

# THE EFFECT OF CAPITAL MARKET DEVELOPMENT ON ECONOMIC GROWTH: CASE OF CROATIA

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## Abstract

The debate concerning the relationship between the financial system and economic growth is one of the oldest debates in the economic literature. In this paper, authors conducted an empirical analysis in which the non-linear multiple regression model is tested in order to examine the connection between the development of capital markets and economic growth in the Republic of Croatia. The results showed that three out of four independent variables point to a positive relationship between capital market development and economic growth. Results are consistent with the expectations, the economic theory and with most papers that analyzed this relationship in other economies.

**Keywords:** capital market, economic growth, Croatia, multiple regression model.

## 1. Introduction

The subject of this paper is to analyze the capital market in Croatia, to study the basic financial institutions, their instruments and markets, to analyze its development and, finally, to examine the relationship between capital markets and Croatian economic growth. The study includes a fifteen-year period, from the first quarter of 2000 to the third quarter of 2015, and the conclusions will be made on the basis of the estimated multiple regression model. The analysis seeks to determine whether the development of the capital market has an impact on the economic growth in Croatia and if so, to see whether it is positive or negative.

The debate concerning the relationship between the financial system and economic growth is one of the oldest debates in the economic literature. The first ones to investigate it were Schumpeter (1912), Robinson (1952) and Hicks (1969), who explored that relationship in the case of the capital market and concluded that it is correlated with economic growth. Gurley and Shaw (1955) included both developed and developing countries and came to the conclusion that the financial systems of developed countries are more advanced so they positively influence the economic growth. This hypothesis is based on the fact that the more developed capital markets assist in credit and funds allocation to investors whose projects can contribute to the economy.

This subject has gained importance in the seventies and in the nineties of the last century, where it is important to mention the papers of Shaw (1973), McKinnon (1973), King and Levine (1993), Levine and Zervos (1996) and Demirguc-Kunt and Levine (1996) that have proven a significant and positive impact of capital markets on economic development. In most of these papers, but also in the more recent ones, the empirical analysis entails the use of models which test the long-term relationship between the financial system and the economy, such as Vector Autoregression (VAR) models and Autoregressive Distributed Lag (ARDL), since they provide information about the direction of causality links. Although there are some studies that prove a negative relationship between the development of capital markets and the economy, most researches confirm a positive relationship, which is also consistent with the economic theory.

The International Monetary Fund (2005) divides the indicators of the financial system development into: banking and insurance sectors; leasing, mortgage, cash, Forex and capital markets and indicators related to investment and pension funds. The capital market development indicators include various indicators of size, liquidity and market activity, as well as the number of listed companies, new listings and the size of the derivatives market, but the researches also often use the main equity indices of the observed capital markets. Indicators in this paper will be chosen according to the availability of data, but also by taking into account a meaningful interpretation and the quality of the estimated regression model.

## 2. Capital Market in Croatia

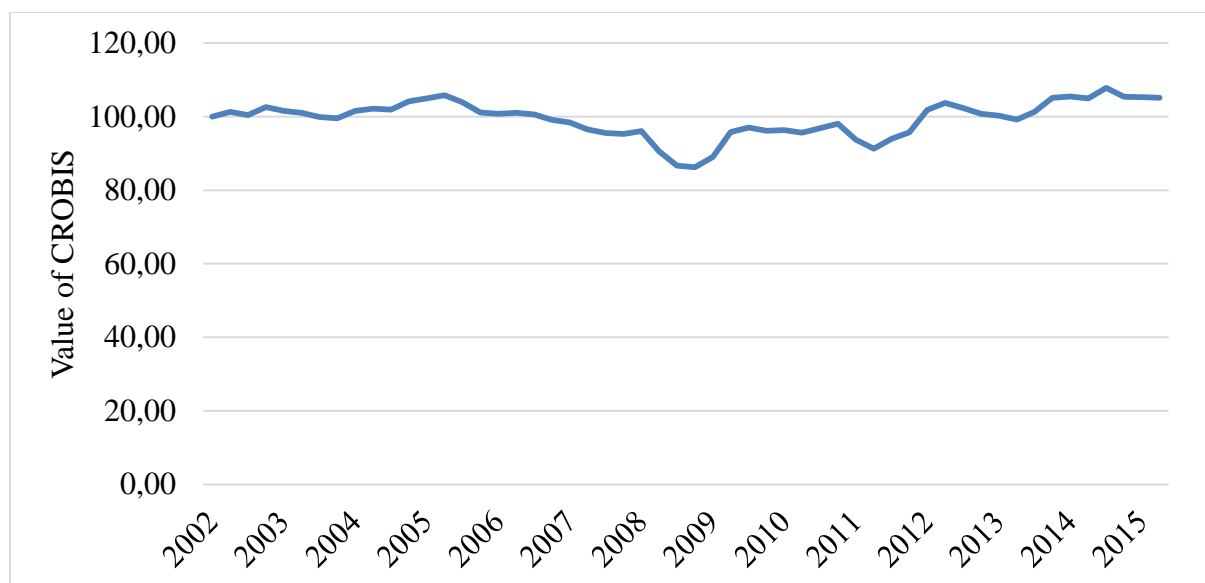
The capital market consists of institutions, financial instruments and mechanisms by which the long-term free savings funds are transferred from the surplus to the deficit units that then invest in capital construction and equipment (Leko, 2012). In the broadest sense, the capital market includes the long-term loans market and long-term securities market, while in the narrower sense capital market is actually securities market (Orsag, 2011).

In this market are traded equity shares and debt instruments with the maturity greater than one year. The capital market in the Republic of Croatia, as well as the domain and jurisdiction of the Croatian Financial Services Supervisory Agency in this area are regulated by the Capital Market Act and the Act on the Takeover of Joint-Stock Companies. The Capital Market Law in the Croatian legal system is based on the specific guidelines of the European Union and regulates the implementation of the regulations of the European Community (HANFA, 2016).

According to the Capital Market Act, institutions of the Croatian capital market are: Zagreb Stock Exchange, Central Depository & Clearing Company, pension funds, mutual funds, insurance companies and authorized companies but also the Croatian financial services supervision agency as the primary regulatory and supervisory body for the aforementioned institutions.

The bond market was presented with CROBIS index. CROBIS is the official bond index of the Zagreb Stock Exchange, which is being published since October 1st 2002. Figure 1 shows trends in CROBIS movements during a period of 13 years. Throughout the entire period there are not any major deviations from the base value. The maximum value was recorded in the first quarter of 2015 when it reached 107.79 points, and the lowest in the second quarter of 2009 when it dropped to 86.27 points. At the beginning of this period, the index value was slightly above the base, until 2007 when it began to decline. The graph shows that the crisis had an impact on the movement of this index, but not a significant one. After that, index value has risen again and returned to figures above the base value in 2012. (ZSE, 2016)

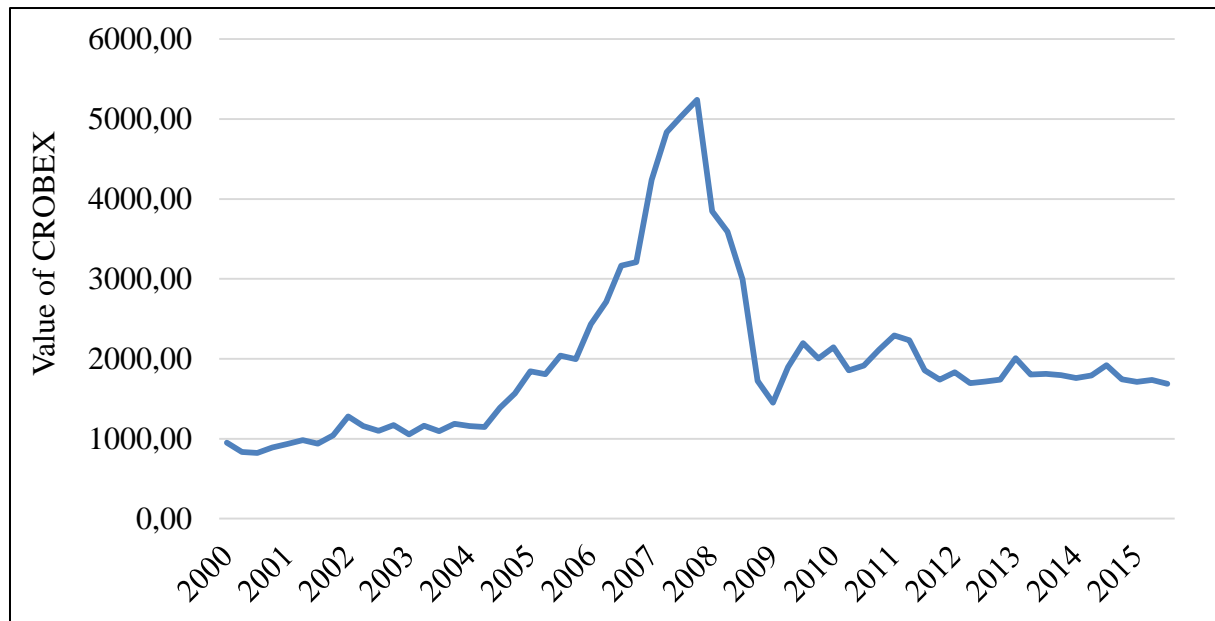
Figure 1 Changes in CROBIS value in the period 2002-2015



Source: Zagreb Stock Exchange

The official index of the Zagreb Stock Exchange is CROBEX. It was first published on September 1st 1997. Figure 2 shows the movement of CROBEX index in a period of 15 years. This index provides the best picture of the Croatian capital market and helps in making investment decisions.

Figure 2 Changes in the value of CROBEX from 2000 to 2015



Source: Zagreb Stock Exchange

At the beginning, the index value was not deviating much from the base value, but after 2004, it began to grow at increasing rates. The maximum value was recorded in the fourth quarter of 2007, when the average quarterly value was 5239 points. The capital market and mutual funds are segments of the Croatian financial system that were affected the most by the financial crisis, which can be seen in Figure 2. After 2010, the market has stabilized and CROBEX varies at around 2000 points, even though further downward trend is noticeable. Comparing Figure 1 and Figure 2, it can be seen that the stock market has been immeasurably more affected by the financial crisis than the bond market.

### 3. Regression Analysis of Capital Markets and Economic Growth in the Republic of Croatia

In accordance with the aim of this paper, the empirical analysis will consist of the estimation of a multiple regression model in order to analyze the impact of regression variables, which represent the capital market, on the variation in the dependent variable, that is, gross domestic product.

#### 3.1. Multiple regression model

Regression analysis is the most often used statistical methods in the empirical research. It allows for the analysis of relations between two or more phenomena at the same time, where the variable of primary interest is determined as a dependent, while the other are independent variables. The regression model in which the variation of the dependent variable is described by two or more independent variables, and in which the relationship between the variables is linear, is called multiple linear regression model, whose general form is:

$$y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \dots + \beta_k x_k + e, \quad (1)$$

where  $y$  is the dependent variable, independent variable are  $x_i$ ,  $\beta_i$  are unknown parameters, and  $e$  is a random variable, and  $k$  represents the number of regressors. This model represents the population, while the model for the sample is obtained by the least squares method. Such a model is estimated as follows:

$$\hat{y} = \hat{\beta}_0 + \hat{\beta}_1 x_1 + \hat{\beta}_2 x_2 + \dots + \hat{\beta}_k x_k, \quad (2)$$

where  $\hat{\beta}_0$  is the estimated (average) value of the dependent variable when the values of all regressors are equal to zero, and the interpretation of that parameter rarely makes sense.  $\hat{\beta}_k$  is the value of the partial effect of  $x_k$  on  $\hat{y}$ , and it is explained as a change in the average value of the dependent variable for the increase of one unit in the variable  $x_k$ , providing that the other variables remain unchanged (Bahovec et al, 2015).

However, instead of an analysis of linear relationship between the dependent and independent variables, it is sometimes more appropriate to assume that the relationship between variables is nonlinear. The ratio of logarithms is often analyzed in applied economic researches and in this paper it is assumed that the relationship between GDP and the capital market indicators is non-linear, so the dependent variable is logarithmically transformed. After the transformation the model has the following form:

$$\ln(y) = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \dots + \beta_k x_k + e. \quad (3)$$

The interpretation of this model is also different from the usual, and here is the interpretation for the first variable:

$$\% \Delta y = (\beta_1 \cdot 100) \Delta x, \quad (4)$$

where  $\% \Delta y$  is the percentage change in  $y$  and  $\Delta x$  first difference of the variable  $x$  (Bahovec et al, 2015).

### 3.2. Variable Selection

Having selected the appropriate model form, the variables that are to be included in the model can be selected. The variable that is of primary concern is the movement of economic growth and development. The economy is represented by the movement of the gross domestic product (GDP), whose values are taken from the reports of the Central Bureau of Statistics. Independent variables were chosen in accordance with similar empirical studies and are briefly explained below.

The Market Capitalization Ratio (*MCR*) is the most common indicator of the capital market development and it is calculated as the ratio of market value of the shares to the gross domestic product. It is used as a measure of the size of the capital market. The Total Value Traded (*TVT*) and the Turnover Ratio (*TR*) are used as indicators of liquidity of capital markets. Number of shares (*NO*) indicates the number of domestic companies listed on the Zagreb Stock Exchange. Data are taken from the reports of the Zagreb Stock Exchange. In order to obtain the real value of the indicator, all data except number of shares, were deflated by the harmonized index of consumer prices (2005 = 100), taken from the Eurostat database. For the purposes of empirical analysis, the statistical software EViews 8.1 has been used.

Table 1 shows the basic measures of descriptive statistics for the dependent variable of *GDP*, as well as the independent variables *MCR*, *TVT*, *TR* and *NO*, but in their original form for an easier interpretation.

Table 1 Measures of descriptive statistics for the dependent and independent variables

	<b>GDP (mil. HRK)</b>	<b>MCR (%)</b>	<b>TVT (%)</b>	<b>TR (%)</b>	<b>NO</b>
<b>Mean</b>	52393,84	214,3375	2,117233	0,815864	209,7937
<b>Median</b>	53349,42	219,2800	0,527561	0,243503	202,0000
<b>Maximum</b>	62925,79	567,2900	20,50813	3,996114	383,0000
<b>Minimum</b>	40511,50	61,56000	0,004917	0,007301	63,00000
<b>Std. Dev.</b>	5330,576	114,6581	3,562423	1,041641	97,70482
<b>Observations</b>	63	63	63	63	63

Source: author's calculations

Table 1 analyzes the quarterly data for the period from the first quarter of 2000 to the third quarter of 2015, accounting for 63 quarters, or 63 observations and it shows that the variables are expressed in different measurement units and that their basic descriptive measures differ greatly. It should be noted that the variables *MCR* and *TVT*, used quarterly, do not depict the real ratio of market capitalization to GDP (whose average value is about 30%), but will be of use in assessing the regression model.

In the end, it is necessary to explain that the semi-logarithmic model has been chosen primarily because of variables *NO* and *GDP* that do not have a linear relationship, while the initial model of multiple linear regression did not provide results that are consistent with the economic logic. However, this variable could not be left out because its exclusion significantly decreased the quality of the model.

### 3.3. Estimation of the Multiple Regression Model

Since a non-linear form of regression is being estimated, the analysis does not start with the correlation analysis. Another reason for its exclusion is that in a correlation analysis, which involves a number of independent variables the direction of correlation variables cannot be inferred, but only the strength of their relationship and all the relevant information on variables will be obtained in the model estimation.

Table 2 gives the results of the estimation of the semi-logarithmic or log-linear regression model with the dependent variable *LBDP* and four independent variables: *MCR*, *TVT*, *TR* and *NO*.

Table 2 Estimation of the regression model (abbreviated estimation output from EViews 8.1)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
<b>MCR</b>	0.000281	0.000133	2.112993	0.0389
<b>TVT</b>	-1.66E-06	5.55E-07	-2.996175	0.0040
<b>TR</b>	5.08E-07	1.56E-07	3.250621	0.0019
<b>NO</b>	0.000800	0.000117	6.853582	0.0000
<b>C</b>	10.62703	0.020495	518.5141	0.0000
<b>R-squared</b>	0.767525	<b>F- statistic</b>	47.87236	
<b>Adjusted R-squared</b>	0.751492	<b>Prob (F-statistic)</b>	0.000000	

Source: author's calculations

The estimated regression equation has the following form:

$$\ln(\widehat{gdp}) = 10,62703 + 0,000281 \cdot mcr - 1,66E^{-6} \cdot tvt + 5.08E^{-7} \cdot tr + 0,000800 \cdot no \quad (5)$$

The equation shows that the variables *MCR*, *TR* and *NO* have a positive impact on the *GDP*, while the link between variables *TVT* and *GDP* has a negative sign. According to the t-Statistic and the corresponding p-value it is concluded that all independent variables are significant in the model. Estimates of parameters are interpreted as follows:

If the ratio of market capitalization to GDP increases by 1%, with other indicators unchanged, GDP of Croatia will increase on average by 0.0281%. The first indicator of market liquidity, the ratio of the volume of the GDP says that, in the event of an increase of 1%, ceteris paribus, GDP will decrease on average by 0.00017%, whereas, if there is an increase in the ratio of the volume and market capitalization, ceteris paribus, an average increase in GDP will be 0.00005%. Thus, the impact of the liquidity ratio of the market is in this model is ambiguous, which is attributable to the use of data on a quarterly basis, which is not common. If the number of shares on the Zagreb Stock Exchange increased by 1%, and other indicators did not change, GDP should increase by an average of 0.08%.

Table 2 also provides information on the proportion of the total variability of the dependent variable which is explained by the model, and information about the coefficient of determination R-squared. The positive square root of the coefficient of determination coefficient of multiple correlation in this model is:

$$R = \sqrt{R^2} = \sqrt{0,767525} = 0,876086 = 87,61\%. \quad (6)$$

Based on the coefficient of determination it is concluded that 76.75 % of all deviations of the dependent variable are interpreted by the model, while the coefficient of multiple correlation shows that between GDP and selected set of regressors there is a very strong link. Table 3 supplements the conclusions reached with the information on the significance of regressors in the model. The null hypothesis of the F-test of significance of regression assumes that no independent variable is significant in the model (Bahovec et al, 2015 ). Since the p-value of F -Statistic is less than the theoretical significance level of 5 % , it is concluded that at least one independent variable is significant in the model, which was expected given that the t-Statistic values (the results of which are given in Table 2) showed that all independent are significant in the model.

Table 3 Analysis of variance for multiple regression model

Source of Variation	df	Sum of Sq.	Mean Sq.	F-test	p > F
<b>Regression</b>	4	3.13E+11	7.84E+10	32.32659	0.0000
<b>Residual</b>	310	7.51E+11	2.42E+09		
<b>Total</b>	314	1.06E+12			

Source: author's calculations

Estimated multiple regression model has proved that the indicators of capital markets (mostly) have a positive impact on the economic growth of the Republic of Croatia. With an increase in size of the capital market, a larger number of opportunities for (profitable) investments is opened and it enables the effective execution of the allocation function, which makes the market capitalization an irreplaceable factor of economic growth (Ishioro, 2013). Greater market liquidity reduces the risk of investing in securities on the secondary market, and because of greater liquidity, investors are willing to invest in the long term (Koirala, 2011).

Regression analysis showed that the estimated value of regression parameters are quite small, which means that the Croatian capital market contributes to the economic growth still in a small amount and that there is a large space for its development. The analysis has shown that the increase in market capitalization, turnover ratio and the number of issues listed on the Zagreb Stock Exchange contributes to the development of the Croatian capital market, which, given the signs of the coefficients in the regression equation, should stimulate economic growth and development of the Croatia.

#### 4. Conclusion

Many economists studied the relationship between capital market development and economic growth, trying to find out whether there is a connection between this segment of the financial system and the economy as a whole and to determine the nature of this link. Most researchers, after conducting empirical analyses, concluded that there is a connection between the development of capital markets and economic growth, which is consistent with the economic theory. However, a number of economists said that there is no link between the financial and economic system or disputed the possibility of analyzing such a link.

In order to examine the connection between the development of capital markets and economic growth in the Republic of Croatia, an empirical analysis is conducted in which the non-linear multiple regression model is tested. The aim was to analyze the influence of independent variables that represented the capital market on the dependent variable, or gross domestic product. Those independent variables were ratio of market capitalization to GDP, ratio of volume to GDP, ratio of volume and market capitalization and number of listed shares on the Zagreb Stock Exchange. Instead of the usual multiple linear regression analysis, in this paper the log-linear regression model was used, since the relationship between the observed variables is not proven to be linear, due to the asymmetric distribution of the variables' values and because of the meaningfulness of the results interpretation. The results showed that three out of four independent variables point to a positive relationship between capital market development and economic growth. Results are consistent with the expectations and the economic theory and thus with most scientific papers that analyzed capital markets in other economies. Although there are many differences from country to country in determining this relationship, the authors who observed the transition economies as well, have come up with similar conclusions, and most of them state that there is a correlation between the development of capital market and economic growth so such results were expected for Croatia.

Since the estimated values of regression parameters are fairly small, the Croatian capital market still has a small impact on the economic growth and it is clear that there is considerable space for its further development. In the end it can be concluded that an increase in market capitalization, turnover ratio and the number of shares listed on the Zagreb Stock Exchange can contribute to the development of the Croatian capital market, which, by the allocation, mobilization and other functions of the financial system, will have a positive impact on the economic growth of the Republic of Croatia.

#### References

1. Bahovec, V. et al. (2015) *Statistika*. Zagreb: Element.
2. Central Depository & Clearing Company Inc.: <http://www.skdd.hr/portal/f?p=100:10>
3. Croatian Bureau of Statistics: <http://www.dzs.hr/>
4. Croatian Financial Services Supervision Agency: <http://www.hanfa.hr/>
5. Demirguc-Kunt, A. i Levine R. (1996) Stock Market Development and Financial Intermediaries: Stylized Facts. *The World Bank Economic Review*, 10, pp. 291-321.
6. Gurley, J. i Shaw, E. (1955) Financial Aspects of Economic Development. *American Economic Review*, 45, pp. 516-537.
7. Hicks, J. A. (1969) *A Theory of Economic History*. Oxford, UK: Clarendon Press.
8. International Monetary Fund (2005) Indicators of Financial Structure, Development, and Soundness. U: *Financial Sector Assessment*. Washington, D.C.: International Monetary Fund
9. Ishioro, B. O. (2013) Stock Market Development and Economic Growth: Evidence from Zimbabwe. *Ekonomika misao i praksa*, 2, pp. 343-360.

10. King, R.G. i Levine P. (1993) Finance and Growth: Schumpeter must be Right. *Quarterly Journal of Economics*, 108, pp. 717-738.
11. Koirala, J. (2011) The Effect of Stock Market Development on Economic Growth: An Empirical Analysis of UK. Available at: <http://ssrn.com/abstract=2494640>
12. Leko, V. (2012) *Financijske institucije i tržišta*, course materials. Zagreb: Faculty of Business and Economics.
13. Levine, R. i Zervos, S. (1996) Stock Markets, Banks and Economic Growth. *American Economic Review*, 88, pp. 537-557.
14. McKinnon, R. I. (1973) *Money and Capital Economic Development*. Washington, D.C.: Brookings Institutions.
15. Narodne novine (2007) *Act on the Takeover of Joint-Stock Companies*. (NN 109/07, 36/09, 108/12 i 148/13)
16. Narodne novine (2008) *Capital Market Act*. (NN 88/08, 146/08, 74/09, 54/13, 159/13, 18/15 i 110/15)
17. Narodne novine (2012) *Act on the Croatian Financial Services Supervisory Agency*. (NN 140/05 i 12/12)
18. Orsag, S. (2011) *Vrijednosni papiri: Investicije i instrumenti financiranja*. Sarajevo: Revicon.
19. Robinson, J. (1952) *The Generalization of the General Theory, the Rate of Interest and Other Essays*. London: McMillan.
20. Schumpeter, J. A. (1912) *The Theory of Economic Development*. Cambridge University Press
21. Shaw, E. S. (1973) *Financial Deepening in Economic Development*. New York: Oxford University Press.
22. Vidučić, Lj. (2006) *Financijski Menadžment*. Zagreb: RRIF Plus.
23. Zagreb Stock Exchange: <http://zse.hr/>