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Regime-dependent determinants of Euro area sovereign CDS spreads☆

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ABSTRACT

We study the determinants of sovereign CDS spreads of five Euro area countries (Greece, Ireland, Italy, Portugal, and Spain) after the collapse of Lehman Brothers. We find that global and/or European Monetary Union (EMU)-wide factors are the main drivers of changes in the sovereign CDS spreads in our sample. However, the impacts of those factors change with market uncertainty. There is a relatively tranquil regime where market uncertainty is low and a relatively turbulent regime where market uncertainty is high. The transition from the tranquil regime to the turbulent regime is driven by changes in the global jump risk, which suggests that contagion from the global financial market significantly affected the pricing of sovereign credit risk in our sample. Domestic economic and financial indicators have little impact on the pricing of sovereign credit risk in all sample countries except Italy. But changes in the sovereign credit risk have significant impacts on domestic economic and financial indicators. Neglecting the financial contagion and feedback effects from sovereign credit risk to domestic economic and financial developments leads to spurious results regarding the determinants of sovereign CDS spreads.

1. Introduction

During the European sovereign debt crisis, sovereign credit default swap (CDS) spreads of the Euro countries drew a lot of public attention. The reason is that a country's CDS spread is usually taken as an indicator of that country's sovereign credit risk (OECD, 2012). In an influential early study, Edwards (1984) links countries' probabilities of default to their sovereign credit spreads and studies the macroeconomic determinants of sovereign defaults by investigating their relationships with the sovereign credit spread. Those macroeconomic determinants are interpreted as proxies for countries' ability and willingness to pay its debt. Subsequent studies extend Edwards' research line by extending the sample period and country coverage, adding new potential determinants of sovereign credit spread to the empirical model, and estimating the model with new econometric techniques (Boehmer and Megginson, 1990; Cantor and Packer, 1996; Min, 1998; Eichengreen and Mody, 1998; Kamin and von Kleist, 1999; Arora and Cerisola, 2001; Baek et al., 2005; Dailami et al., 2008; Hilscher and Nosbusch, 2010; Baldacci et al., 2011; Aizenman et al., 2013; Beirne and Fratzscher, 2013).

While the literature on the macroeconomic determinants of sovereign credit spread is helpful for a better understanding of sovereign defaults, it is relatively silent on the nature of sovereign credit spread during a specific crisis period. This is due to the low frequency of macroeconomic data. In this paper, we study the determinants of changes in the sovereign CDS spreads of five Euro-area countries (Greece, Ireland, Italy, Portugal and Spain) in the post-Lehman-Brothers period (from September 15, 2008 to December 19, 2011). Therefore, our focus is to study the determinants of sovereign CDS spreads in a crisis period. We think this topic is interesting and important for two reasons. First, decision makers during the crisis have to understand the sources of the sovereign credit risk to correctly react to the crisis. Second, the determination process of the sovereign credit risk in a crisis is different from the process in normal times. Therefore, existing studies using data from normal times are not helpful for decision-making during the crisis.

According to the IMF (2013), the year 2008 marks a significant structural change in the trading history of sovereign CDS contracts.

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The sovereign share of single-name CDS contracts remained at a low level before 2008 but starts to increase rapidly after 2008. For example, the gross notional amount outstanding of Ireland's sovereign CDS contracts was only 18 billion US dollars and ranked 262nd among all traded CDS contracts by the end of 2008. The gross notional amount outstanding jumped to 51 billion US dollars and the ranking climbed to the 30th by the end of 2012. This dramatic example suggests that it is actually *during the crisis period* that investors are more interested in sovereign CDS contracts. Policy makers are also keen to find a way to precisely identify the factors adding pressure to sovereigns which are *already in trouble*. Fontana and Scheicher (2010), Dieckmann and Plank (2011), and Fender et al. (2012) find that the pricing of sovereign credit risk is different between normal times and crisis times, which suggests that historical developments in the sovereign CDS market in normal times are less indicative for decision makers *facing the crisis*.

In order to obtain enough variations in the data for clear identification, we follow recent empirical studies (Pan and Singleton, 2008; Fontana and Scheicher, 2010; Longstaff et al., 2011; Dieckmann and Plank, 2011; Fender et al., 2012) to use financial indicators as potential determinants of sovereign CDS spread. Since data on financial indicators are available at higher frequencies than macroeconomic indicators, using financial indicators provides additional variations in the data, which helps identify the determination process of sovereign credit spreads during a relatively short time period such as a financial crisis. Moreover, a recent study by D'Agostino and Ehrmann (2014) suggests that market participants' expectations on macroeconomic developments affect sovereign credit spreads. While real-time macroeconomic data only contain information about the past, financial indicators incorporate information on agents' expectations about future macroeconomic dynamics (Collin-Dufresne et al., 2001; Dieckmann and Plank, 2011; Koop and Korobilis, 2014). Specifically, financial indicators incorporate information on macroeconomic developments which cannot be observed by econometricians using lower-frequency real-time macroeconomic data but which is available to market participants.[1]

Although previous studies have already used financial indicators as potential determinants of sovereign CDS spreads, our paper differs from theirs in important aspects. First of all, those previous studies exclude the possibility of financial contagion. By definition, financial contagion means that spillover effects from one country to another country change across periods with different level of uncertainty.[2] Previous studies, such as Longstaff et al. (2011), Dieckmann and Plank (2011) and Fontana and Scheicher (2010), find strong evidence of international spillover effects. More specifically, changes in global financial indicators appear to have a strong impact on individual sovereign CDS spreads. However, they do not consider the possibility of changes in international spillover effects when market uncertainty changes over time. Therefore, the possibility of financial contagion is excluded. In order to capture potential contagion effects, this paper introduces regime switching into the empirical model, which allows changes in international spillover effects over different regimes.

Our approach also provides a new way to look at financial contagion. Existing literature (Dungey et al., 2005) on financial contagion usually splits the sample into a non-crisis period and a crisis period, and tests whether the international spillover effects significantly differ in those two periods. This approach has a number of limitations. The splitting point, the starting time of the crisis period, is chosen according to some arbitrary criteria, for example, the unconditional variance of asset returns in the country where the crisis is originated. This practice is subject to the pretesting bias discussed by Danilov and Magnus (2004). Simply put, any error in the choice of the sample splitting criterion can bias the contagion test results. By contrast, our regime-switching approach does not require splitting of the sample. The identification of the tranquil regime and turbulent regime, and the estimation of international spillover effects under different regimes are integrated into one estimation process. Therefore, our approach is free from the pretesting bias. Moreover, the sample splitting approach requires a long enough crisis period for reliable estimation while our regime switching model does not suffer from this limitation.

Although they do not test for financial contagion, Fontana and Scheicher (2010), Dieckmann and Plank (2011), and Fender et al. (2012) do find significant changes in the determination process of sovereign credit spreads after the collapse of Lehman Brothers. Noting this structural change is important for policy makers to make the right decisions. Yet another important and frequently asked question for policy makers is whether financial contagion has changed the pricing of sovereign credit risk *during the crisis*. Answering this question properly is important because most decisions on crisis management have to be made during the crisis and understanding the sources of the sovereign risk at play is necessary for making the right decisions. Although important, this question is hardly asked in the existing literature due to technical difficulties. It is difficult to further split the crisis sample into a tranquil period and a turbulent period. Even if a choice of splitting point is made, the number of observations in the turbulent period might be too small for reliable estimation. As we have discussed above, our regime switching approach overcomes those problems.

Another important difference between the current paper and previous studies is that the covariates in the previous papers are assumed to be exogenous while they are allowed to be endogenous in our model. In other words, it is assumed in the previous studies that there are no feedback effects from sovereign credit spread to these covariates. However, this is a very strong assumption. The literature on sovereign defaults suggests that changes in sovereign credit spreads can affect domestic macroeconomic fundamentals. Particularly, Sandleris (2008) suggests that a sovereign default worsens investors' expectations about domestic macroeconomic indicators. Since these expectations affect domestic financial indicators, we would expect that sovereign credit spreads will have potential effects on domestic financial indicators. In addition, sovereign defaults could cause declines in domestic output by creating liquidity problems (Brutti, 2011) or preventing imports which are necessary for efficient domestic production (Mendoza and Yue, 2012). If changes in sovereign credit spreads contain information on the probability and extent of sovereign defaults, investors' expectations on domestic output will follow changes in the sovereign credit spreads. Such expectations can therefore affect domestic financial indicators. Moreover, changes in sovereign CDS markets are likely to influence the borrowing cost of countries (Delatte et al., 2012), which, in turn, may have a direct impact on the domestic economy. Another potential source of endogeneity is that the severity of a sovereign debt crisis (like the one faced by our sample countries) might have feedback effects on the global financial market. Consequently, the various potential sources of endogeneity need to be incorporated in models that are used for explaining the determinants of sovereign CDS spreads. Neglecting these potential sources of endogeneity could therefore cause estimation bias and, as a result, produce misleading empirical results. In this paper, we will allow for the possibility that one or more covariates are endogenous. To that end, we will use a two-step estimation

[1] D'Agostino and Ehrmann (2014) use Consensus Economics data to model expectations on macroeconomic dynamics. Their approach is an obvious alternative to modeling with financial variables. However, the data they use are at a monthly frequency. The frequency is too low to allow a long enough sample period *during the financial crisis*.

[2] There are a number of different definitions of financial contagion (Pericoli and Sbracia, 2003; Forbes, 2012). The definition we use here is one of the most popular (Forbes and Rigobon, 2002; Dungey et al., 2005; Caporin et al., 2013).