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Bank fragility and contagion: Evidence from the bank CDS market

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ABSTRACT

Understanding how contagion works among financial institutions is a top priority for regulators and policy makers who aim to foster financial stability and to prevent financial crises. Using bank credit default swap (CDS) data, we provide a framework for the evaluation of contagion among banks in different countries and regions during a period of prolonged financial distress. We measure contagion in terms of return spillovers, following a Generalized VAR (GVAR) approach. In addition, we propose an innovative framework to distinguish between two types of contagion: systematic (linked to global factors), and idiosyncratic (linked to bank specific factors). We find evidence of both types of contagion, although the spillover dynamics changed over time. Our measure of systematic contagion is always greater than the idiosyncratic component, thus highlighting the importance of common factors in the propagation of risk spillovers. This indicates that international linkages among banking markets are central to the transmission of shocks.

1. Introduction

The turmoil that hit in the world's financial systems in the summer of 2007 has spurred a new debate on bank fragility and contagion. The concept of bank fragility generally refers to increased bank risk taking, leading to higher probability of default. To evaluate bank fragility regulators have traditionally employed bank balance sheet data; although more recently market signals are considered a useful complement to supervisors' traditional accounting information (Gropp et al., 2006).[1] In financial markets, the propensity for bank-specific risks to spillover to other banks and then to the rest of the economy is often seen as contagion (Allen and Gale, 2000). Understanding how contagion works among financial institutions is currently a top priority for regulators and policy makers who need put in place frameworks for the prevention of financial crises. In addition, the recent eurozone sovereign debt crisis highlighted the importance of cross-border linkages in transmitting local conditions across national borders (Tonzer, 2015), as well as the bank and sovereign risk feedback loops (Acharya et al., 2014; De Bruyckere et al., 2013).

In this paper we evaluate the dynamics of international bank risk transmission and present an empirical method to measure contagion. More specifically, in this analysis contagion relates to the notion that events in one bank/country/portfolio spillover to another bank/country/portfolio through banks' cross-border linkages. We therefore use the terms contagion and spillovers as synonyms, and we define contagion as the spillover effect occurring following a shock. In this setting, for contagion to occur, it needs a trigger or a shock, which amplifies the interdependence or co-movement across variables. Our aim is to shed some

E-mail addresses: Laura.Ballester@uv.es (L. Ballester), b.casu@city.ac.uk (B. Casu), ana.gonzalezu@unavarra.es (A. González-Urteaga).

[1] As proxies of bank fragility, empirical studies use measures of bank insolvency risk, either based on accounting data (the z-scores) or on market data (using variations of the Merton Distance-to-Default models).

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light on the potential triggers of contagion in banking markets as well as the channels through which contagion occurs. In line with recent literature, we use the credit default swap (CDS) spreads of major international banks as an indicator of bank credit risk.[2] CDS spreads have a number of advantages in proxing for credit risk, including a more accurate measurement of default risk and higher liquidity (Blanco et al., 2005; Longstaff et al., 2005; Zhang et al., 2009; Yang and Zhou, 2013). Despite these characteristics, the use of CDS data on financial institutions is fairly recent and it came to prominence only as a consequence of the global financial crisis (Stulz, 2010; Eichengreen et al., 2012).

We estimate contagion following a generalized vector autoregressive framework (GVAR) approach (Diebold and Yilmaz, 2012). GVAR is a VAR-based spillover index particularly suited for the investigation of systems of highly interdependent variables. The methodology allows us to identify the dynamics of the interactions over time and to examine both total and directional spillovers. In addition, we propose an innovative framework to distinguish between systematic and idiosyncratic contagion. To this end, we use Principal Component Analysis (PCA) to extract the common factors underlying the correlations among the CDS returns series of individual banks over the sample period. In our setup, systematic contagion captures the spillover effects due to changes in global factors that affect all banks, whereas idiosyncratic contagion measures the spillover effects caused by changes in bank fundamentals. This decomposition allows us to assess to what extent the increase in bank fragility over the crises period was driven by deteriorating bank fundamentals and increased bank-specific risk taking or whether it reflected decline in global economic and financial conditions that affected all banks as an asset class.

We find evidence of contagion in banking markets, documented by an increase in co-movements in CDS returns and confirmed by the results of the GVAR estimations. Contagion came in different waves, with the financial and eurozone crises being distinct episodes with different spillover dynamics. Our results suggest that international linkages among banking markets are central to the transmission of shocks. Our measure of systematic contagion is always greater than the idiosyncratic component, thus highlighting the importance of common factors in the propagation of risk spillovers.

We contribute to the literature in several ways. We bring together the literature on financial contagion and the literature on systematic risk to provide a better understanding of how contagion works in the banking sector. As a novel contribution of the paper, we provide evidence of the time variation of the transmission of credit risk at different stages of the prolonged global crisis by analysing contagion in US and European banking markets during the period January 2004 to March 2013. We do so in a rolling framework, which enables us to analyse the evolution of contagion over time and during a number of "phases" of market instability. We then put forward an interpretation of how contagion spread, by identifying spillover channels among banking markets. By proposing a novel framework for the identification of systematic and idiosyncratic contagion, we also contribute to the literature that develops measures of financial contagion.

The remainder of the paper is organized as follows. Section 2 presents a review of the literature; Section 3 describes the data and Section 4 presents some preliminary analysis. Section 5 discusses the methodological approach. Section 6 presents the results while Section 7 provides some robustness checks. Section 8 reports the results of some additional analysis and Section 9 concludes.

2. Literature review

The global financial crisis and the subsequent eurozone crisis highlighted the importance of risk spillovers, or contagion, across international banking and financial markets. Although a very intuitive concept, contagion is difficult to define and measure empirically. This has lead to various definitions and a large body of literature. A common approach to measure contagion is the analysis of correlation coefficients across markets or assets returns and an increase in correlation is seen as evidence of contagion (Forbes and Rigobon, 2002; Corsetti et al., 2005; Broto and Perez-Quiros, 2015). However, financial institutions are highly interconnected through a network composed of the interbank market, the payment system, the financial markets and so on. Similarly, economies are interconnected through financial and trade linkages. Interconnectedness describes situations when financial distress in one institution (country) significantly increases the probability of financial distress in other institutions (countries). The globalization of trade and markets has strengthened these linkages or interconnections, which are also described as spillovers channels of interdependence. When two markets exhibit a high degree of co-movement during stable periods, and these co-movements do not increase significantly after a shock, then it is interdependence rather than contagion (Forbes and Rigobon, 2002). However, increased co-movements heighten the risk that financial distress originating in a few institutions can spread to many others and ultimately impact upon the real economy (Yang and Zhou, 2013).

In the first instance, contagion can be defined as the transmission of shocks over and above what is expected by the interdependence described above. Dornbusch et al. (2000), Kaminsky et al. (2003), Bae et al. (2003) and Longstaff (2010), among others, define contagion as an episode in which there is a significant increase in cross-market linkages when a shock occurs. In banking markets, contagion can be seen as a negative externality triggered by one institution in distress that affects other market participants. This initial trigger effect needs to be of abnormal speed, strength and scope to cause contagion, which can therefore be seen as the extreme amplification of spillover effects (Alter and Beyer, 2014).

Our contribution builds upon this latter strand of the literature and we define contagion as the spillover effect that follows a shock in a region/portfolio to other regions/portfolios. By proposing an innovative framework to distinguish between systematic and idiosyncratic contagion, we also contribute to the strand of the literature that focuses on the development of methods to evaluate contagion. Pericoli

[2] A CDS is essentially an insurance contract against a credit event of a specific reference entity. The CDS spread is the periodic rate that a protection buyer pays on the notional amount to the protection seller for transferring the risk of a credit event for some period. Since late 2008, the CDS market has attracted considerable attention and CDS are considered a good proxy for bank riskiness and default probability. For a survey of the literature on CDS, see Augustin et al. (2014).