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**COMPARATIVE ANALYSIS OF THE INFLUENCE
OF FDI INFLOWS ON ECONOMIC
DEVELOPMENT BETWEEN SERBIA AND
POLAND**

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Comparative Analysis of the Influence of FDI Inflows on Economic Development Between Serbia and Poland

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Abstract

Research background: The aim of this paper is to measure the impact of the FDI on the economic growth in Poland and on the economic growth in Serbia and further to make comparative analysis of the impact between these two countries.

Purpose of the article: Empirical studies showed that FDIs can make crowding-out effect, i.e. FDIs can out crowd domestic investments which further have more impact on the economic growth. Because this effect depends on the specific level of the development of the country, the aim is to compare the influence of the FDI on economic growths on both of them as long as Poland is classified as a developed country and Serbia is a country which belongs to the group - countries in transition.

Methodology/methods: Panel data includes variable values from 1999-2007, until global economic crisis period and 2008-2015, period after crisis in order to see flows and make comparison between these two periods. GDP is the main indicator which represents economic growth. According to that, using regression analysis, the aim is to measure influence of FDIs as the independent variable on real GDP growth, as dependent variables. Besides, a group of control variables are included in the method. As long as GDP is enhanced by lower inflation, inflation will be used as independent variable. Our model also includes determinants of monetary and government sectors such as official exchange rate, inflation and government consumption.

Findings: Using two multiple linear regression models we found the significant influence of FDI inflows on economic growth in Poland. Using the same models

for observations in Serbia we haven't found significant effects of FDI Inflows on economic growth.

Introduction

There is a great number of differences between Poland and Serbia such as geographical size, population and most important their economy classifications. Poland's economy belongs to the group of developed countries and Serbia has transitional economy. Overall Poland is a member of the European Union and Serbia is EU membership candidate. It is believed that FDIs can make beside positive, negative effect on the private investment and further more on economic growth at all. Our aim is to measure the influence of FDI inflows on economic growth between these two different countries.

One of the most important in this field was published by Borensztein, Gregorio and Lee. The most robust finding of this paper is that the effect of FDI on economic growth is dependent on the level of human capital available in the host economy. They also found some evidence of a crowding-in effect, namely that FDI is complementary to domestic investment (Borensztein, 1995, pp. 123, 134).

Havrylyshyn et al. (1999) concluded that different growth rates can be explained by different circumstances at the beginning of the transition (poorer countries grow faster), and that the possession of resources is not a guarantee for higher growth, but that an unfavourable geographical location can make it more difficult. Economic policies, together with institutional, legal and political framework, have a strong influence on growth (Bodroža, 2016, pp. 51-52).

Blomström and Kokko focused on the diffusion and transfer of technology from foreign multinationals to their host countries, the impact of foreign MNCs for the trade performance of host countries, and the effects on competition and industry structure in host countries. They stated that exact nature of the relation between foreign multinational corporations and their host economies seems to vary between industries and countries (Blomström & Kokko, 1996, pp. 32). Gorodnichenko et al. have found no support for the hypothesis that spillovers are greater for FDI with more advanced technology. FDI spillovers hence vary by sectors and types of firms (Gorodnichenko, 2007, 13-15).

According to Garibaldi's research, foreign direct investments grow was a result of a favourable macroeconomic environment or stable foreign exchange rate, but they are negatively dependent on internal privatisation (Mora *et al.*, 2002, pp. 136-137).

In her study, Alfaro (2007) examined the various links between different "types" of FDI and growth. She found FDI at the industry level to be associated with higher growth in value added. The relation is stronger for industries with higher skill requirements and for industries more reliant on external capital. FDI quality is also associated with positive and economically significant growth effects (Alfaro, 2007, pp. 20).

The most recent work related to FDI and GDP in Poland includes period 1999-2012. The impact of GDP is stronger with respect to attracting FDI inflows than the impact of FDI on GDP. A weaker, though confirmed impact of FDI on economic growth results from the structure of FDI inflows, which are characterised by a considerable share of debt securities (Kosztowniak, 2016, pp. 327).

Kastratović found a statistically significant positive correlation between the foreign direct investment inflows and the gross domestic product of Serbia. He stated that the value of the coefficient of determination equals 50.19% which indicates that 50.19% of the gross domestic product variations can be explained by the movements in the gross domestic product (Kastratović, 2016, pp. 83-85).

Methodology research

One of models that explains the relationship between economic growth and economic variables is the Keynesian model, and the formula base is explained as follows:

$$GDP=C(GDP) + I (GDP, r) + G + X(T, e) - M(T, e).$$

where, GDP is the Gross Domestic Product (economic output), C is Private Consumption (dependent of GDP), I is Domestic Investment (depending on GDP and Interest Rate r), G is government expenditure, X and M are exports and imports, which are assumed to be dependent of the incomes of other countries (T) and the Exchange Rate (e) (Machado *et al.*, 2015, pp. 3).

Barro in his study which included a broad panel of countries over 30 years showed that with the respect to government policies, the growth rate of real per capita GDP is enhanced by better maintenance of the rule of law, smaller government consumption, and lower inflation (Barro, 1996, pp. 70).

Empirical specifications of conditional convergence growth in line with Barro's work have become standard starting point in empirical analysis of growth among the researchers (Bodroža, 2016, pp. 86). Our panel data includes selected macroeconomic indicators relevant to the economic growth for the period 1999-2015. Basic assumptions for our models are found on the Borensztein's approximation to equation:

$$g = c_0 + c_1FDI \times H + c_2FDI \times H + c_3H + c_4Y_0 + c_5X$$

where FDI is foreign direct investment, H is stock of Human capital, Y_0 initial GDP per capita, and X a set of other variables that are frequently included as determinants of growth in cross-country studies, such as government consumption and variables representing foreign exchange and trade distortions (Borensztein, 1995, pp. 124).

Taking everything into account, we specified two models for the multiple linear regression analysis. The first model is:

$$y = \beta_0 + \beta_1FDI + \beta_2G + \beta_3Def + \beta_4Exch + \varepsilon$$

where the variables are denoted as follows:

y = real GDP per capita growth, β_0 – constant, FDI - FDI inflows as percentage of GDP, G - General government final consumption expenditure as percentage of GDP, Def - GDP deflator, $Exch$ - Official exchange rate and ε – random error that includes the effect of the all other variables which are not included in our model.

The second model for the multiple log-linear regression analysis is:

$$y = \beta_0 + \beta_1FDI + \beta_2Exch + \beta_3Inf + \varepsilon$$

where the variables are denoted as follows:

y = real GDP growth, β_0 – constant, FDI – logarithm value of FDI inflows as percentage of GDP, $Exch$ - logarithm value of Official exchange rate, Inf - logarithm value of Inflation CPI, and ε – random error that includes the effect of the all other variables which are not included in our model.

Results of the Comparative Analysis

Our first model includes real GDP per capita growth as dependent variable, FDI inflows as percentage of GDP, General government final consumption expenditure as percentage of GDP, GDP deflator and Official exchange rate. As long as our sample is small (N = 17, 1999-2015), we will focus on the adjusted R square as distinct from R square. In the case of Poland 75,6% and in the case of Serbia 54,7% of the variability of the dependent variable is explained by the variability of the independent variables.

Table 4. Model Summary^b

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
Poland	.904 ^a	.817	.756	.83262
Serbia	.812 ^a	.660	.547	3.43058

Source: Authors' calculations using SPSS

As long as both $\alpha < 0,05$ – Sig POL = 0,000 and Sig SER = 0,008 we can conclude that coefficient of determination differentiates from 0. Not only Sig but also the F values which are 13.402 and 5.820 (greater than 4) confirm this conclusion.

Table 5. ANOVA^a

Model		Sum of Squares	df	Mean Square	F	Sig.
1 POL	Regression	37.165	4	9.291	13.402	.000 ^b
	Residual	8.319	12	.693		
	Total	45.484	16			
1 SER	Regression	273.994	4	68.499	5.820	.008 ^b
	Residual	141.226	12	11.769		
	Total	415.220	16			

Source: Authors' calculations using SPSS

According to Beta - Standardized Coefficients, FDI in Poland contributes the most to explanation of dependent variable (0.872 compared to -0.152, -0.022 and -0.212). All observed Tolerance values are above 0.10 – 0.72, 0.935, 0.654, 0.945 and VIF values are not quite close to 10, so multicollinearity assumption can be rejected.

Table 6. Poland - Coefficients^a

Model	Unstandardized Coefficients		Stand. Coefficients	t	Sig.	95,0% Confidence Interval for B		Collinearity Statistics	
	B	Std. Error	Beta			Lower Bound	Upper Bound	Tolerance	VIF
(Constant)	15.813	11.003		1.437	.176	-8.161	39.787		
FDI	.920	.154	.872	5.994	.000	.586	1.255	.720	1.388
G	-.701	.590	-.152	-1.188	.258	-1.988	.585	.935	1.069
GDP defl.	-.021	.140	-.022	-.147	.885	-.325	.284	.654	1.528
Exch. Rate	-.663	.397	-.212	-1.670	.121	-1.528	.202	.945	1.058

Source: Authors' calculations using SPSS

The most important values in table 6 are given in column Sig. As long as $\alpha > 0.05$ for three variables, in case of Poland using our regression model we can conclude that only FDI inflows as % of GDP gives statistical significant contribution to prediction of GDP per capita growth rate.

According to standardized regression coefficients whose values are given in the column Beta - Standardized Coefficients table 7, Government consumption contributes the most to explanation of dependent variable (0.653 compared to 0.274, 0.041 and 0.049) in case of Serbia. Tolerance and VIF values give us the same important information like for the Poland. Tolerance values are closer to 1 contrary to 0,1 and VIF values are below 10 – 1.394, 1.244, 1.453 and 1.333 so multicollinearity assumption can be rejected.

Analyzing values in column Sig for the FDI inflows as a % of GDP that is above 0.05 (table 7.), so using this model we couldn't find any statistical significant contribution to prediction of GDP per capita growth rate. Government consumption as % of GDP, GDP deflator and Exchange rate have

$\alpha < 0,05$ and further more gives us statistical significant contribution to prediction of GDP per capita growth rate.

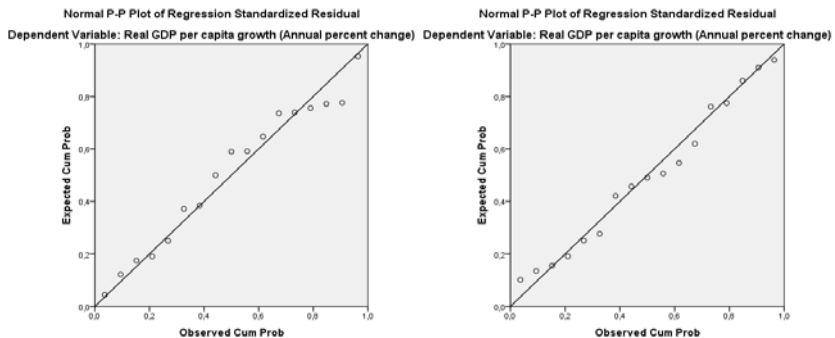
Table 7. Serbia - Coefficients^a

Model	Unstandardized Coefficients		Stand. Coefficients	t	Sig.	95,0% Confidence Interval for B		Collinearity Statistics	
	B	Std. Error	Beta			Lower Bound	Upper Bound	Tolerance	VIF
(Constant)	-59.741	14.164		-4.218	.001	-90.601	-28.881		
FDI	.411	.274	.298	1.500	.159	-.186	1.007	.718	1.394
G	2.505	.653	.720	3.835	.002	1.082	3.928	.804	1.244
GDP defl.	.095	.041	.474	2.334	.038	.006	.184	.688	1.453
Exch. Rate	.157	.049	.624	3.210	.007	.050	.264	.750	1.333

Source: Authors' calculations using SPSS

Based on the diagram dispersion of standardized residuals Scatterplot, diagram 1. shows that the variance of the residuals about the predicted values of the dependent variables are along with the straight line from the lower left to the upper right corner, which indicates that the assumption of homoscedasticity random errors is not significantly impaired.

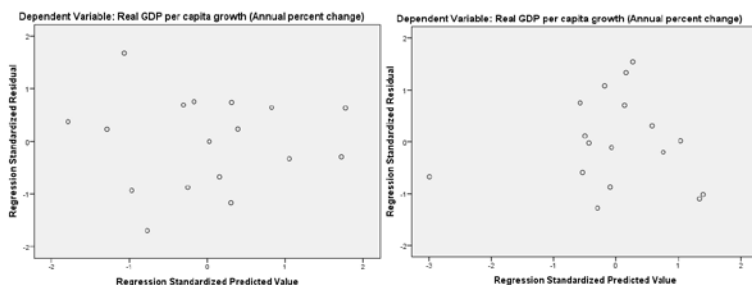
Diagram 1. Normal P-P Plot of Regression Standardized residuals, Poland and Serbia, respectively



Source: Source: Authors' using SPSS

Scatterplot of standardized deviations is used to detect whether there are cases where the standardized residual are less than -3.3 or greater than +3.3. Atypical values can be detected on the basis Mahalanobis distance - comparing the maximum value Mahal. distance, with the corresponding critical value, for a given number of independent variables. As long as we used four independent variables, our critical value is 18,47 and our values are – Poland 6,607 and Serbia 13,185. Mahalanobis distance values do not exceed critical value.

Diagram 2. Scatterplot, Poland and Serbia, respectively



Source: Source: Authors' using SPSS

Our second model includes real GDP growth as dependent variable, logarithm values of FDI inflows as percentage of GDP, Inflation rate and Official exchange rate.

Table 8. Model Summary^b

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
Poland	.743 ^a	.553	.449	1.26200
Serbia	.752 ^a	.566	.466	3.74200

Source: Authors' calculations using SPSS

In the the second model for Poland 44,9% of the variability of the dependent variable is explained by the variability of the independent variables and 46,6% for Serbia. Sig. values are not low as in the previous model but both are $\alpha < 0,05$. The level of α for Poland is 0,013 and for Serbia 0,011. Both F value, in case of Poland for Serbia are greater than 4 so we can conclude that regression model is significant for both countries.

Table 9. ANOVA^a

Model		Sum of Squares	df	Mean Square	F	Sig.
1 POL	Regression	25.578	3	8.526	5.353	.013 ^b
	Residual	20.704	13	1.593		
	Total	46.282	16			
1 SER	Regression	237.384	3	79.128	5.651	.011 ^b
	Residual	182.033	13	14.003		
	Total	419.418	16			

Source: Authors' calculations using SPSS

As mentioned, Beta coefficients are independent of units of measurement. According to this, in case of Poland FDI contributes the most to explanation of dependent variable (0.682 compared to -0.348, and -0.020). All observed Tolerance values are above 0.10 – 0.959, 0.974, 0.939 and VIF values are far away from the value 10, so multicollinearity assumption can be rejected. In case of Poland using our regression model we can conclude that only FDI inflows as % of GDP gives statistical significance contribution to the prediction of real GDP growth.

Table 10. Poland - Coefficients^a

Model	Unstandardized Coefficients		Stand. Coefficients	t	Sig.	95.0% Confidence Interval for B		Collinearity Statistics	
	B	Std. Error	Beta			Lower Bound	Upper Bound	Tolerance	VIF
(Constant)	6.713	2.434		2.758	.016	1.454	11.972		
LOG FDI	3.143	.873	.682	3.599	.003	1.257	5.029	.959	1.043
LOG Exch. Rate	-8.510	4.599	-.348	-1.851	.087	-18.445	1.425	.974	1.026
LOG Inflation	-.073	.703	-.020	-.104	.919	-1.592	1.446	.939	1.065

Source: Authors' calculations using SPSS

In case of Serbia, Inflation contributes the most to explanation of dependent variable (0.751 compared to 0.666 and 0.420). Tolerance and VIF values give us the same important information like for the Poland. Tolerance values are above 0.1 and VIF values are below 10 - 1.817, 1.479

and 1.798. Exchange rate and Inflation have $\alpha < 0.05$ and further more gives us statistical significance. We can conclude that these two independent variables gives contribution to prediction of real GDP growth rate.

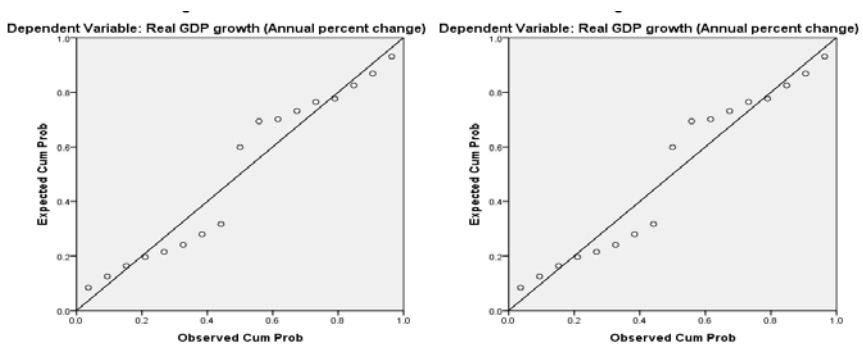
Table 11. Serbia - Coefficients^a

Model	Unstandardized Coefficients		Stand. Coefficients	t	Sig.	95.0% Confidence Interval for B		Collinearity Statistics	
	B	Std. Error	Beta			Lower Bound	Upper Bound	Tolerance	VIF
(Constant)	-39.690	11.051		-3.591	.003	-63.564	-15.815		
LOG FDI	5.646	3.311	.420	1.705	.112	-1.506	12.798	.550	1.817
LOG Exch. rate	16.612	5.540	.666	2.999	.010	4.644	28.580	.676	1.479
LOG Inflation	8.232	2.686	.751	3.065	.009	2.430	14.034	.556	1.798

Source: Authors' calculations using SPSS

The assumption of homogeneity of variance random errors is not significantly impaired based on variance of the residuals for the predicted values of the dependent variables which are along with the straight line from the lower left to the upper right corner.

Diagram 3. Normal P-P Plot of Regression Standardized residuals, Poland and Serbia, respectively

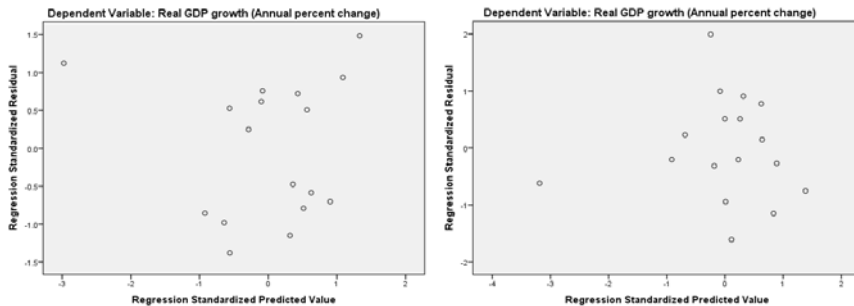


Source: Source: Authors' using SPSS

Atypical values are detected on the basis Mahalanobis distance - comparing the maximum value Mahalanobis distance with the

corresponding critical value for a given number of independent variables. As long as we used three independent variables, our critical value is 13.82 and our values are – Poland 12.078 and Serbia 14.107.

Diagram 4. Scatterplot, Poland and Serbia, respectively



Source: Source: Authors' using SPSS

Mahalanobis distance value for Serbia exceeds critical value. That is shown on scatterplot of standardized deviations where the standardized residual is greater than -3.3. In both cases Cook's distance is above 1, 7,373 for Poland and 25,389 for Serbia which indicates that extraordinary observations influence the confidence of our model.

Conclusion

Our time series data set included period 1999-2015. Analyzing the effects of FDI inflows using multiple regression linear model which included real GDP per capita growth as dependent variable, FDI inflows as percentage of GDP, General government final consumption expenditure as percentage of GDP, GDP deflator and Official exchange rate, we found statistically significant effect of FDI inflows on economic growth in Poland. Using the same model for observations in Serbia, our results haven't shown significant effects of FDI on economic growth, but government consumption, exchange rate and GDP deflator effects have.

The second model we used included GDP growth and we used logarithm values of FDI inflows as percentage of GDP, Inflation rate and Official exchange rate. Once again, given results have shown the positive statistically significant effect of foreign direct investment inflows on economic growth in Poland. The same multiple regression linear model applied on data from Serbia gave the results from which we concluded

influence of the official exchange rate and inflation on economic growth in Serbia. Nevertheless, we don't have enough arguments to claim that foreign direct investment inflows contribute to prediction of real GDP growth rate. In addition, in both cases Cook's distance is above 1, 7,373 for Poland and 25,389 for Serbia which indicates that extraordinary observations influence the confidence of our model.

Although it seems that FDI inflows do not statistically affects economic growth in Serbia, we believe that there is positive correlation. Contradictory given results using the same models in both countries, authors describe as a differences in the level of development, external debt, the structure of FDI inflows (type and sector) and efficiency of investments.

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