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Linkages between emerging and developed equity markets: Empirical evidence in the PMG framework



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ABSTRACT

This paper empirically investigates the international equity market causal links between Central and South-Eastern Europe, on the one hand, and developed countries (Western Europe and the United States), on the other hand, over the monthly sample period spanning from October 2000 to September 2012. Unlike previous studies, we use the pooled mean group (PMG) approach of [Pesaran et al. \(1999\)](#), which is suitable to estimate dynamic heterogeneous panels to draw reliable conclusions. After cointegration is found between the stock markets of interest, the PMG estimates show evidence of each market's sensitivity to the fluctuations of the other markets over both the short- and long-run, supporting the feedback hypothesis. The impact of developed markets on emerging markets is more important than that of emerging markets on developed markets and the bidirectional impact is higher between emerging and Western European markets than between these emerging markets and the United States. These conclusions are robust to an alternative specification, which supports the view that the stock markets are closely interlinked. The findings are of great interest and have important implications for policy makers, investors, and practitioners.

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1. Introduction

The study of the relation between Central and South-Eastern European (CSEE) stock markets and developed markets is interesting for three reasons. First, the CSEE equity markets are considered promising for regional portfolio diversification. Second, these markets are likely to be susceptible to the fluctuations of regional and international equity markets. Third, investors can benefit from investing in local and global markets, and stock exchange markets can be regulated by policy makers through the analysis of the linkage between CSEE stock markets and developed markets.

The literature related to the stock markets of the CSEE countries presents some important empirical results based on methods and approaches developed in the context of time series analysis that is, country-by-country techniques such as the vector autoregressive (VAR) process and Granger causality test, the cointegration and vector error correction (VEC) model of [Johansen \(1988\)](#), the multivariate GARCH models of [Bollerslev, Engle, and Wooldridge \(1988\)](#) (VECH-GARCH model) and [Engle and Kroner \(1995\)](#) (BEKK-GARCH model), and standard and rolling correlation analysis. In addition, most of empirical works cover few countries, especially those of Central Europe, particularly the Czech Republic, Hungary, and Poland. However, the South-Eastern European equity markets have hardly been investigated either (e.g., [Babetskii, Komarek, & Komarkova, 2007](#); [Cappiello, Gérard, Kadareja, & Manganelli, 2006](#); [Demian, 2011](#); [Egert & Kocenda, 2007](#), [Cerny & Koblas, 2008](#); [Egert & Kocenda, 2011](#); [Gilmore, Lucey, & McManus, 2008](#); [Horvath & Petrovski, 2013](#); [Li & Majerowska, 2008](#); [Voronkova, 2004](#)). This paper aims to circumvent the shortcomings noted in the literature. In this context, we innovate from the perspective of the econometric methodology used to investigate the potential of bidirectional causal links between the CSEE equity markets and developed markets. Moreover, unlike most empirical works, our investigation considers not only countries from Central Europe but also from South-Eastern Europe.

We first apply panel cointegration tests to investigate the emergence of long-run dependence between the CSEE equity markets and developed markets. Given the supported long-run relations, we assess the causal linkages between equity markets at a second stage. To the best of our knowledge, the PMG estimation approach of [Pesaran, Shin, and Smith \(1999\)](#) has not been used before in investigating such linkages in the context of dynamic heterogeneous panels. This approach allows us to obtain reliable results and to make convincing conclusions on the causal relation between the markets of interest by distinguishing between short- and long-run effects. When estimating the model, we account for the effect of the recent financial crisis on such relation to avoid spurious inferences and misleading conclusions due to neglecting this important global event.

The results show evidence of long-term dependence between all equity markets and reveal robust bidirectional causal links between the CSEE stock markets and developed markets over both the short- and long-run. The prediction power of Western European and US markets on CSEE markets is more apparent than that of CSEE markets on Western European and US markets and the bidirectional influence is greater between emerging markets and the Western European market than between emerging markets and the US market. Overall, our empirical investigation points to the usefulness of the panel techniques to analyze how the information contained in each equity market predicts fluctuations in the other markets. Our findings are of great interest and have important implications for policy makers, investors, and practitioners.

The balance of the paper is organized as follows. Section 2 reviews the related literature. Section 3 introduces the PMG econometric approach. Section 4 presents a preliminary analysis of the data, analyzes the cointegration hypothesis among equity markets, assesses the causal links between them, and conducts a further sensitivity analysis in which the robustness of the basic findings are checked. Section 5 offers concluding remarks and the policy implications of the empirical results.

2. Literature review

Over the last decades, the relation between the CSEE equity markets and their links with other developed markets has been an issue of global debate. Indeed, [Shachmurove \(2000\)](#) derives

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