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A sovereign risk index for the Eurozone based on stochastic dominance

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ABSTRACT

We propose a new method to assess sovereign risk in Eurozone countries using an approach that relies on consistent tests for stochastic dominance efficiency. The test statistics and the estimators are computed using mixed integer programming methods. Our analysis is based on macroeconomic fundamentals and their importance in accounting for sovereign risk. The results suggest that net international investment position/GDP and public debt/GDP are the main contributors to country risk in the Eurozone. We also conduct ranking analysis of countries for fiscal and external trade risk. We find a positive correlation between our rankings of the most vulnerable countries and the S&P's ratings, whereas the correlation for other countries is weaker.

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1. Introduction

The widening and fluctuating behavior of sovereign risk premium differentials in the Eurozone, since the onset of the 2008–2010 financial crises, which jeopardized the creditworthiness of several Euro area countries, led a number of authors to question the determinants of sovereign differentials

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in the context of a monetary union and whether yield spreads are a good measure of sovereign risk default.[1]

At the same time, the recent crises showed the inadequacy of existing early warning signal (EWS) models that failed to ring alarm bells before the outburst of the crises.[2]

Understanding what has prompted recent changes in sovereign risk is particularly relevant for policymakers. Motivated by the current Eurozone sovereign debt crisis, our paper offers a further contribution to the existing literature on the determinants of sovereign risk and proposes a method to assess sovereign risk in the Eurozone. It is based on macroeconomic variables and employs a methodology that relies on consistent tests for stochastic dominance (SD hereafter) efficiency.

Most literature in the context of a monetary union has been dissecting a systemic risk factor, associated with shifts in international appetite, or "the effects of common macroeconomic shocks on economic fundamentals" (Ang and Longstaff, 2013, p. 493), and has discarded country-specific determinants (Eichengreen and Mody, 2000; Baek et al., 2005; Reinhart and Rogoff, 2009; Dieckmann and Plank, 2012). Spillovers effects and contagion (see e.g., Kaminsky et al., 2003, Bekaert et al., 2011; Longstaff et al., 2011) have also been studied to analyze the common shock mechanism that is not related to country-specific fundamentals. However, other studies analyzing the recent financial crises led to controversial results. Barrios et al. (2009), looking at weekly data and using CDS spreads, find that the impact of domestic factors on yield spreads increased significantly during the crisis. They also suggest that because of the changes in public finances and the expected higher risk awareness of investors after the crisis, yield spreads raised at a higher level than in the pre-crisis period. Ang and Longstaff (2013) study the exposure of sovereigns to systemic and idiosyncratic shocks, comparing US states and countries inside the EU. They find that Greece had about three times the systemic risk of other vulnerable sovereigns, such as Portugal, Ireland, Italy, Spain and Belgium, which, in turn had roughly twice as much systemic risk as the remaining sovereigns in the EMU. Manasse and Zavalloni (2013) study CDS spreads inside the EU and explore possible regional contagion within the Eurozone. Their evidence supports the conclusion that country-specific fundamentals and structural fragilities matter for sovereign risk. Finally, Beirne and Fratzscher (2013), Beetsma et al. (2013), Kalotychou et al. (2013), De Grauwe and Ji (2014) stress a role for sovereign's macroeconomic fundamentals and regional contagion during the European sovereign debt crisis.

Concerns about fiscal sustainability are significant for countries like Greece, Ireland, Italy, Portugal and Spain (see e.g., Gibson et al., 2012). At the same time, the use of public balance sheets to shore up national financial systems has also created a link between financial sector and public sector bailouts (see e.g., Sgherri and Zoli, 2009). In particular, each country has shown its own mix and strict interconnection between external, fiscal and financial imbalances, depending on specific circumstances (see e.g., Gibson et al., 2014; Honkapohja, 2014). Thus, there is a need of developing a measure to assess higher default risk for governments pursuing unsound fiscal policies, or economies exposed to weakness in the external trade sector. It would be also called for to make sure that the institutional system can address potential sources of instability in these dimensions.

In this paper we propose a construction of an aggregate index of sovereign risk in the Eurozone based on macroeconomic variables. Our focus on sovereign's macroeconomic variables is grounded on previous studies that rely on macro indicators as explanatory variables of a country vulnerability and/or contagion or spillover effects from other countries. The methodology we employ is based on SD efficiency tests on multi-variate (multidimensional) comparisons of country panel data over various

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[1] The credit and banking crises, which anticipated the Eurozone sovereign debt crisis, culminated with the demise of Lehman Brothers in September 2008. Since then, doubts about the creditworthiness of individual European countries emerged. Fitch downgraded Ireland and Greece in November–December 2009, but the apex was reached on 28 April 2010, when the intra-day interest rate for 2-year Greek government bond peaked at 38%. After a series of downgradings and bailouts of Greece (Spring 2010), Ireland (Fall 2010), and Portugal (Spring 2011), the instability increased and both Italy and Spain were downgraded after summer 2011. Instability affected other EU countries, including Germany and France, and EU banks that held large portfolios of Eurozone sovereign debt. The Securities Markets Program was instituted by the ECB in May 2010. While initially only Greek debt was eligible, in summer 2010 the ECB started buying Irish and Portuguese debt and later Spanish and Italian. The overall size of the program reached $218 billion in December 2012.

[2] Among others, Davis and Karim (2008) applying macro EWS models, logit and binary recursive tree methodologies, found that for the US and UK these models failed to predict a crisis in 2007.

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