Capital Market Integration. New Challenges in an Enlarged Europe

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Abstract: The purpose of this paper is to analyse the linkages between Emerging European stock markets and the developed ones, in relatively stable times that followed the global economic crisis. One of the main reasons that served as an argument in studying stock market integration relies in the prior contradictory results regarding the regional versus international interdependencies. Using a Vector Error Correction Model we tested if the Central and Eastern European markets are more internationally or regional integrated. Our findings suggest that the stock exchanges from CEE react mainly to the arrival of price innovations from the most mature market in the EU perimeter. The main contribution of this paper is that it provides further evidence on stock market integration and correlations in emerging stock markets, emphasizing new connections between London Stock Exchange and the other CEE stock markets. The results are of particular interest for both portfolio managers and policymakers.

Keywords: emerging stock markets; interdependencies; price innovation

JEL Classification: C13; G15; F21

1 Introduction

On the background of European Union accession of eleven new member states, the capital markets from Emerging Europe have registered a considerably development, which lasted until the global economic and financial crisis of 2008. Unfortunately, the global crisis revealed major EU issues, issues that are related to the institutional weaknesses of the Euro perimeter. As an example we mention: Greece did not meet the convergence criteria on a sustainable basis at the time of joining the euro area, the existence of budget deficits exceeding the 3% limit, high government debt, the mispricing of risk by capital markets and an ensuing misallocation of capital that had the effect of giving wrong incentives to policymakers, the fact that democracies and financial markets did not operate "on the same clock", the Western governments being blamed for the excessive deregulation of financial markets and for their growing dependence on borrowing (Tsoukalis, 2012), the fact the monetary policy rate is not sufficient for maintaining both price and financial stability (Schwartz, 2003), etc.

Briefly, in Central and Eastern Europe (CEE) it all started like this: the first market affected was Hungary that registered a significant reduction in portfolio investments. Shortly after, Romania and Bulgaria were contaminated; two countries that were struggling with a substantial foreign currency

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debt and a cumbersome growth in the volume of loans. The only states in the region that showed resistance during the recession are Poland and the Czech Republic. One consequence of this turmoil in which we are interested is the decrease in the European financial market integration. At present, even if the integration in financial markets improved, is still worse than before crisis.

Therefore, given the fact that the economic crisis of 2008 has not lost its pulse in the European perimeter, the purpose of this article is to investigate mutations within the dynamic linkages between Emerging Europe and more developed stock markets, namely, the British and Austrian markets, in the period that succeeded the crisis.

Our results generally support the increasing interdependencies between capital markets in Central and Eastern Europe and the most developed market in Europe.

The remainder of this paper is structured as follows. Section 2 describes the literature review. Section 3 presents the motivation and hypothesis of the research. Section 4 describes the analysed data. Section 5 describes briefly the methodology used. Section 6 reports on our empirical results. Section 7 concludes.

2 Literature Review

The discussion of correlations between CEE equity markets drives divergent opinions. Therefore, the first group argues for a weak interdependence among the CEE and international markets, and the second one supports the opposite of this assumption.

The first group of studies validates the hypothesis that the countries from CEE exhibit strong correlations between them, and not with the mature markets (Syriopoulos & Roumpis, 2009). In this regard, Li and Majerowska showed limited interaction between Poland and Hungary, on the one hand, and Germany, the UK and the US, on the other hand (Li & Majerowska, 2008). The authors Gilmore, Lucey and McManus Lucey found no strong relationship between British and German stock markets, on the one hand, and Hungary, Poland, Czech Republic, the other side (Gilmore *et al*., 2008). Moreover, other study emphasized the existence of a relatively modest link between French, German and British stock markets and Czech, Hungarian and Polish emerging markets (Égert & Kocenda, 2011). These authors consider the reluctant convergence as the main cause of the modest cointegration.

Standing at the border between the two contrasting views, Pajuste notified that capital markets from Central and Eastern Europe behaves different correlations with EU capital markets. Thus, while the Czech Republic, Hungary and Poland show high correlations with each other and with the EU, in the cases of Romania and Slovenia this correlation is inexistent and even negative (Pajuste, 2002).

Secondly, there are a large number of empirical studies that emphasizes increasing interdependence between Central and Eastern European markets, on the one hand, and between them and the developed markets, on the other hand. Syriopoulos pointed out that capital markets from Poland, Czech Republic, Hungary and Slovakia tend to maintain strong links with their "counterparts" (Syriopoulos, 2007). In addition, Syllignakis and Kouretas showed that the links between CEE and global markets have increased with the beginning of EU accession process (Syllignakis & Kouretas, 2010). The authors also highlighted the fact that the emerging markets from CEE - except Estonia - Germany and the US have a common permanent significant component that influences the stock markets in this region on the long run. Furthermore, other authors revealed that both long-term and short-term relations between stock markets in the US and Germany and Eastern Europe were strengthened in the period 1999-2002

as compared to the period before the Russian crisis (Hsiao *et al*., 2008). Finally, Lucey and Voronkova concluded that emerging markets have become increasingly integrated with world markets and showed the existence of long-term links between UK, Germany, France and the countries of Central Europe (Lucey & Voronkova, 2008).

3 Hypothesis of the Study

The working assumption is that the interdependencies between CEE and the British stock markets are greater than the intra-regional interdependencies, at least during a more stable period that succeeded the global crisis.

The reasons of the research are multiple. First, we mention that the global turmoil still has reminiscence over the degree of European integration, which still has not reached the levels before the crisis. Second, the emerging markets from the sample are those that joined the EU in 2004, 2007 and 2013, situation that facilitates the analysis of integration differences between the three categories of European stock markets. Third, the need of the study arises from the fact that the researches in the field are contradictory in the sense that either highlight the existence of a strong link between CEE and international leaders, or suggest a strong regional link.

4 Data

The analysed states are: the Czech Republic, Hungary, Poland, Bulgaria, Romania, Republic of Croatia, Austria and United Kingdom. The stock indexes are: PX50 Index for Prague Stock Exchange, BUX for Budapest Stock Exchange, WIG40 for Warsaw Stock Exchange, SOFIX for Bulgarian Stock Exchange- Sofia, BET for Bucharest Stock Exchange, CROBEX10 for Zagreb Stock Exchange, ATX for Vienna Stock Exchange and FTSE100 for London Stock Exchange.

The first six indices we considered to be representative for Central and Eastern Europe, while the last two indices belong to the developed markets. We have chosen these indexes because we want to highlight the interdependencies between emerging stock markets in Europe and the largest regional market - Vienna Stock Exchange - and European market – London Stock Exchange. We chose Austrian stock market for simple reasons: the intense financial relations between it and emerging Europe and the recent formation of CEESEG group. We chose the British Stock Exchange on the grounds that it is a commonly used proxy used to demonstrate the links between international markets.

The frequency of the data is daily. The time series are expressed in national currency and are collected from the Thomson Reuters Datastream. The period of analysis is from January 1st, 2010 to August 31st, 2014.

5 Methodology

In attempting to validate our assumption we used the Vector Error Correction Model (VECM) of size eight, the following variables: the logarithmic series of the Czech stock index (ln_CZ), the logarithmic series of the Hungarian stock index (ln_HU), the logarithmic series of the Polish stock index (ln_PL), the logarithmic series of the Bulgarian stock index (ln_BG), the logarithmic series of the Romanian stock index (ln_RO), the logarithmic series of the Croatian stock index (ln_HR), the logarithmic series of the Austrian stock index (ln_AT), the logarithmic series of the British stock index (ln_GB).

Briefly, the steps made in order to fit the appropriate VECM are the following:

1. Testing the stationarity of the variables in order to find the order of integration through performing the tests: Augmented Dickey-Fuller (ADF), Kwiatkowski-Philips-Schmidt-Shin (KPSS) and Phillips – Perron (PP). According to the tests' results, all the variables have a unit root, and thus, being integrated of order I;

2. The fact that our analysis focuses on eight stock indexes is indicating the possible presence of equilibrium relations between them. To check this we applied the Johansen Cointegration test and for an increased robustness we have used the Engel-Granger methodology. In order to obtain results with higher accuracy, we followed the study of Lutkepohl (2004) and performed Johansen test in pairs of two variables, and then we introduced the eight variables in the system. The presence of cointegration vectors requires the use Vector Error Correction Model (VECM) with the following specifications:

$$\Delta Y_t = \Pi Y_{t-1} + \Gamma_1 \Delta Y_{t-1} + \cdots + \Gamma_{p-1} \Delta Y_{t-p-1} + u_t$$

Where Y_t is a vector of size (K X 1) of the endogenous variables, with r cointegrating vectors and the number of lags resulted in the VAR estimation minus one, u_t is the error term. K is the number of variables and is equal to eight. The vector of endogenous variables Y_t is represented as follows:

$$Y_t = \begin{bmatrix} \ln\_GB \\ \ln\_AT \\ \ln\_PL \\ \ln\_CZ \\ \ln\_HU \\ \ln\_RO \\ \ln\_BG \\ \ln\_HR \end{bmatrix}$$

The order of variables is recursive, according to the market capitalization.

3. In order to check the VEC model, we use the following tests: the descriptive analysis of residuals - to see the distribution of residuals, Portmanteau test for autocorrelation test, Breusch-Godfrey LM test to determine the order autocorrelation of residues, ARCH-LM test - to test the homoscedasticity, Jarque-Bera test for normality vector observe residual values.

The VEC analysis is finalized, in our case, with the error variance decomposition.

6 Empirical Results

Table 1 presents the descriptive statistics of the eight indexes returns throughout the analysed period. In the descriptive analysis of the variables we chose the returns of the indexes because they provide noteworthy information in examining and explaining the evolution of stock indexes.

Table 1. Descriptive Statistics for National Stock Market Indices

Index	Mean	Std. dev.	Skewness	Kurtosis	Jarque-Bera
FTSE100	9.33E-05	0.011800	-0.321017	5.466501	176.7409
ATX	-0.000324	0.016828	-0.258197	6.138273	275.2237
WIG40	-8.94E-05	0.010956	-1.539074	12.09557	2508.727
PX50	-0.000327	0.013373	-0.522247	7.890552	680.4388
BUX	-0.000285	0.016509	0.103166	6.927988	420.9581
BET	-2.01E-05	0.016183	-0.909599	17.84789	6088.387
SOFIX	-0.000464	0.009159	-0.188302	6.177853	278.6291
CROBEX10	-0.000278	0.008984	1.032099	18.33245	6512.180

Source: author's calculations

At first glance, the data in the table supports the idea that almost all the indexes offer negative average returns, but the asymmetric distributions characterizing the examined series makes this indicator of central tendency not to be significant because it is heavily influenced by the values of tail. In addition, we see that the highest values of standard deviation are recorded on the stock markets of Austria, Hungary and Romania, but the differences are not large compared to the values of the other markets. The global economic crisis can be a reason for flattening the differences between advanced and emerging market volatilities. The indicator skewness is negative, with the exception of Hungary and Croatia, implying that the distribution is skewed to the right, having more extreme values to the left. The values of kurtosis are high, indicating that the distribution of all indices is leptokurtic. The characteristic of this distribution is that the probability of extreme events is high. Therefore, the two indices of symmetry measurement are sensitive to extreme observations, and the high values recorded by them are clearly related to global crisis. Also, the Jarque-Bera test highlights the pronounced deviation from normality in all the cases.

Table 2 shows the variance decomposition for the fitted eight dimensional VECM(1) with r=2.

Firstly, the table below shows that, in a horizon of one day, Polish, Romanian, Bulgarian and Croatian indexes are explained, in the highest proportion, by their own innovations. This result is consistent with that of the study authors and Li & Majerowska (2008) that showed that in the short-run emerging stock markets are determined mainly by specific country risk factors rather than external ones. Regarding the developed market importance, in this horizon, the movements registered by WIG40, PX50 and BUX are mainly determined by the FTSE index. Therefore, we can split our sample in two entities: one that has a higher degree of integration with the most developed market from Europe (Poland, Czech Republic and Hungary), being more sensitive to the shocks from London Stock Exchange, and one that does not react instantaneous to the news coming from the mature market (Romania, Bulgaria and Republic of Croatia).

However, at longer time horizon, this situation is changed. In this regard, Bucharest Stock Exchange and Zagreb Stock Exchange join the other stock markets that are mainly influenced by the British market. In Bulgaria the situation is different. The most important variation of the index (over 80%) is explained by its own innovations, while the shocks of FTSE100 and ATX sums up just over 15%.

Secondly, we would have expected that the formation of CEESEG in and the acquisition of majority shareholdings of Hungarian and Czech stock market lead to a significant increase interdependencies between them. Perhaps, following the example of another group in the area exchange, Nasdaq OMX Baltic, better strategies and medium and long term measures will drive in this direction.

Thirdly, from the variation in the analysed indices, a relatively small proportion, ranging from 2-10% is explained by the variation of the CEE indices.

Table 2. Variance decomposition of CEE stock market indexes

Index	Horizon	I_{OWN}	I_{FTSE}	I_{ATX}	I_{CEE}
ln_WIG	1	53.67674	42.33649	3.986773	0.000000
	10	41.70158	51.55834	4.591819	2.148254
ln_PX	1	39.73221	40.26982	17.45449	2.543479
	10	22.10829	48.15042	20.04012	9.701170
ln_BUX	1	49.31946	39.40850	6.385590	4.886450
	10	48.50330	37.24264	6.397480	7.856580
ln_BET	1	64.00564	22.89666	5.586654	7.511047
	10	48.51785	37.71800	7.234390	6.529766
ln_SOFIX	1	90.70608	3.098918	1.360094	4.834907
	10	82.55233	13.31721	2.575674	1.554794
ln_CROBEX	1	72.46432	16.41805	4.377623	6.740007
	10	57.97371	32.96453	5.825022	3.236733

Source: author's calculations

In conclusion, we have highlighted the existence of a relatively large influence on CEE capital markets from the British market and, to a lesser extent, an inter-regional integration. Therefore we place ourselves in the same line with the findings of Syriopoulos (2007) who showed that market movements in Central Europe mainly come from developed international markets.

7 Conclusions

To summarize, we have validate our hypothesis of high impact of most developed markets in the globe on Emerging Europe markets, after the big degringolade – except for Bulgaria. Firstly, this result can be directly utilized by portfolio managers in planning portfolio diversification strategies in accordance with the expected future volatility and risk measurement. They lead to the argument that investor can benefit, at least in the short run, from diversifying into the Central and Eastern European equity markets. Secondly, the stock market is often considered the "barometer" of economy, and for good reason, since the feedbacks received from this segment, the most dynamic of the nominal economy, play the role of a seismograph for the evolution of the entire economic system. Here, especially in times of crisis, novel things are occurring for which neither the standard theory, nor the "class lesson" do not find riveted answers. Therefore, the pragmatic utility of this study lies in the real force of prediction that a responsible policy maker is not allowed to disregard.

Given that most influence is coming from the British market, we can further research the determinants of volatility in this perimeter, considering as proxy for external shocks the FTSE100 index.

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