THE EFFECT OF FINANCIAL DEVELOPMENT ON GROWTH IN COUNTRIES JOINING THE EU AFTER 2004: A PANEL DATA ANALYSIS

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Abstract

In this study, the effect of financial development on the growth in 12 countries joining the EU after 2004 was analysed by using data of the period 2004-2012. Panel data was used as the analysis method. According to the results of the analysis, domestic credits to private sector as % of GDP negatively affect economic growth. Market capitalization of listed companies as % of GDP is statistically insignificant affect on growth. However, M2 have a positive effect on growth and interest rate has negative impact on growth. Also 2009 year has a negative impact on economic growth. This situation can be described by 2009 global financial crisis.

Key words**:** *Financial development, economic growth, European Union, panel data*

Jel classification**:** *C01, C23, G23, O47, O52, R11*

1. Introduction

Levine (1997: 691) has modeled the theoretical structure between financial system and economic growth. According to Levine's model, information and transaction costs are decreased by means of financial markets and intermediaries. Within that period, savings become mobilized, allocation of resources takes place, managerial risks decrease, trade of goods and

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services becomes easier and making contract becomes easier. By means of the opportunities of financial system, capital accumulation and technological innovations occur, so the economy grows.

When it is seen that developed countries have unexceptionally developed financial markets, it can be expected that policies aimed at the development of financial sectors increase economic growth at the same time. So, financial development is described as the key of economic growth and development (Khan and Senhadji, 2000: 3).

Patrick (1966: 174) explains the relation between financial development and economic growth in two different interactions. One of these interactions is "demand-following". The establishment of modern financial institutions and the tools and services provided by these institutions will create demand from investors and savers in the economy. So the developments in the financial system will affect economic growth process. According to "supply leading", resources are transferred from traditional sector to modern sector and so entrepreneur in the modern sector will come into action (Patrick, 1966: 175-176).

In this study, the effect of financial development on the growth in 12 countries[1] joining the EU after 2004 was analysed through the panel data method by using data of the period 2004-2012. These countries in this study are the countries which joined the EU during and after the fifth enlargement in 2004. Slovakia is excluded from the analysis because there is not sufficient data about this country.

2. Literature

Barjaktarovic et al. (2013) have analysed the relation between financial development and economic growth in Central and East Europe Countries (CEE) for the period of 2005-2010. Correlation and panel regression analyses were used the method. They concluded that the increase in individuals' welfare and economic growth are positively related with banking services and foreign investment inflow. Additionally, global economic crisis in 2009 affected the welfare level of individuals.

Bena and Jurajda (2011) stated that firms in 15 EU countries can reach similar growth opportunities with the beginning of 'single market' process in 1993; however these countries are different between each other in terms of their financial markets. In the study, they examined the relation of firms' growth rates with financial depth and corporate quality on the basis of 'single

market'. They concluded that financial depth and corporate quality have positive impact on economic growth even if the level of financial depth and corporate quality are different between countries. Additionally, while firms in countries whose financial markets are defective are disadvantageous in terms of growth, this disadvantage is removed after financial integration in EU begins to perform successfully (Bena and Jurajda, 2011: 401, 423).

Botric and Slijepcevic (2008) have analysed the relationship between the effectiveness of banking sector and economic growth in 6 South-eastern European countries in the period of 1995-2005. Panel data analysis was used as the method. Since financial markets were not developed in these countries, they took banking sector into account. They concluded that developments in banking sectors cause the decrease in interest rates and this situation has positive impact on the economic growth in these countries (Botric and Slijepcevic, 2008: 253).

Carp (2012) has analysed the effects of the changes in foreign capital inflows on economic growth in Central and Eastern Europe for the period of 1995-2010. According to results of analysis, direct casual relationship of GDP growth rates with the market capitalization and stock value traded in the long-term could not be found. There is a bidirectional correlation between GDP growth rates and turnover ratio (Carp, 2012: 438, 441, 443).

Dudian and Popa (2013) have analysed the relationship between financial development and economic growth 8 Central and Eastern Europe countries in the period of 1996-2011. Panel data analysis was used as the method. According to the results, nonperforming loans and interest rates have negative impact on economic growth. Private sector loans affect economic growth in a negative way. The increase in M2 has a partially positive impact on economic growth (Dudian and Popa, 2013: 59).

Friedrich et al. (2013) examined the impact of the financial integration on economic growth. In the study, they used industry data of 55 countries which consist of 24 developed countries, 12 developing EU countries and other 19 developing countries in the period of 1998-2005. According to the results of analysis, financial integration can also take place in countries where political integration takes place. It can be said that political integration may increase benefits of financial integration dramatically (Friedrich et al., 2013: 522, 524).

Gaffeo and Garalova (2013) have investigated the relation between financial depth and economic growth in 13 transition countries in the period of

1995-2007 through panel cointegration method. According to the results of analysis, the relation between financial depth and economic growth is positive in the long-term. However, the impact of financial markets on economic growth is poor and negative in the short-term. The reason is that failures in market discipline and taking extreme risk may cause economic malaise. Additionally, it was stated that financial system may have more impact on economic growth if the funds of financial intermediaries are used by private entrepreneurs rather than households and public institutions.

Prochniak (2011) could not find a relation of economic growth with M2/GDP ratio, domestic credit provided by banking sector (% of GDP) and domestic credit to private sector (% of GDP) in his study in which he analysed the factors affecting economic growth of 10 Central and Eastern Europe countries in the period of 1993-2009. He concluded that there is a positive relationship between stock market capitalization rate and economic growth (Prochniak, 2011: 453, 465).

Djalilov and Piesse (2011) have analysed the relationship between financial development and economic growth in 27 Eastern Europe and old Soviet Union countries which are called as transition economy in the period of 1992-2008. Three different variables were used in terms of financial development. First of these variables is finance index which arises from composition of different financial arguments. Second of these variables is financial inclusion which shows the competition level in banking sector and involves the difference between loan interest rates and deposit interest rates. Third variable is credit to private sector (% of GDP) (2011: 14). It was concluded that countries reach a certain development level when financial sector has an impact on economic growth. Credit to private sector (% of GDP) variable does not have a statistically significant impact on economic growth (Djalilov and Piesse, 2011: 21).

3. Data Set and Methodology

The data of 12 countries affiliating to EU in 2004 or later for the period of 2004-2012 were taken into account. These countries are Hungary, Poland, Czech Republic, Slovakia, Slovenia, Latvia, Lithuania, Estonia, Malta, and Cyprus which joined the EU in 2004 and Romania, Bulgaria which joined the EU in 2007. Data were collected from the "World Development Indicators" website of World Bank. Within the context of studies in the literature, GDP Per Capita Growth Annual was determined as dependent

variable and Domestic Credit to Private Sector as % of GDP (DCP), Market Capitalization of Listed Companies as % of GDP (MCLC), Money and Quasi Money M2 as %of GDP (M2) were determined as independent variables with respect to the impact of financial development on economic growth. Domestic credit to private sector refers to financial resources provided to the private sector, such as through loans, purchases of non-equity securities, and trade credits and other accounts receivable, that establish a claim for repayment. For some countries these claims include credit to public enterprises (Rashid, 2011: 29). Market capitalization (also known as market value) is the share price time periods the number of shares outstanding. Listed domestic companies are the domestically incorporated companies listed on the country's stock exchanges at the end of the year (Rashid, 2011: 29). Money and quasi money comprise the sum of currency outside banks, demand deposits other than those of the central government, and the time period, savings, and foreign currency deposits of resident sectors other than the central government. This definition of money supply is frequently called M2 (World Bank). Real interest rate (INT), real interest rate is the lending interest rate adjusted for inflation as measured by the GDP deflator. According to the theoretical expectations, there is a positive correlation between independent variables except interest rate and dependent variables. A negative correlation is only expected between the interest rate and growth. Panel data analysis was carried out by using data of 12 countries for nine years including the period of 2004-2012. Accordingly the model used in the study is in Equation 1.

4. Analysis Process

When all observations in panel data analysis are homogeneous pooled OLS model can be used. However it can be said that if the observations included unit and time period effects, the use of fixed effects model or random effects model would be appropriate (Yerdelen Tatoğlu, 2012: 163-164). So firstly, it was examined with likelihood ratio test whether there are unit and time period effects for the model. In LR test, it is checked that standard errors of unit effects is equal to zero (H_0: $\sigma_\mu=0$). Additionally, standard errors of time period effects is also checked with LR test (H_0: $\sigma_\lambda=0$) (Yerdelen Tatoğlu, 2012: 170). When unit and time period effects cannot be determined through LR test, pooled OLS method may be used. However if unit and/or time period

effects can be determined, it can be concluded that the model is one way or two way.

$$GDPPG_{it}=\beta_0+\beta_1 DCP_{it}+\beta_2 MCLC_{it}+\beta_3 M2_{it}-\beta_4 INT_{it}+u_{it} \quad (1)$$

Several tests should be carried out in order to select the model. Firstly, LR test should be carried out by way of maximum likelihood in order to check the validity of two way (time period and unit effect) model. According to this test, it can be said that there is unit and/or time period effects in the model. It can be decided through this test that the model is two way. Nevertheless the existence of these effects should be checked separately. For this purpose, the existence of unit effects can be checked through several tests such as F, LR, Score, Breusch and Pagan Lagrangian Multiplier Test. First of these test is F test which is carried out by way of fixed effects (within-group) and in which the null hypothesis is that 'unit effects are equal to zero'. In second and third tests the null hypothesis is that 'standard errors of unit effects are equal to zero' and these tests are LR test and score test which are carried out by way of maximum likelihood. Forth of the tests is Breusch and Pagan Lagrangian multiplier test which is carried out by generalized least squares for random effects and the null hypothesis is that 'variance of unit effects is equal to zero'. Additionally, the existence of time period effect can be checked through LR test whose null hypothesis is that 'time period effects are equal to zero' (Yerdelen Tatoğlu, 2012: 187).

Table 1: Selection of Model and Tests to Check the Existence of Unit Effect: LR, Score and Breusch-Pagan Lagrange Multiplier (LM) Test

GDPPG	PLS	FE	RE	OWUEMLE	OWTPEMLE	TWEMLE
DCP	-0.033	-0.191***	-0.033	-0.079***	-0.017	-0.025
MCLC	0.016	0.027	0.016	0.029	-0.025	-0.017
M2	0.015	0.105***	0.015	0.053***	0.007	0.014
INT	-0.825***	-0.812***	-0.825***	-0.858**	-0.544***	-0.568***
_cons	7.247***	13.091***	7.247***	7.789***	6.426***	6.421***
N	92	92	92	92	92	92
F	18.18	3.76				
chi2			72.71	96.03	52.25	49.10
r2	0.4553	0.6121				
F_f		29.99				
P	0.000	0.0003	0.000	0.000	0.000	0.000

chi2_c				2.60	41.90	42.21
p_c				0.0534	0.000	0.000

The Model of MLE: Score test of sigma_u=0: chi2(1)= 31.61 Prob>=chi2 = 0.000

The Model of GLS for RE: Breusch and Pagan Lagrangian multiplier test for random effects

chibar2(01)=0.0 Prob>=chibar2 = 1.000

In Table 1, pooled least squares (PLS), fixed effects (FE), random effects (RE) and maximum likelihood (MLE) estimators are seen. Maximum likelihood estimators were estimated for one way unit effect (OWUEMLE), one way time period effect (OWTPEMLE) and two way effects (TWEMLE). Additionally, there are several tests relating these models in Table 1. Firstly, LR test by way of maximum likelihood (TWEMLE) was used in order to check the validity of two way (time period and unit effects) model. Accordingly, the null hypothesis was rejected and it was decided that the model is two way. It can be said that there are unit and/or time period effects. After reaching this result, the existence of the effects is checked separately. Four different tests were carried out in order to be sure about the existence of unit effects. These tests are F, LR, Score, Breusch and Pagan Lagrangian multiplier tests. When examining the results of tests, unit effects are different than zero according to the LR test (OWUEMLE) which carried out by way of (within-group) fixed effects (F_f=29.99). Standard error of unit effect is different than zero according to (OWUEMLE) LR test (chi2_c=2.60) and score test (chi2 (1) =31.61) which are carried out by way of maximum likelihood. Variance of unit effects is equal to zero according to Breusch and Pagan Lagrangian multiplier test which is carried out by generalized least squares for random effects (chibar2(01)=0.0). According to the results of first three tests, it was decided that there is unit effect. The existence of time period effects was checked through LR test (chi2_c=41.90) (OWTPEMLE) and it was concluded that time period effects are different than zero. As the result of the test it was understood that the model is two way, that is it includes both unit and time period effects. Shortly explained that, two way model is valid.

Additionally, Hausman specification test is used to check whether unit and time period effects of the two way model are fixed or random. According to Hausman test, both unit and time period effects estimators are valid if there

is not a correlation between error components (u_i) and explanatory variables (x_{kit}). However if there is a correlation between error components and explanatory variables, random effects estimator is invalid. The null hypothesis should be determined in the way that there is not a correlation between error components and explanatory variables in Hausman test (Hill vd., 2011: 559). So it can be said that random effects are valid when there is not a correlation between u_i and x_{kit}, and fixed effects are valid when there is a correlation between u_i and x_{kit} (Gujarati, 2003: 650).

Table 2: Hausman Test

χ^2	19.67
prob.	0.0006

The results of Hausman test through which the selection between two way fixed and random effects is made take part in Table 2. Accordingly, the null hypothesis (H_0) is rejected and fixed effects estimator is valid. So it was concluded that two way fixed effects model is appropriate.

$$Y_{it}=\alpha+\beta X+\mu_i+\lambda_t+u_i \quad (2)$$

Two way fixed effects model is shown in Equation 2. μ_i and λ_t are defined as fixed parameters which should be estimated. Shadow variables which are one less than the number of units and time period dimensions [(N-1)+(T-1)] are formed and included in the model as independent variables. After that, this model is used to make estimation (Yerdelen Tatoğlu, 2012: 140).

Then models were checked on the basis of basic assumptions. One of these assumptions is constant variance (homoscedasticity) assumption. According to the constant variance assumption, variance of the error term remains the same despite unit values of explanatory variables change. When this assumption does not actualize, the model includes inconstant variance (heteroskedasticity) (Wooldridge, 2012: 93). Modified Wald Test was used to check this assumption. According to the autocorrelation assumption, there is no correlation between error terms and independent variables (Wooldridge, 2012: 353). The sitation in which this assumption does not actualize means that there is correlation between error terms and independent variables. Durbin-Watson test of Bhargava, Franzini and Narendranthan is used to check

this assumption. Another assumption is in relation to inter-unit correlation. This assumption is checked through Breusch-Pagan LM test.

Some deviations were checked within the scope of this model. According to the constant variance assumption (homoscedasticity), variance of the error term remains the same despite unit values of explanatory variables change. When this assumption does not actualize, the model includes inconstant variance (heteroskedasticity) (Wooldridge, 2012: 93). According to the autocorrelation assumption, there is not correlation between error terms and independent variables (Wooldridge, 2012: 353).

Modified Wald Test was used to check Heteroskedasticity assumption. LBI test of Baltagi-Wu and Modified DW test of Bhargava, Franzini and Narendranthan were used in order to check autocorrelation. According to Table 3, heterokedasticity and autocorrelation problems were identified in the model. Since correlation matrix of residuals is singular, it is possible to check the existence of inter-unit correlation through Breusch-Pagan LM test. In order to this test, there is a correlation between units.

Table 3: Tests of Deviations from Assumption

Modified Wald test	**Modified Bhargava et al. Durbin-Watson test and Baltagi-Wu LBI**	**Breusch-Pagan LM test**
chi2 (12) = 299.54	Bhargava et al. Durbin-Watson = 1.6319278	Breusch-Pagan LM test of independence: chi2(66) = 118.111
Prob>chi2 = 0.0000	Baltagi-Wu LBI = 1.8100154	Pr = 0.0001

Heterokedastsity, autocorrelation and correlation between units were valid and the model estimated through resistance estimator Driscoll Kraay standard errors. Driscoll Kraay statistics is resistance to errors in the results and produced by deviations from three assumptions.

Table 4: Resistance Estimation Model - Two Way Fixed Effects Model

Explanatory Variables	**SCC**	**Driscoll/Kraay Std. Err.**	**t-statistics**	**p-value**
DCP	-0.1456802	0.0430439	-3.38	0.006

MCLC	-0.0016855	0.0206509	-0.08	0.936
M2	0.0947299	0.0159457	5.94	0.000
INT	-0.5125308	0.1048099	-4.89	0.000
Y_{2005}	0.3089108	0.2674868	1.15	0.273
Y_{2006}	1.718897	0.8068232	2.13	0.057
Y_{2007}	1.262334	1.431585	0.88	0.397
Y_{2008}	-1.279899	0.9656482	-1.33	0.212
Y_{2009}	-8.387417	1.328659	-6.31	0.000
Y_{2010}	-0.2368386	1.17668	-0.20	0.844
Y_{2011}	1.567728	0.8659047	1.81	0.098
Y_{2012}	-1.518207	0.7704951	-1.97	0.074
Cons.	10.32087	2.295337	4.50	0.001
R^2 F(12, 11) Prob > F	0.8104 5.57e+07 0.0000			

According to the results of analysis, coefficient of DCP (Domestic Credit to Private Sector as % of GDP) variable has negative impacts on growth in contrast with the theory and it was found statistically significant. 1% increases in DCP causes 0.14% decrease in growth. MCLC (Market Capitilization of Listed Companies as % of GDP) variable has negative impacts on growth in contrast with the theory and it was found statistically insignificant. Coefficient of M2 (Money and Quasi Money M2 as %of GDP) variable has positive impacts on growth as expected and it was found statistically significant. According to this coefficient, 1% increase in M2 gives rise to 0.95% increase in growth. The impact of INT variable on growth is negative in accordance with the theory and it is statistically significant. 1% increase in INT decreases growth by 0.51%. According to the results of the analysis in which the impacts of years are seen, statistically significant 2006 and 2011 years have positive impact on economic growth and 2009 and 2012 years have negative impact on economic growth.

5. Results

This study in which the relationship between financial development and economic growth in selected EU countries was analysed shows that the change in Domestic Credit to Private Sector as % of GDP rate has a negative impact on economic growth. This result is at variance with the theoretical expectations. The reason may be the fact that domestic credits to private sector

were not used in growth-generating areas in these countries. Additionally, Dudian and Popa (2013) relate the negative impact to banking crises which were experienced between 1996 and 2000. It could not be found a statistically significant relation between Market Capitalization of Listed Companies as % of GDP and economic growth. M2/GDP ratios have a positive effect on and economic growth. According to this result, usage level of financial systems by individuals and the increase in monetization level in the economy increase economic growth. Interest rates have a negative effect on economic growth. This result is in accordance with the expectations. In the study of Botric and Slijepcevic (2008) which was conducted on similar countries, positive impact of the decrease in the interest rates on economic growth is explained with the developments in the banking sector. 2009 year negative effect on economic growth can be describe by 2009 global financial crisis.

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