Research in International Business and Finance 45 (2018) 307–322

Contents lists available at ScienceDirect

Research in International Business and Finance

journal homepage: www.elsevier.com/locate/ribaf

Full length Article

Modeling financial market volatility in transition markets: a multivariate case☆

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ARTICLE INFO

JEL classification:
G01
G15

Keywords:
Multivariate EGARCH models
Spillover effects
Transition markets
Equity markets

ABSTRACT

This paper presents evidence of equity market linkages in the following transition economies: Russia, Ukraine, Poland and Czech Republic from beginning of January 2005 till the end of December 2014. I apply a multivariate asymmetric EGARCH model. Empirical results indicate significant return and volatility spillover effects during the full sample, the "Great Recession" and Ukrainian political crisis episodes. Over the full sample period, there is evidence of return co-movements, and strong volatility persistence. During the "Great Recession" subsample, the own-return effects of the markets are stronger than the cross-market effects and their correlations have increased. Finally, the Ukrainian political crisis indicated no clear information producer, whereas, evidence of returns co-movement still exists. The markets in question are mainly partially integrated and the volatility transmission linkages across them are not that strong in crises periods, thus confirming previous literature on the particularities of emerging and frontier markets.

1. Introduction

Volatility is a crucial factor for assessing the performance of financial markets with very volatile ones being perceived as not functioning effectively towards channeling savings into investment (Bauwens et al., 2012). Therefore, a good modeling of the sources, magnitude and persistence of volatility in equity markets is crucial in making informative investment decisions about pricing local securities, implementing appropriate hedging and asset allocation strategies, as well as developing and implementing regulatory recommendations to restrict international capital flows.

Motivated by the ongoing Ukrainian political crisis, the purpose of this paper is to uncover whether financial market shocks are transmitted across regional equity markets. Specifically, I focus on several transition equity markets, since there is a lack of empirical studies focusing on this region and in particular on the Ukrainian frontier transition market. My paper aims to answer the following research questions: Is the volatility of a market leading the volatility of other markets? Does the shock on a market increase the volatility in another market? Do the correlations between stock market returns vary over time? Are they higher during periods of higher volatility (usually linked with financial crises)? Are the markets in the region interdependent or driven by their own-volatility effects, in a longer time horizon?

In this vein, a large number of theoretical and empirical studies has attempted to better understand comovements, interdependencies and linkages across equity markets. Beirne et al. (2010) assess global and regional spillover effects in 41 emerging markets in Europe, Asia, Latin America and Middle East. Their results indicate the existence of spillovers to regional and global markets in most of the emerging markets. However, although spillovers in mean returns are present in emerging Asia and Latin

☆ I would like to thank the DFG (German Research Foundation), Germany RTG 1723 for financial support towards preparing the current research paper.
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http://dx.doi.org/10.1016/j.ribaf.2017.07.163
Received 7 April 2016; Received in revised form 4 October 2016; Accepted 6 July 2017
Available online 26 July 2017

America, spillovers in variance play a major role in Emerging Europe.

My contribution in the literature is three fold. First, I focus on transition markets where there is limited empirical literature. The selection of emerging/frontier markets has been done intentionally in order to serve as a comparison to the initial application of this model to advanced European equity markets. Second, I examine potential transmission effects of the regional financial crises, "Great Recession" and Ukrainian political crisis. The regional character and the effects of the Ukrainian political crisis have not been studied in any other research paper before. This has implications for investors interested in investing in the region as well as on the frontier Ukrainian market in particular. Frontier markets by definition are supposed to be less correlated with the other markets and mainly driven by their own-effects, therefore they can be used by investors for portfolio diversification purposes. In addition, the Ukrainian stock market has not been included in another study in the past. For instance, Beirne et al. (2010) have not included the Ukrainian stock market from their analysis on Emerging European markets. Third, my methodological approach follows Koutmos (1996) methodological approach which has not been applied to an emerging/frontier market context. I also want to stress the fact that the principal focus of this study is to assess the regional implications of mean and volatility spillovers in selected Emerging European equity markets rather than provide a more general picture on global mean and volatility spillovers which has already been studied in the past.

The paper is organized as follows. Section 2 presents an overview of the related literature and Section 3 provides a description and analysis of the data used in this study. Section 4 describes the methodology and Section 5 analyzes the empirical results. Finally Section 6 concludes and summarizes the key findings.

2. Literature review

In the empirical finance literature, an extensive body of studies explores how financial crises are transmitted to domestic and international markets, usually referred as *contagion* (Forbes and Rigobon, 2002; Karanasos et al., 2014; Kenourgios et al., 2011).

As previously mentioned, another strand in the literature examines linkages and interdependences across international financial markets. These terms are usually referring to normal periods. Hamao et al. (1990) examine the interdependence of returns volatility across three developed stock markets and provide evidence of unidirectional volatility spillovers from US to Japanese stock market. Conversely, Lin et al. (1994) find bidirectional linkages between the former two stock markets. Koutmos and Booth (1995) assess the linkages among US, Japanese and UK stock markets by applying an asymmetric Multivariate EGARCH model that differentiates between good and bad news effects. Their findings suggest that volatility spillovers are higher when news is bad and when prices fall in the latest market to trade before opening. Booth et al. (1997) applied the same methodology and provided evidence on price and volatility spillovers among Scandinavian stock markets. Their findings are also in line with Koutmos and Booth (1995) that volatility transmission is asymmetric with negative news having larger importance than positive ones. Golosnoy et al. (2015) apply a four-phase model which is based on a conditional autoregressive Wishart framework for realized variances and covariances. They also quantify intra-daily volatility spillovers within and across the US, German and Japanese stock markets before and during the sub-prime crisis. Their findings suggest important short-term spillovers from one stock market to the next trading market.

Factor models such as the ones developed by Bekaert and Harvey (1997) and Ng (2000) are also alternative methods of modeling the volatility behavior in equity markets. Cuadro-Sáez et al. (2009) analyze the transmission of emerging market shocks to global equity markets. Using a large dataset with both mature and emerging markets, they find that emerging market shocks have a statistically and economically significant impact to global equity markets, thus confirming their initial assumption of systemic importance of the emerging market economies as drivers of global asset price developments.

Scheicher (2001) examines whether the equity markets in Poland, Hungary and Czech Republic are regionally and globally integrated by estimating a vector autoregression with a multivariate GARCH component. His empirical findings suggest that volatility innovations have a regional character whereas returns are influenced by both regional and global shocks. Li and Mayeroska (2008) examine the linkages among Warsaw, Budapest, Frankfurt and US stock markets by using an asymmetric multivariate GARCH model. They find evidence of unidirectional return and volatility spillovers from developed to emerging markets, thus suggesting portfolio diversification benefits from risk reduction and low correlation of emerging markets with their developed counterparts. Arouri et al. (2011) apply a generalized VAR-GARCH approach in order to examine the extent of volatility transmission between oil and stock markets in Europe and US at sectoral level. Their empirical results highlight volatility spillovers between oil and stock markets, which are unidirectional from oil to stock markets in Europe and bidirectional in US.

Saleem (2009) examines international linkages of Russian equity market with the rest of the world and international transmission effects of 1998 Russian financial crisis. He provides evidence of direct linkages of Russia with the rest of the world but these linkages are weak indicating partial integration of Russian equity market. His estimated results also confirm contagion effects during the Russian financial crisis with the rest of the markets.

Yavas and Dedi (2016) explore the linkages as well as the volatility transmission in Germany, Austria, Poland, Russia and Turkey, based on Exchange Traded Funds data. Their findings stress the existence of significant return comovements among the sample countries. Furthermore, there exist strong evidence of volatility spillovers as well. Baldi et al. (2016) examine to what extent shocks in stock markets impact commodity price volatility and how persistent this phenomenon is. Their empirical results indicate that volatility spillovers accentuated remarkably after the 2008 financial crises, demonstrating a rising interconnection between financial and agricultural commodity markets.