Stock Exchange Development in V4 Countries

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Abstract:

Purpose: The paper presents an investigation of the stock market development in Visegrad Group countries with the use of selected determinants.
Design/Methodology/Approach: The methodology is based on an estimation of panel data. The econometric model of Weighted Least Squares (WLS) is implemented in order to estimate structural parameters. Stock market capitalization to GDP is chosen as the dependent variable. The set of independent variables consists of, liquid liabilities to GDP, domestic credit to private sector (% of GDP), stock market total value traded to GDP, the number of listed companies per 1,000,000 people, GDP per capita (constant 2015 USD) and stock price volatility. The timeframe of the study is from 1993 to 2020.
Findings: The major factors that contribute to stock market development in Visegrad Group countries include stock market total value traded to GDP, the number of listed companies per 1,000,000 people and GDP per capita (constant 2015 USD). Not all of the determinants have a statistically significant impact on the stock market development. Economic growth, stock market liquidity, and the number of listed firms per 1 000 000 people have a maximum influence on the stock market development. Economic growth, stock market liquidity, and the number of listed firms per 1 000 000 people have a positive and statistically significant impact on the stock market development. It seems to be in accordance with theory and other studies.
Practical Implications: The results of the estimation can be useful for students, practitioners, and policy makers. They can be the basis for further research and discussion.
Originality/Value: The paper attempts to determine whether selected factors affect the development of stock exchanges in the given countries in a significant way. It provides new evidence based on both the actual dataset and the factors under analysis.

Keywords: Financial markets, stock exchange development, weighted least squares.

JEL codes: G10, C23, O16.

Paper type: Research article.

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1. Introduction

Financial development and its impact on economic growth have been the subject of research for several decades. Researchers have studied this impact particularly in terms of the effect of financial markets and the banking sector on economic growth. Various indicators characterizing both these markets are taken into account. The research has been carried out at the macro and microeconomic levels, for enterprises and sectors of the economy, for individual countries and their groups. The results of these studies are overwhelmingly positive. The direction of causality is also bi-directional. Researchers also try to determine factors influencing the development of financial markets, in particular stock exchanges. Stock exchanges, as the main institutions of the capital market, have become the subject of more and more extensive analyzes. Researchers try to identify the main determinants of their development.

This line of study was initiated by Gurley and Shaw (1955), Goldsmith (1969), McKinnon (1973), and Shaw (1973). Other researchers soon followed. They employed more and more complex econometric models. Due to a better availability of statistical data, longer time series could be implemented to study the phenomena. More recent studies affirm the significance of financial markets to economic growth (King and Levine 1993; Levine and Zervos 1996; 1998a; Rousseau and Wachtel 2000; Bukowski and Zięba 2019).

King and Levine (1993) referred in their research to the work of W. Goldsmith. They produced cross-sectional regression equations for 77 countries in the period 1960-1989, supplementing the model with additional factors influencing economic growth, including the volume of trade, expenditure on education, and political stability (King and Levine 1993).

This article attempts to assess some selected factors of stock market development in V4 countries (Visegrad Group – Czechia, Hungary, Poland, the Slovak Republic) in a given timeframe. To this end, the author conducts a literature review and uses selected statistical datasets on financial development.

The following hypothesis is posited: monetary base M3, bank credit, stock market liquidity, the number of listed companies per 1,000,000 people, economic growth, and stock price volatility affect the stock market development in the selected countries in an economically and statistically significant way.

2. Literature Review

The financial development – economic growth nexus is the subject of studies conducted by various authors. The approach tends to vary depending on the researcher. Some different sets of variables are used and various methods of econometric model estimation are implemented in order to assess selected determinants of stock market development.

Garcia and Liu (1999) show that GDP growth, domestic investment, and financial intermediary sector development in the analyzed countries (Latin America and Asia) play a crucial role in stock market development. Economic growth, financial liberalization, and foreign portfolio are the factors that play a crucial role in the stock market expansion in a study by El-Wassal (2005).

Other authors point to a reduction in trading cost (Domowitz and Steil, 1999) and the growth rate of investment (Henry, 2000) in the stock market development. Greenwood and Jovanovic (1989) indicate a mutual dependence and parallelism in the development of financial markets and economic development. They state that the relationship between the development of financial markets and economic growth is based on feedback.

In his analysis of the stock exchange situation and the factors of development of stock exchanges, El-Wassal (2013) points out that the development of stock exchanges is a multi-layered, complex and long-term process in which the activity of the private sector is a key element. He distinguishes 4 groups of factors influencing and contributing to the development of stock exchanges. He identifies supply, demand, and institutional factors as well as economic policy. Detailed characteristics are shown in Figure 1.

Figure 1. *The factors of stock markets development*
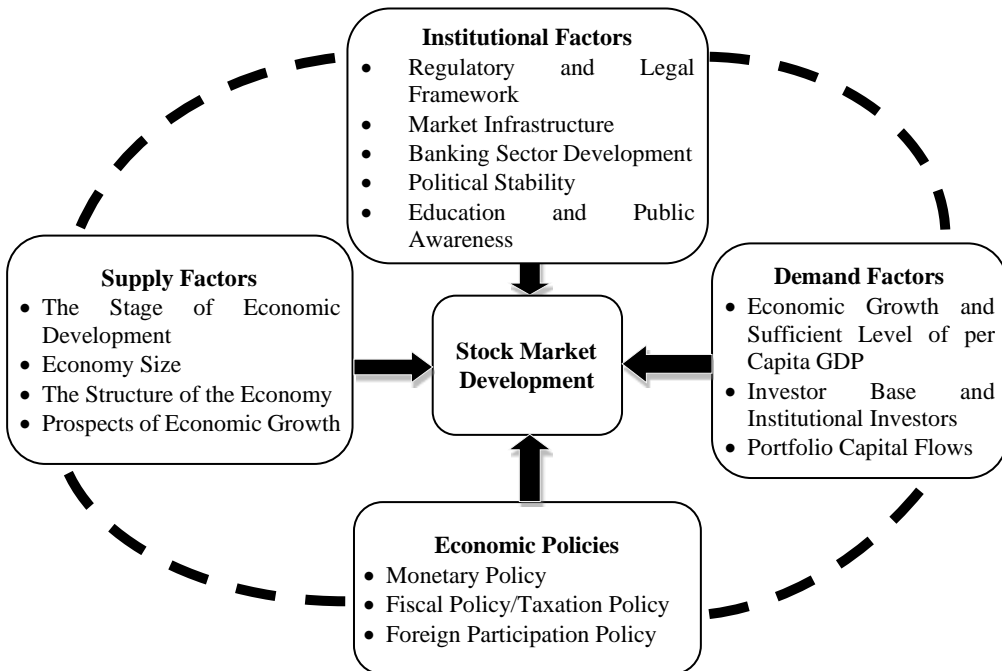
Source: *El-Wassal 2013, 614.*

The empirical results from Abu-Bader and Abu-Qarn (2008) strongly support the hypothesis that finance-growth causality is bi-directional. The authors examine the causal relationship between financial development and economic growth in Egypt during the period 1960-2001 using VAR model.

Gursoy and Muslumov (2000) use total capitalization/GDP, the volume of transactions/GDP, and the volume of transactions/total capitalization indices for their panel data (20 countries, 1981–1994) and find a two-way causation between the stock market development and economic growth.

On the other hand, Rousseau and Wachtel (2005) state that the relation between financial development and growth weakens in the final years of their study (84 countries between 1960-2003) as compared to 1960-1989. Claessens *et al.* (2001) find that privatization programs and foreign direct investment contribute to the stock market development. Stojkovic *et al.* (2019) determine an interdependence between the Belgrade Stock Exchange development and Serbia's economic growth. They use quarterly data about the market capitalization, the turnover of shares, and Serbia's gross domestic product between 2003 and 2018.

The study by Prazak and Stavarek (2017) addresses the effect of specific macroeconomic factors on the stock prices of selected financial sector companies. They investigate the causality relationship in selected companies listed on the Budapest Stock Exchange, Prague Stock Exchange, Bratislava Stock Exchange, and Warsaw Stock Exchange in both the short- and long-term time frame. The long-term causality is tested by means of the Johansen cointegration test. The short-term dynamics between the variables are examined using the VECM model. Quarterly data from 2005 to 2014 is used. They conclude that macroeconomic fundamentals as well as interest rates have a negative impact on stock prices. The interest rate also turns out to be the most prominent predictor of long-run developments.

Guru and Yadav (2019) use the generalized method of moment system estimation (SYS-GMM) in their study of BRICS group of countries (Brazil, Russia, India, China, and South Africa). The authors employ banking sector and stock market development indicators in the 1993-2014 time frame to assess the relationship between financial development and economic growth. The size of the financial intermediaries, credit to deposit ratio, and domestic credit to private sector serve as banking sector development indicators. The stock market development indicators are the value of shares traded and turnover ratio. Their findings suggest that the banking sector development and stock market development indicators are complementary to each other in stimulating economic growth.

Nieuwerburgh *et al.* (2006) use indicators of both the stock market development and banking sector development. They study spans for a period of 1830-2000 utilising the annual data and conclude that the availability of stock market based financing for

firms was an important determinant in the economic growth of Belgium. They also find that the strongest effects were felt in the post 1873 period.

3. Data and Model

The data for the study is obtained from the latest (November 2021) version of Global Financial Development Database (Cihak *et al.,* 2012; World Bank 2012) and World Development Indicators. The annual data for Visegrad Group (V4 – Czechia, Hungary, Poland, Slovak Republic) countries is used. It ranges from 1993 to 2020. The extent of data varies among countries because of its availability. The set of variables used is as follows: Stock market capitalization to GDP, Liquid liabilities to GDP, Domestic credit to private sector (% of GDP), Stock market total value traded to GDP, Number of listed companies per 1,000,000 people, GDP per capita (constant 2015 USD), and stock price volatility.

The following model is built in compliance with the literature and data availability:

$$lnSTOCK_{i,t} = \alpha + \beta_1 \, lnMAGGR_{it} + \beta_2 lnCREDIT_{it} + \beta_3 lnSMLIQUID_{it} + \beta_4 lnLISTED_{it} + \beta_5 lnGDP_{it} + \beta_6 lnVOL_{it} + \mu_{it} \qquad (1)$$

where:
$lnSTOCK_{i,t}$ – the natural logarithm of stock market capitalization (% of GDP) for for the country *i* in the year *t*,
α – the intercept,
$\beta_1, \ldots, \beta_k$ - the structural parameters,
$lnMAGGR_{it}$ - the natural logarithm of liquid liabilities to GDP, for for the country *i* in the year *t*,
$lnCREDIT_{it}$ - the natural logarithm of domestic credit to private sector (% of GDP) for for the country *i* in the year *t*,
$lnSMLIQUID_{it}$ - the natural logarithm of stock market total value traded to GDP for for the country *i* in the year *t*,
$lnLISTED_{it}$ - the natural logarithm of the number of listed companies per 1,000,000 people for the country *i* in the year *t*,
$lnGDP_{it}$ - the natural logarithm of GDP per capita (constant 2015 USD) for for the country *i* in the year *t*,
$lnVOL_{it}$ - the natural logarithm of stock price volatility for for the country *i* in the year *t*,
μ_{it} – the error term.

The model is constructed using step wise regression with backward elimination. First of all, the regressors from the point of view of collinearity are reduced. The regressors whose correlation with other regressors was relatively high and those which were very weakly correlated with the dependent variable are eliminated. The model is unbalanced. It has been estimated with the use of weighted least squares method

(WLS) since autocorrelation and heteroscedascity need to be eliminated. The results of the estimation are shown in Table 1.

Table 1. *WLS estimation using 68 observations. 4 cross-sectional units are included. Dependent variable: l_STOCK. Weights based on per-unit error variances*

	Coefficient	Std. Error	t-ratio	p-value	
const	−3.38461	2.66753	−1.269	0.2093	
l_MAGGR	−0.667277	0.477439	−1.398	0.1673	
l_CREDIT	−0.254693	0.140756	−1.809	0.0753	*
l_SMLIQUID	0.412367	0.0334232	12.34	<0.0001	***
l_LISTED	0.331153	0.0602202	5.499	<0.0001	***
l_GDP	0.966505	0.406016	2.380	0.0204	**
l_VOL	−0.178494	0.159224	−1.121	0.2667	

Statistics based on the weighted data:

Sum squared resid	66.59555	S.E. of regression	1.044859
R-squared	0.735297	Adjusted R-squared	0.709261
F(6, 61)	28.24121	P-value(F)	7.02e-16
Log-likelihood	−95.77824	Akaike criterion	205.5565
Schwarz criterion	221.0930	Hannan-Quinn	211.7125

Statistics based on the original data:

Mean dependent var	2.845980	S.D. dependent var	0.616263
Sum squared resid	5.917562	S.E. of regression	0.311463

Test for normality of residual -
Null hypothesis: error is normally distributed
Test statistic: Chi-square(2) = 0.377401
with p-value = 0.828034

Pesaran CD test for cross-sectional dependence -
Null hypothesis: No cross-sectional dependence
Asymptotic test statistic: z = 1.94791
with p-value = 0.051426

Source: *The author's own calculations with the use of GRETL.*

4. The Results of the Model Estimation

The model estimation indicates that, out of all the variables estimated, 3 are statistically significant at 5% level and 1 is statistically significant at 10% level and in accordance with the theory and hypothesis. However, the p-value below 5%, which causes the null-hypothesis to be rejected, indicates that only 3 variables are statistically significant: SMLIQUID, LISTED and GDP. This means that there is a long run relationship between those 3 variables and the dependent variable under the study in the selected countries. The model seems to be well fitted: Adjusted R-squared value equals 0.71, which means the model explains 71% of the variability of the dependent variable STOCK.

There are also some different levels of impact of the variables on the dependent variable STOCK. A change of the SMLIQUID variable by 1 percentage point effects a STOCK change by 0.41 percentage point, a change of the LISTED variable value by 1 percentage point produces a STOCK change by 0.33 percentage point, and a change

of the GDP variable value by 1 percentage point results in a STOCK change by 0.97 percentage point.

5. Conclusion

The study described in this paper explores some selected determinants of stock market development in the Visegrad Group. The major factors that contribute to stock market development in the analyzed countries include stock market total value traded to GDP, the number of listed companies per 1,000,000 people, and GDP per capita (constant 2015 USD). The model estimation is based on WLS method. Not all the determinants have a statistically significant impact on the stock market development.

Economic growth, stock market liquidity, and the number of listed firm per 1 000 000 people have a maximum influence the on stock market development. Economic growth, stock market liquidity and number of listed firm per 1 000 000 people have a positive and statistically significant impact on stock market development. It seems to be in accordance with theory and intuition.

An increase in the liquidity ratio influences the efficiency of the stock market. This is favorable for both investors and issuers. Consequently, it may be a factor attracting new investors and potential issuers of shares.

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