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Volatility spillovers in EMU sovereign bond markets

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ABSTRACT

New evidence is presented on the sudden shift in the sentiment of market participants with the outbreak of the sovereign debt crisis. Since volatility reflects the extent to which the market evaluates the arrival of new information and provides useful insights into the dynamics of EMU sovereign debt markets, we analyze their spillovers. To that end, we first examine the unconditional patterns during the full sample (April 1999–January 2014) using a measure recently proposed by Diebold and Yilmaz (2012). Second, we make use of a dynamic analysis to evaluate net directional volatility spillovers for each of the eleven countries under stud and to determine whether core and peripheral markets present differences both before and during the crisis periods. Finally, we apply a panel analysis to empirically investigate the determinants of net directional spillovers of this kind. Our results suggest that slightly more than half of the total variance of the forecast errors is explained by shocks across countries rather than by idiosyncratic shocks. Besides, they give further support to the idea that during the pre-crisis period, most of the triggers in the volatility spillovers were central countries – peripheral countries imported credibility from them – while during the crisis, peripheral countries became the dominant transmitters.

1. Introduction

Recent financial crises have all been characterized by quick, large-scale regional spillovers of negative financial shocks. These have been especially significant in Europe where, after the huge distress in the Greek government debt market that culminated in the rescue of May 2010, South European countries found their yield spreads with respect to Germany spiraling and also faced skyrocketing refinancing rates. Indeed, an important reason and justification for providing financial support to Greece was precisely the "fear" of contagion (see Constâncio, 2012); there was a sudden loss in investor confidence and the macroeconomic and fiscal imbalances within the rest of EMU countries came firmly under the spotlight (see Beirne & Fratzscher, 2013).

The significant increase in cross-border financial activity in the euro area since the start of the century (see Barnes, Lane, & Radziwill, 2010 and Kalemi-Ozcan, Papaioannou, & Peydró-Alcalde, 2010), which has fostered a high degree of integration in European financial markets,[1] and the low degree of fiscal federalism are some of the reasons for the speed as well as the amplitude of the transmission of those shocks. Clearly, empirical studies are needed to evaluate the importance of spillovers across public debt markets.

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[1] See Schoenmaker and Wagner (2013).

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Researchers have already used a variety of methodologies to study the transmission effects in euro area sovereign debt markets (correlation-based measures, conditional value-at-risk or Granger-causality approach, among others)[2]: Kalbaska and Gatkowski (2012), Metiu (2012), Caporin, Pelizzon, Ravazzolo, and Rigobon (2013), Beirne and Fratzscher (2013), Gorea and Radev (2014), Gómez-Puig and Sosvilla-Rivero (2014), and Ludwig (2014) to name a few. Our paper adds to this literature by applying the methodology recently proposed by Diebold and Yilmaz (2012) to measure spillover effects using a generalized vector autoregressive framework in which forecast error variance decompositions are invariant to the variable ordering. This methodology allows us to examine the relative importance of both within-market and cross-market information in explaining volatility movements in each EMU sovereign bond market. Besides, it also allows us (1) to evaluate total spillovers of volatility across these markets; (2) to compute net directional volatility spillovers summarizing information about how much each market contributes to the volatility in other markets, in net terms; (3) to produce continuously varying indexes of total and net directional spillovers illustrating how markets evolved over time and reacted to the impressive number of specific events that took place during the sample; and (4) to map out the complex network of volatility interlinkages among the eleven markets in our sample.

Besides, to our knowledge, although there is a substantial body of literature using different extensions of Diebold and Yilmaz's (2012) methodology to examine spillovers and transmission effects in stock, foreign exchange, or oil markets in non-EMU countries,[3] it has only rarely been applied to euro area sovereign debt markets (some of the few exceptions are Antonakakis & Vergos, 2013; Claeys & Vašicek, 2014; and Glover & Richards-Shubik, 2014).[4] Nevertheless, in contrast to those studies, we focus our analysis on sovereign debt market volatility since, as far as we know, there are no empirical analyses of the effects of spillovers on sovereign market volatility, in spite of the relevance of the issue.

In this sense, as volatility reflects the extent to which the market evaluates and assimilates the arrival of new information, the analysis of its transmission pattern might provide useful insights into the characteristics and dynamics of sovereign debt markets. Thus, since the information gathered would provide a barometer for the vulnerability of these markets, we consider that empirically examining spillovers on sovereign debt market volatility is a novel and relevant issue. Moreover, during crises, markets' volatilities tend to increase rapidly, and financial analysts seem to believe that volatility shocks in one market can easily have an impact on the other markets. Thus, the European debt crisis is ideal for testing net directional spillovers, identifying when and where they started in sovereign bond markets and how subsequently spread to the rest of countries.

Therefore, the main objective of this paper is to contribute to this challenging avenue of research by focusing on the effects of spillovers on EMU sovereign bond market volatility. Unlike previous studies, in our analysis, we will focus on euro area countries; however, we consider both central (Austria, Belgium, Finland, France, Germany, and the Netherlands) and peripheral EMU countries (Greece, Ireland, Italy, Portugal, and Spain)[5] and work with 10-year yields instead of spreads over the German bund, in order to be able to include Germany in the study. Furthermore, while other studies analyze bond yield spread spillovers (Antonakakis & Vergos, 2013, among them), we will study bond yields' volatility spillovers. We will analyze the determinants of the detected pairwise net directional spillovers, considering not only macroeconomic fundamentals, but also the role played by indicators of investor sentiment. Finally, we examine an extended time period spanning from the inception of the euro in January 1999, well before the global financial and sovereign debt crises, until January 2014, covering the Greek write-off and the agreement with Greece's creditor banks in 2012 and the decision of Eurogroup to consider bail-ins in the future, that was eventually decided in 2013, after the crisis in Cyprus.

Our results suggest that a little more than half of the total variance of the forecast errors is explained by shocks across countries rather than by idiosyncratic shocks. Besides, they give further support to the idea that during the pre-crisis period, most of the triggers in the volatility spillovers were central countries – peripheral countries imported credibility from them- while during the crisis peripheral countries became the dominant transmitters. These results are in line with those of Antonakakis and Vergos (2013) who also highlight the increased vulnerability of EMU countries from the destabilizing shocks originating from the beleaguered peripheral countries rather than from core countries during the crisis.

We proceed as follows. In Section 2 we discuss the econometric methodology. Section 3 describes our data and presents our empirical results (both static and dynamic). In Section 4 we present the empirical results regarding the pairwise net directional spillovers and examine their determinants. Finally, Section 5 summarizes the main findings and offers some concluding remarks.

[2] See Billio, Getmansky, Lo, and Pelizzon (2012) for a review of the different measures proposed in the literature to estimate these linkages.

[3] Awartania, Maghyerehb, and Al Shiabc, (2013), Lee and Chang (2013), Chau and Deesomsak (2014), and Cronin (2014) apply this methodology to examine spillovers in the United States markets; Yilmaz (2010), Zhou, Zhang, and Zhang (2012), and Narayan, Narayan, and Prabheesh (2014) focus their analysis on Asian countries; Apostolakisa and Papadopoulos (2014) and Tsai (2014) examine G-7 economies; while Duncan and Kabundi (2013) center their analysis on South African markets.

[4] Alter and Beyer (2014) also apply this methodology to quantify spillovers between sovereign credit markets and banks in the euro area.

[5] This distinction between central and peripheral countries has been extensively used in the empirical literature. The two groups we consider roughly correspond to the distinction made by the European Commission (1995) between those countries whose currencies continuously participated in the European Exchange Rate Mechanism (ERM) from its inception maintaining broadly stable bilateral exchange rates among themselves over the sample period, and those countries whose currencies either entered the ERM later or suspended its participation in the ERM, as well as fluctuating in value to a great extent relative to the Deutschmark. These two groups are also roughly the same found in Jacquemin and Sapir (1996), applying multivariate analysis techniques to a wide set of structural and macroeconomic indicators, to form a homogeneous group of countries. Moreover, these two groups are basically the same that those found in Ledesma-Rodríguez, Navarro-Ibáñez, Pérez-Rodríguez, and Sosvilla-Rivero (2005) according to the perception of economic agents with respect to the commitment to maintain the exchange rate around a central parity in the ERM and those identifying by Sosvilla-Rivero and Morales-Zumaquero (2012) using cluster analysis when analysing permanent and transitory volatilities of EMU sovereign yields.