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IMPACT OF FOREIGN CAPITAL INFLOW ON GDPpc IN CEE COUNRIES

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ABSTRACT: The impact of foreign capital inflow on the level of GDPpc during the period of 2005 - 2010, on the basis of a sample of fifteen countries of Central and Eastern Europe (CEE) is the subject of this paper. The following foreign capital inflows were analyzed: cross-border credits (CB), foreign direct investment (FDI), portfolio investment (PI) and workers' remittances (REM). Correlation and panel regression are used for determine the influence. The models for explaining the level of GDPpc, based on the character of foreign capital inflow, were created using panel regression. The obtain results show that GDPpc in CEE depends to the greatest possible extent on CBCpc inflow and that the world economic crisis persists since 2009. This points to the low level of savings in those countries, so that their need to increase GDPpc had to be satisfied from foreign sources. Since those countries have not yet created a satisfactory business environment that will attract FDI, necessary growths capital had to be sought form more expensive sources - CBC.
KEYWORDS: Foreign capital inflow, cross-border credits, foreign direct investments, portfolio investments, remittances, CEE

INTRODUCTION

During the past decade, many countries of Central and Eastern Europe (CEE) recorded a significant increase in GDPpc. This increase was not predominantly based on domestic investments. Gross national savings accounted for about 15% of GDP on the average, while the levels of gross domestic savings accounted for about 8% of GDP, thus being lower by about 7 percentage points. Since CEE countries were trying to catch up with the EU, it was necessary to achieve high growth rates of GDPpc. Therefore, there was a pronounced need for investment. According to the IMF [6] and UNCTAD [16] data, the rate of gross capital formation accounted for about 25-30% of GDP. The difference between savings and investments had to be covered by foreign capital inflows, including specifically foreign direct investment (FDI), cross-border credits (CBC), portfolio investment (PI) and workers' remittances (REM). Countries with relatively lower public expenditures (below 40% of GDP) recorded relatively higher investment rates. Considered from a macroeconomic viewpoint, this confirms the occurrence of the crowding-out effect whereby excessive public expenditures crowd out private investment.

Chang and associates (2011) argued that GDPpc for nine Eastern-European countries during the period 1969-2009 recorded a steady rate of growth and that policy innovations had temporary effects. Generally speaking, CEE had open vulnerabilities, including heavy dependence on global markets and capital flows, as well as a large buildup of foreign debt. On the other hand, hidden vulnerabilities emerged due to the lack of adequate regulatory reforms and prudential controls to match the growing risks associated with fast and deep integration with the EU and world markets. This exacerbated sudden stops exposed these countries to the unexpected risks of asymmetric reduction in access to credit and uneven availability of government policy and fiscal support during the crisis [18]. According to Josifidis et al. [8], emerging countries with smaller pre-crisis vulnerabilities went into recession later and exited earlier, thus suffering smaller output declines during the crisis. Expectedly, emerging countries with stronger external linkages, that is, higher dependence on demand than advanced economies, or larger exposure to foreign bank claims, experienced larger output losses in the crisis phase. Continuing their analysis, Josifidis et al. [9] argued that CEE countries with rigid exchange rate regimes (Baltic countries) were forced to accept internal devaluation, accompanied by significant output and employment losses. On the other hand, CEE countries with flexible regimes allowed significant currency depreciations, thus accepting the role of exchange rate as a shock absorber. Taking the situation in the Croatian economy as an example, Bezić and associates [1] argued that the manufacturing industry was characterized by the lack of comparative advantage due to insufficient investment in production, which would speed up the adjustment of this industry to the competitive conditions on the international market. The same conclusion is valid for most countries in our panel.

Savings in CEE were much lower than the EU average and in Baltic countries they even became negative. As a result, the loan-to-deposit ratio and the proportion of external liabilities to total liabilities increased significantly between 2004 and 2008. Therefore, there was a strong need for foreign capital inflow for development finance.

The basic channels of foreign capital inflows included FDI, CBC, PI and REM. Today FDI flows amount to about $2.5 trillion, while in 2007 they reached a record amount of nearly $2 trillion.

Table 1. Capital inflows to developing countries, 2005-2010 (billions USD)

	2005	2006	2007	2008	2009	2010
Total	579	930	1,650	447	656	1095
FDI	332	435	571	652	507	561
PI	154	268	394	-244	93	186
Other	94	228	686	39	56	348
REM	173	204	245	288	281	297

Source: [see UNCTAD 16]

Neto and associates [10] concluded, on the basis of the panel data of 53 countries over the period 1996-2006, that FDI through greenfield investment had a positive impact on economic growth in all countries and that M&A had a negative effect on developing countries. The UNCTAD [16] reported that global FDI inflows rose modestly by 5%, thus amounting to $1.24 trillion in 2010. While global industrial output and world trade already returned to their pre-crisis levels, FDI flows in 2010 remained some 15% below their pre-crisis average and nearly 37% below their 2007 peak.

According to Revoltella and Mucci [14], the evolution of cross-border lending reveals that the group of countries characterized by a high degree of foreign ownership and presence of large international players, experienced a relatively higher stability of cross-border flows relative to countries with a smaller presence of foreign banks (e.g. Russia, Turkey and Kazakhstan). This represents an indirect proof that international banks generally do have a long-term horizon in funding their local CEE subsidiaries.

Cross-border credits directly became a transmission mechanism through which the crisis came to developing countries from highly developed ones. Fearing that they will be unable to meet the local market's demand, advanced economies' banks shifted to capital concentration and lending exclusively in their own countries, or reduced their cross-border activities to a minimum, coupled with very high interest rates.

According to Takáts [15], supply factors drove a fall in CBC to emerging markets during the crisis. The demand for CBC also declined, but it played a much smaller role. This contrasts to a much more balanced impact before the crisis. A 1% increase in output is associated with about 0.2% higher CBC. At the height of the crisis in Q4 2008, CBC flows to the average emerging market dropped by 12.4%; supply factors contributed 8.4% and demand factors 2.5% to the decrease. However, demand and supply factors tend to be more balanced during non-crisis periods.

CEE countries experienced a less severe reversal of capital flows than other regions of the emerging world. This can be attributed to the presence of foreign banks through their subsidiary structure. Specifically, many foreign banks were "located in" because their local subsidiaries had granted long-term loans in the host countries that could not be recalled. This suggests that the impact of the crisis would have been even larger without the presence of foreign banks in the region.

The CEE experience of the Great Recession shows that excessive reliance on foreign capital inflows makes a country vulnerable. Therefore, it is necessary to increase domestic savings, reduce fiscal expenditures, eliminate crowding-out effects and deepen the domestic capital market, so that commercial banks can rely to a greater extent on long-term funding in local currency.

Bearing in mind the described foreign capital flows, the aim of this paper was to determine whether foreign capital inflow had an impact on an increase in GDPpc in CEE.

In this paper we tested two hypotheses for CEE countries:

- ☐ *Hypothesis 1: Foreign capital inflow has an impact on an increase in GDPpc and*
- ☐ *Hypothesis 2: CBCpc inflow had the greatest impact on an increase in GDPpc.*

METHODOLOGY

Since it is the question of panel (longitudinal) data the paper uses panel regression. Two panel regression models were analyzed: Fixed Effect Model and Random Effect Model. By means of the Hausman test it was determined that for the purpose of this research it would be better to apply a fixed effect regression panel model. The panel regression results show that, compared to the analyzed inflow, CBCpc represents the most significant foreign capital inflow.

The sample of the analyzed countries includes Albania, Bosnia and Herzegovina (B&H), Bulgaria, Croatia, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Montenegro, Poland, Romania, Slovenia, Slovakia and Serbia. The paper used the data of The International Monetary Fund, The World Bank, The European Central Bank, The Bank for International Settlements (BIS), The Central Bank of Austria, as well as the central banks and statistical institutions of 15 countries making up the sample.

The following series were analyzed: GDP, FDI, PI, CBC and REM, expressed in per capita terms using the central banks' exchange rates at the end of the year under review.

The hitherto studies of CBC identified the following factors determining their level [7]: the macroeconomic performance of a credit beneficiary, geographic and cultural links between the creditor (or lender) country and credit beneficiary country, existence of daughter bank in the credit beneficiary country, in order to determine the credit rating of a legal entity or natural person seeking credit, as well as legislation in the credit beneficiary country. The study of Hermann and Mihaljek [5] shows that the greater the distance between the CBC beneficiary country and CBC lender country, the smaller is the amount of credit granted, and that the greater the level of GDP in the CBC beneficiary country the more attractive is such a country. CBC flows correspond positively to the levels of interest and GDP growth rates and negatively to the weakening of local currency. Puhr et al. [11] argued that during the period from IQ 2002 to IVQ 2008 Austrian banks' investments in the neighboring countries and CEE doubled (from €15.3 billion to €67.4 billion).

The BIS data [2] show that during the period 2005-2010, CBC was predominantly used by Albania, Bosnia and Herzegovina, Bulgaria, Croatia, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Montenegro, Poland, Romania, Slovenia, Slovakia and Serbia.

The correlation coefficient was calculated in order to determine the relationship between CBCpc and GDPpc. The calculation shows that the value of the correlation coefficient for all countries is 0.76, i.e. it is high and positive, showing that as the level of CBCpc increases the level of GDPpc increases as well.

In continuation, we analyzed the degree of linear relationship between GDPpc and other indicators. Table 4 shows the results that point to a distinctly weak relationship between FDIpc and GDPpc, and a weak relationship between PIpc and GDPpc. One can also observe a strong indirect relationship between REMpc and GDPpc. Correlation analysis showed that GDPpc was directly and strongly related to CBCpc, and that there was also an indirect relationship with REMpc.

Table 2. Correlation coefficients for the period 2005-2010

	GDPpc
FDIpc	0.11
Pipc	0.31
REMpc	-0.68
CBCpc	0.76

Source: [The authors' original work, adapted from raw data in 6]

Since the previously considered data have a cross-section character and are presented as the time series, they can be observed as so-called panel (longitudinal) data that can be analyzed using the specifically developed methods. Due to the nature of these data the conditions for using a linear panel regression were provided. With panel data it is possible to observe and quantify a possible regularity or, more exactly, the effects between groups, subjects, that is, countries, on one side or, within a certain period of time, on the other, or finally between both countries and periods of time.

Panel regression models investigate fixed and/or random effects of input data (variables). A substantive difference between these two models lies in the role of so-called dummy variables [18]. If dummy variables are considered part of the intercept of the linear model, it is the question of the fixed effect (FE) model. In random effect (RE) models, dummy variables are treated as part of the error, or are contained in the error. The FE model investigates group differences in intercepts, anticipating the same slopes and constant variability of the input data (for the observed countries). Since a group (individual specific) effect is temporally constant and considered part of the intercept, then it is allowed to be correlated to other regressor. The general form of the FE model is:

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

In this model the slope is constant, just like the variance error, while the intercept varies across countries and/or over time. The FE models use the least square dummy variable (LSDV) and within effect estimation methods. OLS belongs to the group of FE models. The general form of RE models is:

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

where the slope is constant like in the previous model, while the intercept and variance differ relative to the previous model. In other words, in this model the intercept is constant, while the variance error varies across countries and/or over time. The variables of the RE model are estimated using the GLS and FGLS methods, as well as an LM test. In contrast to the FE model, the RE model estimates the variabilities across groups or over time, assuming the same free terms and slopes, whereby it behaves as the error component, due to which it is uncorrelated to any regressor coefficient [4]. In the opposite, the substantive OLS assumption will be affected. In this model, the difference between groups or periods of time is based on the variability of the error terms and not the free term. The RE model is estimated using the standard lease square (GLS) method when the Ω matrix of between-group variances is known. The feasible generalized least squares (FGLS) method is used when the Ω matrix is not known. There are several FGLS estimation methods, including the maximum likelihood and simulation method.

The coefficients calculated using the FE method are tested using an F-test, while in the RE model, the investigation is carried out using the Lagrange multiplier (LM). Decision making about the

use of the FE or RE method is based on the results of the Hausman test. If the null hypothesis of the mentioned test that individual effects are uncorrelated to other regressors, is not rejected, then the RE model is better than the FE one. The results of the Hausman test (chi=2.82, p=0.73) in the model justify the rejection of the RE model and use of the FE one.

EMPIRICAL RESULTS

By applying the FE model to the observed data where GDPpc is a dependent variable and FDI, PI, REM and CBC are independent variables, we obtain the results shown in Table 3.

Table 3. Results of the FE model[1]

GDP pc dependent variable				
Independent variables	Coef.	Std. Err.	T	P>|t|
FDI	*-0.01*	0.02	-0.76	0.45
PI	*-0.01*	0.18	-0.02	0.98
REM	*0.17*	0.26	0.64	0.52
CBC	0.05	0.01	7.15	0.00
Fixed effect (country)	Yes			
R-sq (within)	0.4882			
R-sq (between)	0.1156			
R-sq (overall)	0.1502			
F-test	16.93		F-test (u_i)	38.66
p-value	0.00		p-value (u_i)	0.00
Corr (u_i, X_b)	-0.2584			

Source: [The authors' original work]

The statistical significance of each regression coefficient is contained in the output data and is determined using a t-test. The statistical significance of the regression model is determined on the basis of the p-value. Since the p-value is less than 0.05, it is concluded that the obtained model is statistically significant and that the impact of at least one regressor variable on the values of the dependent variable is statistically significant.

On the basis of the obtained results it is clear that the model is statistically significant (F=16.93 and p-value=0.00); only the coefficients obtained for FDI, PI and REM are not statistically significant. The variability of the dependent variable, described by the independent variables (R^2), is deficient so that in continuation we will reduce all variables to the levels expressed in per capita terms. The results obtained using the FE model are shown in Table 4.

Table 4. Results of the FE model (per capita variables)[2]

GDPpc dependent variable				
Independent variables	Coef.	Std. Err.	t	P>|t|
FDIpc	*-0.09*	0.14	-0.65	0.52
Pipc	*-0.62*	1.23	-0.50	0.62
REMpc	*2.81*	2.12	1.32	0.19
CBCpc	0.28	0.03	8.03	0.00
Fixed effect (country)	Yes			
R-sq (within)	0.5826			
R-sq (between)	0.5417			
R-sq (overall)	0.5348			
F-test	24.77		F-test (u_i)	31.85
p-value	0.00		p-value (u_i)	0.00
Corr (u_i, X_b)	0.2870			

Source: [The authors' original work]

The obtained results are statistically significant (F=24.77, p-value=0.00), while the values of R^2 are considerably better than in the previous model. In order to improve the model still further, our subsequent steps will consist in applying the least square dummy variable (LSDV) method (within which dummy variables are introduced). Dummy variables are actually binary variables that are encoded by taking the values 0 and 1. There are also certain dangers associated with the use of dummy variables. In order to avoid them, the LSDV1, LSDV2 and LSDV3 models can be used. These three approaches are reduced to fitting the same linear model, but the dummy variable coefficients in each approach have a different meaning due to which they are also numerically different.

In the LSDV1 model the dummy coefficient shows the extent to which the real intercept of a country differs from the reference point (parameter of the omitted dummy variable) which is the intercept of LSDV1. According to the null hypothesis, the deviation from the reference group equals

[1] Coefficients given in italic are not statistically significant.
[2] Coefficients given in italic are not statistically significant.

zero. Table 5 shows the results of the LSDV1 model when the dummy parameters for countries are introduced. The omitted dummy variable (reference point) is B&H.

The direct impact of CBCpc on GDPpc was determined on the basis of the obtained results. The assessments of statistical significance for FDIpc, PIpc and REMpc in this model are not significant. In this model countries the most distant from the reference point (B&H) include Slovenia, the Czech Republic, Slovakia, Poland, Latvia, Croatia, Hungary, Lithuania and Romania (listed in the order of distance). Since F=75.22 and p-value=0.00, the model is statistically significant. By applying this model each analyzed country can be represented by a different linear equation.

Table 5. Results of the LSDV1 model[3]

GDP pc dependent variable				
Independent variables	Coef.	Std. Err.	t	P>|t|
FDIpc	*-0.09*	0.14	-0.65	0.520
Pipc	-0.62	1.23	-0.50	0.618
REMpc	*2.81*	2.12	1.32	0.190
CBCpc	0.28	0.03	8.03	0.000
Czech	11230.6	1483.35	7.57	0.000
Hungary	4538.41	1496.58	3.03	0.003
Latvia	5301.62	1258.63	4.21	0.000
Poland	7305.89	1169.47	6.25	0.000
Slovenia	11516.51	1870.74	6.16	0.000
Slovakia	10144.16	1163.43	8.72	0.000
Romania	3199.27	1068.61	2.99	0.004
Bulgaria	*2095.09*	1182.99	1.77	0.081
Serbia	*529.76*	812.39	0.65	0.516
Croatia	4355.68	1376.19	3.17	0.002
Montenegro	*1032.98*	1126.72	0.92	0.362
Albania	*364.28*	888.15	0.41	0.683
Lithuania	4139.55	1125.06	3.68	0.000
Estonia	*2733.53*	2241.16	1.22	0.227
R-squared	0.9502			
Adj R-squared	0.9375			
F-test	75.22			
p-value	0.00			

Source: [The authors' original work]

If we use dummy variables for years - and not for countries like in the previous period - in order to detect certain regularities during the period under review, we will obtain the result shown in Table 6. This model shows that a fall in REMpc leads to an increase in GDPpc. The model also shows that the effects of the economic crisis could be observed since 2009.

Table 6. Results of the LSDV1 model[4§]

GDP pc dependent variable				
Independent variables	Coef.	Std.Err.	t	P>|t|
FDIpc	*-0.56*	0.34	-1.64	0.105
Pipc	*1.44*	2.86	0.50	0.615
REMpc	-9.43	2.43	-3.88	0.000
CBCpc	0.29	0.04	7.45	0.000
2005	*-2156.08*	1275.66	-1.69	0.095
2006	*-1897.51*	1247.12	-1.52	0.132
2007	*518.58*	1301.73	0.40	0.691
2008	*1374.47*	1330.33	1.03	0.305
2009	*-1031.58*	1250.99	-0.82	0.412
R-squared	0.6790			
Adj R-squared	0.6429			
F-test	18.81			
p-value	0.000			

Source: [The authors' original work]

[3] Coefficients given in italic are not statistically significant; the dummy variable was introduced for all countries except B&H.

[4] Coefficients given in italic are not statistically significant; dummy variables were introduced for countries and years except the year 2010.

In order to adjust the model still further, we will examine the possibility of using the dummy variables referring both to countries and time. The results of such a model are the output values y_{it} which correspond to a specific country for a specific year (Table 7).

The model is also statistically significant and the level of CBCpc has a direct impact on the level of GDPpc. Just like in the previous model, the impact of the global economic crisis on GDPpc has been felt since 2009. The countries most distant from the reference points are Slovenia, the Czech Republic, Slovakia, Croatia, Poland, Hungary, Latvia, Lithuania, Estonia and Romania (listed in the order of distance).

Table 7. Results of the LSDV1 model[5]

GDP pc dependent variable				
Independent variables	Coef.	Std.Err.	T	P>|t|
FDIpc	*-0.03*	0.09	-0.37	0.71
Pipc	*-0.05*	0.77	-0.06	0.95
REMpc	*-2.03*	1.36	-1.49	0.14
CBCpc	0.12	0.03	3.99	0.00
Czech	10107.38	570.25	17.72	0.00
Hungary	5391.68	644.37	8.37	0.00
Latvia	4659.73	509.37	9.15	0.00
Poland	5476.19	501.93	10.91	0.00
Slovenia	13633.99	905.83	15.05	0.00
Slovakia	9177.22	490.72	18.70	0.00
Romania	1753.67	495.51	3.54	0.00
Bulgaria	*126.53*	504.75	0.25	0.80
Serbia	*535.44*	712.55	0.75	0.45
Croatia	5743.09	646.66	8.88	0.00
Albania	-1156.62	569.21	-2.03	0.05
B&H	*-385.03*	684.69	-0.56	0.58
Lithuania	4432.85	528.54	8.39	0.00
Estonia	4734.32	1084.53	4.37	0.00
2006	712.73	329.39	2.16	0.03
2007	2784.83	381.94	7.29	0.00
2008	4283.83	467.02	9.17	0.00
2009	2441.22	422.38	5.78	0.00
2010	2900.31	341.79	8.49	0.00
R-squared	0.9833			
Adj R-squared	0.9774			
F-test	168.69			
p-value	0.00			

Source: [The authors' original work]

CONCLUSIONS

Both hypotheses were confirmed by using correlation analysis and panel regression fixed effect model. Foreign capital inflow had an impact on an increase in GDPpc in CEE countries. An important conclusion that can be derived from correlation analysis is that CBC is more significant for the level of GDPpc than FDI.

The applied panel regression models show that the effects of the global economic crisis were observable as early as 2009, manifesting themselves through a decline in foreign capital inflow and thus having an effect on a decline in GDPpc in CEE countries. Due to low saving rates, CEE countries had to ensure high foreign capital inflows in order to achieve GDPpc growth and catch up with the advanced EU economies. Since these countries achieved different yet mostly dissatisfactory levels of competitiveness, foreign investors were not sufficiently prepared to enter them through FDI inflow. The main obstacle to higher FDI inflow was reflected in an insufficiently favorable business environment. Faced with the problem of insufficient FDI inflow, on one side, and the need to achieve growth and catch up with the advanced EU economies, on the other, these countries were forced to ensure capital inflows through CBC. Although this was a more expensive method of financing development, they had to apply it due to insufficient levels of competitiveness. According to our analysis Slovenia, the Czech Republic, Slovakia, Poland, Latvia and Romania increased their GDPpc faster than CBCpc; Albania, B&H, Serbia, Montenegro, Bulgaria and Lithuania increased their GPDpc

[5] Dummy variables introduced for specific countries and years; reference points – Montenegro and the year 2005.

simultaneously with CBCpc. Hungary, Croatia and Estonia increased their CBCpc faster than GDPpc. Future research will be aimed at determining the key directions for enhancing competitiveness and the quality of the business environment in order to create the best possible conditions for FDI inflow and GDP pc growth.

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