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ANALYSIS OF THE LINK BETWEEN CAPITAL AVAILABILITY AND ECONOMIC GROWTH WITHIN CEE COUNTRIES

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ABSTRACT: Fifteen countries from CEE region are analyzed in the paper within the period from 2005 till 2010 with the aim of determining the relation between capital availability and economic growth. Moreover, the analysis uses the correlation and panel regression as main tools for confirming the hypotheses. Furthermore, within the paper financial inclusion and availability of financial services as one of the most important topics within EU are being analyzed. The main focus is on empirically investigated correlation between financial development and faster current and future rates of economic growth, with special focus on physical capital accumulation, and economic efficiency improvements. Finally, there is a link established between the growth of the citizens' wealth and economic development of the country and the availability of bank services and foreign capital inflow as well. Consequently, the obtained results indicate that the effects of world economic crisis influenced the citizen's welfare starting from 2009.
KEYWORDS: GDP pc, economic crisis, banking sector, economic growth, financial inclusion

INTRODUCTION

The link between financial sector and economic development of a country has always been the object of interest of various authors. Moreover, King and Levine (1993) emphasize in their papers that there is a strong relation between already mentioned variables i.e. financial sector development and economic growth. Furthermore, King et al (1993) give example of Bolivia, and their research which included two variables LLY (the ratio of liquid liabilities of the financial system to GDP) and GYP (average long run real per capita GDP growth). Moreover, the variable LLY has been used to describe the size of the formal financial intermediary sector relative to economic activity measuring financial sector development or financial depth. The authors argue in their empirical research that Bolivia increased LLY by 10 percents, which was followed with the growth of variable GYP by 0.4 percents in 1960. Moreover, the authors Levine and Zevos (1998) point out that the link between banking sector, capital markets and economic growth is accomplished rather through productivity in comparison to physical capital accumulation. Finally, Levine and King (1993) studied whether higher levels of financial development are positively associated with economic development using data on over 80 countries from 1960 through 1989. King and Levine empirically investigated correlation between financial development and faster current and future rates of economic growth, physical capital accumulation, and economic efficiency improvements.

However, in developing country, usual thing is scarce supply of financial means. Consequently, increasing demand for financial means may lead to a financial gap due to a lack of domestic resources. Thus, the solution is foreign capital. Consequently, Pankova (2005) proved it on twelve European transition economies using Harrod-Domar model. This model reveals what can be tested in order to reduce the gap under an assumption of non-zero elasticity related to substitution of domestic for foreign capital. Moreover, new capital is characterized by capital mobility. A more open capital account implies a higher productive performance, however, for strong economies only. Nevertheless, the author used a Feldstein-Horioka hypothesis to quantify a measure of capital mobility by econometric models. Technique of panel data regressions is briefly mentioned as a tool which helps to solve the problem related to insufficiently long individual time - series.

Additionally, according to Josifidis et al. (2011), emerging countries with smaller pre-crisis vulnerabilities went into recession later and exited earlier, thus suffering less in output decline during crisis. Expectedly, emerging countries with stronger external linkages, i.e. higher dependence on demand from advanced economies or larger exposure to foreign bank claims, experienced larger output losses in crisis phase. The reason because banking crises have larger and more persistent

effects in developing economies is because these countries are more vulnerable to the factors that generally lead to banking turbulences and that amplify their impact, such as: banks and private agents exposure to currency and maturity mismatch, disruption in international capital markets, banks panic (Furceri and Zdziencika, 2010) and sudden stop of capital inflows (Calvo, 2006). Consequently, the main aim of this research is to determine the link between financial sector development and economic growth of the countries within CEE region. Moreover, the authors try to investigate the influence of foreign capital, as one of the tools for compensating scarce domestic supply of financial resources, on the wealth of the citizens as well. Thus, the following theses are being tested:

H0: Traditional bank services, deposits collecting and loan issuing have influence on economic development of the country (measured by Gross Domestic Product per capita (GDP pc) as the main indicator) within CEE countries.

H1: The foreign capital inflow influences the increase of the citizens' wealth (using Gross Domestic Product per capita (GDP pc) as the main indicator) within CEE countries.

METHODOLOGY

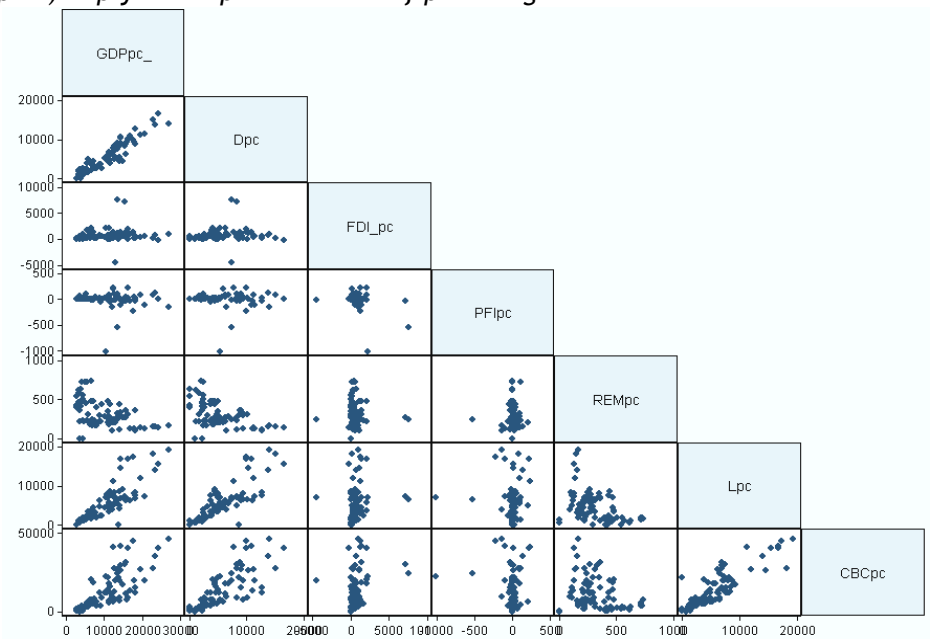
The data used for research were taken from the publications published by International Monetary Fund (IMF), WB, European Central Bank (ECB), Central Bank of Austria and BIS. Additionally, the authors used papers published by Raiffeizen Zentralbank (RZB) and UniCredit Research department for the period within 2005 and 2010. Moreover, the data collected are related to both macroeconomic and microeconomic indicators such are: GDP, FDI, portfolio investments (PFI), cross borders credits (CBC), remittances (REM) and loans (L) and deposits (D) expressed in same values, million of dollars and number of inhabitants (per capita /pc/), applying the exchange rates taken on 31st December of each year, the rate obtained from the site of central bank of related country.

The authors are testing two models of panel regression, fixed effects model and random effects model. However, through applying Hausman tests, the authors have decided to use fixed effects model for this analysis.

The countries used in research are: Czech, Hungary, Poland, Slovenia, Slovakia, Romania, Bulgaria, Croatia, Montenegro, Serbia, Bosnia and Herzegovina, Albania, Estonia, Lithuania, and Latvia. The main criteria for choosing the countries were given by Puhr et al (2009), based on the Report written by Oesterreichische Kontrollbank AG (OeKB).

CREATING A MODEL

While analyzing data, it is concluded that we are dealing with both cross sectional data and the timeline as well, i.e., panel longitudinal data. The type of data and the correlation itself obtained in analysis (Graph 1) imply the implementation of panel regression.



Graph 1. Display of observed cross dependencies of analyzed variables

The linear panel regression indicates a certain symmetry within groups i.e., similarity related to countries within certain time frame or between countries and time as well. Consequently, panel regression analyses fixed and/or random effects of input variables. The main differences between these two models lie in dummy variables. If dummy variables are considered as the independent variables within linear model, we are dealing with FE model (fixed effects model). On the contrary, the RE model (random effects model) regards dummy variables as errors. Moreover, model FE analyze group differences within independent variables (linear function intercepts), assuming the equal slope

and constants referring to variability of input variables (in our example CEE countries). Moreover, a group effect (individually specific) is thought to be constant within time and a part of independent variable, allowing u_i to correlate with other regressors. The equation is:

$$y_{it}=(a+u_i)+X'_{it}\beta+v_{it}. \quad (1)$$

This model indicates that both a slope and variance error is constant, while the intercept is not constant for the countries and/or time. FE model uses the following methods- LSDV (least square dummy variable) and within effect estimation method. Ordinary least squares method (OLS) belongs to FE model.

General model is:

$$y_{it}=a+X'_{it}\beta+(u_i+v_{it}), \quad (2)$$

Consequently, a slope is constant as in the previous model, while intercept and variance are different. Moreover, the intercept in this case is constant, while variance error is not constant for countries and/or time. The variables estimation in RE model is done by GLS and FGLS method and LM test as well. In comparison to FE model, RE model estimates variability in accordance with groups or time, assuming the same independent variables and slopes, while u_i is being considered as a component of error, thus denying correlation with any regressed coefficient. Otherwise, the basic OLS assumption would be denied. Furthermore, in this model the difference within groups or different periods of time is based on variability of the components of error not on the variability of independent variable. The estimations for RE model are made using GLS (generalized least squares) in cases when variance matrix Ω within groups is familiar, while FGLS (Feasible generalized least squares) is used when Ω is unknown. There are several methods for estimation within FGLS including method of max credibility and simulation.

The obtained coefficients within FE model are further tested by F-test, while in RE model testing is done using Lagrange multiplier. Decision related to the choice of RE/FE model is influenced by Hausaman test. If H0 hypothesis, related to inability of individual effects to correlate with other regressors, is not rejected, this implies that RE model is better than FE. Furthermore, the results o four findings are presented in the following chapter.

RESULTS

Correlation analysis indicates that the level of D pc and L pc, representing domestic sources of financing and the level of CBC pc, representing foreign sources of financing directly determine GDP pc. However PFI pc has poor effect, while FDI pc does not have any influence at all on GDP pc (Table 1). Finally, REM determines GDP pc indirectly.

Furthermore, the results of Hausman test in our case indicate rejection of RE model (chi=2.82, p=0.72, Table 2). The applying of FE model on our data, where GDP pc presents dependent variable, whilst D, L, FDI, PFI and REM are considered to be independent, is shown on Table 2.

Table 1. Correlation coefficients for the period from 2005 till 2010:

	GDP pc
D pc	0.95
FDI pc	0.11
PFI pc	0.31
REM pc	-0.68
L pc	0.81
CBC pc	0.76

Table 2. The results of Hausman test (STATA):

	Coefficients fixed group		(b-B) Difference	sqrt (diag(V_b-V_B) S.E.
	(b)	(B)		
deposits	0.1070172	0.1037145	0.0033027	0.0117867
FDI	0.0093966	0.0085596	0.0008370	0.0032384
portfolio	-0.1162688	-0.1163778	0.0001090	0.0322423
remittances	-0.3397122	-0.4179285	0.0782163	0.1491091
loans	23.6054700	21.8674700	1.7380000	7.6456780

b = consistent under Ho and Ha; obtained from xtreg
B = inconsistent under Ha, efficient under Ho; obtained from xtreg
Test Ho: difference in coefficients not systematic
chi2=2.82
Prob>chi2=0.7274

Moreover, statistic significance of each regression coefficient is present in output variables and is determined by t-test. Furthermore, statistic significance of regression model depends on p-value. If p value is less than 0.05 it is concluded that we are dealing with statistically significant regression model, where at least one of the independent variables has significant influence on the dependant variable. According to the final data, it is evident that the model is statistically significant (F=12.02 and p-value=0.00, Table 3), however, it excludes variables relating to deposits and remittances, which do not appear to be significant. Variability of dependant variable described by independent variables R2 is lacking, imposing the need for dividing each variable with the number of inhabitants.

Moreover, if D pc, L pc, FDI pc, PFI pc and REM pc are considered to be independent, F=41.79, p-value=0.00, indicating statistically significant results, while R2 shows more favorable results in comparison with the previous example (Table 4). In order to gain better results, LSDV method is used

as well, method introducing dummy variables. Actually, dummy variables present binary variables, taking values 1 or 0. However, certain mistakes can be made while implementing LSDV method. In order to avoid mentioned problem it is advisable to use methods LSDV1, LSDV2 and LSDV3. Those three approaches include fitting of the same linear model, however, dummy variables coefficients within each method have different meaning, thus leading to different numeric value.

Table 3. FE model results (between the level of deposits, loans, cross borders, portfolio investments, FDI, remittances and GDP pc.

GDP pc dependent variable				
independent variables	Coef.	Std.Err.	t	P
D	0.00	0.30	-0.04	0.97
FDI	-0.01	0.02	-0.68	0.50
PFI	-0.23	0.21	-1.07	0.29
REM	0.14	0.26	0.53	0.60
L	0.04	0.03	1.31	0.19
CBC	0.03	0.01	3.73	0.00
Fixed effect (country)	Yes			
R-sq (within)	0.5185			
R-sq (between)	0.1226			
R-sq (overall)	0.1493			
F-test	12.02		F-test (u_i)	33.30
p-value	0.00		p-value (u_i)	0.00
Corr (u_i, X_b)	-0.3402			

Table 4. FE model results (all variables in pc) STATA

GDP pc dependent variable				
independent variables	Coef.	Std.Err.	t	P
D pc	0.56	0.11	5.06	0.00
FDI pc	-0.01	0.11	-0.09	0.93
PFI pc	-1.79	0.91	-1.97	0.05
REM pc	1.38	1.56	0.88	0.38
L pc	0.28	0.10	2.90	0.00
CBC pc	0.12	0.03	3.61	0.00
Fixed effect (country)	Yes			
R-sq (within)	0.7842			
R-sq (between)	0.8428			
R-sq (overall)	0.8322			
F-test	41.79		F-test (u_i)	15.70
p-value	0.00		p-value (u_i)	0.00
Corr (u_i, X_b)	0.3465			

Table 5. Results for LSDV1 model

GDP pc dependent variable				
independent variables	Coef.	Std.Err.	T	P
D pc	0.56	0.11	5.06	0.00
FDI pc	-0.01	0.11	-0.09	0.93
PFI pc	-1.79	0.91	-1.97	0.05
REM pc	1.38	1.56	0.88	0.38
L pc	0.28	0.10	2.90	0.00
CBC pc	0.12	0.03	3.61	0.00
Czech	5903.14	1336.64	4.42	0.00
Hungary	2566.76	1132.89	2.27	0.03
Latvia	3360.44	975.32	3.45	0.00
Poland	4994.03	907.86	5.50	0.00
Slovenia	5545.10	1556.63	3.56	0.00
Slovakia	6331.08	980.70	6.46	0.00
Romania	2829.04	781.68	3.62	0.00
Bulgaria	689.24	885.86	0.78	0.44
Serbia	898.77	594.62	1.51	0.13
Croatia	2767.97	1093.57	2.53	0.01
Montenegro	178.18	831.74	0.21	0.83
Albania	288.38	648.82	0.44	0.66
Lithuania	3035.75	850.05	3.57	0.00
Estonia	-646.71	1699.79	-0.38	0.70
R-squared	0.9742			
Adj R-squared	0.9668			
F-test	130.48			
p-value	0.00			

In LSDV1 model, dummy variable coefficient shows the level of variation of independent variable country from the reference point (parameter related to omitted dummy), i.e. independent variable within model. Additionally, H0 states that variation from reference point is zero. Consequently, the Table 5 in appendix shows results related to LSDV1 model, introducing dummies for the countries, while omitted variable stands for Bosnia and Herzegovina.

Finally, REM pc, D pc, L pc and CBC pc directly influence the level of GDP pc. However, GDP pc is indirectly influenced by PFI pc, while results regarding FDI pc are not statistically significant. The countries which are at the biggest distance from the reference point (BandH) are the following one: Slovakia, Czech, Slovenia, Poland, Romania, Croatia, Hungary, Serbia etc. Furthermore, the results are following: F=130.48, p-value=0.00, indicating statistical significance, determination coefficient is 97.42%, and adjusted one is 96.68% that is, 3.32% of GDP pc variability is not determined by independent variables (Table 5).

CONCLUSIONS

The link between financial sector and economic development of a country has always been the object of interest of various authors. Finally, the authors in this paper through applying fixed effects model have confirmed both hypotheses. Furthermore, availability of traditional bank services measured through deposits and loans influence the economic development of the country measured through GDP pc, confirming H0 hypothesis. Moreover, capital inflow determines the increase of the citizens' wealth, that is, GDP pc of the countries within CEE region, thus confirming H1 hypothesis.

Correlation analysis indicates that the level of D pc and L pc, representing domestic sources of financing and the level of CBC pc, representing foreign sources of financing directly determine GDP pc. However PFI pc has poor effect, while FDI pc does not have any influence at all on GDP pc. Finally, REM determines GDP pc indirectly.

In the end financial sector have multiple effects on economic development of a country. The issues related to financial inclusion and availability of financial services are one of the most important topics within EU. Finally, stable financial system may be of great importance for each country and the business sector within it, especially for developing country like Serbia is in terms of its better positioning on the global competitiveness scale.

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