Economic Policy Uncertainty and Sovereign Credit Rating Decisions: Panel Quantile Evidence for the Eurozone

Periklis Boumparis
University of Liverpool, United Kingdom
P.Boumparis@liverpool.ac.uk

Costas Milas*
University of Liverpool, United Kingdom
and
Rimini Centre for Economic Analysis, Rimini, Italy
costas.milas@liverpool.ac.uk

Theodore Panagiotidis
Department of Economics, University of Macedonia, Greece
tpanag@uom.gr

Abstract

We employ a panel quantile framework that quantifies the relative importance of quantitative and qualitative factors across the conditional distribution of sovereign credit ratings in the Eurozone area. We find that regulatory quality and competitiveness have a stronger impact for low rated countries whereas GDP per capita is a major driver of high rated countries. A reduction in the current account deficit leads to a rating or outlook upgrade for low rated countries. Economic policy uncertainty impacts negatively on credit ratings across the conditional distribution; however, the impact is stronger for the lower rated countries. In other words, the creditworthiness of low rated countries takes a much bigger 'hit' than that of high rated countries when European policy uncertainty is on the rise.

Keywords: credit ratings; sovereign debt; panel quantile; Eurozone; uncertainty.

JEL classification: C5; F3; G1

* Corresponding author: Professor Costas Milas, Management School, University of Liverpool, Liverpool L69 7ZH, United Kingdom, Tel: +44151 7953135.

email: costas.milas@liverpool.ac.uk

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1. Introduction

During the global financial crisis of 2007-2009 and the subsequent recession, Central Banks and governments responded by injecting additional liquidity into the system and pursuing expansionary fiscal policies, respectively. With the world economy in (the process of returning to) normality, fiscal positions are also being tightened up. Nevertheless, the significant deterioration of public finances post 2007[1] has put on alert Credit Rating Agencies (hereafter CRAs). For instance, Moody's Investor Services, a major credit rating agency, has downgraded over the 2008-2013 period the debt rating of a number of peripheral European countries, namely Greece, Ireland, Italy, Portugal, and Spain (hereafter the GIIPS) and Cyprus by 63 notches in total.[2] Similar decisions have been implemented by the other two main CRAs, namely Standard & Poor's (S&P's) and Fitch Ratings, respectively.[3]

Sovereign credit ratings provide a measure of the probability that a country will default on its debt obligations. In that sense, they set the tone for borrowing costs in international markets both for a sovereign state and the financial institutions operating in that sovereign state (for recent evidence, see Drago and Gallo, 2017). This is vital for stimulating investments and supporting economic growth.

Reputational concerns do discipline the decisions made by CRAs (see e.g. Bar-Isaac and Shapiro, 2013 and Mariano, 2012). However, the value of reputation depends on economic fundamentals that vary over the business cycle. Using a theoretical model of credit ratings with endogenous reputation, Bar-Isaac and Shapiro (2013) relate credit ratings decisions to the economic cycle. They find that CRAs are more likely to issue less accurate ratings when fee-income is high, the economy is booming and securities' default probabilities are low. Indeed, during booms, hiring skilled analysts becomes more expensive for CRAs. At the same

[1] For instance, the International Monetary Fund estimates that gross debt in thirty-nine advanced economies deteriorated from 71.2% of GDP in 2007 to 107.5% in 2016 whereas gross debt in the Euro area deteriorated from 64.9% of GDP in 2007 to 91.7% of GDP in 2016. Data available from: https://www.imf.org/external/pubs/ft/weo/2016/02/weodata/weoselagr.aspx.

[2] In particular, Greece, Ireland, Italy, Portugal, Spain and Cyprus have been downgraded by 14, 10, 6, 10, 9 and 14 notches, respectively by Moody's.

[3] The three main CRAs have a total EU market share of 92.85% (see https://www.esma.europa.eu/sites/default/files/library/20161662_cra_market_share_calculation.pdf).

time, CRAs can potentially charge higher fees and since bond issues are less likely to default, monitoring a CRA activity becomes less effective.

Although the recent empirical literature has discussed a number of quantitative and qualitative factors affecting the decisions of CRAs, an increasingly large number of decisions appear to remain unexplained. For instance, some of the downgrades of peripheral European debt which took place in 2010 and beyond have been contested by the downgraded peripheral countries and by prominent European policymakers. Speaking to the European parliament in May 2010, Jose Manuel Barroso, then the European Union Commission President, criticised the three main CRAs noting that "deficiencies in their working methods has led to ratings being too cyclical, too reliant on the general market mood rather than on fundamentals-regardless of whether market mood is too optimistic or too pessimistic" (Barroso, 2010).

In a letter published in March 2011 by *The Economist*, David Beers, Standard & Poor's (at that time) Global head of sovereign ratings, defended the record of the CRAs. He noted that credit ratings "provide a robust ranking of the risk of sovereign default" and "are independent opinions of creditworthiness based on fundamental analysis and therefore should be expected to change as credit risk evolves over the cycle". Gärtner and Griesbach (2012) argued that "sovereign ratings, their meaning and their underlying procedures are rather opaque". They also went on to argue that "the set of relevant fundamental variables is an open one, and the interpretation of ever evolving political institutions and processes in unprecedented environments are a dime a dozen". Moritz Kraemer, Global Chief Rating Officer of Standard & Poor's, dismissed the arguments of Gärtner and Griesbach (2012) as "simply wrong" and went on to note that S&P's sovereign rating decisions are accompanied by comprehensive published rationales and, often, press releases that explain their reasoning and approach. Kraemer (2012) also pointed out that S&P's explain on their website how they arrive at their ratings and how their ratings perform over time (see www.understandingratings.com) which makes their publications as transparent and complete as possible.

The growing dissatisfaction across Europe about some of the recent credit rating decisions, has given rise to talks amongst Eurozone member states about setting up a European credit rating agency which will increase competition in the rating business. Nevertheless, the European Central Bank (ECB) has been very cautious about how quickly such a project could be deployed. In February 2011, the ECB pointed out that a new credit rating agency will have to rely on extensive data, a number of models, experienced staff and go through building a sound track record for several years before it establishes itself as a credible agency in the rating business (Tait, 2011). In 2016, European Securities and Markets Authority (ESMA), which is the authority competent for the supervision of CRAs, published a report on sovereign ratings processes which noted that because of a "switch to a regulated industry with focus on integrity of process…ESMA has driven significant changes in the credit rating process and the methodology…thereby strengthening their integrity, independence, quality and transparency (ESMA 2016 Report, page 16).

This paper attempts a comprehensive assessment of credit rating decisions made by the three main CRAs for the Eurozone economies in light of the ongoing criticism discussed above. The existing literature on the determinants of sovereign credit ratings has focussed on several macroeconomic, qualitative and risk factors. Recent studies focus on time-varying models of credit ratings (Reusens and Croux, 2017) and models with debt levels conditional on debt being above or below endogenously determined debt threshold levels (Hmiden et al., 2016). Prior to this, Afonso et al. (2011) examine differentiations across rating levels by splitting their dataset into two groups according to the ratings level, namely high-rated countries with credit grades BBB+ and above and low rated countries with credit grades BBB and below.

Arguably, however, the actual degree of importance of the different explanatory variables across the conditional distribution of sovereign credit rating has not been explored in detail as most of the studies focus on the average responses.

We fill the gap in the literature by implementing panel quantile estimation with nonadditive fixed effects as proposed by Powell (2016). Our contribution to the existing literature is summarised as follows: First, we employ a panel quantile

framework that allows us to observe the relative importance of quantitative and qualitative factors across the conditional distribution of sovereign credit ratings. Second, we augment the information set considered in previous studies by examining and identifying the significant impact of competitiveness and the European economic policy uncertainty index on the Eurozone sovereign credit ratings.

Among our findings, the unemployment rate, regulatory quality and competitiveness have a stronger impact for low rated countries whereas GDP per capita is a major driver of high rated countries. A reduction in the current account deficit or an increase in the current account surplus leads to a rating or outlook upgrade for low rated countries. Economic policy uncertainty impacts negatively on credit ratings across the conditional distribution; however, the impact is stronger on the lower rated countries. We quantify the effects of uncertainty on credit ratings by using estimates of our model under uncertainty to infer what credit ratings would have been had uncertainty remained at its 2002-2007 pre-financial and pre-European debt crisis average value. We find that economic policy uncertainty in the Euro area has reduced Greece's credit rating by some 3 notches at the height of the Eurozone crisis in 2011 and in 2012; the impact of uncertainty has been substantial but somewhat less severe for the remaining GIIPS and Cyprus. In other words, our empirical analysis suggests a pivotal role that economic policy uncertainty in the Euro area has played in downgrading the credit profile of Eurozone's periphery.

The structure of the paper is as follows. Section 2 discusses the data. Section 3 introduces the model and Section 4 presents the empirical estimates. Section 5 provides a discussion of our findings and offers some policy implications. Finally, Section 6 offers some concluding remarks.

2. Data

We use annual data from 2002 to 2015 for nineteen Eurozone countries (266 observations in total). Our dependent variable is the sovereign credit rating published by the three main international rating agencies, Moody's, Standard & Poor's (S&P's) and Fitch Ratings (attributed at the end of each calendar year). A linear transformation of credit ratings to numerical scale is implemented starting from 21 for the highest quality with a stable outlook (AAA for Fitch and S&P's and Aaa for Moody's) and ending to 1 for Default (D for Fitch and S&P's and C for Moody's). The difference between two continuous ratings with the same outlook is always equal to 1. Not only we account for changes in credit ratings, but we also consider changes in credit outlooks.[4] The difference between two continuous outlooks is always equal to 1/3, so the difference between two continuous ratings with the same outlook is always equal to one. Table 1 reports the linear transformation of credit ratings.

We adopt a set of explanatory variables previously used in the literature (see e.g. Reusens and Croux, 2017; Dimitrakopoulos and Kolossiatis, 2016, Aizenman et al., 2013 and Afonso et al., 2011), namely GDP per capita, Government Debt, Current Account Balance, Inflation Rate, Unemployment Rate and Regulatory Quality Index. Further, we consider two new explanatory variables. The first one is the Competitiveness Indicator; an increase in the index implies lower competitiveness which impacts negatively on credit rating decisions.[5] Weak competiveness is often highlighted by government authorities and international organizations such as the International Monetary Fund (IMF), the European Commission (EC) and the European Central Bank (ECB) as one of the main drawbacks of Eurozone's periphery relative to Eurozone's core. The second explanatory variable is the

[4] We do not account for watch positive and watch negative outlooks for two reasons. First, we assume that the positive (negative) outlook is conceptually very close to watch positive (watch negative) outlook and, second, the number of watch positive and watch negative observations in our dataset is very small.

[5] This is the harmonised competitiveness indicator based on unit labour costs indices for the total economy; available from:

https://www.ecb.europa.eu/stats/ecb_statistics/escb/html/table.en.html?id=JDF_EXR_HCI_ULCT&period=index.

European Policy Uncertainty Index. This captures the impact of uncertainty, generally on the behaviour of rating agencies over time and more specifically on the cumulative downgrades of periphery's bonds during the recent Eurozone sovereign debt crisis. The index is constructed based on newspaper articles regarding policy uncertainty from 10 leading European newspapers. It counts the number of newspaper articles containing the terms uncertain or uncertainty, economic or economy, and one or more policy-relevant terms; for more information see Baker et al. (2015) and http://www.policyuncertainty.com/index.html. Appendix Table A.1 provides details on our data definitions and sources.

Next, we discuss the expected impact of each explanatory variable on credit ratings:

1. GDP per capita – positive response: Higher GDP per capita coincides with a larger tax base and, therefore, an increased ability of the government to repay its obligations. This variable can also reflect economic development.

2. Government debt – negative response: A high stock of government debt implies higher interest rates to accommodate it. Therefore, additional financial resources are needed to repay debt obligations. A higher government debt can increase the risk of default.

3. Current account balance – uncertain response: On the one hand, a higher current account deficit can signal overconsumption, undermining prosperity in the long run. On the other hand, it might have a positive effect, taking into account the productivity of the additional investments and their potentially positive economic impact in the short run.

4. Inflation rate – uncertain response: Higher inflation rates are a sign of structural and macroeconomic imbalances in the government's finances. On the other hand, very low inflation might lead to a deflationary spiral (Reusens and Croux, 2017). If we were dealing with debt in domestic currency, high inflation reduces the real stock of government debt in domestic currency and partially offsets the negative impact of high inflation.

5. Unemployment rate – negative response: A country with lower unemployment has an efficient labour market. The lower is the unemployment, the greater is overall taxable income and the lower the fiscal burden for unemployment subsidies.

6. Regulatory quality[6] – positive response: A high value of regulatory quality index reflects the ability of the government to implement necessary regulations that can boost private sector development and increase investment and GDP. Moreover it can be a qualitative quantification of the government's willingness to repay its obligations.

7. Competitiveness indicator – negative response: Competitiveness reflects a country's ability to attract private investments in an international environment.

8. European policy uncertainty – negative response: Higher uncertainty worsens the economic environment, makes consumers and investors more cautious and reduces future consumption and investment.

3. Methodology

Quantile regression is appropriate when the variables of interest potentially have varying effects at different points of the conditional distribution of the outcome variable. In recent years, there has been a growing literature that combines quantile estimation with panel data. In mean regression, panel data allow for the inclusion of fixed effects to capture within group variation. Many quantile panel data estimators use an analogous method and include additive fixed effects. However, the additive fixed effects change the underlying model. We implement the quantile regression estimator for panel data (QRPD) with nonadditive fixed effects introduced by Powell (2016).

[6] Regulatory quality index is a combination of several individual variables such as investment and financial freedom, business regulatory environment, competition policy, tax inconsistency, financial institution's transparency, public sector openness to foreign bidders and easiness to start new business. See: http://info.worldbank.org/governance/wgi/pdf/rq.pdf.

The main advantage of this method relative to the existing quantile estimators with additive fixed effects (α_i) is that it provides estimates of the distribution of Y_{it} given D_{it} instead of $Y_{it} - \alpha_i$ given D_{it}.[7]

Powell (2016) notes that in many empirical applications the latter is undesirable. This is because observations at the top of the ($Y_{it} - \alpha_i$) distribution may be at the bottom of the Y_{it} distribution and therefore additive fixed effect models cannot provide information about the effects of the policy variables on the outcome distribution. Thus, Powell's (2016) method provides point estimates which can be interpreted in the same way as the ones coming from cross-sectional regression. It is also consistent for small T. The underlying model is:

$$Y_{it} = \sum_{j=1}^{8} D_{it}^{'} \beta_j (U^{*}_{it}), \tag{1}$$

where Y_{it} is the sovereign credit rating for each CRA, β_j is the parameter of interest, D_{it} is the set of explanatory variables and U^{*}_{it} is the error term that may be a function of several disturbance terms, some fixed and some time-varying. The model is linear in parameters and $D_{it}^{'}\beta(\tau)$ is strictly increasing in τ. In general, for the τ^{th} quantile of Y_{it}, quantile regression relies on the conditional restriction:

$$P(Y_{it} \leq D_{it}^{'}\beta(\tau) \Big| D_{it}) = \tau \tag{2}$$

Equation (2) states that the probability the outcome variable is smaller than the quantile function is the same for all D_{it} and equal to τ. Powell's (2016) QRPD estimator allows this probability to vary by individual and even within-individual as long as such variation is orthogonal to the instruments. Thus, QRPD relies on a conditional restriction and an unconditional restriction, letting $D_i = (D_{i1}, ..., D_{iT})$:

[7] That is due to the different structural quantile functions (SQF). The SQF of QRPD is $d^{'}\beta(\tau)$. In contrast, the SQF of models using additive fixed effects is $\alpha_i + d^{'}\bar{\beta}(\bar{\tau})$ where d denotes potential values of D_{it} and τ is the relevant quantile of Y_{it}. The notation $\bar{\beta}(\bar{\tau})$ for the additive fixed effect model is used to highlight that these parameters are different than those used in the nonadditive fixed effects model.

$$P(Y_{it} \le D_{it}^{'}\beta(\tau)\Big|D_i) = P(Y_{is} \le D_{is}^{'}\beta(\tau)\Big|D_i),$$
$$P(Y_{it} \le D_{it}^{'}\beta(\tau)) = \tau \qquad (3)$$

Powell (2016) develops the estimator in an instrumental variables context given instruments $Z_i = (Z_{i1},...,Z_{iT})$ but notes that if the explanatory variables are exogenous (in which case $D_i = Z_i$) many of the identification conditions are met trivially. Estimation uses Generalized Method of Moments. Sample moments are defined as:

$$\hat{g}(b) = \frac{1}{N}\sum_{i=1}^{N} g_i(b) \text{ with } g_i(b) = \frac{1}{T}\{\sum_{i=1}^{T}(Z_{it} - \bar{Z}_i)[1(Y_{it} \le D_{it}^{'}b)]\}, \qquad (4)$$

where $\bar{Z}_i = \frac{1}{T}\sum_{i=1}^{T} Z_{it}$.

Using (3), the parameter set is defined as:

$$\mathrm{B} \equiv \{b\Big|\tau - \frac{1}{N} \le \frac{1}{N}\sum_{t=1}^{N} 1(Y_{it} \le D_{it}^{'}b) \le \tau\} \text{ for all } t. \qquad (5)$$

Then, the parameter of interest is estimated as

$$\hat{\beta}(\tau) = \arg\min_{b\in\beta} \hat{g}^{'}(b)\hat{\mathrm{A}}\hat{g}(b) \qquad (6)$$

for some weighting matrix $\hat{\mathrm{A}}$. The model is estimated using the Markov Chain Monte Carlo (MCMC) optimization method.[8]

[8] All estimations are done in STATA using David Powell's quantile estimator with nonadditive fixed effects available at:

https://sites.google.com/site/davidmatthewpowell/quantile-regression-with-nonadditive-fixed-effects.

4. Empirical results

4.1. Main estimates

We capture the varying effects on credit ratings by estimating the model for the 0.05, 0.10, 0.15,..., 0.75 quantiles for each of the three CRAs (the model also estimates time fixed effects).[9] In order to control for potential endogeneity, we re-run the same model treating all explanatory variables as endogenous and using first-order lags as instruments. Estimated results (reported in Appendix Tables A.2-A.4) are very similar to those reported below.

Tables 2-4 report estimated coefficients, associated *p*-values, the pseudo-R^2 and the Akaike Information Criterion (AIC) for each quantile and each CRA. All explanatory variables have the expected signs and are statistically significant at almost all quantiles. The impact of the unemployment rate, regulatory quality and competitiveness is stronger at low ratings. For instance, the coefficient of unemployment rate reduces from -0.4446 at the 0.05 quantile to -0.2201 at the 0.35 quantile and then to -0.0069 at the 0.75 quantile for Fitch. The estimates for Moody's and S&P's follow a similar pattern. Based on the quantile distribution, the impact of an improvement in regulatory quality on credit ratings is almost two times higher for counties rated at A1 and below for Moody's than those rated at Aa3 and almost 8 times higher than those rated at Aa1 or Aaa (Appendix Figures A.1-A.3 map the sovereign credit ratings to the quantile distribution for the three CRAs; these should be read together with Table 1). Additionally, *ceteris paribus*, an annual decrease in the cost competiveness index by seven points of the index (such a move is not unusual in our dataset) brings about one half ($\approx 7 * 0.0687$) of a notch upgrade at the 0.05 quantile for S&P's, one quarter ($\approx 7 * 0.0324$) of a notch upgrade at the 0.35 and only 0.05 ($\approx 7 * 0.0061$) of a notch upgrade at the 0.75 quantile. The impact of government debt on credit ratings is almost equally important for countries rated at adequate payment capacity and below and for those rated at high and highest quality, but impressively enough, is less strong for countries rated at strong payment capacity (that is, A1, A2, and A3 ratings for Moody's, and A+, A, and A- ratings for S&P's and Fitch) for all three CRAs. For

[9] Almost 25% of the observations are in the highest quality AAA. That is the reason why 0.75 is the highest quantile we employ in this paper.

example, the coefficient of Government Debt for S&P's is -0.0398 at the 0.15 quantile, -0.0370 at the 0.70 quantile but only -0.0209 and -0.0069 at the 0.45 and 0.50 quantiles, respectively.

CRAs attribute a higher weight on GDP per capita[10] for high rated countries; the impact of GDP per capita on sovereign credit rating is almost five times higher for the 0.65 quantile relative to the 0.15 one and almost two times higher relative to the 0.30 and 0.35 quantiles for Fitch. Therefore, the high level of GDP per capita provides a 'safety net' safeguarding (to some extent) against downgrades in the case of high rated countries.

The significance of inflation rate varies across the rating distribution but without any specific trend pattern. Economic policy uncertainty impacts negatively on credit ratings across the quantile distribution and the impact is stronger on the lower rated countries; in other words, when European uncertainty kicks in, low rated countries take a much bigger 'hit' than high rated countries. Further, the uncertainty effect is stronger for Moody's and weaker for Fitch at all quantiles.

The impact of the current account balance is positive at the 0.05, 0.10 and 0.15 quantiles for all agencies and remains positive at the 0.20, 0.25, and 0.30 quantiles for S&P's and at the 0.20 and 0.30 quantiles for Fitch. The impact of the current account turns negative at all other quantiles for all CRAs. Hence, we find an asymmetric impact of the current account over the quantile distribution of sovereign ratings. Noting that the impact of current account balance on sovereign credit ratings is theoretically uncertain, our analysis shows that a reduction in the current account deficit or an increase in the current account surplus leads to a rating or outlook upgrade for low rated countries which have historically recorded high current account deficits.[11] The effect is entirely different for countries with

[10] Moody's GDP per capita coefficients at the 0.05 and 0.10 part of the distribution are counter-intuitive as is the S&P's GDP per capita coefficient at the 0.05 one. This, however, does not apply to Fitch. One possibility for this result is that countries at this very low part of the distribution, mainly Greece after 2010 and Cyprus after 2012, have witnessed persistent recession in the second half of the sample.

[11] Over 2002-2015, Greece recorded an average current account deficit of 7.61% as a share of its GDP. The corresponding deficit figures for Ireland, Italy, Portugal, Spain and Cyprus were 0.85%, 0.87%, 6.63%, 4.02% and 6.45%. By contrast, the Euro area recorded an average current account surplus of 0.71% as a share of its GDP.

strong payment capacity, high and highest quality. In this case, a higher current account deficit or a lower current account surplus is associated with either higher creditworthiness or positive economic prospects of the economy and consequently a higher sovereign rating (Afonso et al., 2011). But why low rated countries (namely the GIIPS and Cyprus) are downgraded when they record higher current account deficits? Recalling that current account deficits reflect net borrowing from abroad, one might argue that there is nothing intrinsically wrong with current account imbalances if countries borrow from abroad to invest in capacity which consequently allows them to satisfy their debt obligations. Rather than doing this, Eurozone's periphery funds from abroad largely ended up in non-traded sectors (like government consumption and housing); see, for instance, the discussion in Baldwin and Giavazzi (2015).

4.2. Robustness checks

As alternatives to the European policy uncertainty index, we use (a) the US policy uncertainty index of Baker et al. (2015) and (b) the Euro area uncertainty proxy of Girardi and Reuter (2017). Like the European policy uncertainty index, the US one captures the policy related economic uncertainty by counting the number of newspaper articles containing the terms uncertain or uncertainty, economic or economy, and one or more policy-relevant terms of ten leading newspapers (including *The Washington Post*, *The New York Times* and *The Wall Street Journal*) and can be thought of as capturing spillover US economic policy effects to the Eurozone area. On the other hand, the Girardi and Reuter (2017) uncertainty measure pools information from 22 forward-looking business and consumer survey questions contained in the EU Business and Consumer Surveys programme (see Girardi and Reuter, 2017).

The correlation between the European and US policy indices is equal to 0.80 whereas the correlation between the European policy index and the survey-based uncertainty measure of Girardi and Reuter (2017) is much weaker and equal to 0.20. Figure 1 plots together the three uncertainty measures. Notice that European policy uncertainty is much more volatile than the remaining uncertainty

measures; it also shows a marked increase following from the 2008-2009 financial crisis and the most recent Eurozone debt crisis in 2011-2012. It drops after ECB President Mario Draghi pledged in 2012 that the ECB was 'ready to do whatever it takes' to protect the Eurozone from collapse.[12]

Appendix Tables A.5-A.7 report the empirical estimates using the US economic policy uncertainty index. As can be seen from Tables A.5-A.7, there is a spillover negative impact of US uncertainty on Eurozone's credit ratings but the impact is smaller compared to the European uncertainty impact reported in Tables 2-4. There is mixed evidence in terms of whether the model using the European policy uncertainty index dominates the model using the US one. In the case of Moody's, the model using the European uncertainty index delivers a lower Akaike Information Criterion (AIC) than the model using the US index in 7 out of the 15 quantiles of the rating distribution. In the case of S&P's, the model using the European uncertainty index delivers a lower AIC than the model using the US index in 6 out of the 15 quantiles of the rating distribution. In the case of Fitch, however, the dominance of the European index is much stronger; indeed, the model using the European uncertainty index delivers a lower AIC than the model using the US index in 11 out of the 15 quantiles of the rating distribution. To save space, we do not report our estimates using the uncertainty survey-based measure of Girardi and Reuter (2017); these estimates are available on request. We note, however, that the statistical evidence in favour of a negative impact of the uncertainty survey-based measure is much weaker (for Moody's, this happens in 6 out of the 15 quantiles of the rating distribution; the corresponding figures for S&P's and Fitch are 7 and 8, respectively).

Compared to the alternative uncertainty measures, the stronger impact of the European policy uncertainty index should not necessarily come as a surprise. Policymakers have arguably been rather slow in putting together a workable plan dealing with the Eurozone crisis as planning requires in general parliamentary approval from all member states. In addition, the major institutions (nick-named as the 'Troika' of the International Monetary Fund, the European Commission and

[12] See e.g. http://www.telegraph.co.uk/finance/financialcrisis/9428894/Debt-crisis-Mario-Draghi-pledges-to-do-whatever-it-takes-to-save-euro.html.

the European Central Bank) have not always agreed on how to deal with issues of the crisis therefore fuelling policy uncertainty in the Euro area.[13] Indeed, Eurozone's institutional infrastructure was not prepared to deal with the crisis. Baldwin and Giavazzi (2015, page 21) noted in a critical manner that "judging from market reactions, each policy intervention made things worse" and that it was only in the summer of 2012 with the 'whatever it takes' assertion by ECB President Mario Draghi that the corner was turned.

In preliminary analysis we added the growth rate of GDP as an extra explanatory variable but found very weak evidence of a positive and statistically significant impact on credit ratings; this might have to do with the persistently weak GDP growth rates observed in the Euro area over the recent years. Arguably, however, the impact of GDP growth on credit ratings is indirectly captured by the impact of the unemployment rate through an Okun's-law type of approximation (in which case there is an inverse relationship between unemployment and GDP growth).

Fiscal discipline has been on the agenda of policymakers in the Euro area after 2009. Fiscal balance to-GDP-ratio was not a major concern for CRAs in making credit rating decisions for developed countries until the recent Eurozone debt crisis; Reusens and Croux (2017) identify a significant positive effect from the fiscal balance-to-GDP ratio on credit ratings only after 2009. In our case, we could only find some statistical evidence using the lagged fiscal balance-to-GDP ratio as an explanatory variable. Arguably, such a finding has to do with continuous revisions in the fiscal balance variable as well as the disagreement between authorities not only on the predicted fiscal balance but also on the actual outcome[14] [15]; to this end, we mention the study of De Castro et al. (2013) who find that most preliminary European Union government balance data releases "are biased and non efficient predictors of subsequent releases, with later vintages of data tending to show lower budget balances than indicated by earlier data releases on average" (De Castro et al., 2013, page 1207). In light of this, CRAs might have been reluctant to monitor current fiscal balance for credit rating decisions

[13] See e.g. http://www.bbc.co.uk/news/business-33531845.

[14] See, for instance: http://www.reuters.com/article/us-eu-deficits-idUSTRE63L1G420100422.
[15] See: http://ec.europa.eu/info/files/winter-2017-economic-forecast-greece_en.

which, in turn, might explain why lagged fiscal balance might play more of a role. Our results (available on request) suggest that there is a positive effect of the lagged fiscal balance throughout the distribution for Moody's, whereas, for S&P's and Fitch, we find a negative effect at the 0.10 and 0.15 quantiles of distribution (estimates on the remaining variables are qualitatively similar to what we report in Tables 2-4).

Our quantile panel model offers valuable and additional information compared to a standard panel model with fixed individual and time effects; detailed estimates of the latter model for all three CRAs are available on request. We illustrate some differences between the two models by focusing on the impact of regulatory quality in Figure 2 and on the impact of competitiveness in Figure 3. Figure 2 plots the estimated impact of regulatory quality for Moody's across the conditional distribution of credit ratings (based on the quantile panel model reported in Table 2) together with the estimated impact of regulatory quality for a standard panel model with fixed individual and time effects (which is equal to 2.912); the latter focuses on the conditional mean response of credit ratings. Figure 3 plots the estimated impact of competitiveness for Fitch across the conditional distribution of credit ratings (based on the quantile panel model reported in Table 4) together with the estimated impact of competitiveness for the standard panel model with fixed individual and time effects (which is equal to -0.0286). As can be seen from Figures 2 and 3, relying on the impact of the model with fixed effects misses valuable information across the quantile distribution that can only be captured by the quantile panel model discussed throughout this paper.

5. Discussion of results and policy implications

From a policy point of view, and noting the higher relative importance of the competitiveness and regulatory quality indices for Eurozone countries with low credit ratings, our results suggest that structural reforms and improvements in the competitiveness profile of these very countries will improve significantly their low rating profile and therefore reduce their borrowing costs in financial markets. This is in line with policy recommendations recently put forward by the European

Commission.[16] In addition, a decrease in policy uncertainty in the Eurozone area could definitely favour all countries, but low rated would gain more in terms of their credit rating score. We also note the potential of indirect spillover effects from sovereign credit rating decisions on low rated countries to Eurozone's sovereign bond yields; for instance, De Santis (2014) identifies spillover effects in terms of the direct impact of a Greek credit rating downgrade on other Eurozone sovereign yields.

We can illustrate the effects of European uncertainty on credit ratings by using estimates of our credit rating model under uncertainty to infer what credit ratings would have been had uncertainty remained at its 2002-2007 average value. To do this, we construct the difference between the fitted values of the estimates of credit rating model (1) for each CRA (as reported in Tables 2-4) and the fitted values of the counterfactual model (1) which sets the post 2007 values of the uncertainty variable equal to its 2002-2007 average.

Tables 5-7 report the difference between the fitted and the counterfactual values for Eurozone's periphery, namely all GIIPS (that is, Greece, Ireland, Italy, Portugal and Spain) and Cyprus where a negative value of this difference indicates that credit ratings are lower because of the increased uncertainty.

Our estimates suggest that economic policy uncertainty has impacted negatively on the credit ratings of all GIIPS and Cyprus during the 2008-2015 period. The impact has been more prolonged for Greece. Notice that uncertainty has reduced Greece's credit rating by some 3 notches at the height of the Eurozone crisis in 2011 and 2012 (the impact is higher in the case of Moody's and Fitch and slightly lower in the case of S&P's). This is not surprising. Greece has witnessed successive bail-outs and still remains (at the time of writing this paper) on bail-out support.[17]

[16] See: http://ec.europa.eu/europe2020/pdf/csr2016/cr2016_comm_en.pdf.

[17] Greece, which was bailed-out twice (for €110bn in 2010 and then again for €109bn in 2011), negotiated, in February 2012, a new €130bn rescue package involving a voluntary haircut of some 53.5% on the face value of its bonds held by the private sector. Eurozone ministers agreed (in November 2012) to cut Greece's debt by a further €40bn. In July 2015, Greece was bailed-out for a third time for €86bn.

From Tables 5-7, the impact of uncertainty on the remaining GIIPS and Cyprus is still substantial but, in general, less severe than what Greece witnessed (Portugal suffered, due to uncertainty, the same rating downgrades as Greece in 2011-2014; Cyprus suffered, due to uncertainty, the same rating downgrades as Greece in 2012-2015).[18] Again, this should not come as a surprise as the remaining GIIPS and Cyprus witnessed less 'expensive' and 'smoother' bail-outs; in fact, all these countries are now off bail-out support.[19]

Earlier work by Livingston et al. (2010) suggests that Moody's is more conservative (in the sense that it gives more inferior ratings) than S&P's using data on US corporate bond rating decisions. From Tables 5-7, the impact of uncertainty on the GIIPS and Cyprus is in general more severe for Moody's than for S&P's and for Fitch. Hence, our findings support the work of Livingston et al. (2010) in the sense that, since the recent financial and Eurozone crises, Moody's have remained more conservative than the other CRAs because of European policy uncertainty concerns.

Returning to Greece, we note that the Boards of Directors of the European Stability Mechanism (ESM) and European Financial Stability Facility (EFSF) [20] adopted, in January 2017, a set of short-term debt relief measures for Greece aiming at a

[18] Notice, in Tables 5-7, some overlapping for a number of countries in a number of years. This should not come as a surprise. For a given quantile, the difference between the fitted values of the estimates of our credit rating model and the fitted values of the counterfactual model is equal to the estimated coefficient on uncertainty (for the quantile in question) times the difference between uncertainty in time period *t* and mean uncertainty (over 2002-2007). Recall that European uncertainty does not vary at the cross-sectional dimension. When two (or more countries) are placed in the same quantile of the rating distribution for a given time period *t*, the difference between the fitted values of the estimates of our credit rating model and the fitted values of the counterfactual model is the same.

[19] Ireland was bailed-out for €85bn in November 2010. Portugal was bailed-out for €78bn in May 2011. Spain was granted, in July 2012, financial assistance from the European Stability Mechanism (ESM) for up to €100bn. Cyprus was bailed-out for €10bn in March 2013. See, for instance, the discussion in Dergiades et al., 2015 and *The Financial Times* 'dedicated' website (at https://www.ft.com/topics/themes/Greece_Debt_Crisis).

[20] ESM is a European Union permanent agency that provides financial assistance, in the form of loans, to Eurozone countries or as new capital to banks in difficulty. It has replaced the temporary EFSF.

cumulative reduction of Greece's debt-to-GDP ratio of around 20 percentage points until 2060.[21]

Policymakers from the so-called 'Troika' have repeatedly pointed out that Greece needs to proceed with structural reforms and improve its competitiveness as prerequisites for getting substantial 'medium term relief'. At the time of writing, Greece stood at the 0.05 quantile of the rating distribution of S&P's (and the remaining CRAs), some 5 notches deep into 'junk status territory' [22] faced with a 7% servicing cost for its 10-year debt; this was some 3 percentage points higher than the 10-year Portuguese yield and 5 percentage points higher than the 10-year Spanish yield. Future rating upgrades of Greece (triggered, for instance, by accelerating structure reforms) will definitely push down Greek borrowing costs.[23]

Although a deep front 'voluntary' haircut on Greek debt is not on the 'negotiating table', our estimates (in Table 3 for S&P's) suggest that a haircut of as many as 36 percentage points in the debt-to-GDP ratio (that is, from 179.7% in 2016 to 143.7% in 2017) will, *ceteris paribus*, raise Greece's credit rating by only 1 notch ($\approx 36 * 0.0277$; results are similar using the estimates in Table 2 for Moody's and in Table 4 for Fitch, respectively). A speedier and much more realistic (since debt haircut is not on the 'negotiating table') Greek exit from the 'junk status territory' would indeed be triggered by structural reforms (and an improvement in competitiveness). For instance, our estimates (in Table 3 for S&P's) suggest that Greece would witness an upgrade of almost 3 notches[24] by S&P's, if it were to implement structural reforms that would raise its regulatory quality index to the level observed for Portugal.

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[21] See: https://www.esm.europa.eu/press-releases/esm-and-efsf-approve-short-term-debt-relief-measures-greece.

[22] In 2017, the S&P's, Moody's and Fitch credit rating scores for Greece were B-, Caa3, and CCC, respectively. From Table 1, junk (or high credit risk) sovereign bonds carry a credit rating of BB+ or lower for S&P's and Fitch and a credit rating of Ba1 or lower for Moody's.

[23] Gibson et al. (2017) discuss in detail the strong interaction between sovereign ratings, sovereign borrowing costs and bank ratings in the Eurozone area.

[24] We derive 3 notches as $\approx[(0.940-0.397)*5.075]$; 5.075 is the estimated coefficient on regulatory quality and 0.947 and 0.397 refer to the regulatory quality values for Portugal and Greece, respectively.

6. Conclusions

This paper examines the determinants of sovereign credit ratings for the Eurozone countries from 2002 to 2015 in a panel quantile framework which allows the relative significance of the explanatory variables to vary across the quantile distribution of sovereign ratings. Our results are summarised as follows: First, the impact of the unemployment rate, regulatory quality and competitiveness is stronger for low rated countries whereas GDP per capita is a major driver of high rated countries; in other words, the high level of GDP per capita provides a 'safety net' safeguarding (to some extent) against downgrades in the case of high rated countries. Second, a reduction in the current account deficit or an increase in the current account surplus leads to a rating or outlook upgrade for low rated countries which have historically recorded high current account deficits whereas, for countries with strong payment capacity, a higher current account deficit or a lower current account surplus is associated with either higher creditworthiness or positive economic prospects of the economy and consequently a higher sovereign rating. Third, economic policy uncertainty impacts negatively on credit ratings across the quantile distribution; however, the impact is stronger on the lower rated countries. In other words, the creditworthiness of low rated countries takes a much bigger 'hit' than that of high rated countries when European uncertainty is on the rise.

Our model, which allows for differential impact across the rating distribution, could arguably go some way towards shedding some light on how CRAs assign sovereign credit ratings. For instance, our counterfactual analysis suggests the pivotal role that economic policy uncertainty in the Euro area has played in driving down sovereign credit ratings in Eurozone's periphery. We believe that our empirical analysis and results provide valuable information which can potentially be used by a new credit rating agency towards making credit rating decisions if indeed European policymakers decide to set up such an agency in the near future.

What we have not considered in this paper is the possible impact (if any at all) of liquidity injections put forward by the ECB in terms of purchases and holdings of securities for monetary policy purposes from 2009 onwards (see the discussion in Lo Duca et al., 2016) and post-2014 Quantitative Easing support (see e.g. the

discussion in Koijen et al., 2016) on Eurozone's sovereign credit ratings. If, for instance, these types of policies provide a 'signal' that Eurozone's economic recovery is, at best, shaky, CRAs might become more reluctant to proceed with a number of sovereign upgrades. The counter-argument, of course, is that ECB's policies might have safeguarded against deteriorating economic conditions, therefore preventing additional sovereign downgrades over the recent years. We intend to explore these issues in future research.

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Table 1: Linear transformation of sovereign ratings

	Rating Agency				Rating Grades (1-21)
	Fitch	S&P's	Moody's	Outlook	
Highest quality	AAA	AAA	Aaa	Stable	21
				Negative	20.67
				Positive	20.33
	AA+	AA+	Aa1	Stable	20
				Negative	19.67
				Positive	19.33
High quality	AA	AA	Aa2	Stable	19
				Negative	18.67
				Positive	18.33
	AA-	AA-	Aa3	Stable	18
				Negative	17.67
				Positive	17.33
	A+	A+	A1	Stable	17
				Negative	16.67
				Positive	16.33
Strong payment capacity	A	A	A2	Stable	16
				Negative	15.67
				Positive	15.33
	A-	A-	A3	Stable	15
				Negative	14.67
				Positive	14.33
	BBB+	BBB+	Baa1	Stable	14
				Negative	13.67
Adequate payment				Positive	13.33
capacity	BBB	BBB	Baa2	Stable	13
				Negative	12.67
				Positive	12.33
	BBB-	BBB-	Baa3	Stable	12
				Negative	11.67
				Positive	11.33
	BB+	BB+	Ba1	Stable	11
				Negative	10.67
Likely to fullfill				Positive	10.33
obligations, ongoing uncertainty	BB	BB	Ba2	Stable	10
				Negative	9.67
				Positive	9.33
	BB-	BB-	Ba3	Stable	9
				Negative	8.67
				Positive	8.33
	B+	B+	B1	Stable	8
				Negative	7.67
				Positive	7.33
High credit risk	B	B	B2	Stable	7
				Negative	6.67
				Positive	6.33
	B-	B-	B3	Stable	6
				Negative	5.67
				Positive	5.33
	CCC+	CCC+	Caa1	Stable	5
				Negative	4.67
				Positive	4.33
Very high credit risk	CCC	CCC	Caa2	Stable	4
				Negative	3.67
				Positive	3.33
	CCC-	CCC-	Caa3	Stable	3
				Negative	2.66
Non default wih possibility of recovery	CC C	CC	Ca		2.33 2
Default	DDD DD D	SD D	C		1

Table 2: Estimates for Moody's, 2002-2015

Dependent Variable: Moody's rating

	Log GDP per capita		Government Debt		Current Account		Inflation Rate		Unemployment Rate		Regulatory Quality		Competitiveness		Uncertainty		AIC	Pseudo R^2
quantile	coef.	p-val.	coef.	p-val.	coef.	p-val.	coef.	p-val.	coef.	p-val.	coef.	p-val.	coef.	p-val.	coef.	p-val.		
0.05	**-1.1960**	0.000	**-0.0264**	0.000	**0.1159**	0.000	**0.2609**	0.000	**-0.3202**	0.000	**4.3321**	0.000	**-0.0467**	0.000	**-0.0325**	0.000	9.207	0.585
0.10	**-0.6623**	0.000	**-0.0384**	0.000	**0.0604**	0.000	**0.0332**	0.000	**-0.3341**	0.000	**4.3158**	0.000	**-0.0360**	0.000	**-0.0158**	0.000	9.072	0.594
0.15	**0.6975**	0.000	**-0.0370**	0.000	**0.0077**	0.000	**-0.0027**	0.000	**-0.2744**	0.000	**4.1139**	0.000	**-0.0349**	0.000	**-0.0119**	0.000	8.804	0.608
0.20	**3.1277**	0.000	**-0.0387**	0.000	**-0.0508**	0.000	0.0034	0.864	**-0.2400**	0.000	**4.1229**	0.000	**-0.0313**	0.000	**-0.0117**	0.000	8.049	0.627
0.25	**4.6216**	0.000	**-0.0449**	0.000	**-0.0196**	0.014	**-0.0680**	0.000	**-0.1907**	0.000	**3.3931**	0.000	**-0.0329**	0.000	**-0.0175**	0.000	7.426	0.639
0.30	**5.4820**	0.000	**-0.0372**	0.000	**-0.0377**	0.000	0.0410	0.203	**-0.1181**	0.000	**4.1231**	0.000	**-0.0341**	0.000	**-0.0109**	0.000	7.528	0.625
0.35	**4.8628**	0.000	**-0.0412**	0.000	**-0.1542**	0.011	**-0.1530**	0.024	**-0.1286**	0.000	**3.2106**	0.000	**-0.0251**	0.000	**-0.0307**	0.000	7.345	0.575
0.40	**3.3678**	0.000	**-0.0082**	0.000	**-0.0739**	0.001	0.0221	0.576	**-0.2136**	0.000	**4.4561**	0.000	**-0.0484**	0.000	**-0.0136**	0.000	7.884	0.584
0.45	**4.3645**	0.000	0.0089	0.153	**-0.0789**	0.000	-0.0111	0.694	**-0.2083**	0.000	**4.0718**	0.000	**-0.0294**	0.000	**-0.0191**	0.000	7.092	0.533
0.50	**3.7006**	0.000	0.0032	0.337	**-0.0226**	0.000	**-0.1233**	0.000	**-0.2119**	0.000	**2.4526**	0.000	**-0.0156**	0.000	**-0.0140**	0.000	7.505	0.554
0.55	**4.4081**	0.000	**-0.0097**	0.000	**0.0050**	0.029	**-0.0834**	0.000	**-0.2319**	0.000	**1.6651**	0.000	**-0.0325**	0.000	**-0.0158**	0.000	7.621	0.589
0.60	**6.7502**	0.000	**-0.0272**	0.000	**-0.0347**	0.056	0.0363	0.213	**-0.2010**	0.000	**1.9421**	0.000	**-0.0263**	0.000	**-0.0062**	0.001	8.069	0.627
0.65	**6.9493**	0.000	**-0.0168**	0.000	**-0.0641**	0.000	**-0.2221**	0.000	**-0.2727**	0.000	**0.6950**	0.000	0.0036	0.656	**0.0091**	0.070	8.414	0.519
0.70	**8.4967**	0.000	**-0.0246**	0.000	**-0.0411**	0.000	**-0.1600**	0.000	-0.0403	0.163	**0.9713**	0.001	**-0.0100**	0.000	**-0.0042**	0.000	8.736	0.519
0.75	**9.7634**	0.000	**-0.0308**	0.000	**-0.0263**	0.025	**-0.1112**	0.011	0.0133	0.629	0.3437	0.180	**-0.0201**	0.000	**-0.0076**	0.002	8.889	0.495

Notes: Figures in bold indicate significance at the 10% level or lower. AIC is the Akaike Information Criterion.

Table 3: Estimates for S&P's, 2002-2015

Dependent Variable: S&P's rating

	Log GDP per capita		Government Debt		Current Account		Inflation Rate		Unemployment Rate		Regulatory Quality		Competitiveness		Uncertainty		AIC	Pseudo R^2
quantile	coef.	p-val.	coef.	p-val.	coef.	p-val.	coef.	p-val.	coef.	p-val.	coef.	p-val.	coef.	p-val.	coef.	p-val.		
0.05	**-0.1961**	0.000	**-0.0277**	0.000	**0.0565**	0.000	**0.0361**	0.000	**-0.3655**	0.000	**5.0575**	0.000	**-0.0687**	0.000	**-0.0219**	0.000	9.101	0.620
0.10	**2.7722**	0.000	**-0.0316**	0.000	**0.0156**	0.000	**-0.0336**	0.000	**-0.2247**	0.000	**3.3226**	0.000	**-0.0539**	0.000	**-0.0112**	0.000	8.414	0.663
0.15	**4.1889**	0.000	**-0.0398**	0.000	**0.0424**	0.000	**-0.1598**	0.000	**-0.2510**	0.000	**1.8446**	0.000	**-0.0417**	0.000	**-0.0118**	0.000	8.019	0.681
0.20	**4.8046**	0.000	**-0.0293**	0.000	**0.0194**	0.049	**-0.1416**	0.000	**-0.2487**	0.000	**2.7552**	0.000	**-0.0328**	0.000	**-0.0206**	0.000	7.397	0.684
0.25	**3.2558**	0.000	**-0.0237**	0.000	**0.0540**	0.000	**-0.1174**	0.000	**-0.2821**	0.000	**2.6147**	0.000	**-0.0420**	0.000	**-0.0159**	0.000	8.292	0.675
0.30	**4.5407**	0.000	**-0.0277**	0.000	**0.0555**	0.000	**-0.0873**	0.000	**-0.2470**	0.000	**2.4303**	0.000	**-0.0439**	0.000	**-0.0109**	0.000	7.616	0.682
0.35	**5.6193**	0.000	**-0.0402**	0.000	**-0.0202**	0.035	**-0.2705**	0.000	**-0.2713**	0.000	**2.3127**	0.000	**-0.0324**	0.000	**-0.0151**	0.000	6.908	0.683
0.40	**6.2628**	0.000	**-0.0270**	0.000	0.0083	0.303	**-0.1976**	0.000	**-0.2361**	0.000	**1.7445**	0.000	**-0.0275**	0.000	**-0.0129**	0.000	7.490	0.687
0.45	**6.5806**	0.000	**-0.0209**	0.000	**0.0130**	0.003	**-0.1212**	0.000	**-0.2405**	0.000	**1.3283**	0.000	**-0.0275**	0.000	**-0.0066**	0.000	7.834	0.670
0.50	**5.4772**	0.000	**-0.0069**	0.046	-0.0419	0.308	**-0.1020**	0.000	**-0.2703**	0.000	**1.0692**	0.000	-0.0041	0.169	**-0.0153**	0.000	7.345	0.636
0.55	**8.1589**	0.000	**-0.0373**	0.000	**-0.0568**	0.029	**-0.0810**	0.000	**-0.2010**	0.000	**1.6103**	0.000	**-0.0191**	0.000	0.0007	0.810	8.576	0.671
0.60	**8.3574**	0.000	**-0.0200**	0.000	-0.0129	0.315	0.0264	0.686	**-0.1562**	0.000	**0.4308**	0.072	**0.0118**	0.000	**-0.0109**	0.000	8.727	0.645
0.65	**8.8327**	0.000	**-0.0211**	0.000	**-0.0524**	0.001	**-0.3271**	0.000	**-0.2436**	0.000	**1.1058**	0.000	0.0036	0.360	**0.0137**	0.000	8.896	0.567
0.70	**11.1976**	0.000	**-0.0370**	0.000	**-0.0311**	0.007	-0.0352	0.245	**-0.0564**	0.000	-0.2596	0.417	0.0009	0.460	**-0.0085**	0.000	9.133	0.619
0.75	**12.6666**	0.000	**-0.0429**	0.000	-0.0292	0.105	**-0.0962**	0.005	0.0169	0.359	0.1282	0.343	**-0.0061**	0.009	**-0.0064**	0.089	9.316	0.591

Notes: Figures in bold indicate significance at the 10% level or lower. AIC is the Akaike Information Criterion.

Table 4: Estimates for Fitch, 2002-2015

Dependent Variable: Fitch rating

	Log GDP per capita		Government Debt		Current Account		Inflation Rate		Unemployment Rate		Regulatory Quality		Competitiveness		Uncertainty		AIC	Pseudo R^2
quantile	coef.	p-val.	coef.	p-val.	coef.	p-val.	coef.	p-val.	coef.	p-val.	coef.	p-val.	coef.	p-val.	coef.	p-val.		
0.05	**0.8393**	0.000	**-0.0237**	0.000	**0.0960**	0.000	**-0.0463**	0.000	**-0.4446**	0.000	**1.2453**	0.000	**-0.0509**	0.000	**-0.0317**	0.000	9.116	0.577
0.10	**0.7370**	0.000	**-0.0179**	0.000	**0.0765**	0.000	**-0.1005**	0.000	**-0.4457**	0.000	**2.8360**	0.000	**-0.0389**	0.000	**-0.0115**	0.000	8.911	0.633
0.15	**2.3524**	0.000	**-0.0253**	0.000	**0.0583**	0.000	**-0.1070**	0.000	**-0.4223**	0.000	**2.7182**	0.000	**-0.0419**	0.000	**-0.0053**	0.000	8.563	0.651
0.20	**3.4014**	0.000	**-0.0203**	0.000	**0.0433**	0.000	**-0.1092**	0.000	**-0.3287**	0.000	**2.6176**	0.000	**-0.0421**	0.000	**-0.0107**	0.000	8.214	0.663
0.25	**6.5064**	0.000	**-0.0294**	0.000	-0.0045	0.442	**-0.1364**	0.000	**-0.3004**	0.000	**1.6866**	0.000	**-0.0488**	0.000	**-0.0093**	0.000	7.198	0.669
0.30	**4.7267**	0.000	**-0.0554**	0.000	**0.0523**	0.019	**-0.2287**	0.000	**-0.3111**	0.000	**1.3404**	0.000	**-0.0381**	0.000	0.0040	0.441	7.729	0.634
0.35	**5.6993**	0.000	**-0.0074**	0.000	**-0.0179**	0.006	**-0.0578**	0.000	**-0.2201**	0.000	**2.2305**	0.000	**-0.0370**	0.000	**-0.0118**	0.000	7.267	0.635
0.40	**6.5795**	0.000	**-0.0120**	0.000	**-0.0386**	0.000	**-0.1348**	0.000	**-0.1908**	0.000	**2.3079**	0.000	**-0.0388**	0.000	**-0.0152**	0.000	7.794	0.633
0.45	**6.1085**	0.000	**-0.0122**	0.000	**-0.0202**	0.000	**-0.0288**	0.035	**-0.2246**	0.000	**2.7174**	0.000	**-0.0402**	0.000	**-0.0098**	0.000	7.632	0.647
0.50	**5.4025**	0.000	**-0.0128**	0.000	-0.0241	0.144	**-0.1071**	0.000	**-0.2603**	0.000	**2.5984**	0.000	**-0.0315**	0.000	0.0049	0.201	7.495	0.630
0.55	**5.2451**	0.000	**-0.0092**	0.001	0.0082	0.309	-0.0148	0.259	**-0.2261**	0.000	**2.3528**	0.000	**-0.0221**	0.000	**-0.0077**	0.000	7.297	0.660
0.60	**9.3137**	0.000	**-0.0249**	0.000	**-0.0217**	0.000	**-0.0429**	0.000	**-0.1646**	0.000	**0.1749**	0.006	**-0.0177**	0.000	**-0.0010**	0.097	8.789	0.632
0.65	**10.1534**	0.000	**-0.0262**	0.000	**-0.0306**	0.000	**-0.0698**	0.000	**-0.1308**	0.000	**0.6065**	0.000	**-0.0091**	0.000	0.0009	0.667	9.021	0.616
0.70	**9.1753**	0.000	**-0.0292**	0.000	**-0.0575**	0.000	**-0.1863**	0.000	**-0.0706**	0.000	**0.8319**	0.000	**-0.0133**	0.000	0.0006	0.832	8.843	0.595
0.75	**11.8393**	0.000	**-0.0379**	0.000	**-0.0449**	0.000	**-0.1528**	0.000	-0.0069	0.193	**-0.7012**	0.000	**-0.0181**	0.000	0.0025	0.132	9.182	0.498

Notes: Figures in bold indicate significance at the 10% level or lower. AIC is the Akaike Information Criterion.

Table 5: Impact of European policy uncertainty on ratings for Moody's

Year	Greece	Ireland	Italy	Portugal	Spain	Cyprus
2008	-0.535	-0.212	-0.442	-0.442	-0.212	-0.392
2009	-0.314	-0.112	-0.283	-0.250	-0.135	-0.250
2010	-1.037	-0.780	-1.037	-0.893	-0.410	-0.918
2011	-3.025	-1.471	-1.632	-3.025	-2.860	-1.471
2012	-3.521	-1.712	-1.712	-3.521	-1.712	-3.521
2013	-2.707	-1.316	-1.316	-2.707	-1.316	-2.707
2014	-1.453	-0.532	-0.532	-0.707	-0.532	-1.453
2015	-2.010	-0.736	-0.736	-0.977	-0.736	-2.010

Notes: Table 5 illustrates the effects of European policy uncertainty on credit ratings by using estimates of our credit rating model under uncertainty to infer what credit ratings would have been had uncertainty remained at its 2002-2007 average value. To do this, we construct the difference between the fitted values of the estimates of credit rating model (1) for Moody's (as reported in Table 2) and the fitted values of the counterfactual model (1) which sets the post 2007 values of the uncertainty variable equal to its 2002-2007 average.

Table 6: Impact of European policy uncertainty on ratings for S&P's

Year	Greece	Ireland	Italy	Portugal	Spain	Cyprus
2008	-0.4227	-0.1800	-0.1855	-0.4280	-0.1800	-0.1855
2009	-0.2108	0.0128	-0.1187	-0.2317	-0.1954	-0.1187
2010	-0.7379	-0.7151	-0.4352	-1.3492	0.0469	-0.7151
2011	-2.0431	-1.9144	-1.0146	-1.0470	-1.4244	-1.0470
2012	-2.3775	-1.2761	-1.2184	-2.3775	-1.2184	-2.3775
2013	-1.8281	-1.7130	-0.9369	-1.8281	-0.9369	-1.8281
2014	-0.9815	-0.6757	-0.5030	-0.9815	-0.5268	-0.9815
2015	-1.3576	-0.4103	-0.6957	-0.6957	-0.7287	-1.3576

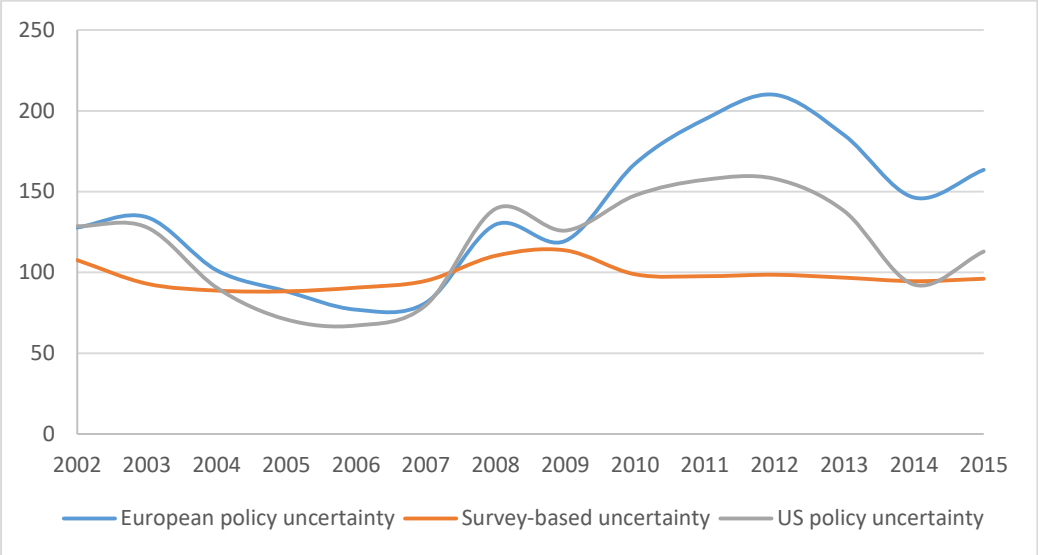
Notes: Table 6 illustrates the effects of European policy uncertainty on credit ratings by using estimates of our credit rating model under uncertainty to infer what credit ratings would have been had uncertainty remained at its 2002-2007 average value. To do this, we construct the difference between the fitted values of the estimates of credit rating model (1) for S&P's (as reported in Table 3) and the fitted values of the counterfactual model (1) which sets the post 2007 values of the uncertainty variable equal to its 2002-2007 average.

Table 7: Impact of European policy uncertainty on ratings for Fitch

Year	Greece	Ireland	Italy	Portugal	Spain	Cyprus
2008	0.1132	0.0687	0.1382	-0.2166	0.0687	0.1382
2009	-0.0945	0.0884	0.0884	0.0884	0.0439	0.0884
2010	-0.7522	-0.7007	0.3240	-0.7734	0.0596	0.3240
2011	-2.9516	-0.4918	-1.0974	-2.9516	-0.9145	-1.0673
2012	-3.4349	-0.5723	-1.1569	-3.4349	-1.2420	-3.4349
2013	-2.6411	-0.8896	-0.4401	-2.6411	-0.9550	-2.6411
2014	-1.4179	-0.4160	-0.4776	-0.5127	-0.4776	-1.4179
2015	-1.9613	-0.5754	-0.6606	-0.7092	-0.6606	-1.9613

Notes: Table 7 illustrates the effects of European policy uncertainty on credit ratings by using estimates of our credit rating model under uncertainty to infer what credit ratings would have been had uncertainty remained at its 2002-2007 average value. To do this, we construct the difference between the fitted values of the estimates of credit rating model (1) for Fitch (as reported in Table 4) and the fitted values of the counterfactual model (1) which sets the post 2007 values of the uncertainty variable equal to its 2002-2007 average.

Figure 1: Uncertainty measures



Note: The survey-based uncertainty are from Girardi and Reuter (2017) and the other two from Baker et al (2015).

Figure 2: Impact of regulatory quality on ratings for Moody's: Quantile panel model versus standard panel model with fixed individual and time effects

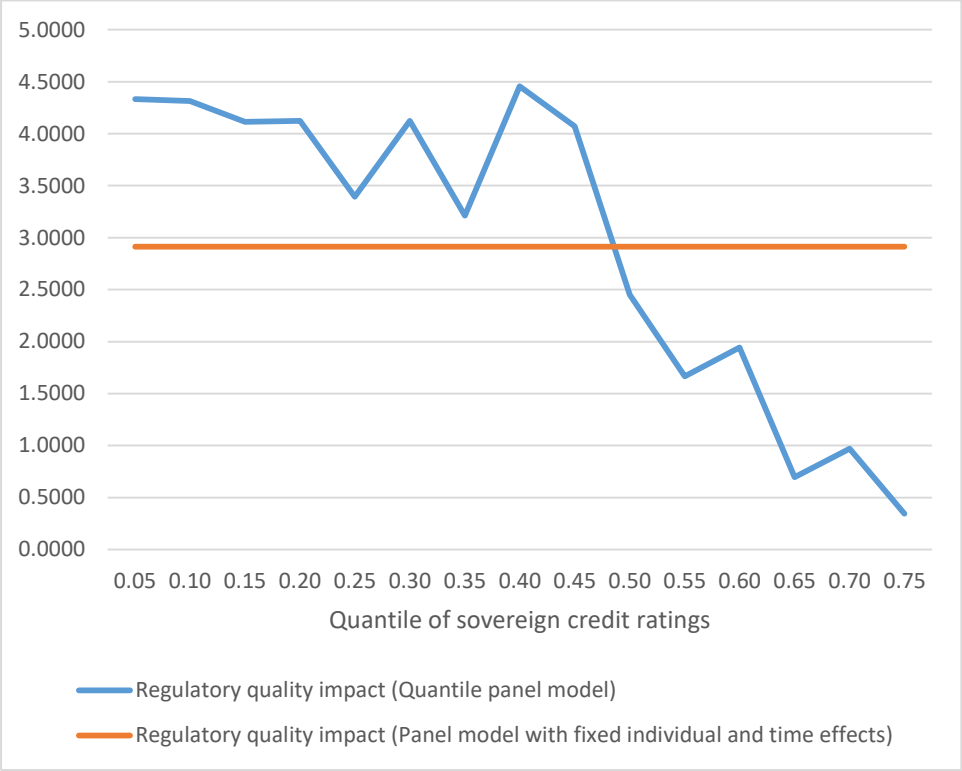
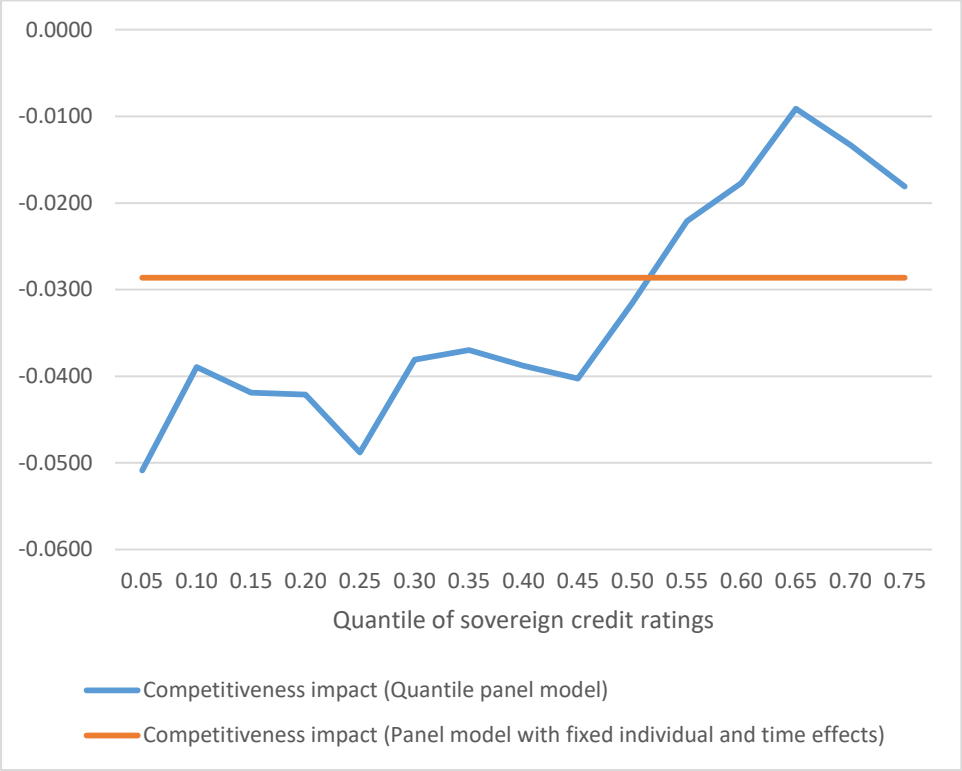


Figure 3: Impact of competitiveness on ratings for Fitch: Quantile panel model versus standard panel model with fixed individual and time effects



APPENDIX

Table A.1: Data definitions and sources

Data Definitions

Variable Name	Definition	Source
Fitch rating	Sovereign rating attributed at 31st December of each year	Fitch
S&P's rating	Sovereign rating attributed at 31st December of each year	S&P's
Moody's rating	Sovereign rating attributed at 31st December of each year	Moody's
GDP per capita	Log GDP per capita, US dollars, constant 2005 prices	World Bank
Government debt	General government gross dedt as a percent of GDP	IMF WEO
Current account balance	Current account balance as a percent of GDP	IMF WEO
Unemployment Rate	Unemployment rate as a percent of total labor force	IMF WEO
Inflation Rate	Annual growth rate of consumer price index	IMF WEO
Regulatory Quality	Aggregate government indicator	World Bank
Competitiveness Indicator	Harmonised competitiveness indicator based on unit labour costs indices for the total economy	ECB
European Policy Uncertainty	Eurozone countries average	www.policyuncertainty.com

Table A.2: Estimates for Moody's with first order lags as instrumental variables, 2002-2015

Dependent Variable: Moody's rating

	Log GDP per capita		Government Debt		Current Account		Inflation Rate		Unemployment Rate		Regulatory Quality		Competitiveness		Uncertainty		AIC	Pseudo R^2
quantile	coef.	p-val.	coef.	p-val.	coef.	p-val.	coef.	p-val.	coef.	p-val.	coef.	p-val.	coef.	p-val.	coef.	p-val.		
0.05	**-0.7718**	0.000	**-0.0272**	0.000	**0.1196**	0.000	**0.2586**	0.000	**-0.3085**	0.000	**4.2377**	0.000	**-0.0476**	0.000	**-0.0307**	0.000	9.150	0.593
0.10	**-0.5901**	0.000	**-0.0390**	0.000	**0.0580**	0.000	**0.0355**	0.000	**-0.3339**	0.000	**4.2815**	0.000	**-0.0361**	0.000	**-0.0158**	0.000	9.064	0.594
0.15	**0.8942**	0.000	**-0.0396**	0.000	**0.0158**	0.000	**-0.0143**	0.000	**-0.2801**	0.000	**3.7907**	0.000	**-0.0376**	0.000	**-0.0108**	0.000	8.801	0.609
0.20	**2.7490**	0.000	**-0.0412**	0.000	**0.0030**	0.000	**-0.0328**	0.000	**-0.2265**	0.000	**3.7852**	0.000	**-0.0367**	0.000	**-0.0104**	0.000	8.288	0.626
0.25	**5.8908**	0.000	**-0.0456**	0.000	**-0.0179**	0.008	**-0.1727**	0.000	**-0.1720**	0.000	**2.6823**	0.000	**-0.0199**	0.000	**-0.0165**	0.000	7.401	0.638
0.30	**4.6627**	0.000	**-0.0304**	0.000	**-0.1361**	0.000	**-0.1292**	0.000	**-0.0936**	0.000	**6.3281**	0.000	**-0.0177**	0.000	**-0.0087**	0.000	7.774	0.575
0.35	**4.2664**	0.000	**-0.0223**	0.000	**-0.0379**	0.000	-0.0257	0.283	**-0.1272**	0.000	**4.0622**	0.000	**-0.0298**	0.000	**-0.0172**	0.000	7.126	0.626
0.40	**3.9472**	0.000	**-0.0056**	0.015	**-0.0209**	0.024	0.0234	0.454	**-0.2066**	0.000	**3.2522**	0.000	**-0.0379**	0.000	**-0.0146**	0.000	7.578	0.585
0.45	**3.0212**	0.000	**-0.0035**	0.014	**-0.0707**	0.019	**0.0439**	0.018	**-0.2055**	0.000	**4.9529**	0.000	**-0.0403**	0.000	**-0.0176**	0.000	7.904	0.583
0.50	**2.7157**	0.001	0.0074	0.295	**-0.0648**	0.000	-0.0743	0.324	**-0.2392**	0.000	**3.2915**	0.000	**-0.0093**	0.038	**-0.0106**	0.000	7.792	0.554
0.55	**8.1312**	0.000	**-0.0318**	0.000	-0.0003	0.978	**-0.1885**	0.000	**-0.0999**	0.000	-0.0333	0.915	**-0.0224**	0.000	**-0.0122**	0.000	8.358	0.570
0.60	**5.4859**	0.000	**-0.0111**	0.030	-0.0309	0.159	**-0.1036**	0.025	**-0.1875**	0.000	**1.5205**	0.001	**-0.0290**	0.000	**-0.0091**	0.000	7.258	0.568
0.65	**8.1615**	0.000	**-0.0217**	0.000	**-0.0377**	0.000	**-0.1567**	0.012	**-0.0658**	0.000	**0.6343**	0.000	**-0.0157**	0.000	-0.0037	0.307	8.608	0.509
0.70	**9.4343**	0.000	**-0.0264**	0.000	**-0.0342**	0.000	**-0.0781**	0.021	**-0.0191**	0.015	0.2237	0.299	**-0.0193**	0.000	**-0.0052**	0.000	8.841	0.496
0.75	**10.5101**	0.000	**-0.0357**	0.000	**-0.0379**	0.003	**-0.1316**	0.000	0.0251	0.113	0.1774	0.398	**-0.0222**	0.000	**-0.0087**	0.001	8.983	0.502

Notes: Figures in bold indicate significance at the 10% level or lower. AIC is the Akaike Information Criterion.

Table A.3: Estimates for S&P's with first order lags as instrumental variables, 2002-2015

Dependent Variable: S&P's rating

	Log GDP per capita		Government Debt		Current Account		Inflation Rate		Unemployment Rate		Regulatory Quality		Competitiveness		Uncertainty		AIC	Pseudo R^2
quantile	coef.	p-val.	coef.	p-val.	coef.	p-val.	coef.	p-val.	coef.	p-val.	coef.	p-val.	coef.	p-val.	coef.	p-val.		
0.05	**0.2561**	0.223	**-0.0332**	0.000	**0.0996**	0.000	**0.1097**	0.000	**-0.3598**	0.000	**5.0597**	0.000	**-0.0704**	0.000	**-0.0224**	0.000	9.049	0.629
0.10	**3.1985**	0.000	**-0.0336**	0.000	**0.0123**	0.000	**-0.0188**	0.000	**-0.2321**	0.000	**3.1895**	0.000	**-0.0540**	0.000	**-0.0091**	0.000	8.277	0.666
0.15	**4.1839**	0.000	**-0.0403**	0.000	**0.0425**	0.000	**-0.1568**	0.000	**-0.2497**	0.000	**1.8321**	0.000	**-0.0425**	0.000	**-0.0128**	0.000	8.048	0.680
0.20	**3.8653**	0.000	**-0.0317**	0.000	**0.0616**	0.000	**-0.0849**	0.006	**-0.2305**	0.000	**2.4660**	0.000	**-0.0412**	0.000	**-0.0145**	0.000	8.034	0.684
0.25	**5.2135**	0.000	**-0.0386**	0.000	**0.0713**	0.002	**-0.1237**	0.000	**-0.2467**	0.000	**1.7475**	0.000	**-0.0456**	0.000	**-0.0167**	0.000	7.554	0.685
0.30	**4.5990**	0.000	**-0.0285**	0.000	**0.0421**	0.001	**-0.0986**	0.000	**-0.2503**	0.000	**2.4420**	0.000	**-0.0466**	0.000	**-0.0124**	0.000	7.663	0.682
0.35	**5.0184**	0.000	**-0.0234**	0.000	**0.0311**	0.000	**-0.1279**	0.000	**-0.1890**	0.000	**2.5447**	0.000	**-0.0393**	0.000	**-0.0154**	0.000	7.068	0.679
0.40	**7.0828**	0.000	**-0.0235**	0.000	-0.0323	0.452	**-0.2229**	0.000	**-0.2458**	0.000	**1.5197**	0.000	**-0.0227**	0.009	**-0.0113**	0.000	8.059	0.674
0.45	**5.8402**	0.000	**-0.0189**	0.000	**-0.0128**	0.593	**-0.1645**	0.016	**-0.2379**	0.000	**2.0647**	0.000	**-0.0289**	0.000	**-0.0088**	0.000	7.406	0.672
0.50	**6.6124**	0.000	**-0.0222**	0.000	-0.0113	0.212	**-0.2705**	0.000	**-0.2465**	0.000	**1.5298**	0.000	**-0.0210**	0.000	**-0.0053**	0.025	7.938	0.666
0.55	**5.1502**	0.000	**-0.0213**	0.000	**-0.0181**	0.029	0.0020	0.927	**-0.2167**	0.000	**3.6500**	0.000	**-0.0184**	0.000	-0.0004	0.863	7.684	0.664
0.60	**7.9678**	0.000	**-0.0281**	0.000	**0.0271**	0.007	-0.0017	0.957	**-0.1486**	0.000	-0.0360	0.907	**-0.0041**	0.081	**-0.0056**	0.000	8.517	0.661
0.65	**8.2714**	0.000	**-0.0321**	0.000	0.0111	0.416	**-0.2254**	0.007	**-0.1171**	0.000	**0.8732**	0.001	**-0.0254**	0.000	-0.0067	0.289	8.490	0.654
0.70	**10.5796**	0.000	**-0.0422**	0.000	**-0.0138**	0.002	**-0.1360**	0.000	**-0.0601**	0.000	**0.2215**	0.092	**-0.0039**	0.009	**-0.0071**	0.007	9.033	0.640
0.75	**11.5694**	0.000	**-0.0378**	0.000	-0.0127	0.122	**-0.1121**	0.000	**-0.0254**	0.000	**0.3859**	0.054	-0.0028	0.161	-0.0048	0.383	9.209	0.605

Notes: Figures in bold indicate significance at the 10% level or lower. AIC is the Akaike Information Criterion.

Table A.4: Estimates for Fitch with first order lags as instrumental variables, 2002-2015

Dependent Variable: Fitch rating

	Log GDP per capita		Government Debt		Current Account		Inflation Rate		Unemployment Rate		Regulatory Quality		Competitiveness		Uncertainty		AIC	Pseudo R^2
quantile	coef.	p-val.	coef.	p-val.	coef.	p-val.	coef.	p-val.	coef.	p-val.	coef.	p-val.	coef.	p-val.	coef.	p-val.		
0.05	**0.5366**	0.000	**-0.0204**	0.000	**0.1048**	0.000	**-0.0159**	0.000	**-0.4264**	0.000	**1.6633**	0.000	**-0.0492**	0.000	**-0.0297**	0.000	9.113	0.587
0.10	**-0.4317**	0.000	**-0.0093**	0.000	**0.0646**	0.000	**-0.1265**	0.000	**-0.4788**	0.000	**3.5251**	0.000	**-0.0380**	0.000	**-0.0052**	0.000	9.028	0.611
0.15	**1.9404**	0.000	**-0.0240**	0.000	**0.0662**	0.000	**-0.1173**	0.000	**-0.4323**	0.000	**2.6932**	0.000	**-0.0421**	0.000	**-0.0042**	0.000	8.662	0.645
0.20	**3.7112**	0.000	**-0.0213**	0.000	**0.0246**	0.000	**-0.1000**	0.000	**-0.3350**	0.000	**2.6471**	0.000	**-0.0437**	0.000	**-0.0091**	0.000	8.086	0.663
0.25	**4.4816**	0.000	**-0.0185**	0.000	-0.0020	0.756	**-0.1843**	0.000	**-0.3376**	0.000	**2.3379**	0.000	**-0.0379**	0.000	**-0.0095**	0.000	7.643	0.664
0.30	**4.4702**	0.000	-0.0026	0.245	**-0.0674**	0.000	**-0.1153**	0.001	**-0.2963**	0.000	**3.8467**	0.000	**-0.0235**	0.000	**-0.0046**	0.000	6.999	0.633
0.35	**6.3135**	0.000	-0.0052	0.112	-0.0613	0.287	**-0.0742**	0.047	**-0.2090**	0.000	**2.7420**	0.000	**-0.0297**	0.005	**-0.0107**	0.000	7.962	0.625
0.40	**6.5421**	0.000	**-0.0082**	0.001	-0.0443	0.164	-0.1001	0.131	**-0.2181**	0.000	**2.3106**	0.000	**-0.0397**	0.000	**-0.0154**	0.000	7.765	0.626
0.45	**5.9594**	0.000	**-0.0117**	0.000	-0.0195	0.146	**-0.1031**	0.063	**-0.2269**	0.000	**2.6819**	0.000	**-0.0372**	0.000	-0.0039	0.284	7.676	0.637
0.50	**5.9069**	0.000	**-0.0177**	0.000	**-0.0405**	0.000	**-0.2021**	0.000	**-0.2611**	0.000	**2.1313**	0.000	**-0.0374**	0.000	**0.0053**	0.000	7.589	0.627
0.55	**7.3734**	0.000	**-0.0133**	0.000	**-0.0199**	0.000	**-0.0637**	0.000	**-0.2130**	0.000	**1.8956**	0.000	**-0.0221**	0.000	**-0.0048**	0.000	8.382	0.647
0.60	**6.1613**	0.000	**-0.0178**	0.000	**0.0217**	0.000	**-0.1767**	0.000	**-0.2968**	0.000	**0.3757**	0.000	**0.0073**	0.012	**-0.0087**	0.000	7.809	0.665
0.65	**7.9307**	0.000	**-0.0205**	0.000	-0.0029	0.756	**-0.0691**	0.002	**-0.2220**	0.000	**0.9636**	0.000	**-0.0079**	0.013	**0.0073**	0.010	8.627	0.623
0.70	**9.5834**	0.000	**-0.0344**	0.000	**-0.0781**	0.000	**-0.1846**	0.000	**-0.0804**	0.000	0.1674	0.263	**-0.0190**	0.000	**-0.0055**	0.013	8.806	0.625
0.75	**11.6596**	0.000	**-0.0355**	0.000	**-0.0642**	0.000	**-0.1174**	0.008	-0.0070	0.426	-0.1257	0.591	**-0.0129**	0.000	-0.0025	0.476	9.184	0.566

Notes: Figures in bold indicate significance at the 10% level or lower. AIC is the Akaike Information Criterion.

Table A.5: Estimates for Moody's using the US policy uncertainty index, 2002-2015

Dependent Variable: Moody's rating

	Log GDP per capita		Government Debt		Current Account		Inflation Rate		Unemployment Rate		Regulatory Quality		Competitiveness		US Uncertainty		AIC	Pseudo R^2
quantile	coef.	p-val.	coef.	p-val.	coef.	p-val.	coef.	p-val.	coef.	p-val.	coef.	p-val.	coef.	p-val.	coef.	p-val.		
0.05	**-1.0811**	0.000	**-0.0463**	0.000	**0.0798**	0.000	**0.1869**	0.000	**-0.3495**	0.000	**4.2204**	0.000	**-0.0390**	0.000	**-0.0105**	0.000	9.125	0.553
0.10	**-0.0365**	0.000	**-0.0510**	0.000	**0.0451**	0.000	**0.0346**	0.000	**-0.3460**	0.000	**3.5093**	0.000	**-0.0454**	0.000	**-0.0090**	0.000	9.039	0.570
0.15	**2.4221**	0.000	**-0.0460**	0.000	**-0.0298**	0.000	**-0.0239**	0.000	**-0.2643**	0.000	**3.6139**	0.000	**-0.0364**	0.000	**-0.0011**	0.000	8.360	0.602
0.20	**2.1861**	0.000	**-0.0416**	0.000	**-0.0049**	0.000	**0.0104**	0.000	**-0.2914**	0.000	**4.0044**	0.000	**-0.0434**	0.000	**-0.0050**	0.000	8.476	0.608
0.25	**2.8051**	0.000	**-0.0318**	0.000	**-0.0276**	0.000	-0.0144	0.324	**-0.2250**	0.000	**4.3131**	0.000	**-0.0399**	0.000	**-0.0102**	0.000	8.166	0.610
0.30	**4.2157**	0.000	**-0.0295**	0.000	**-0.0348**	0.003	**0.0851**	0.001	**-0.1798**	0.000	**5.0614**	0.000	**-0.0479**	0.000	0.0032	0.335	7.060	0.588
0.35	**3.8584**	0.000	**-0.0245**	0.000	**-0.0717**	0.000	0.0248	0.116	**-0.1511**	0.000	**4.7225**	0.000	**-0.0504**	0.000	**-0.0128**	0.000	7.579	0.586
0.40	**4.2968**	0.000	**-0.0250**	0.000	**-0.0368**	0.000	**-0.0411**	0.006	**-0.1663**	0.000	**3.7575**	0.000	**-0.0468**	0.000	-0.0013	0.569	7.228	0.586
0.45	**4.5009**	0.000	**-0.0082**	0.001	**-0.0256**	0.001	-0.0305	0.220	**-0.2563**	0.000	**3.5760**	0.000	**-0.0272**	0.000	**-0.0097**	0.001	7.050	0.577
0.50	**6.4926**	0.000	**-0.0153**	0.000	**-0.0811**	0.000	**-0.0845**	0.000	**-0.1773**	0.000	**1.9668**	0.000	**-0.0326**	0.000	**0.0087**	0.009	8.152	0.533
0.55	**6.7314**	0.000	**-0.0196**	0.000	-0.0078	0.120	**-0.0476**	0.000	**-0.1232**	0.000	**1.0435**	0.000	**-0.0358**	0.000	-0.0034	0.189	7.994	0.527
0.60	**5.9102**	0.000	**-0.0152**	0.000	**0.0328**	0.000	0.0019	0.842	**-0.2000**	0.000	**0.9797**	0.000	**-0.0174**	0.000	**-0.0127**	0.000	7.585	0.569
0.65	**7.5368**	0.000	**-0.0163**	0.001	-0.0560	0.363	-0.0246	0.267	**-0.0631**	0.000	0.8085	0.148	**-0.0128**	0.050	-0.0054	0.407	8.510	0.516
0.70	**8.2166**	0.000	**-0.0201**	0.000	**-0.0393**	0.000	**-0.1358**	0.000	**-0.0800**	0.000	**0.4679**	0.005	**-0.0192**	0.000	-0.0009	0.569	8.612	0.486
0.75	**9.5034**	0.000	**-0.0257**	0.000	**-0.0445**	0.000	**-0.1482**	0.000	-0.0332	0.463	**0.1742**	0.012	**-0.0156**	0.000	0.0140	0.174	8.951	0.420

Notes: Figures in bold indicate significance at the 10% level or lower. AIC is the Akaike Information Criterion.

Table A.6: Estimates for S&P's using the US policy uncertainty index, 2002-2015

Dependent Variable: S&P's rating

	Log GDP per capita		Government Debt		Current Account		Inflation Rate		Unemployment Rate		Regulatory Quality		Competitiveness		US Uncertainty		AIC	Pseudo R^2
quantile	coef.	p-val.	coef.	p-val.	coef.	p-val.	coef.	p-val.	coef.	p-val.	coef.	p-val.	coef.	p-val.	coef.	p-val.		
0.05	**1.0733**	0.000	**-0.0455**	0.000	**0.0714**	0.000	**0.0970**	0.000	**-0.3025**	0.000	**4.1584**	0.000	**-0.0764**	0.000	**-0.0198**	0.000	8.965	0.615
0.10	**4.1456**	0.000	**-0.0398**	0.000	-0.0020	0.453	**-0.1039**	0.000	**-0.2420**	0.000	**2.2753**	0.000	**-0.0398**	0.000	0.0008	0.849	7.707	0.668
0.15	**7.3733**	0.000	**-0.0542**	0.000	**-0.0238**	0.034	**-0.1443**	0.000	**-0.1919**	0.000	**0.9407**	0.000	**-0.0364**	0.000	-0.0019	0.375	7.971	0.672
0.20	**4.3276**	0.000	**-0.0414**	0.000	**0.0767**	0.000	**-0.1416**	0.000	**-0.3205**	0.000	**2.6185**	0.000	**-0.0213**	0.000	**-0.0251**	0.000	7.819	0.658
0.25	**3.7672**	0.000	**-0.0248**	0.000	**0.0519**	0.000	**-0.0537**	0.000	**-0.2790**	0.000	**3.0710**	0.000	**-0.0452**	0.000	**-0.0125**	0.000	7.985	0.665
0.30	**5.3187**	0.000	**-0.0250**	0.000	**0.0143**	0.022	-0.0288	0.118	**-0.1949**	0.000	**3.5621**	0.000	**-0.0434**	0.000	-0.0016	0.595	7.281	0.660
0.35	**4.4419**	0.000	**-0.0306**	0.000	**-0.0248**	0.013	**-0.2510**	0.000	**-0.2719**	0.000	**2.8031**	0.000	**-0.0437**	0.000	**-0.0065**	0.000	7.605	0.666
0.40	**5.3021**	0.000	**-0.0213**	0.000	**0.0171**	0.006	**-0.1674**	0.000	**-0.2376**	0.000	**2.1254**	0.000	**-0.0342**	0.000	-0.0049	0.159	6.948	0.661
0.45	**7.2741**	0.000	**-0.0229**	0.000	**-0.0190**	0.079	**-0.1977**	0.000	**-0.2624**	0.000	**1.9839**	0.000	**-0.0313**	0.000	**-0.0075**	0.001	8.166	0.658
0.50	**5.8615**	0.000	**-0.0177**	0.000	0.0046	0.840	**-0.0878**	0.000	**-0.2357**	0.000	**2.3395**	0.000	-0.0001	0.991	-0.0002	0.918	8.089	0.666
0.55	**7.4878**	0.000	**-0.0125**	0.006	-0.0181	0.487	**-0.1858**	0.000	**-0.2607**	0.000	**1.8494**	0.000	**-0.0280**	0.000	**-0.0128**	0.024	8.271	0.624
0.60	**10.7138**	0.000	**-0.0381**	0.000	**-0.0661**	0.046	**-0.0819**	0.011	**-0.1080**	0.000	**0.6225**	0.000	**0.0086**	0.001	**-0.0283**	0.003	9.038	0.610
0.65	**9.8143**	0.000	**-0.0343**	0.000	**-0.0123**	0.000	**-0.1153**	0.013	**-0.0898**	0.000	**0.9291**	0.000	**-0.0075**	0.002	-0.0048	0.160	8.953	0.639
0.70	**10.7290**	0.000	**-0.0310**	0.000	**-0.0453**	0.000	**-0.2093**	0.000	**-0.0967**	0.000	0.4517	0.229	0.0012	0.819	**-0.0046**	0.082	9.105	0.610
0.75	**11.3388**	0.000	**-0.0399**	0.000	-0.0016	0.873	**-0.0665**	0.000	-0.0346	0.212	**0.3835**	0.026	**-0.0056**	0.009	-0.0114	0.331	9.147	0.614

Notes: Figures in bold indicate significance at the 10% level or lower. AIC is the Akaike Information Criterion.

Table A.7: Estimates for Fitch using the US policy uncertainty index, 2002-2015

Dependent Variable: Fitch rating

	Log GDP per capita		Government Debt		Current Account		Inflation Rate		Unemployment Rate		Regulatory Quality		Competitiveness		US Uncertainty		AIC	Pseudo R^2
quantile	coef.	p-val.	coef.	p-val.	coef.	p-val.	coef.	p-val.	coef.	p-val.	coef.	p-val.	coef.	p-val.	coef.	p-val.		
0.05	**1.6295**	0.000	**-0.0408**	0.000	**0.0589**	0.000	**-0.2168**	0.000	**-0.4458**	0.000	**1.1758**	0.000	**-0.0329**	0.000	**-0.0126**	0.000	8.871	0.603
0.10	**1.6581**	0.000	**-0.0250**	0.000	**0.0282**	0.000	**-0.2082**	0.000	**-0.4687**	0.000	**2.6636**	0.000	**-0.0468**	0.000	**-0.0029**	0.000	8.766	0.631
0.15	**1.9947**	0.000	**-0.0266**	0.000	**0.0478**	0.000	**-0.1543**	0.000	**-0.4698**	0.000	**2.7098**	0.000	**-0.0367**	0.000	**0.0032**	0.000	8.595	0.638
0.20	**2.9458**	0.000	**-0.0229**	0.000	**0.0318**	0.000	**-0.1051**	0.000	**-0.3810**	0.000	**3.0963**	0.000	**-0.0410**	0.000	**-0.0056**	0.000	8.305	0.653
0.25	**4.4844**	0.000	**-0.0155**	0.000	**-0.0428**	0.007	**-0.1952**	0.000	**-0.3602**	0.000	**2.8791**	0.000	**-0.0391**	0.000	**-0.0129**	0.009	7.594	0.644
0.30	**3.0192**	0.000	**-0.0124**	0.000	**0.0251**	0.000	**-0.0799**	0.000	**-0.3332**	0.000	**3.3293**	0.000	**-0.0371**	0.000	**-0.0040**	0.000	8.100	0.647
0.35	**4.5063**	0.000	**-0.0224**	0.000	-0.0132	0.727	**-0.0882**	0.000	**-0.1951**	0.000	**3.5161**	0.000	**-0.0263**	0.003	**-0.0115**	0.000	6.913	0.655
0.40	**6.3075**	0.000	**-0.0125**	0.000	**-0.0371**	0.000	**-0.1339**	0.000	**-0.1951**	0.000	**2.4441**	0.000	**-0.0405**	0.000	-0.0037	0.385	7.840	0.617
0.45	**6.6617**	0.000	**-0.0101**	0.000	**-0.0317**	0.000	**-0.0819**	0.000	**-0.2160**	0.000	**2.9831**	0.000	**-0.0413**	0.000	**-0.0104**	0.000	8.010	0.619
0.50	**5.8961**	0.000	**-0.0154**	0.000	-0.0149	0.280	**-0.1328**	0.000	**-0.2610**	0.000	**2.2834**	0.000	**-0.0234**	0.000	-0.0002	0.951	7.761	0.655
0.55	**8.9905**	0.000	**-0.0320**	0.000	-0.0097	0.399	**-0.1322**	0.000	**-0.2261**	0.000	0.2419	0.682	**-0.0257**	0.000	**-0.0029**	0.068	8.670	0.660
0.60	**9.4244**	0.000	**-0.0222**	0.000	**-0.0320**	0.000	-0.0241	0.223	**-0.2069**	0.000	**0.1083**	0.063	**-0.0037**	0.068	0.0002	0.484	8.873	0.633
0.65	**9.9326**	0.000	**-0.0195**	0.000	**-0.0603**	0.000	**-0.1353**	0.000	**-0.1377**	0.000	**0.8549**	0.000	**-0.0086**	0.001	**-0.0015**	0.090	8.989	0.604
0.70	**10.7658**	0.000	**-0.0315**	0.000	**-0.0450**	0.000	**-0.1552**	0.000	**-0.0706**	0.000	**0.8198**	0.000	**-0.0064**	0.000	0.0006	0.513	9.121	0.598
0.75	**12.0175**	0.000	**-0.0344**	0.000	**-0.0866**	0.000	**-0.1331**	0.000	0.0101	0.514	0.2083	0.143	**-0.0120**	0.000	-0.0014	0.787	9.253	0.545

Notes: Figures in bold indicate significance at the 10% level or lower. AIC is the Akaike Information Criterion.

Figure A.1: Mapping of sovereign credit ratings to quantile distribution for Moody's

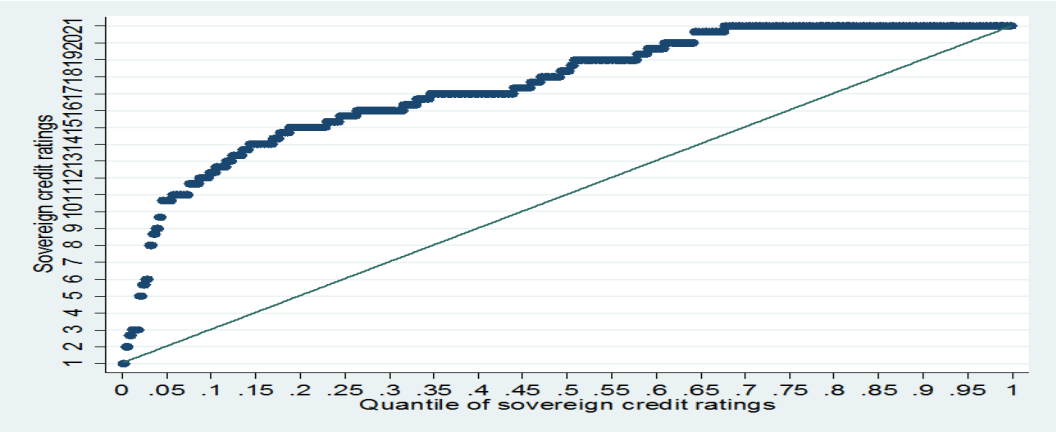


Figure A.2: Mapping of sovereign credit ratings to quantile distribution for S&P's

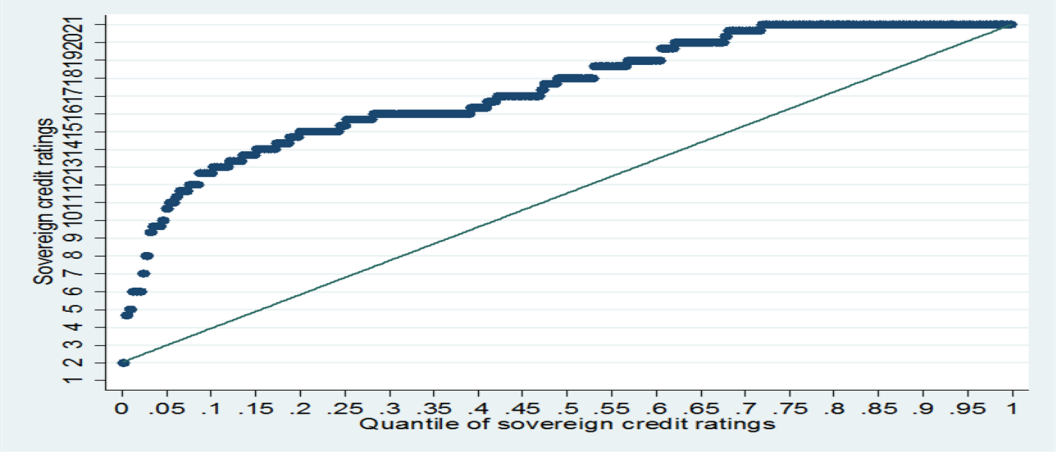


Figure A.3: Mapping of sovereign credit ratings to quantile distribution for Fitch