

Nebojsa Savic<sup>1</sup>, Lidija Barjaktarovic<sup>2</sup>, Snezana Konjikusic<sup>3</sup>

## FOREIGN CAPITAL INFLOW AND GDPpc IN CEE COUNTRIES\*

*The aim of this paper is to determine the impact of foreign capital inflow on the level of GDPpc during the period 2005–2010, on the basis of the sample of 15 Central and Eastern European (CEE) countries. The following foreign capital inflows were analyzed: cross-border credits (CBC), foreign direct investment (FDI), portfolio investment (PI) and workers' remittances (REM). The paper uses correlation, panel regression and cluster analyses. The models for explaining the level of GDPpc, based on the character of foreign capital inflow, were created using the panel regression. The obtained results show that GDPpc in the CEE depends to the greatest possible extent on CBCpc inflow and that the world economic crisis persists since 2009. This points to the low levels 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 growth capital had to be sought from a more expensive source – CBC. According to the 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 GDPpc simultaneously with CBCpc and Hungary, Croatia and Estonia increased their GDPpc slower than CBCpc.*

*Keywords:* cross-border credits; FDI; remittances; CEE; GDP per capita.

*JEL Classification:* G21, G15, G01, F34, C22.

## Небойша Савич, Лідія Баряктарович, Снежана Конікушич ПРИПЛИВ ІНОЗЕМНОГО КАПІТАЛУ ТА ВВП НА ДУШУ НАСЕЛЕННЯ: ЗА ДАНИМИ КРАЇН ЦЕНТРАЛЬНОЇ ТА СХІДНОЇ ЄВРОПИ

*У статті досліджено вплив припливу іноземного капіталу на ВВП на душу населення протягом 2005–2010 рр. за даними 15 країн Центральної та Східної Європи. В якості потоків іноземного капіталу досліджено: транскордонні кредити, пряме іноземне інвестування, портфельне інвестування та перекази заробітків. Для аналізу даних використано методи кореляційного та кластерного аналізу, а також панельну регресію. Побудовано моделі, що пояснюють вплив потоків іноземного капіталу на рівень ВВП на душу населення. Результати аналізу показали, що найбільший вплив на ВВП має іноземне кредитування. Це можна пояснити малими обсягами внутрішніх заощаджень у всіх досліджуваних країнах. Нерозвиненість бізнес-середовища у даних країнах призводить до того, що регіон не є привабливим для прямого іноземного інвестування. Словенія, Чехія, Словачія, Польща, Латвія та Румунія протягом усього періоду збільшували свої ВВП швидше за зростання іноземного кредитування. В Албанії, Боснії та Герцеговині, Сербії, Чорногорії, Болгарії та Литві зростання цих показників проходило однаковими темпами. А в Угорщині, Хорватії та Естонії зростання зовнішнього кредитування випереджувало зростання ВВП на душу населення.*

*Ключові слова:* транскордонне кредитування; пряме іноземне інвестування; заробітки за кордоном; Центрально та Східна Європа; ВВП на душу населення.

*Табл. 8. Рис. 1. Форм. 3. Літ. 31.*

\* This research paper was part of the research project "Advancing Serbia's Competitiveness in the Process of EU Accession", No. 47028, during the period 2011–2015, financed by the Serbian Ministry of Science and Technological Development.

<sup>1</sup> PhD, Full-Time, Professor, Faculty of Economics, Finance and Administration FEFA, Belgrade, Serbia.

<sup>2</sup> PhD, Part-time Professor, Faculty of Economics, Finance and Administration FEFA, Belgrade, Serbia.

<sup>3</sup> PhD, Associate Professor, Faculty of Economics, Finance and Administration FEFA, Belgrade, Serbia.

**Небойша Савич, Лидия Баряктарович, Снежана Коникушич**  
**ПРИТОК ИНОСТРАННОГО КАПИТАЛА И ВВП НА ДУШУ**  
**НАСЕЛЕНИЯ: ПО ДАННЫМ СТРАН ЦЕНТРАЛЬНОЙ**  
**И ВОСТОЧНОЙ ЕВРОПЫ**

*В статье исследовано влияние притока иностранного капитала на ВВП на душу населения в течение 2005–2010 гг. по данным 15 стран Центральной и Восточной Европы. В качестве потоков иностранного капитала исследованы: трансграничные кредиты, прямое иностранное инвестирование, портфельное инвестирование и переводы заработков. Для анализа данных использованы методы корреляционного и кластерного анализа, а также панельная регрессия. Построены модели, объясняющие влияние потоков иностранного капитала на уровень ВВП на душу населения. Результаты анализа показали, что наибольшее влияние на ВВП имеет иностранное кредитование. Это можно объяснить малым объемом внутренних сбережений во всех исследуемых странах. Незрелость бизнес-среды в данных странах приводит к тому, что регион не является привлекательным для прямого иностранного инвестирования. Словения, Чехия, Словакия, Польша, Латвия и Румыния в течение всего исследуемого периода увеличивали свои ВВП быстрее, чем происходил рост иностранного кредитования. В Албании, Боснии и Герцеговине, Сербии, Черногории, Болгарии и Литве их рост проходил одинаковыми темпами. А в Венгрии, Хорватии и Эстонии рост внешнего кредитования опережал рост ВВП на душу населения.*

*Ключевые слова:* трансграничное кредитование; прямое иностранное инвестирование; заработки за рубежом; Центральная и Восточная Европа; ВВП на душу населения.

### **1. 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 average, while the levels of gross domestic savings accounted for about 8% of GDP, thus being lower by about 7%. Since CEE countries were trying to catch up with the EU, it was necessary to achieve higher growth rates of GDPpc. Therefore, there was a pronounced need for investments. According to the IMF (2012) and UNCTAD (2011) 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 the macroeconomic viewpoint, this confirms the occurrence of the crowding-out effect whereby excessive public expenditures crowd out private investments.

Chang et al. (2011) argued that GDPpc for 9 Eastern-European countries during the period 1969–2009 recorded a steady growth rate and that policy innovations had temporary effects. Generally speaking, CEE had vulnerabilities, including heavy dependence on global markets and capital flows, as well as a large 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 (Vujovic et al., 2011). According to Josifidis et al. (2009:2), emerging countries with smaller precrisis 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.

## 2. Literature review

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 finance development.

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

*Table 1. Capital inflows to developing countries, 2005–2010 (bln 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

\* – Other investments include loans from commercial banks, official loans and trade credits.

Source: UNCTAD (2011).

Neto et al. (2008) 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 the countries and M&A had negative effect on developing countries. The UNCTAD (2011) reported that global FDI inflows rose modestly by 5%, thus amounting to 1.24 trln USD in 2010. While global industrial output and world trade already returned to their precrisis levels, FDI flows in 2010 remained some 15% below their precrisis average and nearly 37% below their 2007 peak.

Apart from the mentioned foreign capital inflows, CEE also recorded a significant CBC inflow. Allen et al. (2011) argued that the key benefit of CBC was reflected in the effects of the bank assets diversification, so that they were increasingly less exposed to country-specific shocks. This also reduced the risks caused by non-performing loans. When domestic banks are hit by some shock, foreign bank presence can have a stabilizing effect on credit market. Foreign banks are often more efficient and the expansion of best practice usage can also be beneficial for domestic banks. However, to some extent cross-border banking may isolate domestic economy from domestic shocks it may expose a country to foreign shocks. All things considered, foreign banks and CBC were the drivers of financial deepening and credit boom. CBC in the Euro zone amounted to 152 bln EUR in 1999 and to 361 bln EUR in 2006, thus accounting for about 5% of GDP in CBC donor countries and for 10% of GDP in CBC recipient countries.

According to Revoltella and Mucci (2011), the evolution of cross-border lending reveals that the group of countries characterized by a high degree of foreign own-

ership and the 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.

Calvo (2006) argued that the reason why banking crises have greater and more persistent effects on developing economies and CEE countries lies in the fact that these countries are more vulnerable to a sudden termination of capital inflows.

According to Allen et al. (2011), Western European countries were home and host of large cross-border banks, but CEE countries were exclusively hosts of such banks. CEE countries have benefited more from foreign bank equity in terms of higher growth than other parts of the emerging world. The main benefit of cross-border banking is diversification. Portfolio suggests that even though diversification into new assets gives rise to new exposures, the overall risk is reduced.

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.

The CEE experience of the Great Recession shows that excessive reliance on foreign capital inflows makes them 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 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.

*Hypothesis 2:* CBCpc inflow had the greatest impact on an increase in GDPpc.

### **3. Methodology**

Since it is the question of panel (longitudinal) data the paper uses panel regression. Two panel regression models were analyzed: a fixed effect model and a 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, which provides a basis for applying a K-means cluster analysis to GDPpc and CBCpc. This method was used in order to group the analyzed countries into clusters relative to the mentioned variables. Countries belong to a cluster if they are similar, or if a distance between is small with respect to the analyzed parameters (GDPpc, CBCpc).

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, 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 BIS data (2012) 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 the countries is 0.76, i.e. is high and positive, showing that as the level of CBCpc increases the level of GDPpc increases as well.

**Table 2. Correlation coefficients of GDPpc and CBCpc for the period 2005–2010**

Country	Correlation coefficients
Czech	0.888
Hungary	0.862
Latvia	0.859
Poland	0.917
Slovenia	0.936
Slovakia	0.754
Romania	0.928
Bulgaria	0.947
Serbia	0.917
Croatia	0.949
Montenegro	0.849
Albania	0.916
B&H	0.733
Lithuania	0.755
Estonia	0.697

*Source:* Calculated by the authors.

In continuation, we analyzed the degree of linear relationship between GDPpc and other indicators. Table 3 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 3. Correlation coefficients for the period 2005–2010**

	GDPpc
FDIpc	0.11
PIpc	0.31
REMpc	-0.68
CBCpc	0.76

*Source:* Calculated by the authors, adapted from raw data by the IMF (2012).

Since the previously considered data have a cross-section character and are presented as time series, they can be observed as the so-called panel (longitudinal) data that can be analyzed using specifically developed methods. Due to the nature of these

data as well as the relationship presented in Figure 2 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 the one hand 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 the so-called dummy variables (Wooldridge, 2002). 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 a part of an error, or are contained in the error. The FE model investigates group differences in intercepts, anticipating same slopes and constant variability of 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:

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

In this model the slope is constant, just like the variance error, while the intercept varies across the 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:

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

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 LM test.

The coefficients calculated using the FE method are tested using an F-test, while in the RE model investigation is carried out using the Lagrange multiplier (LM). Decision-making on the use of FE or RE method is based on the results of the Hausman test. If the null hypothesis of this test that individual effects are uncorrelated to other regressors, is not rejected, then RE model is better than FE. The results of the Hausman test ( $chi = 2.82$ ,  $p = 0.73$ , Table 5 in the Appendix) in the model justify the rejection of the RE model and use of the FE one.

#### 4. Empirical results

By applying the FE model to the observed data where GDPpc is the dependent variable and FDI, PI, REM and CBC are independent variables, we obtain the results shown in Table 4.

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  $p\text{-value} = 0.00$ ); 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 the variables to the levels expressed in per capita terms. The results obtained using the FE model are shown in Table 5.

**Table 4. Results of the FE model\***

GDP pc (dependent variable)				
Independent variables	Coef.	Std. Err.	T	P >  t
FDI	<i>-0.01</i>	0.02	-0.76	0.45
PI	<i>-0.01</i>	0.18	-0.02	0.98
REM	<i>0.17</i>	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. ( $u_i$ , $X_i$ )	-0.2584			

\* – coefficients given in italics are not statistically significant.

Source: Calculated by the authors.

**Table 5. Results of the FE model (per capita variables)\***

GDPPc (dependent variable)				
Independent variables	Coef.	Std. Err.	t	P >  t
FDIpc	<i>-0.09</i>	0.14	-0.65	0.52
PIpc	<i>-0.62</i>	1.23	-0.50	0.62
REMPc	<i>2.81</i>	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. ( $u_i$ , $X_i$ )	0.2870			

\* – coefficients given in italics are not statistically significant.

Source: Calculated by the authors.

The obtained results are statistically significant ( $F = 24.77$ ,  $p\text{-value} = 0.00$ ), 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 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, LSDV1, LSDV2 and LSDV3 models can be used. These 3 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 (the parameter of the omitted

dummy variable) which is the intercept of LSDV1. According to the null hypothesis, the deviation from the reference group equals to zero. Table 6 shows the results of the LSDV1 model when dummy parameters for countries are introduced. The omitted dummy variable (reference point) is B&H.

Table 6. Results of the LSDV1 model\*

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 <sup>2</sup>	0.9502			
Adj R <sup>2</sup>	0.9375			
F-test	75.22			
p-value	0.00			

\* – coefficients given in italics are not statistically significant; the dummy variable was introduced for all the countries except B&H.

Source: Calculated by the authors.

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 the countries 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  $p\text{-value} = 0.00$ , the model is statistically significant. By applying this model each analyzed country can be represented by a different linear equation.

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 7. 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.

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 8).



Table 7. Results of the LSDV1 model\*

GDP <sub>pc</sub> (dependent variable)				
Independent variables	Coef.	Std.Err.	t	P >  t
FDI <sub>pc</sub>	<i>-0.56</i>	0.34	-1.64	0.105
Pi <sub>pc</sub>	<i>1.44</i>	2.86	0.50	0.615
REM <sub>pc</sub>	<i>-9.43</i>	2.43	-3.88	0.000
CBC <sub>pc</sub>	0.29	0.04	7.45	0.000
2005	<i>-2156.08</i>	1275.66	-1.69	0.095
2006	<i>-1897.51</i>	1247.12	-1.52	0.132
2007	<i>518.58</i>	1301.73	0.40	0.691
2008	<i>1374.47</i>	1330.33	1.03	0.305
2009	<i>-1031.58</i>	1250.99	-0.82	0.412
R <sup>2</sup>	0.6790			
Adj R <sup>2</sup>	0.6429			
F-test	18.81			
p-value	0.000			

\* – coefficients given in italics are not statistically significant; dummy variables were introduced for countries and years except the year 2010.

Source: Calculated by the authors.

Table 8. Results of the LSDV1 model\*

GDP <sub>pc</sub> (dependent variable)				
Independent variables	Coef.	Std. Err.	T	P >  t
FDI <sub>pc</sub>	<i>-0.03</i>	0.09	-0.37	0.71
Pi <sub>pc</sub>	<i>-0.05</i>	0.77	-0.06	0.95
REM <sub>pc</sub>	<i>-2.03</i>	1.36	-1.49	0.14
CBC <sub>pc</sub>	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	<i>126.53</i>	504.75	0.25	0.80
Serbia	<i>535.44</i>	712.55	0.75	0.45
Croatia	5743.09	646.66	8.88	0.00
Albania	<i>-1156.62</i>	569.21	-2.03	0.05
B&H	<i>-385.03</i>	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 <sup>2</sup>	0.9833			
Adj R <sup>2</sup>	0.9774			
F-test	168.69			
p-value	0.00			

\* – dummy variables introduced for specific countries and years; reference points – Montenegro and the year 2005.

The model is also statistically significant and the level of CBC<sub>pc</sub> has a direct impact on the level of GDP<sub>pc</sub>. Just like in the previous model, the impact of the glob-

al 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).

Since the previous analysis singles out two variables by their significance, GDPpc and CBCpc, a K-means cluster analysis imposes itself. This is an iterative method that enables the grouping of countries into clusters on the basis of the similarity of the mentioned parameters. A cluster includes countries between which there is a small distance relative to the observed variable. In order to more easily observe possible similarities between the analyzed countries, the normalization of all the data on GDPpc and CBCpc was done. By normalization all observed data are replicated within the interval [0,1] for which the following function was used:

$$f(x_i) = (x_i - x_{\min}) / (x_{\max} - x_{\min}), \quad (3)$$

where  $x_i$  – represents the observed data,  $x_{\min}$  – the minimum value in a set of the observed data,  $x_{\max}$  – the maximum value in a set of the observed data. The normalized data for the analyzed countries are grouped into 7 clusters, according to the obtained K-means cluster analysis shown in Figure 1.

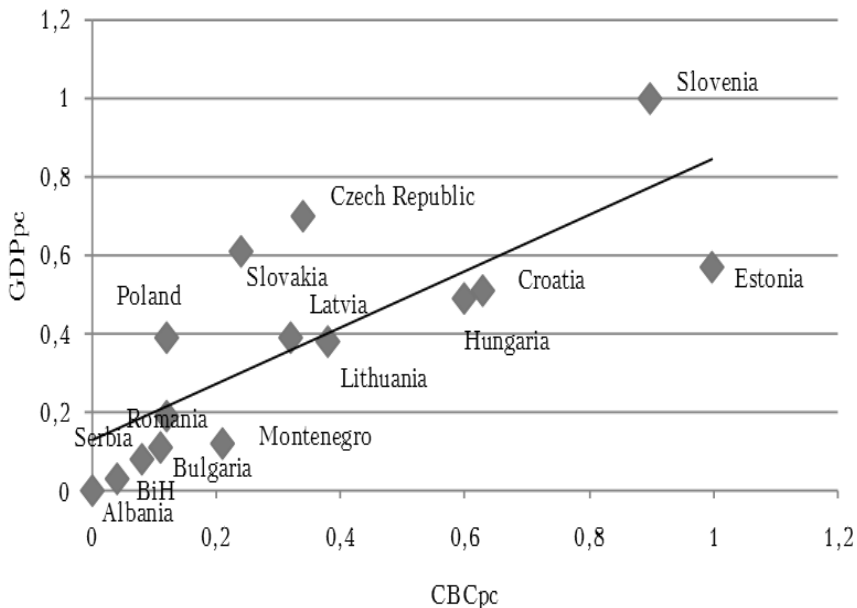


Figure 1. Normalized positions of the observed countries' GDPpc and CBCpc

One can observe a direct relationship between GDPpc and CBCpc, and that in the case of Slovenia, the Czech Republic, Slovakia, Poland, Latvia and Romania GDPpc increases faster than CBCpc (these countries are above the line  $y = x$ ). The countries closest to the observed line are Albania, B&H, Serbia, Montenegro, Bulgaria and Lithuania. In these countries there exists the equality of GDPpc and CBCpc. The countries in which CBCpc is higher than GDPpc are Hungary, Croatia and Estonia.

## 5. Conclusion

By using a K-means cluster analysis, correlation analysis and panel regression fixed effect model, both hypotheses were confirmed. Foreign capital inflow had impact on the increase in GDPpc in CEE countries. A K-means cluster analysis grouped CEE countries into 7 clusters on the basis of the similarity of CBC, FDI, PI and REM inflows. Correlation analysis showed that GDPpc in the countries making up the sample was directly and heavily dependent on CBCpc inflow as a foreign source of finance. PIpc has a small impact, while the impact of FDIpc on GDPpc is insignificant; REM is indirectly related to the level of GDPpc. An important conclusion that can be derived from the 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 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. The main obstacle to higher FDI inflows 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 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 GDPpc 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 business environment in order to create the best possible conditions for FDI inflow and GDP pc growth.

## References:

- Allen, F., Beck, T., Carletti, E., Lane, P.R., Schoenmaker, D., Wagner, W. (2011). Cross-Border Banking in Europe: Implications for Financial Stability and Macroeconomic Policies. London. Centre for Economic Policy Research (CEPR).
- Bezic, H., Cerovic, L., Galovic T. (2011). Changes in the Competitive Advantages of Croatia's Manufacturing Industry. Proceedings of Rijeka Faculty of Economics, 29(2): 465–487.
- BIS (2012). Quarterly Review, March; retrieved form: <http://www.bis.org> (the date of access 06.02.2012).
- Calvo, G. (2006). Monetary Policy Challenges in Emerging Markets: Sudden Stop, Liability Dollarization and Lender of Last Resort, NBER Working Paper 12788. December. National Bureau of Economic Research.
- Chowdhury, I., Keller, L. (2012). Managing Large-Scale Capital Inflows: The Case of the Czech Republic, Poland and Romania. IMF Working Paper No. 12/138. May.
- Chang, H.-L., Su, C.-W., Zhu, M.-N. (2011). Flexible Fourier Stationary Test in GDP per capita for Central Eastern European Countries. Proceedings of Rijeka Faculty of Economics, 29(1): 51–63.
- Ernst, W., Sikimic, J. (2010). CEE Banking Sector Report, Raiffeisen Research – RZB Group. Vienna: September.
- Gujarati, D. (2006). Essentials of Econometrics, 3th edition. McGraw-Hill. New York.

- Herrmann, S., Dubravko, M.* (2010). The Determinants of Cross-border Bank Flows to Emerging Markets: New Empirical Evidence on the Spread of Financial crises. Basel: BIS Working Papers No. 315. July.
- IMF (2012). World Economic Outlook Databases. Washington, DC: IMF.
- Jelenkovic, Z., Barjaktarovic, L.* (2011). Cross Border Loans During the World's Economic Crisis. Proceedings of the 7th International Conference of Associations of Economic Universities of South and Eastern Europe and the Black Sea Region (ASECU): Recent Economic Crisis and Future Development Tendencies, October 6–8, 2011. Rostov-on-Don Rostov: State University of Economics, pp. 151–163.
- Josifidis, K., Allegret, J.-P., Beker Pucar, E.* (2009). Monetary and Exchange Rate Regimes Changes: The Case of Poland, Czech Republic, Slovakia and Republic of Serbia. *Panoeconomicus*, 2: 199–226.
- Josifidis, K., Allegret, J.-P., Beker Pucar, E.* (2011). Exchange Rate Regimes During Crisis: The Case of Emerging Europe. 15th International Conference on Macroeconomic Analysis and International Finance, Rethymno, 26–28 May. Retrieved from: [economics.soc.uoc.gr/macro/docs/year/2011/papers/paper\\_1\\_152.pdf](http://economics.soc.uoc.gr/macro/docs/year/2011/papers/paper_1_152.pdf).
- Krugman, P.* (2007). Who was Milton Friedman? *The New York Review of Books*, 54(2), February 15.
- Mishkin, F., Eakins, S.* (2011). *Financial Markets and Institutions*, 7th ed., Prentice Hall.
- Neto, P., Brandao, A., Cerqueria, A.* (2008). The impact of FDI, Cross Border Merger and Acquisitions and Greenfield Investments on Economic Growth, FEP Working Papers No. 291, September. Porto: ISCA Universidade de Aveiro.
- Puhr, C., Schwaiger, M.S., Sigmund, M.* (2009). Direct Cross-Border Lending by Austrian Banks to Eastern Europe. ONB Financial Stability Report 17, June 2009. Vienna: Oesterreichische Nationalbank, pp. 102–122.
- Ribnikar, I.* (2011). Capitalism, advanced and "transitional", unfolded during the financial crisis. Proceedings of Rijeka Faculty of Economics, 29(1): 89–107.
- Ribnikar, I.* (2011a). Transition, Privatization and Monetary Arrangements in the Countries Founded on the Territory of Former Yugoslavia. Proceedings of Rijeka Faculty of Economics, 29(2): 333–353.
- Reinhart, C., Rogoff, K.* (2008). Is the 2007 US Sub-Prime Financial Crisis So Different? An International Historical Comparison. *American Economic Review*, 98 (May): 339–344.
- Revoltella, D., Mucci, F.* (2011). The Prospects for the Banking Market in CESEE Beyond the Crisis. In: Csajbok, Attila and Ernest Gnan. *The Future of Banking in CESEE after the Financial Crisis*, Vienna: SUERF – The European Money and Finance Forum: pp. 65–78.
- Savic, N.* (2012). Comparative Analysis Based on New Competitiveness Index. *Panoeconomicus*, 59(1): 105–115.
- Sever, I. et al.* (2009). The Starting Points of New Economic Policy in the Conditions of Recession. Proceedings of Rijeka Faculty of Economics, 27(2): 217–262.
- Simor, A.* (2011). Macro to Micro: New Focus in Financial Stability. In: Csajbok, Attila and Ernest Gnan, eds. *The Future of Banking in CESEE after the Financial Crisis*, Vienna: SUERF – The European Money and Finance Forum: pp. 15–29.
- Stojanov, D.* (2009). Keynes and Economic Crisis: Some Reconsiderations. Proceedings of Rijeka Faculty of Economics, 27(2): 293–310.
- Stiglitz, J.* (2009). The Financial Crisis of 2007/2008 and its Macro-Economic Consequences. Initiative for Policy Dialogue Working Paper Series. April.
- Takats, E.* (2010). Was it Credit Supply? Cross-border Bank Lending to Emerging Market Economies During the Financial Crisis. Basel: BIS Quarterly, June: pp. 49–56.
- Taylor, J.* (2009). The Financial Crisis and the Policy Responses: an Empirical Analysis What Went Wrong. NBER Working Paper No. 14631. National Bureau of Economic Research.
- UNCTAD (2011). *World Investment Report 2011 – Non-Equity Modes of International Production and Development*. New York and Geneva: United Nations.
- Vujovic, D., Djenic, M., Popovic-Avric, S., Konjikusic, S.* (2011). Assessing the Impact of Global Crisis on European Transition Economies: The Role of Institutional Vulnerability and Resilience. Proceedings of the 7th International Conference of Associations of Economic Universities of South and Eastern Europe and the Black Sea Region (ASECU): Recent Economic Crisis and Future Development Tendencies, October 6–8. Rostov-on-Don: Rostov State University of Economics, pp. 316–328.
- Wooldridge, J.* (2002). *Econometric Analysis of Cross Section and Panel Data*. MIT Press.

Стаття надійшла до редакції 04.06.2013.