Sectoral dynamics of financial contagion in Europe - The cases of the recent crises episodes

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ARTICLE INFO

ABSTRACT

In this paper, we investigate the existence of financial contagion in the European Union during the recent Global Financial Crisis (GFC) of 2007–2009 and the European Sovereign Debt Crisis (ESDC) that started in 2009. Our sample includes sectorial equity indices for 15 countries from 2004 to 2014. We adopt an ADCC-GJR-GARCH model for the time-varying correlations and a Markov-Switching model to identify the lead/lag relationship in crisis transition dates across the countries and the sectors. We assess the patterns of financial contagion by sector and by country. Our results support the existence of financial contagion in all business sectors under the GFC and the ESDC. Financials and Telecommunications are the most affected, while the Industrials and the Consumer Goods the least in each crisis respectively. Stock markets in the Core EU are the most affected in both crises. We find evidence of a non-synchronised transition of all countries to the crisis regime, in both crises. We believe that our results may provide useful insights for investors and policy makers.

1. Introduction

The increasing globalization and integration of financial markets facilitates the functioning of a "Single Market" and has therefore been associated with prosperity and economic wellbeing. Nevertheless, at the same time financial integration may facilitate the spread of financial instability across countries and markets, as has been the case during both the Global Financial Crisis (GFC) of 2007–2009 and the European Sovereign Debt Crisis (ESDC), with adverse impact on the relations amongst the member countries of the European Union (EU).

Financial contagion, the phenomenon in which a financial crisis spreads across countries, has received a certain focus over the past two decades. Although no uniformly accepted definition exists for financial contagion, most of the empirical work typically follows the Forbes and Rigobon (2002) and/or the Bekaert et al. (2005) seminal papers. One of the key distinctions in these two approaches is that the former, also dubbed as "shift-contagion", examines for a significant increase in the cross-market correlation following a crisis event, where the latter emphasizes the role of (economic) fundamentals by attributing the characterisation of contagion only when correlations significantly increase over and above what fundamentals can explain.

In the field of empirical analysis, King and Wadhwani (1990) and Lee and Kim (1993) comprise some of the early work on the issue of financial contagion following the US stock market crash of October 1987. The East Asian crisis of 1997, the "dot.com" bubble of the early 2000s, the GFC of 2007 and the ESDC of 2009 have been used as a reference point to investigate contagion across a variety of countries (Cho and Parhizgari, 2008; Kenourgios, 2014; Naoui et al., 2010; Pappas et al., 2016; Yiu et al., 2010). Most of this research is focused on stock market indices (Chiang et al., 2007), however there are instances where exchange rates (Khalid and Rajaguru, 2007) or bond market data have been used (Coudert and Gex, 2010). Even rarer however are applications pertaining to sectorial equity data, with notable exceptions the studies of Baur (2012), Kenourgios and Dimitriou (2015) and Phylaktis and Xia (2009). All of these studies have some global focus as far as sectorial indices are concerned. For example, Kenourgios and Dimitriou (2015) use sectorial equity indices for six geographical regions (e.g., Developed Pacific, Emerging Asia). In terms of crisis focus, in the Phylaktis and Xia (2009) the data span covers most of the 1990s and early 2000s crises, from the 1992 ERM attacks up to the dot.com bubble. By contrast, Baur (2012) and Kenourgios and Dimitriou (2015) focus on the GFC and/or the ESDC crises.

The aim of this paper is to assess financial contagion across equity markets and business sectors in the EU following the GFC and the ESDC.

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For this purpose, we adopt a multivariate dynamic conditional correlation model. To identify lead/lag relationships in the crisis transition dates of the featured countries and business sectors we compare the estimated crisis transition dates from a Markov-Switching model to the official timeliness of the GFC and the ESDC.[1] To gauge the magnitude of financial contagion, we regress the conditional correlation estimates on a set of binary variables that identify different periods of the crisis in line with Kenourgios (2014) among others.

We contribute to the literature in two ways. First, we conduct a geographically focused analysis within the EU-15. Previous studies have often included a subset of EU countries and/or had a global focus. This may have been desirable for certain crises (e.g., the GFC) but the ESDC is largely Europe-specific. Furthermore, the ties between EU (and moreover Eurozone) members are much stronger than any non-EU sample of countries. In this respect, we expect that our statistical results will reveal more clearly the dynamics of a financial crisis. These results, may prove useful to the EU policy makers in terms of policies designed for future events and to investors wishing to ensure proper country and/or sectorial diversification for their portfolios.

Secondly, although other researchers have used sectorial equity indices, we are the first to the best of our knowledge to examine financial contagion in such a comprehensive manner. Specifically, we test for three distinct variants of financial contagion. Namely, within sector (across countries), within country (across sectors) and across country and sectors. The first allows us to examine if the existence, timing and magnitude of contagion differ by business sector. This variant assumes that the transmitter and the receiver of contagion is the same business sector and can classify them according to the resilience they offer to contagion transmission. The second examines how contagion spreads across the different business sectors within a country. Thus, it reveals similarities and differences in the resilience of each sector in each country. The third generalises even further by examining the magnitude of contagion where the transmitter and receiver may both be different countries and business sectors. Following the above analysis, we can derive valuable information for policy makers and investors since we can obtain very detailed dynamics dealing with the economic sectors and countries under investigation.

A preview of our results follows. We verify the existence of financial contagion for all business sectors under the GFC and the ESDC. Financials and Telecommunications sectors are the most affected, while the Industrials and Consumer Goods sectors are the least from the GFC and the ESDC respectively. In addition, all countries experienced financial contagion at varying magnitudes, with those in the Core EU being the most affected in both crises. The timing of the financial contagion differs between the two crises with the Core EU countries being affected first in the GFC crisis, but those of the PIIGS group being first in the ESDC. In both cases, we find evidence of a non-synchronised transition of all countries to the crisis regime.

The remainder of the paper is organized as follows. Section 2 reviews the relevant literature. Section 3 presents the data while Section 4 presents the methodology we utilise. Section 5 presents and discusses the results analysis. A final section concludes.

2. Literature review

Financial contagion may be perceived as the dark side of financial integration. Even though financial integration and contagion are found, to a larger or smaller extent, in a worldwide context, the European Union (EU) is regarded as the main workhorse for such investigations, in part owning to the long tradition of common institutions, rules and regulations and the existence of a monetary union. Financial integration in the

EU has been perceived as an essential element for the effective implementation of European Central Bank (ECB) economic policies (ECB, 2010) with beneficial effects upon prosperity and economic wellbeing. By contrast, financial contagion is associated with uncertainty, market downturns and periods of economic, and often, political instability. The appeal and retraction of financial integration and contagion respectively may be evidenced by the expansion of the EU from 15 to 28 country members in the years prior to the GFC but also the increasing appreciation of a retrenchment to national borders policy in the years following the GFC and ESDC.[2]

Albeit there is an agreement in the literature about what financial contagion is about, no universally accepted definition of financial contagion exists. Instead, the definition of financial contagion seems to be customised to a handful of research methodologies that have been employed over the years, see Karolyi (2003) and Dungey et al. (2005) for some surveys on the topic. For example, contagion has been defined as a rise in the probability that a country experiences a crisis given that a crisis is developing in another country (Eichengreen and Rose, 1999). Alternative definitions suggest that contagion is identified by correlation levels beyond those that may be explained by economic fundamentals. As such, related approaches typically build on factor models where observable or latent fundamental factors and financial contagion tests are applied, see for example (Bekaert et al., 2014, 2005). Forbes and Rigobon (2002) provide yet another definition, that of an increase in cross-market linkages following an economic shock in one nation. This "shift-contagion" definition has the advantage of using correlation values that are intuitively straightforward to interpret and integrate well within the financial integration framework (Bekaert et al., 2009). Furthermore, this definition matches with investor perceptions about risk. When markets drop, investors reduce their exposure to risky assets by rebalancing their portfolios, hence placing more weight on easily available public information (i.e., herding behaviour), while often ignoring fundamentals (Bekaert et al., 2014; Kumar and Persaud, 2002).

The "shift-contagion" definition became quite popular following the innovation of multivariate GARCH models (e.g., ADCC-GARCH) that were capable of producing conditional correlation estimates, while handling a large number of assets, see for example Cappiello et al. (2006), Engle (2002), Tse and Tsui (2002). Much of the empirical literature investigates the existence of contagion following some crisis event. For example, Chiang et al. (2007) and Cho and Parhizgari (2008) look into East Asian stock market exchanges and find evidence of contagion after the 1997 Asian financial crisis. Yiu et al. (2010) and Naoui et al. (2010) focus on the 2000 dot.com and the GFC crisis and find evidence of contagion between the US and East Asia. Kenourgios (2014) compares the contagion experience of developed versus developing countries across a wide range of financial crises.

A large part of the literature has focused on financial crises, such as the GFC and ESDC, with several studies investigating contagion and financial linkages in multiple frameworks, such as cross-country (Alexakis et al., 2016; Dimitriou et al., 2017, 2013; Kalbaska and Gatkowski, 2012; Ludwig, 2014; Mollah et al., 2016; Neaime, 2016; Romero-Meza et al., 2015; Suh, 2015; Wang et al., 2017), cross-industry (Kenourgios and Dimitriou, 2015), cross-asset (Aloui et al., 2015; Leung et al., 2017; Tamakoshi and Hamori, 2014a) or some combination. A variety of asset classes has been examined including equity indices (Bhatti and Nguyen, 2012; Dimitriou et al., 2013; Kenourgios et al., 2016; Luchtenberg and Vu, 2015; Pappas et al., 2016; Romero-Meza et al., 2015; Wang et al., 2017; Yang and Hamori, 2013; Ye et al., 2017), CDS spreads (Broto and Pérez-Quirós, 2014; Kenourgios and Padhi, 2012; Tamakoshi and

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[1] Official timeliness of the crises are obtained from the Bank of International Settlements (BIS, 2009) and the Federal Reserve Board (Federal Reserve Board of St. Louis (2009).

[2] The popular representation of the hard-working North versus the lazy-South has also received much attention and highlights the lack of uniformity within the EU (Charlemagne, 2010). In June 2016, a referendum in the UK highlighted that continued membership in the EU (also dubbed as Brexit) may not be desirable.