

# STOCK MARKET DEVELOPMENT IN CEE COUNTRIES – THE PANEL DATA ANALYSIS

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**Abstract.** *Since financial system development is a necessary condition of the long-run economic growth, in this paper we address the question about the factors that may drive in particular the development of stock market segment. We propose a set of potential determinants and then empirically verify their importance, employing panel data methodology. We focus our attention on the thirteen CEE states and look for the conclusions that may be specific for transition economies in this region. Finally, we formulate the finding that large budget deficits have affected significantly and adversely the CEE countries' stock markets growth.*

**Key words:** *stock market development, macroeconomic stability, fixed and random effects models*

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## 1. Introduction

The need of establishing an effective financial system has been one of the top priority points in the transition strategies of the CEE countries. It is not surprising since these “catching up” economies have required a significant increase both in the quantity and quality of investments. The financial system that fulfils three crucial functions, i.e. mobilizes savings, reduces the information asymmetry between borrowers and lenders and provides the tools of risk management, seems to be therefore a necessary condition of the successful convergence process. This conclusion has a long tradition in the history of economics and has been confirmed by numerous studies (Bagehot, 1873; Schumpeter, 1911; Patrick, 1966; Roubini, Sala-i-Martin, 1992).

In theory, two ideal types of financial system – market-based (Anglo-Saxon system) and bank-based (German system) – can be distinguished. As Grosfeld (1994) points out, at the beginning of the transition process CEE governments tended to support the Anglo-Saxon model, often being treated as the symbol of capitalism. However, the legacy of the central-planned economy in which bank deposits were the only investment instrument and bank credit was the only source of external financing, pushed the reformers to realize the German type scenario.

It is not clear which type of a system better supports the long-run economic growth. Yet it is well recognized that there are some differences between banks and financial

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markets in realizing the mentioned three functions. Allen and Gale (2000) stress the fact that financial markets are better prepared to finance innovative projects in which the main problem is assessing the profitability of such a business. Having in mind the markets' information efficiency and rational expectations hypothesis, a lot of market participants that express their opinions by buying or selling assets can better judge the projects than the small group of bank employees. On the other hand, in order to provide the incentives for borrowers to truly report the effects of investments projects, a single bank monitoring a lot of agents and exploiting the economies of scale decreases the cost of financial intermediation.<sup>1</sup> Therefore, we prefer to consider banks and markets as complements rather than substitutes.

Despite the fact that the bank-based system dominates in these states, the financial markets as noted above are the second pillar of an effective system, and their size in these countries is rapidly growing. Hence, it is useful to identify the factors that drive the financial market development.

Naceur *et al.* (2005) while analyzing data from twelve MENA countries found a strong support evidence that in these economies stock market development was driven by a few factors. Real GDP, monetization ratio, stock market liquidity, inflation rate were the most significant variables in the estimated regressions. Yartey (2008) puts a lot of attention to the institutional dimension of the stock market development. Controlling the measures that tended to be significant in the previous studies, he confirmed the positive influence of governance factors such as political risk, law and order, and bureaucratic quality in the group of 42 emerging economies for the period 1990 to 2004. Another interesting conclusion was formulated by Hryckiewicz (2009) who found that in the CEE economies the activity of the institutional investors, mainly driven by the pension reforms, contributed a lot to the stock market development.

In this study, we intended to verify empirically the determinants of the stock market development once again. Our contribution to the existing literature would be twofold:

- we use data on thirteen CEE states for the years 1996-2006. We think that the updated period of verification may influence some results. In the previous studies, the inflation rate was used as the measure of macroeconomic stability. However, from the late nineties, inflation is not so a severe problem in most of the CEE economies as it was at the beginning of the transition period. According to Ocampo (2005), macro-stability is a multidimensional phenomenon, so we propose to focus attention on fiscal deficit;
- due to a short time series, the effect of accessing the European Union and its influence on the stock market development has not been tested yet, hence we would like to assess its importance.

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<sup>1</sup> For a comprehensive discussion about the differences between banks and financial markets, see Dolar and Meh (2002).

We pay attention only to stock markets due to the data availability to create a large cross-country panel. However, we believe that some conclusions may be valid also in the case of other segments of financial market.

## 2. Methodology and data

To assess the importance of the factors under study in the stock market development, we employ the panel data approach. The panel data methodology is used in situations when we utilize data for multiple  $N$  objects (in our case countries) observed in two or more  $T$  periods (in our case years). The baseline form of our model would be then

$$CAP_{it} = \alpha + \beta'x_{it} + \varepsilon_{it}. \quad (1)$$

For  $i = 1, \dots, N$ , ( $N = 13$ ) and  $t = 1, \dots, T$  ( $T = 12$ ) and where  $CAP_{it}$  is the measure of the stock market development in the country  $i$  at time  $t$ ,  $\alpha$  is the common intercept,  $x_{it}$  is the  $1 \times K$  vector of control variables, and  $\varepsilon_{it}$  is the error term.

Estimating the model in this form, however, may meet a serious problem. Even if we add numerous independent variables, it is possible that some of the determinants are still omitted, and such a situation leads us to the biased estimation of the model. To overcome this limitation, we use two types of models – those of fixed (FE) and random (RE) effects.

The FE model may be defined by the following formula:

$$CAP_{it} = \alpha_i + \beta'x_{it} + \varepsilon_{it}. \quad (2)$$

There is a specific  $\alpha_i$  constant term (fixed effect, group dummy) that controls for the average differences across countries in any observable or unobservable predictors. To test whether the countries have different intercepts, we employ the  $F$ -test. In the null hypothesis, the estimated constant terms are equal. The rejection of the null (low  $p$ -value) indicates the validity of the different country dummy estimates.

However, prevailing the omitted bias problem leads to another limitation in the FE model. Due to subtracting the observations from the intra-country mean, it explains only the intra-country variation, and we cannot draw any conclusions about the significance of inter-country differences.

To describe the RE model, we use the equation

$$CAP_{it} = \beta'x_{it} + \mu_{it}, \quad (3)$$

where  $\mu_{it} = \alpha_i + \varepsilon_{it}$ . The individual heterogeneity  $\alpha_i$  is assumed to be normally distributed i.e.  $\alpha_i \sim N(0, \sigma_\alpha)$  and what also differs the FE and RE specification  $\alpha_i$  is uncorrelated with  $\varepsilon_{it}$  and  $x_{it}$ . Under these strong assumptions, the RE model preserves both inter-country and intra-country variations; hence, we say that the independent variables that are significant in the RE model explain the inter-country and intra-country variations.

To decide whether the FE or RE model would be more appropriate, the Hausman test is carried out. Under the null hypothesis, both models are consistent when their estimates do not differ significantly. When this difference is statistically significant (low *p-value*), we should reject the RE model as inconsistent.<sup>2</sup>

The empirical verification strategy would be therefore as follows. First, we estimate the FE models, changing each time the set of the explanatory variables. Using the partial *F*-test, we check whether the fixed effects are significant. Then we estimate the RE model in order to employ the Hausman test. The indications of the latter test enable us to draw the final conclusions.

In this research, we used the annual data for the years 1996–2007; the study sample consisted of thirteen CEE states: Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Russian Federation, Slovak Republic, Slovenia and Ukraine. This sample covers all the CEE states on which data were available. It is also possibly diversified enough to capture the effect of the EU accession (we have 8 countries that became in this period the EU members). The collected dataset formed finally the unbalanced panel.

To measure the level of stock market development, we utilize stock market capitalization as a percentage of GDP. The data on this variable are presented in Table 1 and show that stock markets in the CEE states grew significantly over the last years. On the other hand, in most cases these values are far from the levels known from the well established market economies.

TABLE 1. **Market capitalization ratio in the selected countries**

Bulgaria		Croatia		Czech Republic		Estonia		Hungary	
1996	2006	1996	2006	1996	2006	1997	2006	1996	2006
0.07%	32.80%	14.97%	67.57%	29.15%	33.98%	22.29%	36.34%	11.68%	37.13%
Latvia		Lithuania		Poland		Romania		Russian Federation	
1996	2006	1996	2006	1996	2006	1996	2006	1996	2006
2.70%	13.45%	11.00%	34.24%	5.36%	44.00%	0.16%	26.96%	9.50%	107.12%
Slovak Rep.		Slovenia		Ukraine		USA		Japan	
1996	2006	1996	2006	1997	2006	1996	2006	1996	2006
10.21%	10.13%	3.24%	40,70%.	7.31%	40.27%	109%	148%	67%	108%

**Source:** our own study based on the World Development Indicators (2008) database.

<sup>2</sup> For a comprehensive discussion on FE and RE models, the Hausman test, see Wooldridge (2001) Chapter 10.

It is worth noting that in some countries, the relatively high initial values can be misleading due to the massive voucher privatization that took place in the nineties. The IMF (2000) pointed out that in the Czech Republic a large fraction of the listed companies were not traded and the government holdings of the enterprise shares through the National Property Fund (those not traded) accounted for about 40% of the market capitalization.

The description of the independent variables is presented in Table 2.

TABLE 2. **Independent variables**

Coefficient's symbol	Name	Description
$\beta_3$	GDP per capita (LOG_GDP)	The logarithm of GDP per capita in US Dollars at constant 2000 prices
$\beta_4$	Monetization ratio (M3)	Liquid liabilities (M3) as % of GDP
$\beta_5$	Liquidity ratio (LIQGDP)	Stocks traded, total value as % of GDP
	Turnover ratio (LIQCAP)	Stocks traded total value as % of market capitalization
$\beta_6$	CPI rate (CPI)	Inflation consumer prices (annual %)
	Budget balance (BB)	Cash surplus / deficit as % of GDP
$\beta_7$	Savings rate (S)	Gross domestic savings as % of GDP
$\beta_8$	EU accession (D)	Dummy variable, where 1 indicates EU membership

**Source:** our own study based on the World Development Indicators (2008) database.

The reasons for using the chosen set of control variables are listed below:

- *GDP per capita* – there are at least a few explanations of a positive relationship between income level and stock market development. In the short run, business cycle fluctuations significantly affect the profits of companies and their market valuation. In the long run wealthier societies may look for the new possibilities of financial intermediation other than through the banking system. It is also important that the level of *per capita* income strongly correlates with the level of education. Better educated societies may also tend to use more sophisticated financial instruments;
- *monetization ratio* – it is a measure of banking sector development. The banks that

supply financing in the form of debt may be complementary to the stock markets that deliver equity financing;

- *liquidity ratio and turnover ratio* – we use these two measures alternatively. The more stocks are traded, the more quickly and cheaply the investors can rebalance their portfolios. Hence, market liquidity decreases investment risk;
- *CPI rate and budget balance* – we also use these two measures alternatively, treating them as measures of macroeconomic stability. Traditionally, the CPI rate is used for this purpose. However, we think that for the selected countries and periods, the budget balance variable (budget revenues minus budget expenses) is more accurate. The budget balance is very often viewed as the measure of politicians' attitude to the market reforms.
- *savings rate* – a higher savings rate means more funds to invest. This factor should contribute positively to the stock market capitalization;
- *EU accession* – the vast majority of the empirical studies indicate that EU membership positively affects economic growth; therefore, we can expect a higher valuation of the listed companies.

In all estimated models, we add to the set of regressors the lagged dependent variable in order to capture the dynamic effect in the stock market development and to get rid of a possible autocorrelation. The appropriate coefficient is denoted as  $\beta_2$ .

To summarize, we expect the following coefficient signs:

TABLE 3. **Expected coefficient signs**

$\beta_2$	$\beta_3$	$\beta_4$	$\beta_5$	$\beta_6$ (CPI)	$\beta_6$ (BB)	$\beta_7$	$\beta_8$
+	+	+	+	–	+	+	+

**Source:** our own study.

The data were obtained from the World Development Indicators (2008) database.

### 3. Empirical results

The estimation of the FE and RE model variables led us to the following results:

TABLE 4. **FE model estimation results**

	(1)	(2)	(3)	(4)
CAP(-1)	0.5261 [0.0000]	0.4874 [0.0001]	0.6484 [0.0000]	0.4570 [0.0002]
LOG_GDP	18.1807 [0.0000]	8.2451 [0.0953]	11.1780 [0.0308]	2.6420 [0.6422]

M3	0.137234 [0.0367]	0.2901 [0.0014]	0.317471 [0.0020]	0.3657 [0.0002]
LIQGDP	0.495173 [0.0000]	0.4016 [0.0021]	–	0.3915 [0.0022]
LIQCAP	–	–	0.050254 [0.0020]	–
CPI	-0,0004 [0.9323]	–	–	–
BB	–	0.8075 [0.0040]	0.44984 [0.3043]	0.9645 [0.0010]
S	-0.0874 [0.6845]	0.069809 [0.7792]	–	–
D	–	–	–	2.4036 [0.0726]
Number of observations	139	108	101	108
adj. R <sup>2</sup>	0.8086	0.8464	0.8740	0.8547
F-test	4.5555 [0.0000]	3.6555 [0.0001]	3.8598 [0.0001]	4.1422 [0.0000]

**Note:** *p-values* in brackets.

**Source:** our own estimates.

TABLE 5. **RE model estimation results**

	(1)	(2)	(3)	(4)
CAP(-1)	0.8825 [0.0000]	0.7230 [0.0000]	0.9801 [0.0000]	0.7793 [0.0000]
LOG_GDP	-0.5873 [0.6984]	-0.4872 [0.7502]	-1.0527 [0.4982]	-0.7133 [0.6413]
M3	0.0148 [0.8080]	0.1626 [0.0349]	0.1055 [0.1442]	0.1262 [0.0741]
LIQGDP	0.2249 [0.0993]	0.3845 [0.0089]	–	0.3576 [0.0101]
LIQCAP	–	–	0.0217 [0.5749]	–
CPI	-0.0029 [0.7283]	–	–	–
BB	–	1.0992 [0.005]	0.8305 [0.0144]	1.0086 [0.0009]

S	-0.1544 [0.3304]	0.0907 [0.6143]	–	–
D	–	–	–	1.0496 [0.6317]
Number of observations	139	108	101	108
adj. R <sup>2</sup>	0.6839	0.7139	0.6623	0.7013
Hausman test	40.9616 [0.0000]	30.5735 [0.0000]	22.2597 [0.0005]	33.4497 [0.0000]

**Note:** *p-values* in brackets.

**Source:** our own estimates.

For all FE regressions, the *p-values* for the *F-test* statistics are very low; hence, the fixed effects are present. On the other hand, for all the RE model, the *p-values* for the Hausman test statistics are also low enough to decide that the RE estimations are inconsistent. Therefore, we will base our conclusions on the FE model results.

Starting from regressions (1) and (2), see out that the insignificant variables are CPI and S. Despite the fact that some of the countries from our sample experienced short but serious inflationary episodes (three digit inflation in Bulgaria in 1996 and 1997, Romania 1998), the CPI index in the case of CEE states does not seem to be an important indicator of macroeconomic stability as it was in the past. In line with our initial assessment, the alternative measure – budget balance – is highly significant. The high importance of fiscal balance for stock market development may be also justified in other ways. A higher budget deficit always means higher interest rates, and in the case of emerging markets this interest rate increase is even bigger because of the presence of a large risk premium. The investors that optimize their portfolios may be therefore more willing to choose treasury bonds instead of equities. An additional explanation of the positive correlation between stock market development and budget balance may be based on the Ricardian equivalence. A higher budget deficit leads to higher taxes in the future; this depresses companies' net profits. Therefore, the stock valuation decreases.

It is somehow surprising that the savings rate was found to be an unimportant factor. We think that employing data on the foreign flows of capital may shed a new light on this problem.

Analyzing the results from all of the estimated regressions, we can easily see the dominant role of market liquidity. Its significance is independent of the chosen measure and the set of other independent variables. The key importance for stock market development is also confirmed in the case of the monetization ratio. As we have supposed, the banking sector is complementary to the stock market.

The results of introducing the “EU-dummy” in the last regression lead us to the final conclusion that the EU membership positively affects stock market capitalization.



Besides the positive influence of EU membership on economic growth, the correlation between “EU-dummy” and market capitalization may be explained by the reputational effect. Since entering the EU the perceived country’s investment risk has decreased; hence, the global mutual funds should increase their investments in these countries.

## **Conclusions**

Our analysis of stock market capitalization determinants has confirmed the positive role of GDP growth, banking sector development, market liquidity, fiscal balance and EU membership. However, the new questions that should be answered in the future studies have emerged.

Firstly, what are the factors that drive stock market liquidity? In this context, we suggest testing both the role of stock market organizational issues and the possible influence of the taxation system. The obtained results may be of vital importance for stock exchanges as well as for fiscal policymakers.

Secondly, the role of some institutional factors of stock market development should be examined. This task is really challenging in the econometric agenda because usually the values of different institutional variables are highly correlated; hence, a case study approach may be useful. Therefore, we propose to focus on the implementation of the worldwide accounting standards (IFRS). The role of this factor may be especially important for foreign investors.

Last but not least, it is tempting to find the answer why the debt markets, particularly corporate debt markets, are so highly underdeveloped in the CEE states. As Herring and Chatusripitak (2000) point out, the absence of a well-developed bond market results in the lack of a market-determined term structure of interest rates which would accurately reflect the opportunity cost of funds at different maturities. This weakness of the financial system may have serious consequences. In such environment, the valuation of many business projects is hard because it is not clear what the relevant discount rate should be. In the absence of risk-free rate term structure derived from the highly liquid market, it is also difficult to assess the credit risk of corporate debt. Only two of the mentioned facts indicate that the absence of a piece of the financial system leads to an inefficient allocation. For this reason, research in the area of debt market seems to be justified.

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