysis cannot be reconstructed prior to 2005[10].

The variables in Moody's methodology refer to annual data only. Importantly, we also use real-time data for the two forward-looking variables, namely real GDP growth and the inflation rate. Since the IMF's WEO publication only started forecasting for a 5-year period as of its April 2008 publication, for the years 2005-07, we use the IMF WEO's two-year forecasts and then calculate

[9] We do not use European Commission data (in euros) as Moody's global rating approach relies on converting national currencies into US dollars where needed.

[10] The Global Competitiveness Report 2003/2004 shows the ranking but not the associated scores which are needed to assess the sovereigns' competitiveness according to Moody's methodology.

a forecast using the moving average based on five years of historical data and forecasts available at that time. With regard to the World Bank Governance Indicators, which Moody's uses in its assessment of 'F2: Institutional Strength', we are mindful of the two-year publication lag, as for instance, by year-end 2012, only the 2010 value will have been available.

For each quantitative variable, or sub-factor, we rely on Moody's published cut-off values of their 15-point scale ranging from 'Very High (+)' to 'Very Low (-)' to determine the indicator's assessment. Using these derived assessments and the published weights we aggregate the sub-factors to calculate the assessment of each overall factor ('F1: Economic Strength', 'F2: Institutional Strength'; 'F3: Fiscal Strength').

An important assumption refers to the assessment of 'F4: Susceptibility to Event Risk', which in turn is derived from four distinct risks:

(i) 'Political Risk', which we do not assess as no thresholds are provided by Moody's methodology;

(ii) 'Government Liquidity Risk', which we assess by combining the scores obtained for the variables 'Gross Borrowing Requirements/ GDP' (based on real-time as per the IMF's Article IV reports) and the 'Non-Resident Share of General Government Debt' (using BIS data lagged by two quarters). We do not use Moody's Market Implied Ratings as provided by the agency's website to assess 'Market Funding Stress' given that i) we want to explain the ratings with publicly available data only and ii) it is unclear how market indicators like the yield or spread actually translate into Moody's Implied Ratings[11].

(iii) 'Banking Sector Risk', which we do not estimate. Importantly, while we are able to estimate 'Total Domestic Bank Assets/ GDP' (with IFS data) we cannot use it to construct its impact on the F4 score given that Moody's aggregates the *'combined score of the Strength of the Banking System (measured by the average Bank Baseline Credit Assessment) and the Size of the Banking System in a way that reflects that a simultaneously weak and large banking system represents a significant banking sector risk.'* As we are unable to replicate Moody's assessment of banking sector strength, the size of the banking sector on its own cannot be used to assess 'Banking Sector Risk'. In addition, approximating this risk with an assessment of a banking sector's 'Funding Vulnerabilities' only, which is possible using the ECB series for the loan-to-deposit ratio, would drive the overall F4 score for most sovereigns, which is unlikely. As a result, we choose to exclude 'Banking Sector Risk' from our derivation of the 'fundamental' rating. Consequently, our 'fundamental' rating will be too high for those countries and time periods where the F4 scores were actually driven by 'Banking Sector Risk'. We address this concern in the robustness check where we use Moody's published F4 scores for the time period 2011-2015.

(iv) 'External Vulnerability Risk', which we approximate by using the higher assessment of the two variables (1) (Current Account Balance + FDI Inflows)/ GDP, using IMF figures lagged by one year and (2) the Net International Investment Position/ GDP, based on IMF figures lagged by two quarters (if available on a quarterly basis) otherwise lagged by one year. We do not estimate a sovereign's 'External Vulnerability Indicator (EVI)', as this measure, according to Moody's Statistical Handbook as well as the agency's 'Credit Opinions' is not provided for, and thus presumably does not apply to Advanced Economies such as the euro area sovereigns.

[11] Based on the information published by Moody's Analytics (2011) it is not possible to replicate market implied ratings with publicly available data on yields or spreads.

As a final step, we use the factor assessments and the rating-range grids provided in Moody's methodology to determine the adjustment-free scorecard-implied rating. Thus, contrary to the fundamental benchmarks derived in the literature to date, our derived 'fundamental' rating component is free of an estimation error, subject to the abovementioned data-related limitations.

We also note that Moody's updated its sovereign methodology in September 2013 and again in December 2015. We use the 2013 version to determine the 'fundamental' rating for the whole time period. Using this version should not give rise to consistency concerns. After all, the agency states that *'back-testing the updated [2013] methodology against ratings at the beginning of the financial crisis in 2008 indicates that the new scorecard would have appropriately signalled for discussion in rating committees higher or lower ratings for most of the sovereigns that subsequently experienced multi-notch rating changes.'* In addition, since the period of observation ends in April 2015, the update of December 2015 which only altered some of the factor score thresholds, should only apply going forward, and in any case *'had no material rating implications'*. Our results remain largely unchanged when using these updated thresholds as shown in the robustness check in section 6.

Finally, for completeness, in Section 5 we use the spread between government bond yields of a given country and Germany. They are based on 10-year benchmark bonds as calculated by Thomson Reuters and provided by Datastream. We also use a measure of political uncertainty in Europe.[12]

[12] Data are available at: http://www.policyuncertainty.com/europe_monthly.html.

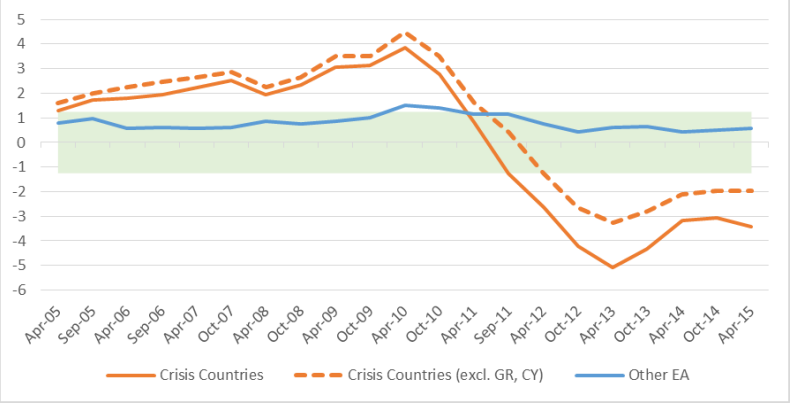
4 Results: 'Fundamental' Criteria vs 'Subjective' Judgement

Comparing our derived 'fundamental' rating with Moody's actual rating allows us to explain the extent to which fundamentals or subjective judgement drove the rating actions of euro area sovereigns between 2005 and 2015. With regard to the actual rating, we use the rating as observed on the last day of the month during which the IMF WEO database was published, which implies that the rating at that point in time will have reflected the updated macro-economic and public finance figures.[13]

Following this approach, Figure 2 reports the average difference in rating notches between the actual and our 'fundamental' rating for the 'Crisis Countries' and the 'Other EA' sovereigns between April 2005 and April 2015[14]. Importantly, since the 'fundamental' scorecard-implied rating refers to the mid-point of a rating range, differences of one-notch are trivial.

Figure 2: Difference in Actual vs 'Fundamental' Rating

Average difference between the actual and 'fundamental' rating (in rating notches) for 'Crisis Countries' and 'Other EA'



Source: Own calculations.

NB. The green area refers to the +/- one-notch range of the 'fundamental' rating. 'Crisis Countries': CY, ES, GR, IE, IT, PT and SI. 'Other EA' = AT, BE, DE, EE, FI, FR, LT, LV, MT, NL and SK.

As can be seen, the extent to which judgement is used differed significantly for the 'Crisis Countries' and the 'Other EA'. Prior to April 2010, the actual ratings of 'Crisis Countries' were on average three notches above those of their 'fundamental' scorecard-implied ratings. As the crisis developed this positive 'subjective' rating component reversed, as is evidenced by the fact that since 2012 the ratings of the 'Crisis Countries' are on average three notches below their respective 'fundamental' scorecard-implied ratings. These results do not change much if we exclude Cyprus and Greece, which are outliers to some extent.

On the other hand, 'Other EA' countries appear to have been rated, on average, within the one-notch rating range of their 'fundamental' scorecard-implied ratings over the same horizon. Are these results driven by a few outliers or do they hold for most of the countries within each group?

[13] We do the same exercise using the average rating over the past six months between publications so as to avoid possible 'cliff-effects'. The results are essentially the same as shown in section 6.

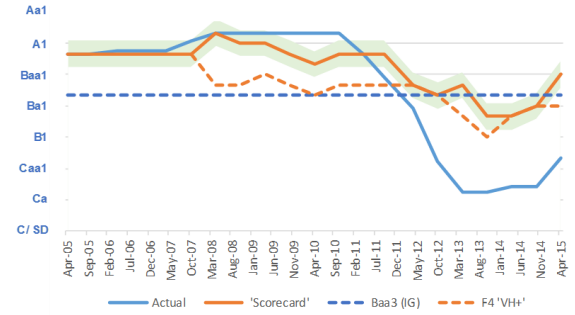
[14] The 'Crisis Countries' refer to Cyprus, Greece, Ireland, Italy, Portugal, Slovenia and Spain given that their ratings were adversely and significantly affected during the crisis period, starting in Q1 2008 until Q2 2013. 'Other EA' refers to the EA sovereigns whose ratings were fairly stable throughout the 2005-15 time period. Further details on the agencies' rating actions can be found in Appendix A.

4.1 In Detail: 'Crisis Countries'

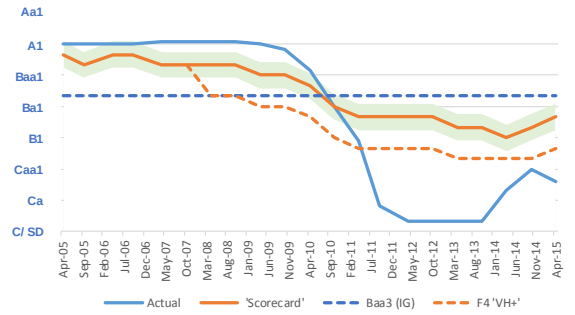
The following charts look at the country-specific developments, comparing our derived 'fundamental' with Moody's actual rating for the 'Crisis Countries' from April 2005 to April 2015.

Figure 3: Actual vs 'Fundamental' Rating of 'Crisis Countries'
Rating; April 2005 – April 2015

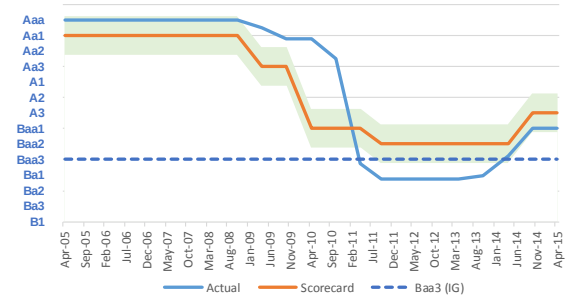
Cyprus



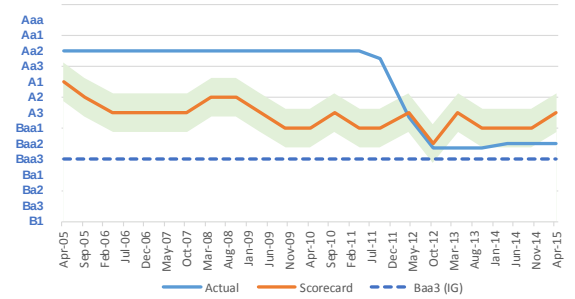
Greece



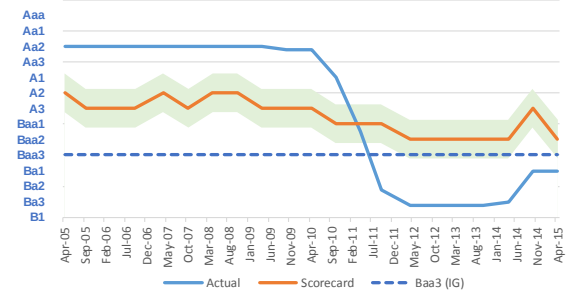
Ireland



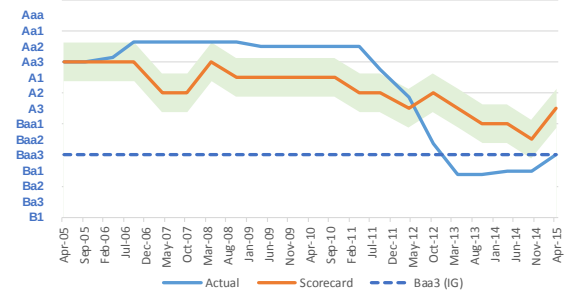
Italy



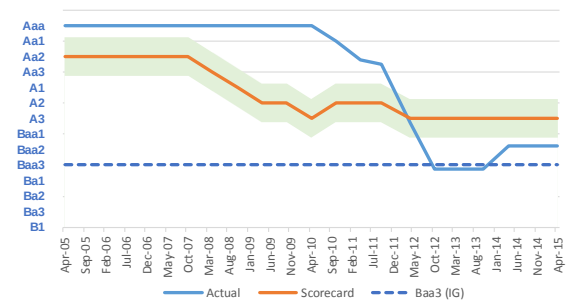
Portugal



Slovenia



Spain



Source: Own calculations.
NB. The green area refers to the +/- one-notch range of the scorecard-implied 'fundamental' rating.

The charts for both **Greece and Cyprus** need to be interpreted with maximum caution. They show that the actual rating of both sovereigns was approximately three notches above that implied by the scorecard until April 2010. The rating-reversal however went 8-10 notches beyond that suggested by the 'fundamental' adjustment-free scorecard-implied rating. This result points to a **critical limitation of the scorecard**, and by implication, our 'fundamental' rating: It does not change once the lowest threshold of a variable is reached or exceeded. For instance, in the case of the debt-to-GDP ratio, once the value is above 140%, the scorecard-implied rating does not change as it is already at the lowest possible assessment 'VL(-)'. As a result, the worsening debt-to-GDP ratio of Greece over the past few years and the associated decrease in the sovereign's creditworthiness, is not mechanistically reflected in the 'fundamental' rating.

Ireland's rating has been broadly in line with that suggested by the scorecard, although we do observe that the deteriorating 'fundamental' rating led the actual rating in the years prior to the crisis. In the case of **Italy**, until September 2011, the sovereign's rating was around four notches higher than the 'fundamental' rating would imply. Since the outbreak of the crisis however, the rating is broadly in line with that suggested by the scorecard. The case of **Portugal** suggests that its rating was two-three notches above its suggested fundamentals until 2011 and approximately two-three notches below its 'fundamentals' since the outbreak of the crisis. The 'fundamentals' of **Spain** and **Slovenia** were deteriorating prior to the multi-notch downgrades of 2012, and it appears that the sovereigns have been rated two notches below their suggested 'fundamental' ratings since 2014. Overall, these charts suggest that in addition to their quantifiable fundamentals, positive judgement prior to 2010 and particularly negative views since 2012, have been important rating drivers for the 'Crisis Countries', albeit to different degrees.

In addition, these charts point to the existence of non-linearities in the assessment of sovereign risk as well as the benefit of any model to be complemented with judgement. In particular, we would like to point out that Greece experienced credit events in October 2011 and March 2012 while Cyprus introduced capital controls in March 2013 and, in June 2013, swapped government bonds maturing in 2013 with new debt maturing in 2016. In these circumstances, a rating above the 'Caa-C' level would be difficult to justify irrespective of 'fundamentals' suggested by the scorecard, not least given Moody's default definitions[15]. However, it is also evident that a non-trivial element of sovereign risk remains unexplained by the scorecard. The dotted orange line shows what the scorecard-implied rating would have been for Greece and Cyprus, had Moody's had perfect foresight and attributed the highest risk assessment to 'F4: Susceptibility to Event Risk' as of April 2008. The significant gap between the scorecard-implied and the actual rating suggests the model does not yet fully capture sovereign risk for wealthier economies in distress.

Finally, we note that contrary to Greece and Cyprus, all other 'Crisis Countries', including Ireland and Portugal which entered into financial assistance packages with the European Financial Stability Facility (EFSF) in December 2010 and May 2011 respectively, did not default, and in fact honoured all their debt obligations in full and on time even without market access. Admittedly, the evolving euro area crisis response and the associated uncertainty justify lower ratings. In addition, it could reasonably be argued that had it not been for the financial assistance provided, both sovereigns could have been rated even lower. However, looking ahead, these cases exemplify the benefit of assessing a sovereign's creditworthiness taking into consideration the strength of and a country's access to regional financial arrangements such as the ESM/ EFSF.

[15] Moody's (2013) third (of four) default definition reads: 'A distressed exchange whereby 1) an obligor offers creditors a new or restructured debt, or a new package of securities, cash or assets that amount to a diminished financial obligation relative to the original obligation and 2) the exchange has the effect of allowing the obligor to avoid a bankruptcy or payment default in the future.'

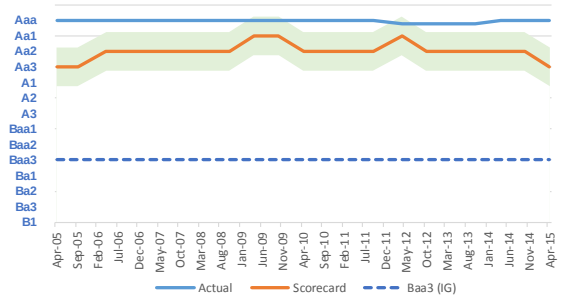
4.2 In Detail: 'Other EA'

Similarly to the above section, the following charts look at the country-specific developments comparing our derived 'fundamental' with Moody's actual rating for the 'Other EA' countries.

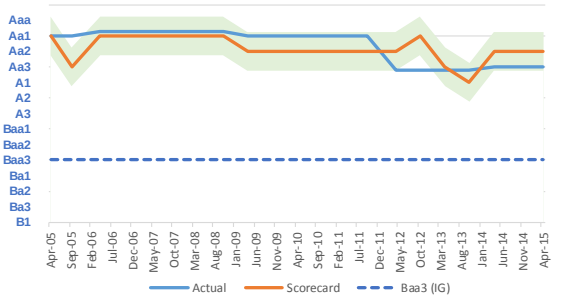
Figure 4: Actual vs 'Fundamental' Rating of 'Other EA' Countries

Rating; April 2005 – April 2015

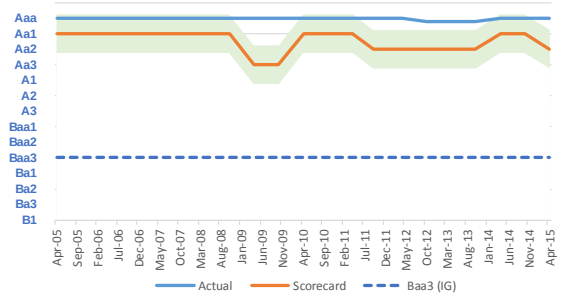
Austria



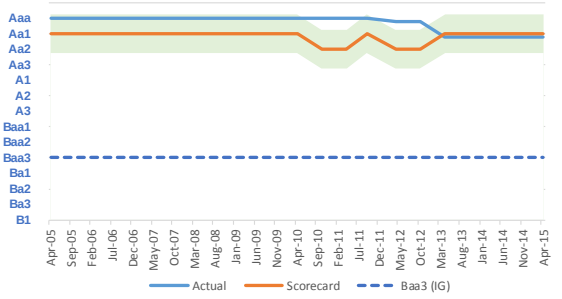
Belgium



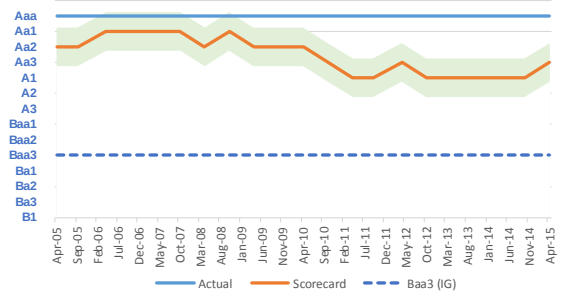
Germany



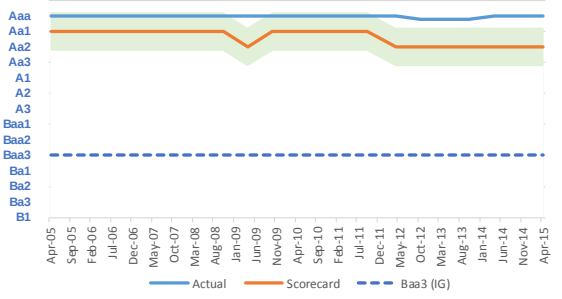
France



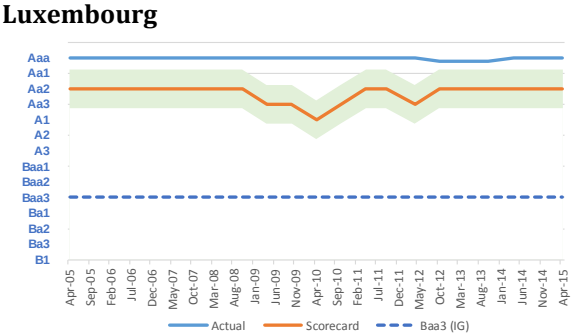
Finland



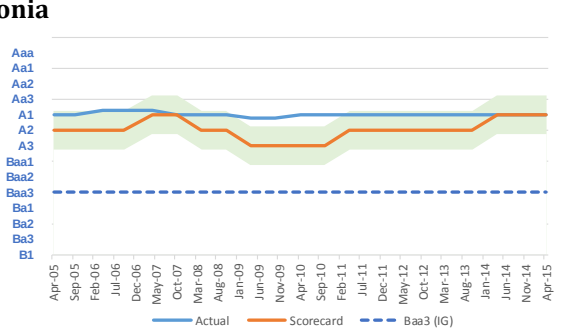
Netherlands



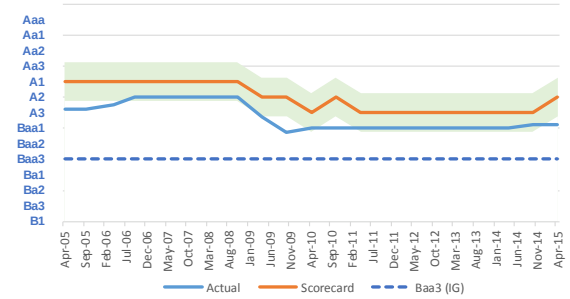
Luxembourg



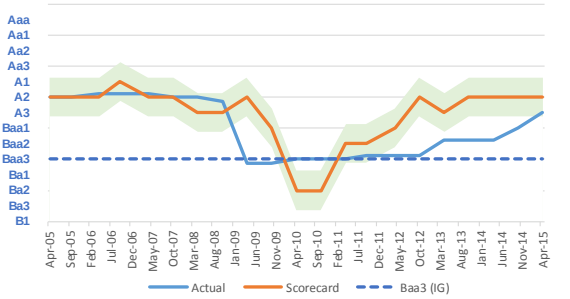
Estonia



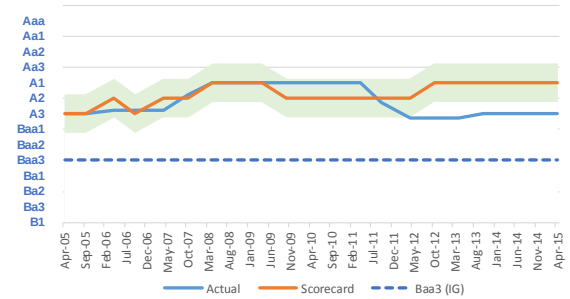
Lithuania



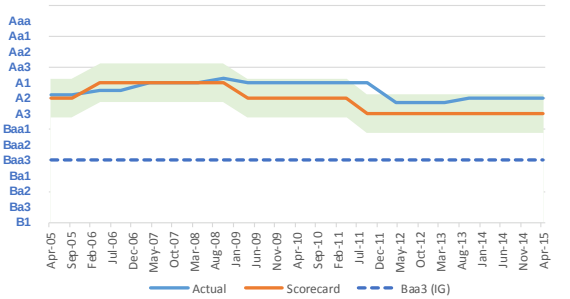
Latvia



Malta



Slovakia



Source: Own calculations.
NB. The green area refers to the +/- one-notch range of the 'fundamental' rating.

Looking at the '**Other EA' countries**, which on average saw their ratings within the scorecard-implied one-notch rating range, it appears that **Finland's** actual rating has been consistently above three notches of its 'fundamentals' since October 2011. To a lesser extent it can be observed that since 2013, the ratings of **Austria** and the **Netherlands** benefit from an approximately two-notch uplift compared to their respective scorecard implied ratings. **Luxembourg's** 'Aaa' rating appears to have been one-two notches above its 'fundamental' rating throughout the 10-year period. We note that the sharp drop in the fundamentals in April 2010 is due to the worsening F4 score driven by a marked decline in the sovereign's net international investment position in 2009.

Germany's 'Aaa' rating was mostly in line with its fundamentals, however, it was three notches higher compared to the rating implied by the scorecard in 2009. This deviation is due to Germany's sharp contraction of GDP in 2009 (-5.6% for the IMF's WEO April 2009 publication) and the adverse impact on the GDP volatility score. **France's** rating on the other hand, has remained within the scorecard-implied rating range throughout the 10-year period, also following the downgrade in November 2012[16]. **Latvia's** actual rating was approximately two notches above its 'fundamentals' in 2010 due to Moody's holding the rating at 'Baa3' despite the sharp increase in debt and interest payments that year.

[16] Comparing the scorecard-implied fundamentals between Germany and France using April 2015 data shows that, contrary to most observer's expectations, France's fundamentals are one-notch higher than Germany's. This is explained by two factors: i) Germany's overall higher real GDP growth volatility, which results in Germany's 'F1: Economic Strength' score to be relatively low at 'H (+)' compared to France's 'VH (-)' and ii) Moody's non-linear aggregation function combining 'Economic Resiliency' (F1 x F2) with 'F3: Fiscal Strength' (which, as expected, is higher for Germany at 'VH (+)' than for France at 'VH (-)') to determine a sovereign's 'Government Financial Strength'. The rationale, according to Moody's, is *'that the creditworthiness of countries with high Economic Resiliency is less susceptible to changes in their debt metrics, whereas the creditworthiness of countries with moderate Economic Resiliency is more sensitive to changes in their Fiscal Strength. In contrast, the creditworthiness of countries with low Economic Resiliency tends to be weak irrespective of debt metrics.'* Since France's F1 score is one-notch higher than Germany's, the non-linearity of the scorecard leads France to have a 'fundamentally' derived higher rating than Germany despite scoring two notches lower on 'F3: Fiscal Strength'.

Finally, the ratings of **Belgium, Estonia, Lithuania, Malta and Slovakia** have been broadly in line with their suggested 'fundamentals' over the observed time period.

Overall, for this group of countries it is evident that the differences between the 'fundamental' scorecard-implied and the actual ratings are small and in some cases even slightly positive. As a result, and importantly, contrary to the 'Crisis Countries', the 'subjective' component of the sovereign rating has remained fairly consistent throughout the observed time horizon.

4.3 Deviation from 'Fundamentals'

From the previous two sub-sections it is evident that for some countries, notably the 'Crisis Countries', qualitative adjustments and judgement have played a more prominent role when determining the final rating outcome compared to the 'Other EA' countries. In Table 2 we provide an overview of the extent to which countries' actual ratings deviated from their respective scorecard-implied 'fundamentals' before, during and after the crisis.

For this assessment, which is inherently subjective, we look at the difference between the actual and the 'fundamental' rating of each country for three timelines which we define according to two approaches, namely, (1) the 'rating-cycle' of each country and (2) specified time periods. For the first approach, we select the specific snapshots for comparing the actual and 'fundamental' ratings as follows: For the 'pre-crisis' period we look at the rating differential one period before the actual rating was lowered for the first time. For the 'during crisis' period we look at the rating differential at the point in time when the actual rating was at its lowest level[17] and finally, for the 'post-crisis' period we compare the ratings for April 2015, our final data point. As the precise timing of countries entering the crisis diverged, this approach caters for the specificities of each country. For the second approach, we define the 'pre-crisis' period as the time period from April 2005 to April 2010, the 'during-crisis' period from October 2010 to October 2013, and the 'post-crisis' period from April 2014 to April 2015. Finally, we highlight those cases where the actual rating deviated by at least two-and-half notches from our derived 'fundamental' rating. While we do not dispute that a deviation of this degree could be reasonable in some circumstances, this threshold highlights that for our sample of EA Member States for the 2005-15 time period, judgement was meaningfully applied to a restricted few countries and instances.

Based on these simple approaches and being mindful of the credit events of Greece and Cyprus, as well as the latter's introduction of capital controls, we identify 'Crisis Countries' whose actual ratings deviated meaningfully from our derived 'fundamental' rating. In particular, this difference was positive before the crisis for Italy, Portugal and Spain, negative during the crisis for Portugal, Slovenia and Spain, and remains negative after the crisis for Cyprus, Portugal and Slovenia. Based on both approaches, Ireland's rating was mostly in line with its 'fundamentals'. In addition, looking at the charts we sometimes observe the pattern that for some countries the 'fundamental' rating led the actual rating. This is evident for Ireland and Spain, but also for Italy, Greece, Portugal and Slovenia.

For the 'Other EA' sovereigns, it appears that some benefit from more benign views, in particular, Finland but also Austria and Luxembourg. Finally, for Belgium, Germany, France, the Netherlands, Estonia, Lithuania, Latvia, Malta and Slovakia, we find that ratings were broadly in line with the 'fundamentals' throughout the entire 10-year period.

[17] In case the actual lowest rating level extended beyond one period, we take the average of the difference between the actual and the 'fundamental' rating for those periods.

Table 2: EA Member States: Deviation from 'Fundamentals'

Difference in rating notches between actual and 'fundamental' rating

Member State		Rating Cycle*			Time Period			Deviation from Fundamentals	
		Pre-Crisis	*During Crisis*	*Post-Crisis*	*Apr 2005 - Apr 2010*	*Oct 2010 - Oct 2013*	*Apr 2014 - Apr 2015*	*Maximum*	*Average***
Crisis Countries	CY	2.00	**-8.75**	**-8.00**	0.82	**-3.75**	**-7.50**	**-10.25**	**2.94**
	ES	**6.00**	**-3.25**	-1.75	**3.18**	-0.11	-1.75	**6.00**	**2.83**
	GR	2.25	**-9.50**	**-6.25**	1.91	**-6.96**	**-5.08**	**-10.00**	**4.05**
	IE	1.00	-2.25	-1.00	1.64	-1.25	-0.92	**5.75**	1.83
	IT	**5.00**	-1.25	-2.00	**3.73**	1.36	-1.33	**5.00**	**2.98**
	PT	**4.00**	**-4.25**	-2.00	**3.59**	**-2.68**	**-3.33**	**-4.25**	**3.54**
	SI	2.25	**-3.75**	**-3.00**	1.59	-0.50	**-2.67**	**-4.25**	2.07
	Avg.	**3.21**	**-4.71**	**-3.43**	2.35	-1.98	**-3.23**		**2.89**
Other EA	AT	2.00	1.50	**3.00**	2.00	1.71	2.33	**3.00**	1.95
	BE	0.25	-0.75	-1.00	0.59	0.00	-1.00	-2.25	0.81
	DE	2.00	1.75	2.00	1.36	1.61	1.33	**3.00**	1.44
	FR	1.00	-0.25	-0.25	1.00	1.14	-0.25	2.00	0.99
	FI***	--	--	**3.00**	1.55	**3.71**	**3.67**	**4.00**	**2.57**
	NL	2.00	1.75	2.00	1.09	1.46	2.00	2.00	1.35
	LU	**3.00**	1.75	2.00	**2.55**	2.18	2.00	**5.00**	2.35
	EE	0.25	1.75	0.00	1.11	1.14	0.00	2.00	0.96
	LT	-1.00	-2.25	-1.75	-1.32	-1.14	-1.17	-2.25	1.24
	LV	0.25	**-3.25**	-1.00	-0.27	-1.39	-1.92	**-4.25**	1.48
	MT	1.00	-1.92	-2.00	0.09	-0.86	-2.00	-2.25	0.95
	SK	0.25	0.75	1.00	0.25	1.04	1.00	2.00	0.71
	Avg.	1.00	0.08	0.58	0.83	0.88	0.50		1.40

*The 'rating cycle' and the associated snapshots for when we compare the actual to our 'fundamental' rating varies for each country.

**The average deviation is based on the average of the absolute value of the difference between the actual and the 'fundamental' rating over the observed period.

*** Finland was consistently rated 'Aaa/ STA' throughout the period and thus a 'rating-cycle' cannot be identified.

NB. Greece and Cyprus experienced credit events which according to Moody's default definitions justify the lowest rating category irrespective of suggested 'fundamentals' of the scorecard.

Source: Own classification. The period of observation is April 2005 to April 2015.

Importantly, we would like to emphasize that the fact that actual and 'fundamental' scorecard-implied ratings differ does not necessarily constitute something positive or negative and it is in fact precisely what Moody's, as well as the other agencies, claim to do. Indeed, given the shortcomings of any model resulting from i) data limitations, ii) some sovereign attributes being impossible to quantify and iii) the existence of idiosyncratic country-specific factors (no 'one-methodology-fits-all', particularly one that is applied to rate over 100 countries), agencies are right not to rely mechanistically on their models' output[18].

However, why does it appear that more 'subjective' judgement is applied to some countries than others, and specifically, why were the actual ratings of most 'Crisis Countries' higher than their suggested 'fundamentals' before the outbreak of the euro area crisis? Why does it appear that at least some of the actual ratings of the 'Crisis Countries' remain below those suggested by their 'fundamentals' after the crisis? And finally, why does it appear that some countries benefit from more benign views during and after the crisis? Our approach, having derived a 'fundamental' and 'subjective' component for each sovereign rating, allows us to explore possible variables explaining the agency's judgement.

[18] We would like to refer the reader to Appendix C, where we show that irrespective of a Rating Committee's opinion, Moody's scorecard in itself does not treat all EA countries equally. This is due to Moody's assessment of 'F3: Fiscal Strength' which varies between those countries considered having a reserve currency, Germany and France, and all other EA Member States which subsequently do not benefit from the associated beneficial methodological adjustment.

5 Source of Judgement

In the previous section we disentangled the rating as the sum of a 'fundamental' and a 'subjective' component. The former is fully derived from a quantitative assessment of key observable factors, while the latter includes judgement related to idiosyncratic country-specific factors which cannot be summarized quantitatively as well as agencies' expectations of future creditworthiness-related developments.

The aim of this section is twofold: First, we want to explain the dynamics of the unobservable component by means of a simple model, and second, we try to track the assigned country rating as the sum of the 'fundamental' and our estimated 'subjective' components. To address the first issue, we use a panel regression with three explanatory variables:

- The lag of the dependent variable (judgement): It is included to test the 'hysteresis' hypothesis: rating agencies are unlikely to change the 'subjective' assessment very frequently as they aim to provide a stable rating pattern.
- The spread between the 10-year government bond yields relative to the German Bund (which is close to risk free): It is meant to capture country-specific risk. This measure has been pivotal for assessing a country's financial distress since the onset of the euro area crisis in early 2010.
- A measure of aggregate political uncertainty: This is aimed to capture political instability in Europe.

Importantly, none of these explanatory variables is used in the derivation of our 'fundamental' rating. In order to study the impact of such variables on the 'subjective' rating component, we estimate a panel data model for a total of ten euro area countries (Austria, Belgium, Spain, Finland, France, Greece, Ireland, Italy, the Netherlands and Portugal) over the period April 2005 - April 2015 for a total of 210 data points (data are semi-annual).[19] The time frequency is six months.[20]

We consider the following pooled regression model:[21]

$$y_{it} = c + \beta_1 y_{it-1} + \beta_2 x_{it} + u_{it} \qquad i = 1, \dots, N \; and \; t = 1, \dots T$$

Table 3 reports the results[22]. Column (A) shows the estimation for the full panel of ten countries with three explanatory variables, plus the constant. The lagged judgement and the spread have the expected sign and are significant at the 1 % level. Political uncertainty has a negative sign and is significant but only at the 10 % level. The R^2 statistic is high, at 0.86. In the second specification (B), we remove the political uncertainty variable. The results are essentially the same: The estimated coefficients on the judgement and spread variables are similar to those in specification (A) while the R^2 statistic is de facto unchanged. Column (C) shows the results for a selected number of countries (Spain, Italy, Ireland, Portugal and Greece), the 'Crisis Countries'. In this case the results are similar to the previous specifications, however the political uncertainty variable is

[19] Cyprus, Estonia, Lithuania, Luxembourg, Latvia, Malta Slovenia and Slovakia are not included because there are no time series of the 10-year government bond yield available from mid-2005. Germany is excluded because it is the benchmark country for the computation of the spread.

[20] To mitigate the endogeneity issue, variables in x_{it}, spread and political uncertainty, which are available on a monthly basis, are sampled on the month before the judgement is formed. In our semi-annual dataset, the reference sampling months are April and September (the IMF's WEO publication dates) and thus the two explanatory variables are instead sampled in March and August. Results remain broadly unaffected if we use the variables lagged by six months.

[21] The regression is estimated with random effects. The null hypothesis of the Hausman test statistic is not rejected in all the specifications.

[22] In addition, specifications adding the VIX and Fitch's 'Banking System Indicator' (which to the best of our knowledge is the only publicly available assessment of the strength of a whole banking sector for the time period 2005 to 2015 for all euro area countries on a semi-annual basis) are not significant and do not change our results.

significant at the 5 % level, suggesting that for these countries political uncertainty affected more significantly the rating. Finally, the last column D shows the results for the remaining countries of the panel (Austria, Belgium, Finland, France, and the Netherlands). In this case the political uncertainty variable is significant at the 10 % level, but with a positive coefficient which can be interpreted as a flight to quality effect.

Table 3: Results Panel Data Model
Judgement is the dependent variable

	Judgement (A)	Judgement (B)	Judgement (C)	Judgement (D)
Constant	0.795	0.385	1.597	0.042
	(0.001)* **	**(0.000)*** **	**(0.000)*** **	(0.834)
Judgement(-1)	0.783	0.786	0.757	0.783
	(0.000)* **	**(0.000)*** **	**(0.000)*** **	**(0.000)*** **
Spread	-0.159	-0.171	-0.147	-0.725
	(0.000)* **	**(0.000)*** **	**(0.000)*** **	**(0.002)** **
Political Uncertainty	-0.003		-0.009	0.004
	(0.054)*		**(0.003)** **	**(0.024)***
Observations	200	200	100	100
Countries	10	10	5	5
R2	0.86	0.85	0.88	0.71

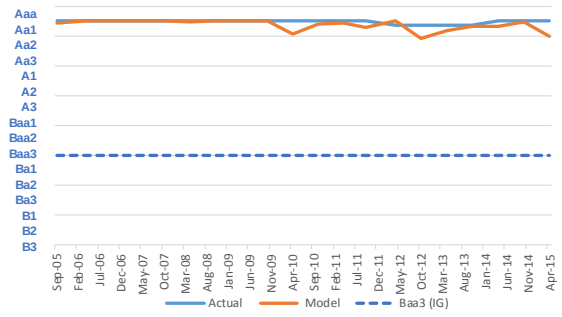
*, ** and *** refer to the statistical significance at the 10, 5 and 1 % levels respectively.
Source: Own calculations.

The simple panel data models estimated above allow us to generate an in-sample fit of the 'subjective' rating component by Moody's. The sum of the fitted 'subjective' and the 'fundamental' component derived in the previous section, can be interpreted as a 'model-based' prediction of the rating. Figure 5 plots the results from this exercise for the panel of ten countries.[23] The blue lines refer to the historical rating by Moody's, while the orange lines refer to the predicted rating.

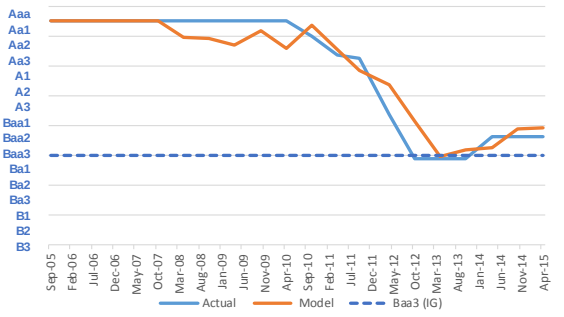
There are two features worth emphasizing: First and most importantly, our results show that the model implied ratings track well the actual rating by Moody's. Second, the country ratings on the left column of Figure 5 have been more stable than the ratings of the 'Crisis Countries' (right-hand column), which have experienced deep downward revisions during the 2010-2012 period. Some discrepancies arise during these years, but they are relatively small.

Figure 5: Model-based prediction of Moody's rating
Rating; September 2005 – April 2015

Austria

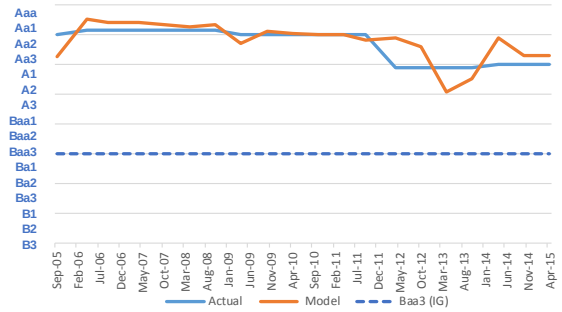


Spain

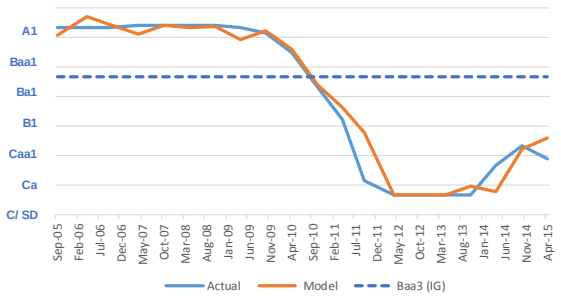


[23] Fitted values are computed with model (A). We apply a rating 'ceiling' and 'floor' of 'Aaa' and 'C' respectively.

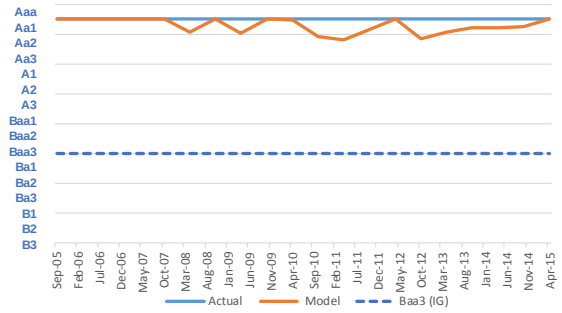
Belgium



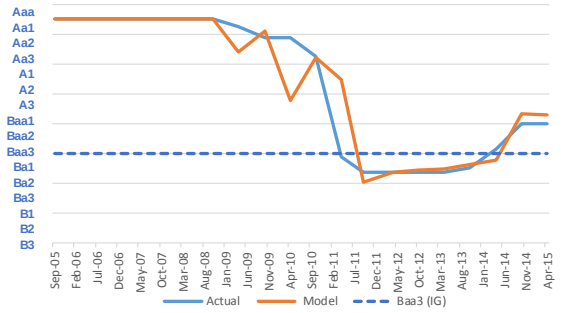
Greece



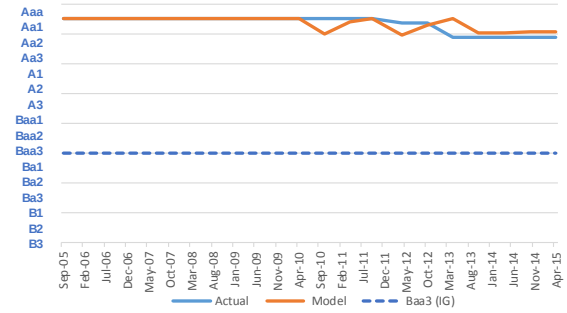
Finland



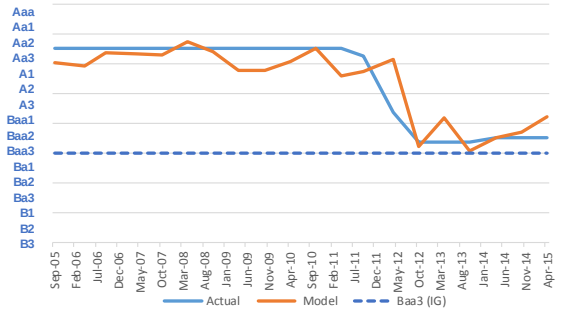
Ireland



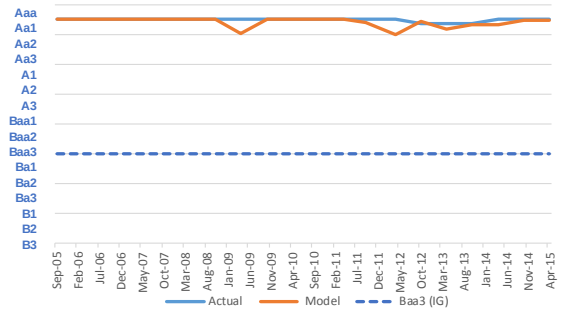
France



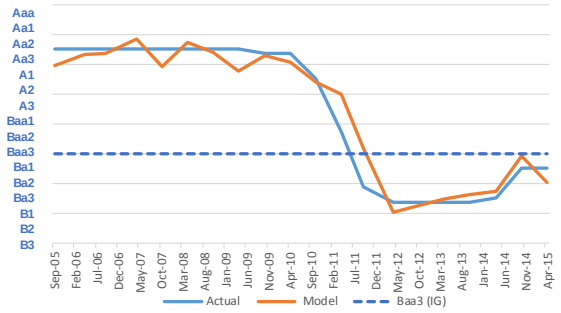
Italy



Netherlands



Portugal



6 Robustness Check

To verify the robustness of our results, which are based on the construction of a dataset relying on i) Moody's 2013 methodology and thresholds, ii) the IMF's semi-annual World Economic Outlook publications and iii) our derived F4 score excluding political and banking sector risk, we construct additional datasets to derive a 'fundamental' rating.

Specifically, we construct the following three datasets:

i) Using the updated thresholds as per Moody's December 2015 methodology, keeping all else the same (Robust 1).

ii) Using Moody's country statistics as published on the agency's website in August 2015 for the years 2004 to 2016 as well as the agency's statistical handbook published in November 2011 for the years 2001 to 2003, instead of the IMF's WEO publications. In addition, for the two forward-looking variables, namely real GDP growth and the inflation rate, we continue to rely on the IMF's WEO forecasts available at that point in time as to the best of our knowledge, Moody's forecasts for those variables at each point in time are not available (Robust 2).

iii) Using Moody's F4 score as published in Moody's annual reports which is possible for the 2011-2015 time period[24]. This dataset should minimize the 'judgement' component for those countries and time periods where the 'F4: Susceptibility to Event Risk' factor was driven by either 'Political Risk' or 'Banking Sector Risk' which we excluded from our F4 derivation (Robust 3).

Based on these datasets, we construct the credit metrics and resultantly the adjustment-free 'fundamental' rating. With regard to the actual rating, we take the rating as observed on the last day of the month of the IMF's WEO publication dates (usually April 30 or October 31) of each year as well as the average rating over the past six months for each snapshot to account for possible 'cliff effects'. Irrespective of the dataset used, our results do not change much from those reported under section 4.

It is evident that prior to 2010, the actual ratings of 'Crisis Countries' were on average three notches above those of their 'fundamental' scorecard-implied ratings. As the crisis developed, this positive 'subjective' rating component reversed, as is evidenced by the fact that since 2012 the ratings of the 'Crisis Countries' are on average three notches below their respective scorecard-implied ratings. On the other hand, 'Other EA' countries appear to have been rated, on average, within the one-notch rating range of their 'fundamental' scorecard-implied ratings over the same horizon. Country-specific results confirm these averages. Appendix D provides further details of our results based on these datasets.

The most noteworthy change is that, as expected, the 'fundamental' rating based on the dataset relying on Moody's F4 score (Robust 3), has a smaller deviation from the actual rating for Cyprus, Greece but also Spain and Slovenia. This is due to the fact that either 'Political Risk' or 'Banking Sector Risk' (more likely) was driving the overall F4 score during the crisis period, resulting in a lower 'fundamental' rating compared to the one derived in our base dataset. The difference between the two 'fundamental' ratings, that is, the 'fundamental' rating derived from our base dataset and the one derived from the 'Robust 3' dataset, is in the magnitude of one-two notches.

[24] Moody's started regularly publishing annual reports for all euro area sovereign as of 2012. For those sovereigns for which the F4 score is not available for 2011 (DE, FI, IT, LU, PT and SI) we assume it is the same as the value for 2012.

7 Conclusion and Recommendations

Contributing to the stream of research explaining the drivers of sovereign ratings, we disentangle ratings into a 'fundamental' and 'subjective' component, deriving the 'fundamental' component exclusively from reverse-engineering Moody's methodology based on a real-time dataset of the quantitative credit metrics cited in the agency's methodology. The main advantage and contribution of our methodology is that the fundamental assessment, which is the most relevant component of the final rating, is built by tracking the approach established by Moody's. Contrary to previous studies determining a 'fundamental' rating, ours is thus free of an estimation error.

Our analysis of the drivers of the current 19 euro area Member States from April 2005 to April 2015 shows that the 'subjective' rating component has been applied to varying degrees, both across countries and over time. Specifically, we find that judgement has played a more significant role for the 'Crisis Countries' compared to the 'Other EA' countries. Being mindful of the credit events for Greece and Cyprus, as well as the latter's introduction of capital controls, we identify 'Crisis Countries' whose actual ratings deviated meaningfully from our derived 'fundamental' rating. In particular, this difference was positive before the crisis for Italy, Portugal and Spain, negative during the crisis for Portugal, Slovenia and Spain, and remains negative after the crisis for Cyprus, Portugal and Slovenia. Ireland's rating appears to have been broadly in line with that suggested by its 'fundamentals', although we do observe that the deteriorating 'fundamental' rating led the actual rating in the years prior to the crisis.

Other countries appear to benefit from more benign views, in particular Finland but also Austria and Luxembourg. Finally, for Belgium, Germany, France, the Netherlands, Estonia, Lithuania, Latvia, Malta and Slovakia we find that ratings were broadly in line with the 'fundamentals' throughout the entire 10-year period. Our results also illustrate that a sovereign's creditworthiness is not mechanistically reflected in the 'fundamental' rating once the most extreme threshold of a variable is reached or exceeded. This limitation points to the benefit of any model to be complemented with judgement.

We also show that the differences in the 'subjective' rating component can be explained by the 'subjective' component lagged by one period as well as the 10-year government yield spread to the Bund. Both variables have the expected coefficient and are statistically significant at the 1 % level. This suggests that the idiosyncratic country-specific factors as well as the agency's expectations of future creditworthiness-related developments, are in fact closely related to, or at least do not deviate largely from, the market's perception of a sovereign's creditworthiness. Indeed, combining the 'fundamental' with our model-implied 'subjective' rating component allows us to very closely replicate Moody's sovereign ratings for 10 euro area Member States over the 10-year horizon. Finally, while our results are based on Moody's methodology, which is the only one transparent enough to allow for a derivation of the 'fundamental' rating, the similarity of the agencies' methodologies in terms of the assessed fundamental criteria as well as the high correlation of sovereign ratings among CRAs suggests they could also apply to Fitch and S&P.

With these results in mind, we would like to conclude with the following recommendations: Given the shortcomings of any model, agencies are right not to rely mechanistically on their models' output, and there is thus nothing wrong in using subjective judgement to arrive at an assessment of a sovereign's creditworthiness. However, CRAs should be much more transparent in showing to what extent their ratings are driven by their models or opinions. Specifically, and along the lines of Vernazza and Nielsen (2015), we recommend that for each sovereign, CRAs publish two ratings, namely, i) a purely quantitatively derived rating – reflecting publicly available data on macro-economic, institutional and public finance fundamentals combined with fully transparent methodologies so as to allow policymakers and market participants to calibrate each agency's

'fundamental' rating themselves, and ii) a final rating, which includes the CRA's judgements and opinions which policymakers and market participants may or may not agree with.

The clear identification of and justification for the 'subjective' rating component could serve as a basis for discussion on a sovereign's creditworthiness between CRAs, Member States and market participants at large. In addition, full methodological transparency would allow for a better assessment of the quality of agencies' methodologies, their analysts and final rating outcomes. In this context, our analysis has shown that a non-trivial element of sovereign risk for wealthier economies in distress remains unexplained by the scorecard. This could be addressed by further back-testing the methodology, empirically assessing the assigned weights and thresholds, and in particular, examining the magnitude of the downward rating-range revision resulting from an elevated assessment of 'F4: Susceptibility to Event Risk'.

Finally, Ireland and Portugal, which honoured their debt obligations in full and on time without market access due to the financial assistance provided by the European Financial Stability Facility, exemplify that, going forward, it could be beneficial to incorporate the strength of and a sovereign's access to regional financial arrangements such as the ESM/ EFSF in the assessment of a sovereign's creditworthiness.

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9 Appendix

A. Sovereign Rating Actions & Correlations

While a comparison of the agencies' methodologies in terms of the 'fundamental' variables and 'subjective' judgements is difficult and not precise, the below analysis allows us to better understand the extent to which sovereign ratings are correlated over time. To this end we look at the sovereign rating actions and levels of 19 euro area countries from January 2005 until June 2015.

Table 4 shows that from January 2005 until June 2015, rating agencies took a total of 445 rating actions (including outlook changes) on today's 19 euro area countries, with S&P leading with a total of 180 actions, followed by Moody's (137) and Fitch (128). Approximately 2/3 of the rating actions were negative. Looking at the rating actions on a per-country-basis shows that not surprisingly Greece leads with 57 rating actions, followed by Cyprus (49), Latvia (40), Portugal and Ireland (each 36). In addition, most negative rating actions (Figure 6) took place in 2011 (80), 2012 (51) as well as 2009 (47), whereas most positive rating actions were during 2014 (42).

Table 4: Rating Actions for EA Member States

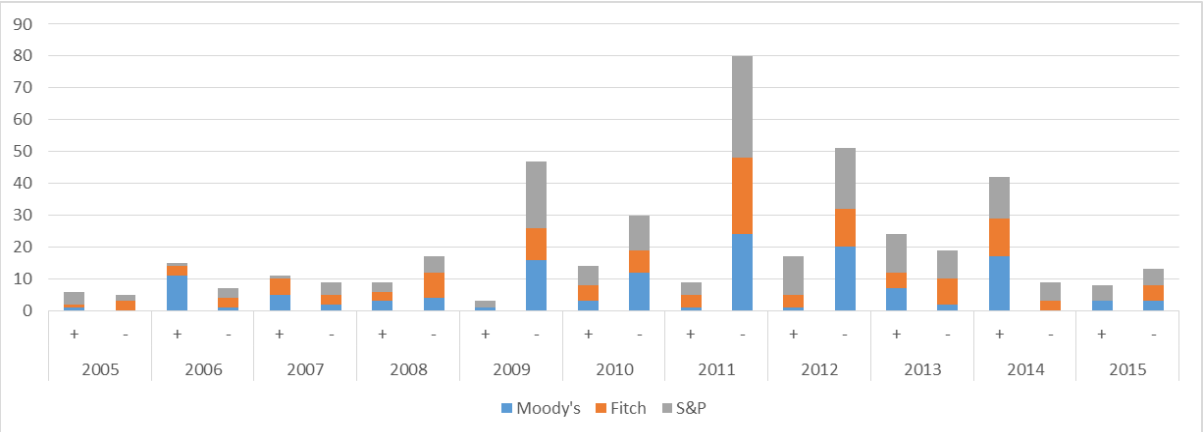
Q1 2005 – Q2 2015; # of rating actions

Member	Moody's			Fitch			S&P			Grand Total		
State	*Total*	*Positive*	*Negative*	*Total*	*Positive*	*Negative*	*Total*	*Positive*	*Negative*	*Total*	*Positive*	*Negative*
AT	2	1	1	1	0	1	3	1	2	6	2	4
BE	5	2	3	6	2	4	5	2	3	16	6	10
CY	16	6	10	13	3	10	20	7	13	49	16	33
DE	2	1	1	0	0	0	2	1	1	4	2	2
EE	6	3	3	8	4	4	13	8	5	27	15	12
ES	11	3	8	8	2	6	11	2	9	30	7	23
FI	1	0	1	1	0	1	5	2	3	7	2	5
FR	2	0	2	4	0	4	4	0	4	10	0	10
GR	16	3	13	19	4	15	22	4	18	57	11	46
IE	11	3	8	11	4	7	14	6	8	36	13	23
IT	5	1	4	8	1	7	8	0	8	21	2	19
LT	9	5	4	11	6	5	14	6	8	34	17	17
LU	2	1	1	0	0	0	3	2	1	5	3	2
LV	11	6	5	14	6	8	15	8	7	40	20	20
MT	7	5	2	2	1	1	3	0	3	12	6	6
NL	2	1	1	2	1	1	4	2	2	8	4	4
PT	11	3	8	9	2	7	16	4	12	36	9	27
SI	11	4	7	7	2	5	11	3	8	29	9	20
SK	7	5	2	4	4	0	7	5	2	18	14	4
Grand Total	**137**	**53**	**84**	**128**	**42**	**86**	**180**	**63**	**117**	**445**	**158**	**287**

Source: CRAs, own calculations.

Figure 6: Rating Actions for EA Member States

Q1 2005 – Q2 2015; # of rating actions

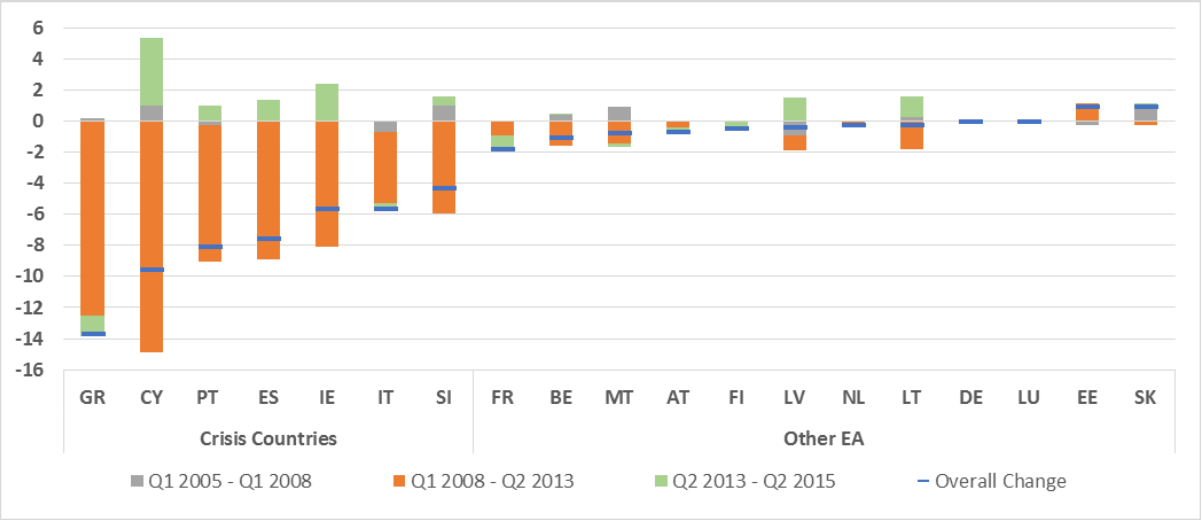


Source: CRAs, own calculations.

Figure 7 shows the change in the average rating of the three agencies for each sovereign between 2005 and 2015[25]. Two distinct groups of countries can be identified: Those sovereigns whose ratings were adversely and significantly affected throughout the crisis, starting in Q1 2008 until Q2 2013, namely, Cyprus, Greece, Ireland, Italy, Portugal, Slovenia and Spain (the 'Crisis Countries'), and the other EA sovereigns whose ratings were fairly stable throughout the 2005-15 time horizon ('Other EA'). Specifically, over the past 10 years, the change in the average rating of the three agencies was highest for Greece (-14 rating notches), Cyprus (-10 rating notches), Portugal and Spain (both approximately -8 rating notches).

Figure 7: Change in Rating Notches for EA Member States

Rating Notches; Q1 2005 – Q2 2015



Source: CRAs, own calculations.

Nb. The chart shows the change in the average rating of the three agencies for each sovereign over the indicated time horizon. Sovereigns are in the order of the greatest adverse rating change between Q1 2005 and Q2 2015.

These tables and charts highlight that the rating actions between the three agencies on the euro area sovereigns are closely aligned despite the fact that CRAs have different methodological approaches.

In addition, and as expected, we also observe a high correlation of the rating levels over the time period. Figure 8 shows the pairwise correlation between the three rating agencies[26] for all 19 euro area sovereigns, which is quite high and tends to vary in the range of 0.94 to 0.99. Figures 9 and 10 show the correlation for the breakdown of the 'Crisis Countries' and the 'Other EA' countries. In both cases the correlation is high. It is slightly lower for the 'Crisis Countries' where the ratings between Moody's and S&P reached the lowest correlation level of 0.83 in 2013 Q2[27]. On the other hand, the rating correlation has been consistently above 0.94 between the three agencies for the 'Other EA' countries.

[25] We use the same key as Vernazza and Nielsen (2015) to convert alphanumeric ratings into numbers (Appendix B).

[26] We compute the correlation between the 19 ratings of two agencies at each point in time (end of each quarter).

[27] Over the observed period, the widest rating divergence was for Slovenia from Q2 2013 to Q4 2014 when S&P, Fitch and Moody's rated the sovereign 'A-', 'BBB+' and 'Ba1' respectively.

Figure 8: Correlations of EA Sovereign Ratings
Correlations (-1 to 1), Q1 2005 – Q2 2015

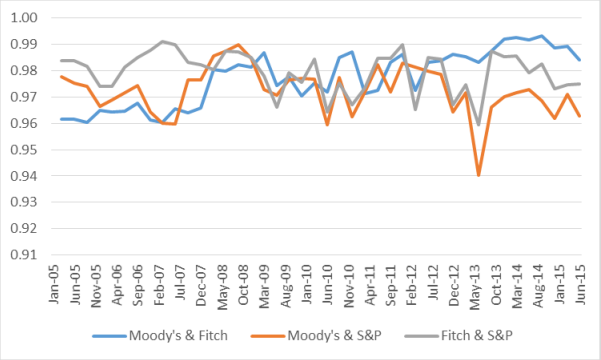


Figure 9: Correlations of 'Crisis Countries'
Correlations (-1 to 1), Q1 2005 – Q2 2015

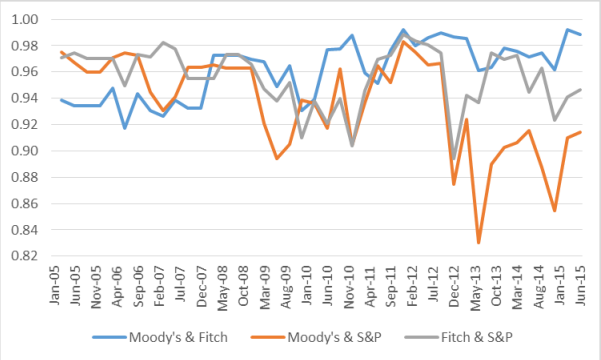
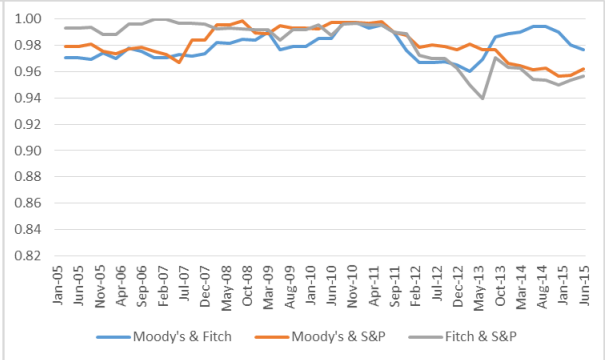


Figure 10: Correlations of 'Other EA'
Correlations (-1 to 1), Q1 2005 – Q2 2015



Source: CRAs, own calculations.
Nb. 'Crisis Countries' = CY, GR, IE, IT, PT, SI and ES. 'Other EA' = AT, BE, DE, EE, FI, FR, LT, LV, MT, NL and SK. The sharp drop in the rating correlation between Moody's and S&P for the Crisis Countries in Q2 2013 is due to Moody's two-notch downgrade of Slovenia to non-investment grade (Ba1/ NEG).

The high rating-correlation suggests that rating agencies' assessments of sovereign risk of EA Member States are strongly aligned, despite distinct methodological approaches. As argued by Bhatia (2002), this is not a problem per se as each sovereign debt instrument can have only one discreet probability of default at any given point in time, which implies that sovereign ratings should in fact be identical. Given that the assessed fundamentals by the three agencies are similar, the fact that their output is highly correlated, could suggest that our results, which are based on Moody's methodology only, could also apply to Fitch and S&P.

B. Rating Key

	Description	Rating Key					
		Moody's		Fitch		S&P	
Investment Grade	Prime	Aaa	24.0	AAA	24.0	AAA	24.0
	High Grade	Aa1	23.0	AA+	23.0	AA+	23.0
		Aa2	22.0	AA	22.0	AA	22.0
		Aa3	21.0	AA-	21.0	AA-	21.0
	Upper Medium	A1	20.0	A+	20.0	A+	20.0
		A2	19.0	A	19.0	A	19.0
		A3	18.0	A-	18.0	A-	18.0
	Lower Medium	Baa1	17.0	BBB+	17.0	BBB+	17.0
		Baa2	16.0	BBB	16.0	BBB	16.0
		Baa3	15.0	BBB-	15.0	BBB-	15.0
Non-Investment Grade	Speculative	Ba1	14.0	BB+	14.0	BB+	14.0
		Ba2	13.0	BB	13.0	BB	13.0
		Ba3	12.0	BB-	12.0	BB-	12.0
	Highly Speculative	B1	11.0	B+	11.0	B+	11.0
		B2	10.0	B	10.0	B	10.0
		B3	9.0	B-	9.0	B-	9.0
	Substantial Risks	Caa1	8.0			CCC+	8.0
	Extremely Speculative	Caa2	7.0	CCC	7.0	CCC	7.0
		Caa3	6.0			CCC-	6.0
	Imminent Default Risk	Ca	4.5	CC	4.5	CC	5.0
						C	4.0
		C	3.0	C	3.0		
	In Default	-	-	RD	2.0	SD	2.0
		-	-	D	1.0		

Outlook Key			
Moody's	Fitch	S&P	Value
Stable	Stable	Stable	0.00
Positive	Positive	Positive	0.25
Negative	Negative	Negative	-0.25
On Watch Upgrade	Rating Watch Positive	Credit Watch Positive	0.50
On Watch Downgrade	Rating Watch Negative	Credit Watch Negative	-0.50
Developing		Developing	0.00

Source: Moody's, Fitch, S&P, Vernazza and Nielsen (2015), own conversion.

C. Euro as Reserve Currency?

All agencies acknowledge that a reserve currency is credit positive for a sovereign's creditworthiness as it provides ample financial and policy flexibility[28]. Moody's (2013) makes a positive adjustment for countries having a reserve currency which it defines as '*a currency that is held in significant quantities by central banks as part of their foreign exchange reserves. Japan, Switzerland, United Kingdom and the US are reserve currency countries'.* Importantly for euro area countries, Moody's states that *'whereas the euro is seen as a reserve currency, only Germany and France as the two largest member states have the extent of leverage over the ECB's monetary policy to support reserve currency analysis.'*

This is important as for countries classified as having a reserve currency, the weights of the two components of 'F3: Fiscal Strength', namely, 'Debt Burden' and 'Debt Affordability', are not 50% each as for all other countries but instead, 10% and 90% respectively. Thus, irrespective of a Rating Committee's opinion, Moody's scorecard in itself does not treat all EA countries equally as judgement is already applied in the derivation of the 'fundamental' rating. 'F3: Fiscal Strength' is thus not assessed equally among the EA Member States, despite i) having the same currency, ii) each a voting member on the ECB's Governing Council (and the ESM's Board of Governors) and iii) the numerous actions of the ECB throughout the crisis (SMP, LTRO, T-LTRO, OMT and PSPP) testifying it is, in fact, a European Central Bank.

Table 5 shows the impact on our 'fundamental' rating using the IMF's WEO April 2015 data assuming all EA countries benefited from the reserve currency status in Moody's methodology. For Germany and France the opposite analysis is done (i.e. assuming the weights of 'Debt Burden' and 'Debt Affordability' are 50% each).

[28] Fitch (2014) states that '*monetary and exchange rate policies figure less prominently in sovereign assessments of countries allied to a currency union such as the euro area'* and that in these instances *'greater emphasis is placed on appropriate fiscal and structural adjustment policies and the competitiveness and flexibility of the economy*'. We note that Fitch (2016) suggests to change their assessment of reserve currencies but the new methodology is not confirmed at this stage. S&P (2014) relies on a mixed approach whereby '*each sovereign that belongs to a monetary union receives an external assessment based on its individual external position*' (eg. Narrow Net External Debt/ Current Account Receipts) as well as the currency of the union. S&P distinguishes between reserve currencies (such as the euro), actively traded currencies and all other currencies whereby for the latter S&P assesses not only a sovereign's external indebtedness but also its external liquidity position.

Table 5: Reserve Currency 'Fundamental' Rating of EA Member States

Reserve Currency Rating	Only DE & FR as RC (Current Approach)	All EAMS as RC*	Difference (Notches)
AT	Aa3	Aa2	1
BE	Aa2	Aa2	--
CY	Baa1	A3	1
DE	Aa2	Aa2	--
EE	A1	A1	--
ES	A3	A2	1
FI	Aa3	Aa2	1
FR	Aa1	Aa1	--
GR	Ba2	Ba1	1
IE	A3	A3	--
IT	A3	A3	--
LT	A2	A2	--
LU	Aa2	Aa2	--
LV	A2	A2	--
MT	A1	Aa3	1
NL	Aa2	Aa2	--
PT	Baa2	Baa1	1
SI	A3	A3	--
SK	A3	A2	1

Source: Own calculations.
* The ratings of DE and FR in this column assume 'Debt Burden' and 'Debt Affordability' are weighted equally.

Whether or not the 'fundamental' rating changes as a result of the change in the respective weights of 'F3: Fiscal Strength' depends ultimately on the sensitivity of each sovereign's scorecard but it is not a surprise that those sovereigns with a high debt burden, including Spain, Portugal and Greece, would likely benefit from being assessed as having a reserve currency.

D. Tables Robustness Check

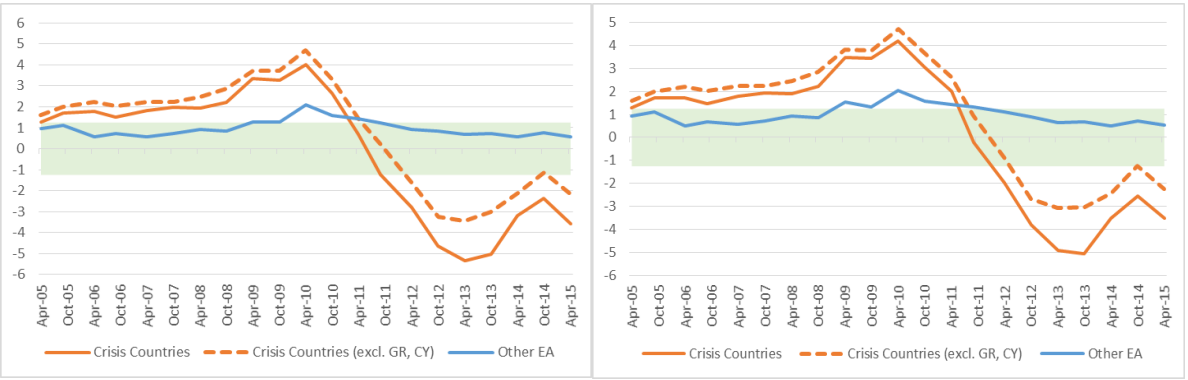
Robust 1

This dataset uses the updated thresholds as per Moody's December 2015 methodology, keeping all else the same.

Figure 11: Difference in Actual vs 'Fundamental' Rating

Average difference between actual and 'fundamental' rating (in rating notches) for 'Crisis Countries' and 'Other EA'

Date Actual Rating: End of month *Date Actual Rating: Average between WEO editions*



NB. The green area refers to the +/- one-notch range of the 'fundamental' rating. 'Crisis Countries': CY, ES, GR, IE, IT, PT and SI. 'Other EA' = AT, BE, DE, EE, FI, FR, LT, LV, MT, NL and SK.

Table 6: EA Member States: Deviation from 'Fundamentals'

Difference in rating notches between actual and 'fundamental' rating

Member State		Rating Cycle*			Time Period			Deviation from Fundamentals	
		Pre-Crisis	*During Crisis*	*Post-Crisis*	*Apr 2005 - Apr 2010*	*Oct 2010 - Oct 2013*	*Apr 2014 - Apr 2015*	*Maximum*	*Average***
Crisis Countries	CY	2.00	**-10.25**	**-8.00**	0.45	**-3.89**	**-7.17**	**-11.25**	**2.96**
	ES	**6.00**	**-3.92**	-1.75	**3.18**	-0.39	-1.75	**6.00**	**2.93**
	GR	1.25	**-10.00**	**-6.25**	1.82	**-7.25**	**-5.08**	**-11.00**	**4.09**
	IE	2.00	-2.25	-1.00	1.73	-1.25	-0.25	**5.75**	1.88
	IT	**5.00**	-1.92	-2.00	**3.18**	0.93	-1.33	**5.00**	**2.74**
	PT	**4.00**	**-5.25**	**-4.00**	**3.50**	**-3.54**	**-3.33**	**-6.25**	**3.77**
	SI	2.25	**-3.75**	-2.00	1.95	-0.36	-2.33	**-4.25**	2.17
	Avg.	**3.21**	**-5.33**	**-3.57**	2.26	-2.25	**-3.04**		**2.93**
Other EA	AT	2.00	1.75	**3.00**	2.27	1.86	**3.33**	**4.00**	2.29
	BE	0.25	0.25	-1.00	0.95	0.57	-1.00	**3.00**	0.88
	DE	2.00	1.75	2.00	1.55	1.89	2.00	**3.00**	1.73
	FR	1.00	-0.25	-0.25	1.00	1.29	-0.25	**2.75**	1.04
	FI***	--	--	**3.00**	1.64	**3.71**	**3.67**	**4.00**	**2.62**
	NL	2.00	1.75	2.00	1.73	1.75	2.00	**3.00**	1.77
	LU	**3.00**	2.08	2.00	**2.55**	2.32	2.00	**5.00**	2.39
	EE	0.25	1.75	0.00	1.11	1.14	0.00	2.00	0.96
	LT	1.00	-1.25	-1.75	-0.77	-1.14	-1.17	-2.00	1.05
	LV	0.25	**-2.75**	-1.00	-0.27	-1.25	-1.92	**-3.25**	1.52
	MT	1.00	-1.92	-2.00	0.18	-0.71	-2.00	-2.25	0.98
	SK	0.25	0.75	1.00	0.16	1.32	1.00	2.00	0.83
	Avg.	1.18	0.36	0.58	1.01	1.06	0.64		1.51

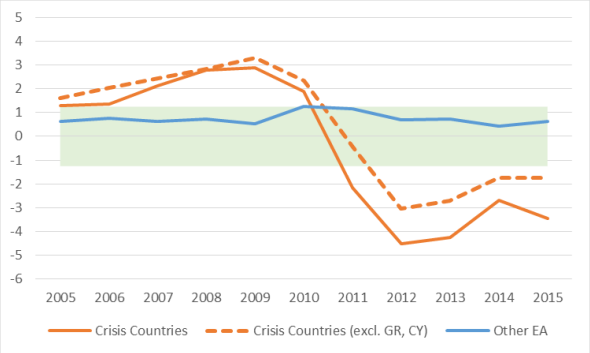
Robust 2

This dataset uses Moody's country statistics as published on the agency's website in August 2015 for the years 2004 to 2016 as well as the agency's statistical handbook published in November 2011 for the years 2001 to 2003.

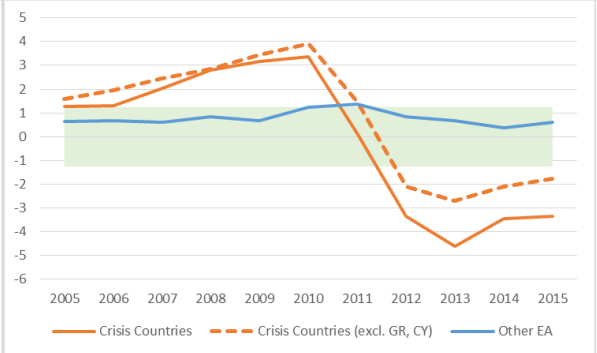
Figure 12: Difference in Actual vs 'Fundamental' Rating

Average difference between actual and 'fundamental' rating (in rating notches) for 'Crisis Countries' and 'Other EA'

Date Actual Rating: End of month



Date Actual Rating: Average between WEO editions



NB. The green area refers to the +/- one-notch range of the 'fundamental' rating. 'Crisis Countries': CY, ES, GR, IE, IT, PT and SI. 'Other EA' = AT, BE, DE, EE, FI, FR, LT, LV, MT, NL and SK.

Table 7: EA Member States: Deviation from 'Fundamentals'

Difference in rating notches between actual and 'fundamental' rating

Member State		Rating Cycle*			Time Period			Deviation from Fundamentals	
		Pre-Crisis	*During Crisis*	*Post-Crisis*	*2005 - 2010*	*2011 - 2013*	*2014 - 2015*	*Maximum*	*Average***
Crisis Countries	CY	2.00	**-9.25**	**-8.00**	0.42	**-6.42**	**-6.50**	**-9.25**	**3.48**
	ES	**4.00**	**-3.25**	-1.75	**2.75**	-1.83	-1.75	**-4.00**	2.45
	GR	**4.25**	**-11.00**	**-7.50**	1.79	**-8.83**	**-6.25**	**-11.00**	**4.61**
	IE	1.00	-2.25	-1.00	0.92	-2.17	-1.00	-2.25	1.32
	IT	**4.00**	-1.75	-1.00	**3.17**	-0.58	-1.00	**-5.00**	2.39
	PT	**4.00**	**-4.25**	-2.00	**3.38**	**-3.83**	-2.00	**-4.25**	**3.25**
	SI	2.25	**-3.25**	**-3.00**	1.96	-1.92	**-3.00**	**-3.25**	2.27
	Avg.	**3.07**	**-5.00**	**-3.46**	2.05	**-3.65**	**-3.07**		**2.82**
Other EA	AT	**3.00**	**2.75**	**3.00**	2.00	**2.83**	**2.50**	**3.00**	2.32
	BE	0.25	-0.92	-1.00	0.46	-0.92	-1.00	-2.25	0.82
	DE	**3.00**	**2.75**	2.00	1.00	**2.83**	1.50	**3.00**	1.59
	FR	1.00	0.00	-0.25	1.17	0.50	-0.25	2.00	0.86
	FI***	**--**	**--**	**2.75**	1.50	**4.00**	**3.38**	**4.00**	**2.52**
	NL	1.00	1.75	2.00	1.00	1.50	2.00	2.00	1.32
	LU	2.00	1.75	2.00	2.33	1.83	2.00	3.00	2.14
	EE	1.25	1.25	0.00	1.13	0.67	0.00	2.00	0.80
	LT	-1.00	-1.00	0.00	-1.38	-1.00	-0.38	-2.25	1.09
	LV	0.25	**-3.25**	-1.00	-0.71	-2.08	-1.50	**-3.25**	1.27
	MT	1.00	-1.25	**-3.00**	0.42	-1.17	**-3.00**	**-3.00**	1.09
	SK	0.25	0.75	1.00	0.08	1.25	1.00	2.00	0.70
	Avg.	1.09	0.42	0.63	0.75	0.85	0.52		1.38

NB. This dataset is based on one 'fundamental' data point per country per year.

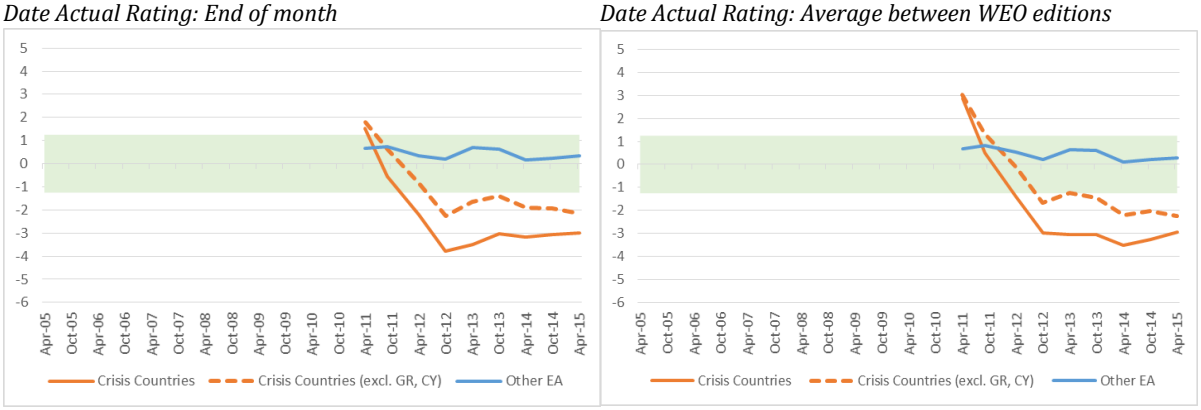
Robust 3

This dataset uses Moody's F4 score as published in Moody's annual reports which is possible for the 2011-2015 time period.

Figure 13: Difference in Actual vs 'Fundamental' Rating

Average difference between actual and 'fundamental' rating (in rating notches) for 'Crisis Countries' and 'Other EA'

Date Actual Rating: End of month *Date Actual Rating: Average between WEO editions*



NB. The green area refers to the +/- one-notch range of the 'fundamental' rating. 'Crisis Countries': CY, ES, GR, IE, IT, PT and SI. 'Other EA' = AT, BE, DE, EE, FI, FR, LT, LV, MT, NL and SK.

Table 8: EA Member States: Deviation from 'Fundamentals'

Difference in rating notches between actual and 'fundamental' rating

Member State		Rating Cycle*			Time Period			Deviation from Fundamentals	
		Apr-11	*During Crisis*	*Post-Crisis*	*N/A*	*Apr 2011 - Oct 2013*	*Apr 2014 - Apr 2015*	*Maximum*	*Average***
Crisis Countries	CY	2.00	**-7.25**	**-6.00**		**-3.88**	**-7.50**	**-8.75**	**5.53**
	ES	1.75	**-2.92**	**-2.75**		-1.13	**-2.75**	**-4.25**	2.39
	GR	-0.25	**-8.00**	**-4.25**		**-6.46**	**-4.08**	**-8.00**	**5.67**
	IE	-1.25	-1.25	-1.00		-1.21	-0.92	-1.25	1.11
	IT	**5.00**	0.75	-2.00		2.08	-1.33	**5.00**	1.83
	PT	0.50	**-3.25**	-2.00		**-2.63**	**-2.67**	**-3.25**	**2.75**
	SI	**3.00**	-1.75	**-3.00**		-0.25	-2.33	**-3.25**	2.11
	Avg.	1.54	**-3.38**	**-3.00**		-1.92	**-3.08**		**3.06**
Other EA	AT	2.00	2.00	**3.00**		2.00	1.67	**3.00**	1.89
	BE	1.00	-0.75	-2.00		-0.17	-2.00	-2.00	1.22
	DE	1.00	1.75	2.00		1.71	1.33	2.00	1.58
	FR	1.00	0.55	-0.25		0.83	0.42	1.00	0.75
	FI***	**3.00**	--	**3.00**		**3.00**	**3.00**	**3.00**	**3.00**
	NL	1.00	1.75	2.00		1.54	2.00	2.00	1.69
	LU	2.00	1.75	2.00		1.88	2.00	2.00	1.92
	EE	0.00	--	0.00		0.00	-0.67	1.00	0.22
	LT	-2.00	--	**-2.75**		-2.00	-1.50	**-2.75**	1.83
	LV	-2.00	--	-1.00		-2.46	-1.25	**-3.75**	2.06
	MT	1.00	-1.25	-2.00		-0.50	-2.00	-2.25	1.22
	SK	0.00	0.75	0.00		0.71	0.00	1.00	0.47
	Avg.	0.67	0.82	0.33					1.49

NB. Robust 3 starts in 2011 as for prior years F4 scores are not consistently available for euro area sovereigns. This also explains the higher average figures regarding the deviation from the 'fundamental' rating. In addition, the lowest ratings for EE, LT and LV were prior to April 2011 which is why the 'during crisis' period is left blank.

*The 'rating cycle' and the associated snapshots for when we compare the actual to our 'fundamental' rating varies for each country.

**The average deviation is based on the average of the absolute value of the difference between the actual and the 'fundamental' rating over the observed period.

*** Finland was consistently rated 'Aaa/ STA' throughout the period and thus a 'rating-cycle' for the datasets Robust 1 and Robust 2 cannot be identified. Similarly, for the dataset Robust 3, no 'during crisis' period can be identified.

NB. Greece and Cyprus experienced credit events which according to Moody's default definitions, justify the lowest rating category irrespective of suggested 'fundamentals' of the scorecard.

Source: Own classification. The period of observation is April 2005 to April 2015.

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