



## Eurozone crisis and BRIICKS stock markets: Contagion or market interdependence?



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### ARTICLE INFO

#### Article history:

Accepted 3 April 2013

#### JEL classification:

C22  
G14  
G15

#### Keywords:

Emerging stock markets  
Financial contagion  
Dynamic conditional correlations (DCC–GARCH)  
Financial crisis  
Eurozone crisis

### ABSTRACT

This paper examines the financial contagion in an emerging market setting by investigating the contagion effects of GIPSI (Greece, Ireland, Portugal, Spain and Italy), USA, UK and Japan markets on BRIICKS (Brazil, Russia, India, Indonesia, China, South Korea and South Africa) stock markets. During Euro-zone crisis period (October 19, 2009–January 31, 2012), the empirical results indicate that among GIPSI countries, Ireland, Italy and Spain appear to be most contagious for BRIICKS markets compared to Greece. The study reports that Brazil, India, Russia, China and South Africa are strongly hit by the contagion shock during the Eurozone crisis period. However, Indonesia and South Korea report only interdependence and not contagion. From policy perspective, the findings provide useful implications for possible decoupling strategies to insulate the economy from contagious effects. For multilateral organizations like International Monetary Fund (IMF) and World Bank, the study will provide an important direction in undertaking coordinated rescue measures for the vulnerable as well as contagious countries.

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### 1. Introduction

As emerging economies aspire to become truly modern and developed nations, one of the key challenges that these countries face is to address the issue of heavy dependence on mature economies. Progress towards self-dependence is typically measured by examining variety of indicators such as macroeconomic integration, stock market correlations, business cycles synchronization, etc. The recent global economic crisis and ongoing Eurozone turmoil have once again revived the interest of researchers and policy makers to investigate the emerging economies with regard to their self-reliance and decoupling potentials (see Claessens et al., 2010; Fidrmuca and Korhonen, 2010; Kose et al., 2012; Lane and Milesi-Ferretti, 2011). The Global Competitiveness Report (2012–2013); see, World Economic Forum, 2012) acknowledges the impact of these crises on emerging countries. Further, due to fragile recovery of USA and troubled European countries, World Economic Outlook (IMF, 2012) also reports the underperformance of emerging economies in terms of achieving economic growth in 2012 compared to previous year. As a consequence, the gloomy economic outlook of emerging markets has attracted a great deal of attention of regulators and investors to examine their dynamic relationship with

developed countries. In this light, the present study attempts to examine the stock market correlations between emerging and mature markets particularly the five most vulnerable countries of Euroarea popularly known as GIPSI<sup>3</sup> (Greece, Ireland, Portugal, Spain and Italy). For emerging markets, we consider 'BRIICKS', which is a pool of seven economies viz., Brazil, Russia, India, Indonesia, China, South Korea and South Africa, that is considered as the hub of investment and portfolio diversification and sometimes treated as single homogenous financial asset class in the world. The initial version of this acronym was coined by Goldman Sachs as 'BRIC' which later extended by including Indonesia and South Korea in 2010 (see Global Development Horizon, 2011, World Bank). South Africa is included in 2011. However, the recently concluded meeting of BRICS held in New Delhi, India, did not include South Korea and Indonesia in the acronym. But in our study, we carry out the empirical analysis on its extended version as BRIICKS, by including those two economies due to their strong economic and trade relations with other emerging markets.

The analysis of cross market correlations is of great significance with regard to the cross-country optimal portfolio allocation and risk management. In the literature, several studies have examined the process of time-varying cross market correlations especially at the time when the economy is completely in the grip of downturn caused by the rapid transmission of shocks originating from neighboring or far distant country (see Aloui et al., 2011; Cappiello et al., 2006; Kim et al., 2005; Marçal et al., 2011; Phylaktis and Ravazzolo, 2005; Samarakoon, 2011). A

<sup>3</sup> Shambaugh (2012) uses this acronym to represent the five troubled economies of Eurozone.

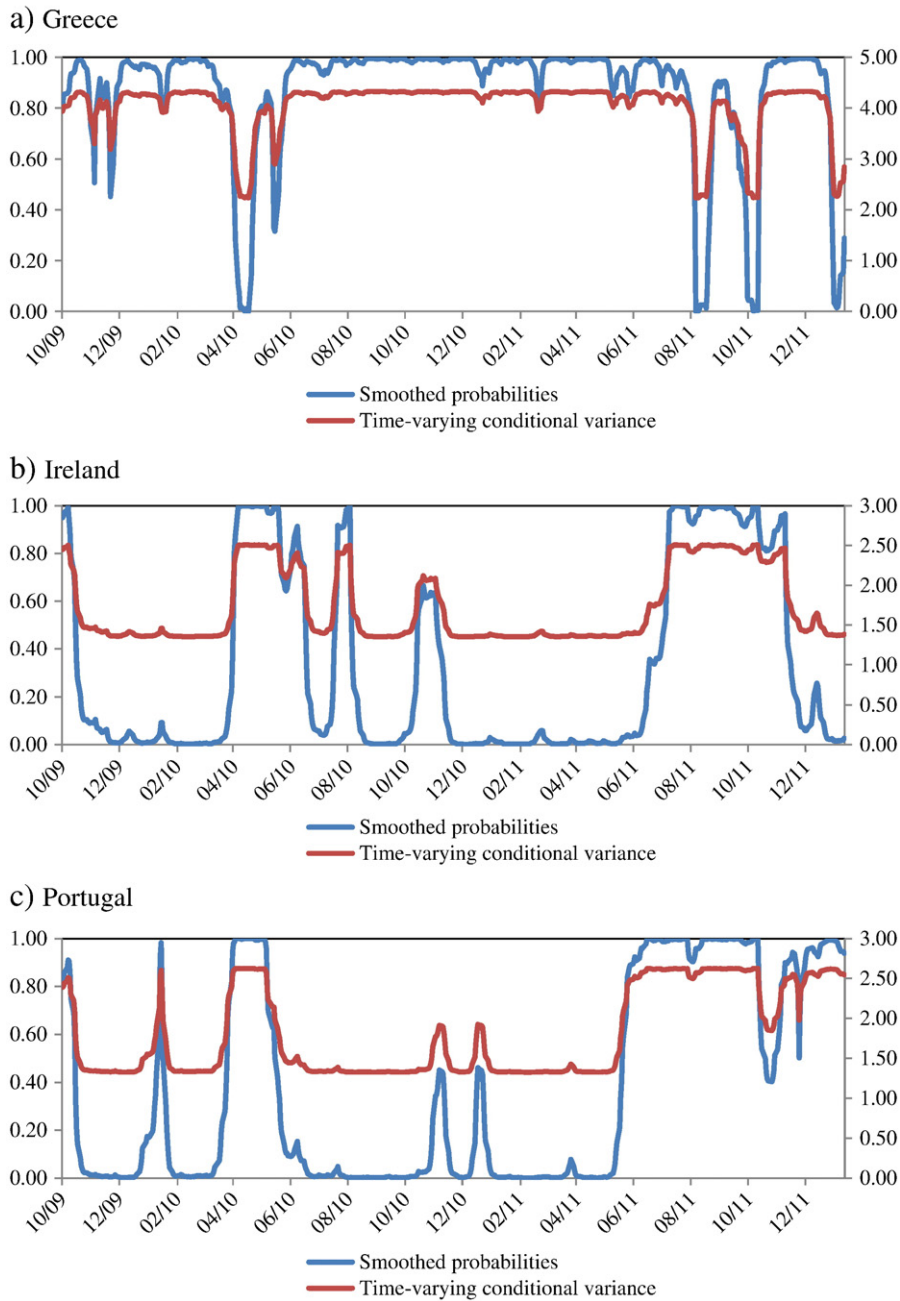
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**Fig. 1.** The figure exhibits X-axis as the year and the Y-axis on the left and right handside shows between 0 and 1 and time-varying conditional variance, respectively. Smoothed state probabilities are calculated from two-state models for GIPSI's stock market returns. We have considered all countries and crisis index in order to identify the crisis period after analyzing the possible periods with very high probabilities. The plotted graphs exhibit smoothed probability of regime 1 being volatile regime with negative returns and regime 2 as stable regime with positive returns estimated from the Markov mean-variance switching model.<sup>4</sup>

$$r_t = \mu(S_t) + \sum_{i=1}^k \phi_i (r_{t-i} - \mu(S_{t-i})) + \sigma^2(S_t) \varepsilon_t$$

where  $S_t$  and  $S_{t-i}$  are unobserved regime variables that take the values of 1 or 2 and the transition between them are governed by a first order Markov process as:  $P = \{P_{ij}\} i, j = 1, 2 \dots m$ ; mean  $\mu$  and variance  $\sigma^2$  of the process depend on the regime at time  $t$ .  $\phi_i$  is the model parameter and  $\varepsilon_t$  is an i.i.d  $N(0, 1)$  random variable. Following, Wang and Theobald (2008), the time-varying volatility of each market based on the complete set of information up to  $T$ , is calculated as follows:

$$E(\hat{\sigma}_t^2 | \hat{\Omega}_T) = \hat{\sigma}_1^2 E[S_t = 1 | \hat{\Omega}_T] + \hat{\sigma}_2^2 E[S_t = 2 | \hat{\Omega}_T] \tag{5}$$

where  $\hat{\sigma}_1^2$  and  $\hat{\sigma}_2^2$  are estimated corresponding volatilities of both the regimes.  $\hat{\Omega}_T$  is set of information under consideration.

significant increase in cross market correlations during the crisis period is referred as contagion which in general term defined as the spread of financial shocks from one country to others (see Ang and Bekaert,

1999; Chiang et al., 2007; Dooley and Hutchison, 2009; Forbes and Rigobon, 2002; Lessard, 1973; Longin and Solnik, 1995, 2001; Solnik, 1974; Syllignakis and Kouretas, 2011 etc.). The burgeoning literature on financial contagion indicates that the stock markets in crisis-hit countries normally indicate higher levels of interdependence,

<sup>4</sup> The results are available upon request.

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