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## On emerging stock market contagion: The Baltic region



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### ABSTRACT

This study provides new evidence on emerging stock market contagion during the Global Financial crisis (GFC) and the Euro zone Sovereign Debt Crisis (ESDC). Focusing on the three emerging Baltic markets and developed European markets, proxied by the EUROSTOXX50 stock index, we explore asymmetric dynamic conditional correlation dynamics across stable and crisis periods. Empirical evidence indicates a diverse contagion pattern for the Baltic region across the two crises. Latvia and Lithuania were contagious during the GFC, while they were insulated from the adverse effects of the ESDC. On the other hand, Estonia decoupled from the negative consequences during the global turmoil period, but recoupled during the ESDC. The results could be attributed to financial and macroeconomic characteristics of the Baltic countries before and after the turmoil periods and the introduction time of the Euro as a national currency.

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### 1. Introduction

The study of the contagion effects between developed and emerging stock markets during turmoil periods is a crucial subject of research in the portfolio management practice. According to the traditional portfolio theory, a major question is whether the emerging markets are less affected by the crises and thus could provide better diversification benefits. As a response to this question, a number of studies provide evidence on the decoupling–recoupling hypothesis during the global financial crisis. According to the decoupling hypothesis, many emerging market countries had undertaken reforms (i.e. increases in reserve assets and substantial reductions in net government debt) and so were insulated (decoupled) from the negative consequences during the turmoil period. However, they recoupled dramatically as the crisis deepened affecting sharply the global financial and macroeconomic environment.

There is a large body of literature which investigates contagion across emerging equity markets of various regions around the world during the global financial crisis. For example, [Dooley and Hutchison \(2009\)](#) support the decoupling of emerging markets from early 2007 to summer 2008, while thereafter responded very strongly to the deteriorating situation in the U.S. financial system and real economy. [Samarakoon \(2011\)](#) shows evidence of contagion among USA and frontier equity markets, but not among USA and emerging markets. [Aloui et al. \(2011\)](#) find strong evidence of time-varying dependence between each of the BRIC equity markets and the U.S. markets, while [Kenourgios and Padhi \(2012\)](#) provide evidence on emerging stock market contagion of the subprime crisis of 2007. [Dimitriou et al. \(2013\)](#) show that BRICS equity markets

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decoupled from USA during the early stages of the global crisis, but their linkages re-emerged (recoupled) after the Lehman Brothers collapse. [Luchtenberg and Vu \(2015\)](#) show that contagion following the 2008 global financial crisis is not confined to emerging markets, in contrast to United States and other mature financial markets.<sup>1</sup>

Our study contributes the emerging stock market contagion literature by paying particular attention to a subset of European emerging markets, namely the Baltic stock markets (Estonia, Latvia and Lithuania) during the two major financial crises since 2000: the Global Financial Crisis (GFC thereafter) and the European Sovereign Debt Crisis (ESDC thereafter). The contagion literature for the Baltic markets is still scarce and focuses only on the GFC. The work most closely related to ours is that by [Nikkinen et al. \(2012\)](#), who examined the linkages between developed European stock markets and the three Baltic markets with particular attention to the GFC of 2008–2009. They found that, while Baltic stock markets were apparently segmented before the crisis, they were highly integrated during the crisis. Therefore, the inclusion of the ESDC into our contagion analysis may also reveal several interesting aspects for the behavior of these European emerging markets during different turmoil periods.

The Baltic region provides an interesting environment for further research given their high rates of economic growth in the years prior to the GFC and ESDC, their EU membership status as well as the adoption of Euro as a national currency. Earlier literature examines the integration of the Baltic equity markets. For example, [Mateus \(2004\)](#) supports the partial integration of the Baltic stock markets with respect to the world market during the period 1997–2002. [Maneschiöld \(2006\)](#) shows that the Baltic markets exhibit a low degree of integration with developed international markets (US, Japan, Germany, UK, and France) during the period 1996–2005.<sup>2</sup>

To provide a robust analysis of the contagion dynamics between the Baltic stock markets and the developed European stock markets, proxied by the EUROSTOXX50 index, we estimate asymmetric dynamic conditional correlations (DCCs) into a Fractionally Integrated Asymmetric Power ARCH (FIAPARCH) framework, and then test their statistical significance across the two crises using appropriate dummies.<sup>3</sup> This approach follows the standard definition in the literature of contagion as a significant increase in correlation between stock indices in different markets during a crisis period, beyond the linkages in fundamentals ([Forbes and Rigobon, 2002](#); [Chiang et al., 2007](#); [Dimitriou et al., 2013](#)). This type of “pure” contagion relates to shifts in investors’ appetite for or aversion to risk and it is distinguished from other types appeared in the literature, such as the wake-up call contagion and the “shift” contagion (for a discussion of each contagion type, see [Chiang et al., 2007](#); [Dungey and Gajurel, 2014](#)).

Our results show a diverse pattern of contagion for the Baltic region across the two crises. Latvia and Lithuania displayed contagion during the GFC, while were immune to the adverse effects of the ESDC. On the other hand, Estonia decoupled from the negative consequences during the global turmoil period, but recoupled during the ESDC. These findings could be attributed to their financial and macroeconomic characteristics before and after the turmoil periods and the introduction time of the Euro as a national currency, while provide important implications for portfolio diversification strategies.

The remainder of this paper is organized as follows. Section 2 presents the methodology used to analyze financial contagion. Section 3 describes and analyzes the data, as well as the GFC and ESDC period identification. Section 4 presents the empirical results. Section 5 concludes.

## 2. Benchmark model: FIAPARCH(1,d,1)-A-DCC

Firstly, we specify the returns equation as follows:

$$r_t = \varphi_0 + \varphi_1 r_{t-1} + \varepsilon_t, \varepsilon_t \sim \text{n.d.} \quad (0, H_t) \quad (1)$$

where  $r_t = [r_{1t}, r_{2t}]'$  is a  $2 \times 1$  vector including each stock index series and  $\varepsilon_t = [\varepsilon_{1t}, \varepsilon_{2t}]'$  is a  $2 \times 1$  vector of innovations conditional on the information set at time  $t-1$ . The error term is assumed to be conditionally multivariate normal with mean zero and the variance–covariance matrix is specified as follows:

$$H_t = E[\varepsilon_t, \varepsilon_t'] = D_t P_t D_t \quad (2)$$

<sup>1</sup> In another strand of the contagion literature, [Bekaert et al. \(2014\)](#) investigate the contagion of the GFC across 55 developed and emerging countries and 415 country-sector equity portfolios and find that contagion mainly occurred through domestic channels. [Kenourgios and Dimitriou \(2015\)](#) examine ten sector stock indices in six developed and emerging regions during different phases of the GFC and find that some sectors in particular Consumer Goods, Healthcare and Technology across all regions seem to be less affected by the crisis, while the most vulnerable sectors are observed in the emerging Asian and European regions.

<sup>2</sup> Other studies on the European emerging stock market integration have focused on the Central and Eastern European countries and the Balkan region (e.g., [Voronkova, 2004](#); [Kenourgios and Samitas, 2011](#); [Horvath and Petrovski, 2013](#)).

<sup>3</sup> This methodology avoids two major limitations of the conventional approaches. First, there is a heteroskedasticity problem when measuring correlations caused by volatility increases during a crisis. Second, contagion must involve evidence of a dynamic increment in the regressions, affecting at least in the second moments correlations and covariances. For a review of conventional and advanced methods used in the literature to analyze emerging stock market contagion, see [Dimitriou et al. \(2013\)](#).

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