Determinants of sovereign defaults

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ABSTRACT

We study major sovereign defaults from 1970 to 2010 using an advanced duration analysis method. Descriptive analysis of the data indicates a cyclical nature of these defaults over a longer period. Regression results highlight the importance of the international monetary conditions as the volatilities of US treasury bills rates and USD-denominated LIBOR exert significant impacts on defaults. Political uncertainty increases the probability of default. Export (import) growth reduces (increases) the probability of default. Similarly, a 1% increase in inflation would increase the probability of defaults by 7%. Higher debt/GDP ratio is also linked to higher probability of default. A 1% increase in external debt would lead to a five to 7% increase in the probability of default. Higher GDP per capita reduces the probability of default. A previous banking crisis is linked to higher chances of sovereign defaults. Further analysis of entry into (out of) sovereign defaults indicates that higher US treasury rates would initiate sovereign defaults and would make it difficult for countries to come out of default. The same is true for central government debt/GDP, higher current account deficit and exchange rate volatility.

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1. Introduction

Reinhart and Rogoff (2009) outlined how throughout history "this time is different" became a credo for private and public investors extensively engaged in sovereign lending, just to eventually face "yet another crisis." In this regard, the recent European sovereign debt crisis is no exception. It started in 2007 with the U.S. subprime financial crisis, which came as a shock to most economies, thus cooling down growth internationally. This forced the newly elected Greek government to announce that the 2009 budget deficit would largely exceed expectations. In the subsequent (2010) Greek sovereign debt crisis, the government struggled not only with high public debt and low competitiveness compared to the rest of the euro zone, but also from a credibility deficit view point too (Tsoukalis, 2012). Before this incident, economists and capital markets seemed to have shared the belief that sovereign default would be an issue only experienced by developing countries. A defaulting developed country, and a member of the European Monetary Union (EMU), was not perceived as a possibility by the market. This allowed Greece (and other EMU members) to borrow at exceptionally low spreads over German bunds, creating a strong incentive to over borrow and accumulate remarkably high amounts of sovereign debt (Tsoukalis, 2012).

Compared to late 1980s and early 1990s when financial markets cooled down and sovereign defaults were few leading to less academic research on foreign borrowing crisis, the number of studies since 2014 on sovereign debt crisis have been regularly forthcoming in particular of European countries. Some of these studies include Ucler and Kirmizioglu (2015), Tamborini (2015), Broto and Perez-Quiros (2015), Popov and Van Horen (2015), Smeets (2016), Moisescu and Giurescu (2016), Stamatopoulos, Arvanitis and Terzakis (2016), Gómez-Puig and Sosvilla-Rivero (2016), Afonso and Silva (2017), Cencini (2017), Reusens and Croux (2017), and Ehrmann and Fratzscher (2017). A significant number of these studies have used time series models to evaluate credit default swaps (CDS) and other similar instruments to assess the riskiness of a country due to the ever rising burden of sovereign debt. This paper aims to develop an empirical model that helps to identify risk factors influencing the probability of sovereign default. The study builds a deep understanding of related economic theory and the findings of other researchers that tried to identify "early

warning signs" (such as Manasse and Roubini, 2009). We use a panel dataset distributed over 70 countries (developing as well as developed) from 1970 to 2010.

The inclusion of a number of important variables in our study to model external debt defaults comprising political, regional, macroeconomic, financial and external trade and debt is useful and significantly advanced compared to existing empirical literature. Compared to a number of other studies mentioned above, our study uses more indicators to approximate in particular political conditions of a country. Our study's use of advanced statistical models such as duration (survival time) analysis is a significant addition and advancement to existing literature and a more up-to-date dataset comprising of both developed and developing countries makes this analysis a significant piece of research and a contribution to the ever developing empirical literature. The paper develops an understanding that the use of time-to-event methodology can have a significant advantage over other techniques such as simple logit or probit used so far for the analysis of sovereign debt analysis.

2. Modelling the determinates of sovereign defaults – a review of literature

An interesting question is how creditors measure sovereign risk. While the calculation of country risk is more an art than a scientific econometric analysis (especially because of only qualitatively assessable political factors), sovereign risk as a part of the country risk is rated by well-known international agencies. These agencies only give hints on which variables they include in their analysis, but do not disclose details of their procedures (Fight, 2004). Fight (2004) asserts that bank managers often faithfully refer to these ratings. This is consistent with Larraín, Reisen and von Maltzan (1997), who present econometric evidence for the period 1987–1996, finding a highly significant announcement effect on financial markets for negative changes in credit ratings. They also state that sovereign risk ratings can be primarily explained with publicly available macroeconomic data (see also Cantor & Packer, 1996; Eichler & Maltritz, 2012; Manasse & Roubini, 2009) and dollar-bond-spreads.

In one of the most-cited recent empirical studies investigating determinants of sovereign default, Manasse and Roubini (2009, p. 3) complain that many "policymakers and analysts continue to use simple rules of thumb to judge risks and to assess fiscal sustainability (International Monetary Fund, 2013a, 2013b, 2013c), as well as the soundness of macroeconomic policies." According to Manasse and Roubini (2009), economists and practitioners struggled to properly understand macroeconomic and structural weaknesses leading to sovereign defaults. They also notice little comparative empirical work on the sovereign debt crises of the 1990s and early 2000s. The recent European sovereign debt crisis, however, seems to have drawn new attention to the issue. Villemot (2012) explains that even though there is a large body of literature trying to empirically identify determinates of sovereign defaults, most results can hardly be interpreted as representing causalities. In particular, endogeneity issues limit these efforts to identify risk factors associated with sovereign defaults. Popular approaches focus on central economic indicators, risk ratios or market estimates of sovereign risk (Das, Papaioannou, & Trebesch, 2012). The most popular explanatory variables are external or public debt to GDP as well as the public debt or debt service to government revenues ratios.

Most studies use probit or logit regressions or signal models (Manasse & Roubini, 2009) to model sovereign defaults. Referring to the existing literature in this regard, Manasse and Roubini (2009) suggest that an empirical model attempting to predict sovereign default should include measures of solvency and liquidity as well

as political, institutional or other variables that could represent a country's willingness to pay. Many authors also emphasize the inclusion of variables on the macroeconomic state and volatility (Hilscher & Nosbusch, 2010; Villemot, 2012; Das et al., 2012), because they capture not only the ability, but also the willingness to pay (Manasse & Roubini, 2009). Das et al. (2012) describe research by Sturzenegger and Zettelmeyer (2006, p. 6) which analyses default and restructuring clusters during the last 200 years and finds that debt crises were preceded by either a worsening in terms of trade, a recession in capital providing countries, a surge in the international costs of capital, or a crisis in a contagion-causing country.

With a range of 50 predictor variables, Manasse and Roubini (2009) use a classification and regression tree (CART) methodology on a panel dataset including 47 market economies from 1970 to 2002. They claim to reach excellent predictive capacities in-sample, while the out-of-sample prediction includes less correct predictions, but also less false alarms than the "Early Warning Signal (EWS)" literature. Moreover, they could identify ten variables as sufficient for the classification or prediction of a sovereign debt crisis. These include total external debt/GDP ratio; short-term debt reserves ratio; real GDP growth; public external debt/fiscal revenue ratio; CPI inflation; number of years to the next presidential election; U.S. treasury bills rate; external financial requirements (current account balance plus short-term debt as a ratio of foreign reserves); exchange rate overvaluation; and exchange rate volatility.

Manasse and Roubini (2009) specify characteristics of a relatively "safe" country: total external debt over GDP ratios below 49.7%; short-term debt over reserves under 130%; public external debt as% of fiscal revenue not being higher than 214; and a maximum overvaluation of the exchange rate of 48%. They also outline three risk types: 1) unsustainability risk can be identified by external debt to GDP ratios over 49.7% in combination with monetary or fiscal imbalances and large needs of refinancing; 2) liquidity risk types show moderate debt levels, with short-term debt over reserves exceeding 130% and political uncertainty (no upcoming elections) as well as tight international capital markets; 3) macro-exchange rate risk types are significant in terms of low growth (−5.5%) combined with relatively fixed exchange rates.

Our study contributes to the existing theoretical and empirical literature reviewed above. We model the sovereign default by using a number of variables discussed above and employing an advanced econometric method: survival (duration) analysis framework. The empirical analysis of our study is rich and would provide a good deal of information for creditors as well as debtor nations to manage future sovereign defaults and related costs. In the following, we discuss the duration (survival) analysis methodology for modelling sovereign defaults alongside justification for the chosen method.

3. Methodology

As mentioned before, the majority of the literature in this field has used logit or probit regression to identify risk factors associated with sovereign default. With the use of CART, Manasse and Roubini (2009) applied a new methodology. Reinhart, Rogoff and Savastano (2003 as cited in Das et al., 2012), call past defaults a main predictor of defaults and debt restructurings. The large number and strong influence of time-dependent variables used in the existing empirical literature to explain external sovereign defaults in combination with the strong role of past events may make survival (duration) analysis an interesting option and a more appropriate method to define determinants or warning signs predictor of sovereign default.