

CORRELATIONS BETWEEN CAPITAL MARKET DEVELOPMENT AND ECONOMIC GROWTH: THE CASE OF ROMANIA¹

Laura OBREJA BRASOVEANU

PhD, Associate Professor, Finance Department,
University of Economics, Bucharest, Romania

E-mail: laura_obreja@yahoo.com



Victor DRAGOTA²

PhD, University Professor, Finance Department,
University of Economics, Bucharest, Romania

E-mail: victordragota@yahoo.com, victor.dragota@fin.ase.ro



Delia CATARAMA

PhD Candidate, Assistant Professor, Finance Department,
University of Economics, Bucharest, Romania

E-mail: delia.catarama@fin.ase.ro



Andreea SEMENESCU³

PhD Candidate, University Assistant, Finance Department,
University of Economics, Bucharest, Romania

E-mail: asemenescu@yahoo.com



Abstract: *In the literature on endogenous growth, the link between capital markets development and economic growth has received much attention. Although there are many studies regarding this aspect, approaches on emergent ex-communist countries' economies, especially for Romania, are very few comparatively to the general cases.*

Our paper examines the correlation between capital market development and economic growth in Romania using a regression function and VAR models. The results show that the capital market development is positively correlated with economic growth, with feed-back effect, but the strongest link is from economic growth to capital market, suggesting that financial development follows economic growth, economic growth determining financial institutions to change and develop.

Key words: *time-series; political economy; economic growth; capital market development*

1. Introduction

In the recent financial literature on endogenous growth, the relationship between capital markets development and economic growth has received much attention (see King and Levine, 1993; Levine, 1997; Rajan and Zingales, 1998; Filler, Hanousek, and Campos, 1999; Arestis, Demetriades, and Luintel, 2001; Calderon and Liu, 2002, Carlin and Mayer, 2003). In this context, King and Levine (1993) state that the level of financial intermediation is a good predictor for economic growth rate, capital accumulation and productivity. In the same context, Carlin and Mayer (2003) concluded that there is a strong relationship between the structure of countries' financial system and economic growth.

Garretsen, Lensink and Sterken (2004) found out a causal relationship between economic growth and financial markets development: a 1% improvement of economic growth determines a 0.4% rise of market capitalization/GDP ratio. Yet, according to their results, market capitalization/GDP ratio does not represent a significant determinant of the economic growth.

Beck, Lundberg and Majnoni (2006), also, found a positive correlation between capital market development (measured by a dummy variable computed to reflect if the market capitalization exceeds 13,5% of GDP) and economic growth.

Bose(2005) offers a theoretical financial model that explains the positive correlation between stock market development and economic growth; the model is based on the hypothesis that for levels of GDP per capita higher than a certain threshold the information costs become lower than bankruptcy costs, determining the development of capital markets. Hence, it is explained why stock markets appeared late after banks.

Beckaert, Harvey and Lundblad (2005) analyzed financial liberalization as a special case of capital market development and determined that equity market liberalizations, on average, led to a 1% increase in annual real economic growth.

Studying the link between domestic stock market development and internationalization, Claessens, Klingebiel and Schmukler (2006) using a panel data technique concluded that domestic stock market development as well as stock market internationalization are positively influenced by the log of GDP per capita, the stock market liberalization, the capital account liberalization and the country growth opportunities and negatively influenced by the government deficit/GDP ratio.

Minier (2003) analyzed the influence of the stock market dimension on economic development by regression tree techniques; he found evidence that the positive influence of stock market development on economic growth held only for developed stock markets in terms of turnover, in the case of underdeveloped stock markets the influence is negative.

Ergungor (2006) analyzed the impact of financial structure on the economic growth on the period 1980-1995; he concluded that in countries with inflexible judicial systems the stronger impact on economic growth is generated by the development of the bank-system, whereas in countries with greater flexibility of judicial systems the development of the capital market had a stronger influence.

Studies on the relation between capital market development and economic growth in different countries were performed. Nieuwerburgh, Buelens and Cuyvers (2006) analysed the long-run relationship between stock market development (measured by market capitalization and number of listed shares) and economic growth (measured as a logarithmic difference of GDP per capita) in Belgium. They performed Granger causality tests and

emphasized that stock market development determined economic growth in Belgium especially in the period 1873-1935, but also on the entire analyzed period (1800-2000) with variations in time dues to institutional changes affecting the stock exchange.

Hondroyannis, Lolos and Papapetrou (2005) studied the case of Greece (1986-1999); they found out that the relationship between economic growth and capital market development is bi-directional.

Studying the effect of different components of financial systems on economic growth in Taiwan, Korea and Japan, Liu and Hsu (2006) emphasized the positive effect of stock market development (measured by market capitalization as percentage of GDP, turnover as percentage in GDP and stock return) on economic growth.

Bolbol, Fatheldin, and Omran (2005) analyzed the effect of financial markets (measured by the ratio of market capitalization on GDP and the turnover ratio) on total factor productivity and growth (the per capita GDP growth rate) in Egypt (1974-2002); they demonstrated that capital market development had a positive influence on factor productivity and growth.

Ben Naceur and Ghazouani (2007), studying the influence of stock markets and bank system development on economic growth on a sample of 11 Arab countries, concluded that financial development could negatively influence the economic growth in countries with underdeveloped financial systems; they stressed the role of building a sound financial system.

In the context of UE enlargement, an analysis of the relationship between capital markets development and economic growth could explain why different countries reach different economic growth rates, and could find solutions in order to stimulate the process of economic growth through capital market using public policy instruments. Related to this issue, even there are many studies regarding developed countries, approaches on East-European ex-communist countries' economies are very few relatively to developed countries cases.

Romanian capital market had developed slowly starting from 1995. Moreover, several years after 1989 Romania had negative economic growth rates (the real rate of GDP growth). Only since 2000 Romania had positive economic growth rates accompanied by the development of the financial system; these particular aspects could alter the relationship between economic growth and capital market development, and more specifically the conclusion on whether capital market development is a good predictor for economic growth rates. This is the reason why the starting point of our study is the year 2000.

Our paper examines the correlation between capital market development and economic growth for Romanian case, considering quarterly data for the period 2000-2006, using a regression function and VAR models for explaining the relationship between market development (size and liquidity of the capital market) and economic growth. This paper tests if the predicts of endogenous growth theory that capital market development positively affects the rate of economic growth is also true in case of Romania.

This paper is structured as follows. In Section 2, we define the measures for capital markets development and economic growth, relatively to the mainstream of financial literature. Section 3 presents the database and methodology that we used. Section 4 presents the main empirical results and Section 5 contains the concluding remarks.

2. Theoretical analysis

There are several discussions about the relationship between the development of the financial system and the economic growth. The literature focuses on the financial system's components, the banking sector or the capital market, that influence economic growth.

Graff (1999) stated that there are four possibilities concerning the causal relationship between financial development and economic growth:

(1) financial development and economic growth are not causally related. An example of this type of relation could be found in the development of modern economy, in Europe, in the 17th Century. In this case, the economic growth was the result of real factors, while the financial development was the result of financial institutions development.

(2) financial development follows economic growth. In this context, economic growth causes financial institutions to change and to develop, so as both the financial and credit market grow.

(3) financial development is a cause of economic growth. In this case, there could be identified two possibilities, respectively: (a) financial development is a precondition for economic growth; (b) financial development actively encourages economic growth (see, e.g. Thornton, 1995). Provided that there are no real impediments to economic growth, mature financial systems can cause high and sustained rates of economic growth (see, Rousseau and Sylla, 2001).

(4) financial development is an impediment to economic growth. Similar to the previous possibility, causality runs from financial development to real development, but the focus lies on potentially destabilizing effects of financial overtrading and crises (see, e.g. Stiglitz, 2002) rather than on the efficient functioning of the financial system. This view considers the financial system as inherently unstable.

The economic growth is a complex process that is influenced by more factors, other than the capital market development. Moreover, capital market development is the results of many influence factors. There are several interdependencies between these factors, which makes it difficult to establish and isolate the causal relation between the economic growth and the capital market development.

There are several empirical studies that analyse the correlation between the economic growth and the financial development. Calderon and Liu (2002), studying the direction of this causality, conclude that, as a general trend, the financial development generates economic growth, the causal relation being stronger in the emergent countries and being explained by two channels: the fast capital accumulation and the growth of productivity. Rajan and Zingales (1998) emphasize that the financial development is a prediction element for the economic growth, because the capital market reflects the present value of the future growth opportunities. The ex-ante development of the financial markets facilitates the ex-post economic growth of the external financing dependent sectors. Levine (1997) and Levine and Zevros (1998) consider that the capital market's liquidity is a good predictor of the GDP per capita growth and of the physical capital and productivity growth, but other indicators of the capital market development such as volatility, size and international integration are not significant for explaining economic growth. Carlin and Mayer (2003) analyse the link between financial systems and economic growth for developed countries and reveal a link between financial system and type of economic

activities which can influence the economic growth. Arestis, Demetriades and Luintel (2001), use the autoregressive vector for an empirical analysis on five developed economies; their study concludes that the capital market has effects on the economic growth, but the impact of the banking sector is stronger. Filer, Hanousek and Campos (1999) notice that capital markets include the future growth rates in current prices, especially in the developed countries, which is a result consistent with the efficient markets hypothesis.

Although in cross-country analyses it can be depicted a correlation between the financial development and the economic growth, we can question if, in the emergent countries, an active capital market is a stimulating factor for the economic growth. An affirmative answer would imply an important role of the public policies and international aid targeted at introducing and maintaining the capital market structures (see Filer, Hanousek and Campos, 1999).

The previous empirical studies assessed and quantified the correlation between capital market development and economic growth using different techniques⁴. The variables used in these studies can be grouped in the following categories:

(A) Capital market variables:

- **size variables:** market capitalization/GDP ratio (used by Filer, Hanousek and Campos, 1999), the logarithm of the stock market capitalization ratio⁵ (used by Arestis, Demetriades and Luintel, 2001);
- **liquidity variables:** turnover ratio⁶ and value traded ratio⁷ (used by Levine and Zevros, 1998)
- **volatility variables:** eight-quarter moving standard deviation of the end-of-quarter change of stock market prices (used by Arestis, Demetriades and Luintel, 2001)

(B) Economic growth variables: logarithm of real GDP (used by Arestis, Demetriades and Luintel, 2001), GDP growth rate (used by Baier, Dwyer Jr. and Tamura, 2004), GDP per capita growth rate (used by King and Levine, 1993).

In this article, we aim at realizing a country-case study for Romania for the period 2000 – 2006. We use quarterly data to identify the existence of a correlation between the development of the capital market and the economic growth.

3. Data and Methodology

We analyze the link between capital market and the economic growth in Romania on quarterly data from 2000: 1 to 2006: 2, meaning 26 observations. In Table 1 we present the variables used to characterize the Romanian capital market and economic growth.

Table 1. Variables

Variables		Symbol
Capital market variables	Market capitalization	MCN
		MCR
	Number of listed shares	NLS
	Trading volume	TVN
		TVR
	Liquidity proxy	NLI
		VLI
	Bucharest Stock Exchange Index	BET
BET-C		
BETCR		
Economic growth variables	Gross Domestic Product	GDP
		GDPR
		GDPRG

The capital market indicators can be classified in three categories:

- (i) **size indicators:** market capitalization in nominal (MCN) and real (MCR) values, number of listed shares (NLS);
- (ii) **liquidity indicators:** trading volume in nominal (TVN) and real (TVR) values, number of traded shares (TLS) and two proxies for liquidity (NLI and VLI);
- (iii) **return indicators:** the BET and BET-C indexes, which are the Bucharest Stock Exchange official indexes.

We selected for our study the following indicators of capital market:

- (i) the real market capitalisation, computed in order to eliminate the inflation effect;
- (ii) the real trade volume, reflected by the indicator $\log(\text{TVR})$ as a measure of the market size, but also of the market liquidity;
- (iii) a liquidity proxy, computed as the number of traded shares divided by the number of listed shares.

In order to analyze the correlations between economic growth and capital market development we used linear regression and vector autoregressive methods.

Several regressions were selected:

$$(R\ 1) \log(\text{GDPR}_t) = a + b \cdot \log(\text{MCR}_t) + c \cdot D_{1t} + \varepsilon_t$$

$$(R\ 2) \log(\text{GDPR}_t) = a + b \cdot \log(\text{TVR}_{t-2}) + c \cdot D_{1t} + \varepsilon_t$$

$$(R\ 3) \log(\text{TVR}_t) = a + b \cdot \log(\text{GDPR}_t) + c \cdot \log(\text{GDPR}_{t-1}) + d \cdot D_{2t} + \varepsilon_t$$

$$(R\ 4) \log(\text{GDPR}_t) = a + b \cdot \log(\text{GDPR}_{t-2}) + c \cdot \log(\text{TVR}_{t-2}) + d \cdot \log(\text{TVR}_t) + e \cdot D_{1t} + \varepsilon_t$$

$$(R\ 5) \log(\text{TVR}_t) = a + b \cdot \log(\text{GDPR}_t) + c \cdot \log(\text{GDPR}_{t-2}) + d \cdot \log(\text{TVR}_{t-2}) + e \cdot D_{1t} + \varepsilon_t$$

Several forms of vector autoregressive were selected:

(VAR 1) $\log(\text{GDPR})$, $\log(\text{TVR})$, with 2 lags for endogenous variables

(VAR 2) GDPRG , NLI , with 2 lags for endogenous variables.

The lags are determined using the Haugh statistic.

In Section 4 the main numerical results are presented.

4. Empirical results

First, we tested regressions (R1), (R2), (R3). In Table 2 we present the results.

Table 2. Results for regressions (R1), (R2), (R3)

Independent variables	$\log(\text{GDPR})$	$\log(\text{GDPR})$	$\log(\text{TVRt})$
	Regression (R 1)	Regression (R 2)	Regression (R 3)
$\log(\text{MCRt})$	0.153471** [7.573879]		
$\log(\text{TVR}_{t-2})$		0.133338** [5.890239]	
$\log(\text{GDPRt})$			1.624155** [3.537126]
$\log(\text{GDPRt-1})$			4.411427** [8.284857]
D_{1t}	-0.345995** [-6.937547]	-0.296155** [-5.202606]	

Independent variables	log(GDPR)	log(GDPR)	log(TVRt)
	Regression (R 1)	Regression (R 2)	Regression (R 3)
D _{2t}			1.651389** [5.947379]
C	20.47147** [45.46441]	21.96865** [66.83687]	-129.4007** [-9.624874]
R ²	0.819541	0.763110	0.848617
R ² adjusted	0.803849	0.740549	0.826990
Durbin-Watson test	1.825150	1.734727	2.11
Jarque-Bera probability	0.70	0.63	0.51
Critical p-value(1%)	2.779	2.797	2.787

t-statistic in []

**All the coefficients in the table are significant at 1% level.

$$(R\ 1) \log(GDPR_t) = 20.47147 + 0.153471 \cdot \log(MCR_t) - 0.345995 D_{1t}$$

$$(R\ 2) \log(GDPR_t) = 21.96865 + 0.133338 \cdot \log(TVR_{t-2}) - 0.296155 \cdot D_{1t}$$

$$(R\ 3) \log(TVR_t) = -129.4007 + 1.624155 \cdot \log(GDPR_t) + 4.411427 \cdot \log(GDPR_{t-1}) + 1.651389 \cdot D_{2t} + \varepsilon_t$$

According to regression (R1), the indicator used for quantifying the economic growth (log(GDPR)) is positively correlated to capital market development, measured by log(MCR), R² for the equation is 0.81, reflecting that the market capitalisation and the economic growth are strongly correlated. This result is consistent with the developed countries case where the structure of market index is similar to the GDP structure and capital market is efficient. It is interesting to find that this situation applies to Romania, an emergent country, even though in this case the market index structure does not follow the GDP structure and the market is not efficient.

The regressions (R1) and (R2) show the relation between the economic growth and the capital market development. The relation between the trade volume on the capital market and the real GDP reflects a „feed-back effect“.

We performed a VAR model for log(GDPR) and log(TVR) in order to find which of these two variables influence the other. A vector autoregressive analysis with two lags was performed, which proved to be the most suitable. The results are listed in Table 3.

Table 3. Results for (VAR 1)

Independent variables	log(GDPR)	log(TVR)
	(VAR 1) - equation 1	(VAR 1) - equation 2
log(GDPR _{t-2})	-0.461722** [2.96094]	1.607671* [2.67358]
log(TVR _{t-2})	0.210746** [5.76643]	0.642622** [4.55985]
C	31.75561** [9.32489]	-32.81263* [-2.49869]
R ²	0.617306	0.769426
R ² adjusted	0.580859	0.747467

t-statistic in []

**The coefficients in the table are significant at 1% level

*The coefficients in the table are significant at 2% level

The trade volume growth influences GDP growth with two lags, and the GDP growth influences the trade volume growth with two lags. That means that the relation between economic growth and development of the capital market is bi-directional.

After this VAR analysis we improved the regressions (R2) and (R3) and tested the regressions (R4) and (R5). The results are presented in Table 4.

Table 4. Results of regressions (R4) and (R5)

Independent variables	log(GDPR)	log(TVR _t)
	Regression (R 4)	Regression (R 5)
log(TVR _{t-2})	0.087074* [2.667285]	0.122043 [0.615192]
log(TVR _t)	0.120594** [3.548049]	
log(GDPR _{t-2})	-0.404943** [-3.610031]	2.178879** [3.784749]
log(GDPR)		3.304636** [3.548049]
D _{1t}	-0.27880 ** [-5.832966]	1.061820** [3.126049]
C	30.48892** [12.67927]	-117.8590** [-4.252721]
R ²	0.878540	0.865139
R ² adjusted	0.852970	0.836747
Durbin-Watson test	1.945242	1.851539
Jarque-Bera probability	0.654	0.62

t-statistic in []

**The coefficients in the table are significant at 1% level

*The coefficients in the table are significant at 2% level

$$(R\ 4) \log(GDPR_t) = 30.48892 - 0.404943 \cdot \log(GDPR_{t-2}) + 0.087074 \cdot \log(TVR_{t-2}) + 0.120594 \cdot \log(TVR_t) - 0.27880 \cdot D_{1t}$$

$$(R\ 5) \log(TVR_t) = -117.8590 + 3.304636 \cdot \log(GDPR_t) + 2.178879 \cdot \log(GDPR_{t-2}) + 0.122043 \cdot \log(TVR_{t-2}) + 1.061820 \cdot D_{1t}$$

These results confirm the conclusion above on the feed-back effect between economic growth and capital market development. The main conclusions are the same: the economic growth influences the capital market development, but the influence is more important with two lags and the trade volume is a good predictor of the economic growth.

Regarding the market liquidity, we performed a VAR model for economic growth and a liquidity proxy computed as the number of traded shares divided by the number of listed shares.

Table 5. Results for (VAR 2)

Independent variables	GDPRG	NLI
	(VAR 2) equation 2	(VAR 2) equation 2
GDPRG _{t-1}	-0.476538* [-2.56392]	0.133181* [2.64883]
GDPRG _{t-2}	-0.746704† [-3.33507]	-0.049297 [-0.81393]

Independent variables	GDPRG	NLI
	(VAR 2) equation 2	(VAR 2) equation 2
NLI_{t-1}	1.222409 [1.45959]	0.623408† [2.75166]
NLI_{t-2}	-1.127060 [-1.50759]	0.171445 [0.84775]
C	0.037609 [0.14554]	0.162183* [2.32009]
R²	0.437066	0.815404
R² adjusted	0.311970	0.774383

t-statistic in []

*The coefficients in the table are significant at 2% level

† The coefficients in the table are significant at 10% level

The test revealed that the liquidity of the market, from the point of view of the number of traded companies, is not a determinant factor of the economic growth. However, as shown above, the trade volume is a determinant of the economic growth; this means that on the Romanian market the volume of trading counts in generating economic growth, and not the number of traded companies. Hence, the speculative transactions on the capital market are important for generating economic growth.

5. Conclusions

This study analyses the dependence between economic growth and capital market development for Romanian case. We found that there is a feed-back effect between capital market trade volume and economic growth; our results are similar to the findings of Hondroyiannis, Lolos and Papapetrou (2005) for Greece.

The regressions and vector autoregressive suggest that the capital market development is positively correlated with economic growth, with feed-back effect, but the strongest link is from economic growth to capital market, suggesting that financial development follows economic growth, economic growth determining financial institutions to change and develop. This results is consistent with the second possibility of a causal relationship between financial development and economic growth stated by Graff (1999). However, the lack of information, only 25 periods could question the validity of these conclusions for a long period analysis.

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Appendix

Appendix 1: Data description

For market capitalization and trading volume we used quarterly average of daily data, provided by the Bucharest Stock Exchange Research Department. As the annually rate of inflation in Romania during 2000-2006 was between 9% and 45.8%, we deflated the values using the quarterly average consumer price index (fix basis: first quarter, 2000). The Romanian National Institute for Statistics and Economic Studies (INSSE) reports, in its annual reports, the monthly consumer price index, using the same basis (October 1990). Based on it, it was calculated the quarterly average consumer price index with the same basis (October 1990 = 100%), and then the quarterly average consumer price index with the basis in the first quarter 2000.

Market capitalization is an absolute measure of the market size and the trading volume is a measure of the financial redistribution made by the capital market in the economy, demonstrating the importance of Bucharest Stock Exchange in the Romanian financial system.

The number of listed shares (NLS) is determined for the last trading day of the quarter. It reflects the role of the capital market both for companies and investors; listed companies have the possibility of obtaining resources, and investors can invest their economies in the traded shares. The number of traded shares (NTS) is calculated as the quarterly average of the daily data. It reflects the market liquidity. Both, NLS and NTS were provided by the Bucharest Stock Exchange Research Department.

For assessing the market liquidity we have calculated two proxies:

- 1) the ratio between the number of traded shares and the number of listed shares:

$$NLI = \frac{NTS}{NLS} \quad (1)$$

- 2) the ratio between the trading volume and the market capitalization:

$$VLI = \frac{TVR}{MCR} \quad (2)$$

The BET and BET-C indexes quantify the evolution of the market portfolios, being general indicators for Romania's capital market. For the same reasons as above we deflated the BET-C index, obtaining a BETCR index.

The economic growth is measured by the real gross domestic product growth rate. The nominal quarterly values (GDPN) were taken from the Romanian National Institute for Statistics and Economic Studies (they are computed based on the ESA '95 methodology for the national accounts). The values were then deflated, using the quarterly average consumer price index with the basis in the first quarter, 2000. Thus, we obtained real values for the gross domestic product (GDPR). Based on the real values it was determined the growth rate of the real gross domestic product (GDPRG), which is a measure of the Romanian economic development, during the analyzed period.

The variables of the economic growth that have been selected for regression were the real gross domestic product by the indicator of log(GDPR) and the economic growth calculated as the growth rate of the real GDP (GDPRG).

We noticed a seasonal evolution of the quarterly real gross domestic product. In order to eliminate the seasonal effect for the 4th quarter, we introduced dummy variables (D_1, D_2).

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² Victor Dragota holds a PhD in Finance granted in 2003 by University of Economics, Bucharest. He graduated the Faculty of Finance from Bucharest University of Economics.

He is (co)author of papers and books like:

Dragota, V., Dumitrescu, D., Ruxanda, Gh., Ciobanu, A., Brasoveanu, I., Stoian, A. and Lipara, C. **Estimation of Control Premium: The Case of Romanian Listed Companies**, Economic Computation and Economic Cybernetics Studies and Research, Vol. 41, No. 3-4, 2007, pp. 55-72

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He is member in the scientific board of Economic Computation and Economic Cybernetics Studies and Research and The Valuation Journal.

The main research fields are: market efficiency, dividend policy, corporate finance, investments, business valuation.

He is teaching the following courses: corporate finance, investments, corporate governance.

³ Born in 1980, she graduated Bucharest University of Economics in 2003 and a Banks and Insurance master program at Orleans University in 2004. Since then she works in the Finance Department of Bucharest University of Economics. Her competence domains are: corporate finance, capital markets, public finance, direct investments. Her doctoral research program is "The application of methods for determining the efficiency of public investment projects".

⁴ Regression, VAR, Granger Causality, Event Studies etc.

⁵ Stock market capitalization ratio equals market capitalization over GDP.

⁶ Turnover ratio equals trading volume over market capitalization.

⁷ Value traded ratio equals trading volume over GDP.