Economics & Economy, Vol. 2, No. 5 (June, 2015), 7-18

MODELING THE IMPACT OF FOREIN DIRECT INVESTMENTS ON GROSS DOMESTIC PRODUCT OF MONTENEGRO

MODELIRANJE UTICAJA STRANIH DIREKTNIH INVESTICIJA NA BRUTO DOMAĆI PROIZVOD CRNE GORE

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JEL Classification: A10; B41
Original Scientific Papers
Primljeno / Received: April 5, 2015
Prihvaćeno / Accepted: April 20, 2015

Abstract
The process of globalization and liberalization with the expansion of international capital movement influenced the economic system of the Western Balkan countries. Foreign direct investments (FDI) as one of the most important agent of economic growth have had a very significant role in the process of transition from socialist to market economies. FDI was a dominant form of capital inflow in the Western Balkan region. Significant capital inflow into relatively weak economies in the region has had positive effects on overall economic indicators (high growth rates, low level of inflation, increase of employment rates, etc.). In attracting FDI Montenegro has been the leading country measured by net FDI inflow per capita. In Montenegro FDI is considered the most important force of: economic growth, public finance recovery, capital market and banking sector development, i.e. of the overall revival of economy. The goal of this paper is to estimate the impact of foreign direct investments on GDP of Montenegro. The regression model is used to measure the impact of FDI on GDP of Montenegro. The results of the regression analysis serve as an empirical evidence that there is a direct relation between FDI and GDP. This paper contributes to the empirical research of the relations between foreign direct investments and gross domestic product of a host country.
Key words: *Foreign direct investment, Gross domestic product, Regression model, statistical technique.*
Sažetak
Proces globalizacije i liberalizacije sa širenjem međunarodnog kretanja kapitala uticao je na ekonomski sistem zemalja Zapadnog Balkana. Strane direktne investicije (FDI) kao jedan od najvažnijih sredstva ekonomskog rasta su imale vrlo značajnu ulogu u procesu tranzicije iz socijalističkih u tržišne ekonomje. FDI je dominantan oblik priliva kapitala u regiji Zapadnog Balkana. Značajan priliv kapitala u relativno slabe ekonomije u regiji ima pozitivne

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učinke na ukupne ekonomske pokazatelje (visoke stope rasta, niska stopa inflacije, rast zaposlenosti, itd). U privlačenju FDI Crna Gora je bila vodeća zemlja Zapadnog Balkana mjereno neto prilivom stranih ulaganja po glavi stanovnika. U Crnoj Gori FDI se smatra najvažnijim snagom: ekonomskog rasta, oporavaka javnih finansija, oporavka tržišta kapitala i razvoja bankarskog sektora, odnosno ukupnog oživljavanja ekonomije. Cilj ovog rada je da procijeni uticaj GDP na bruto domaći proizvod (BDP) Crne Gore. Regresioni model se koristi za mjerenje utjecaja, a rezultati regresione analize će poslužiti kao empirijski dokaz da postoji direktna veza između FDI i BDP-a. Ovaj rad teži da doprinese unapređenju empirijskog istraživanja odnosa između FDI i BDP.
Ključne riječi: *strane direktne investicije, bruto domaći proizvod, regresioni model, statističke tehnike.*

1. INTRODUCTION

The globalization of international capital movement is one of the main characteristics of the modern economics. Foreign direct investments, being part of the international capital, act as one of the main engine of the economic growth and development. FDI have had a very significant role in the process of transition from socialist to market economies.

The importance of foreign direct investments and their impact on economic growth has been an interesting research topic in economic literature. This was the case especially in time of international capital expansion before the last economic crises. The results of research on FDI mostly confirm the contribution of FDI in promoting economic growth. It has been argued in literature that FDI provide large potential benefits for developing countries. Longani, Razin and Mody have found the evidence that FDI inflows promote efficiency, where the effect of FDI on GDP growth was seen higher than the effect of other inflows. (Longani and Razin 2001, Mody et al. 2003)

The researchers have argued that larger FDI inflows would lead to the higher volume of trade and would benefit the increase of total factor productivity growth and higher output rates. (Lane and Milesi-Ferrett 2004, Rose and Spiegel 2004, Swenson 2004) Sergi (2004) has found the inflow of foreign investments to be the key in resolving the problems of capital scarcity and low productivity in the Central and Eastern European countries. Smarzynska (2002) concluded that the effect of FDI inflows on domestic investment and capital formation was significantly larger than other capital flows, where unique gains from FDI in a host country were observed as increases of domestic investment. In their research of 25 CEEC and former Soviet Union economies Campos and Kinoshita (2002) found out that FDI had a significant positive effect on economic growth of the researched countries. De Gregorio (1992) reported similar results for the case of Latin American economies while Blomstrom et. al. (2008) provided similar evidence for the transition countries characterized by high income levels and successful privatization programs. In economic literature numerous positive effects of the FDI inflow on over-

all economic growth have been documented. However, researchers sometimes have quite different opinions regarding the FDI significance and the empirical literature has not succeeded in establishing a significant positive impact of FDI on the host country's rate of economic growth.

In developing and transition countries FDI are important in overcoming the problems of insufficient resources of domestic capital, the need for technical and technological improvements and extension of the market relationship with developed countries providing FDI. Hence, a greater number of countries in Central and South East Europe are competing to attract foreign investments. Countries, especially Balkan countries that replicate transition model of growth and follow EU integration strategy, have started to compete in providing the most favorable conditions for foreign capital, somewhat ignoring their own engines and factors of economic growth. (Botrić, 2010) .

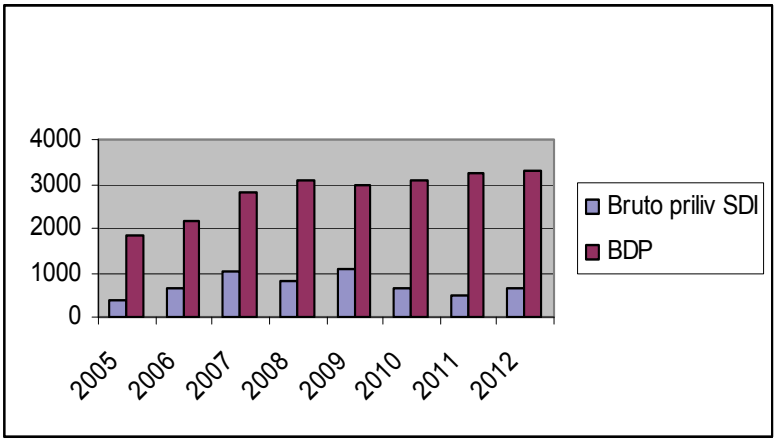
After Montenegro gained independence in 2006, a very favorable climate for the influx of foreign capital has been created which led to the positioning of Montenegro among the top 10 investment locations. FDI inflows in 2006, which accounted for about 30% of GDP and the FDI inflow in 2007, with a share of around 40% of GDP, are only some of the indicators that our country has been "attractive" to foreign investors. Very intensive economic dynamics is evidenced through the double-digit GDP growth rates and achieved surplus in budget. Domestic banks were able to lend to private sector or to the population. Immediately after gaining independence Montenegro made a number of structural reforms in the field of privatization and the Law on investments. All this allowed Montenegro to be one of the fastest growing economies in the region and the absolute leader in terms of FDI inflow per capita. FDI were the most important force of economic growth, public finance recovery, capital market and banking sector development and the overall revival of economy.

A short overview of the GDP and FDI dynamics in Montenegro is presented in the following figures.

Figure 1. clearly indicates that FDI is not an insignificant in the analysis of trends in GDP of Montenegro. It can also be noticed an increasing trend of ratio of the gross FDI inflow to GDP prior to economic crises.

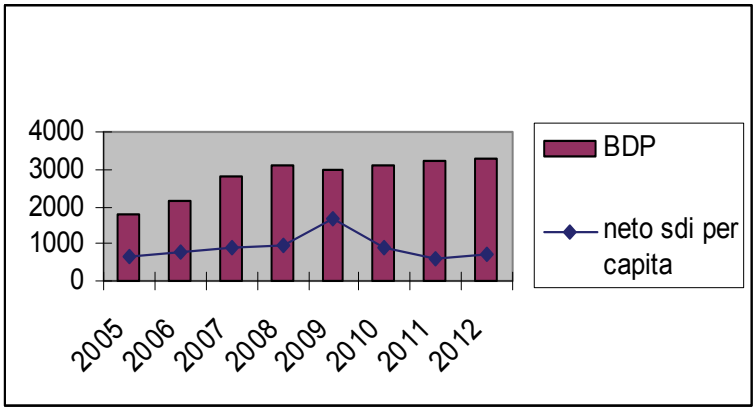
In Figure 2. the upward, positive trend of net FDI per capita is obvious in the period after the renewed independence of Montenegro. In 2007 and 2008 there was a large "investment boom", especially in the real estate sector. Also, following the potentials of the tourism sector a large number of investors from across Europe were attracted to invest in Montenegro. It was only two years after the beginning of the global economic crises in 2008 that Montenegro felt the effects of crisis in terms of FDI inflows, contrary to the experience of the most countries in the region. However, in 2010, there was a drastic decline in FDI inflow, leading to a decline of FDI per capita by about 52%, according to Central Bank of Montenegro. In the same time, the crisis has cleared the surface of the many bad privatization and poor strategic partners.

Figure 1. Gross FDI inflows and GDP of Montenegro



Source: Monstat

Figure 2. Dynamics of FDI per capita and GDP of Montenegro



Source: Monstat

The purpose of this paper is to investigate and measure the impact of FDI on GDP of Montenegro as an important indicator of the overall performance of Montenegrin economy. The paper is organized in four parts. In the introduction some basic information regarding FDI flows in Montenegro are presented. The second part of the paper is dedicated to the methodology of time series analysis. The third part contains the results of the empirical analysis and the final part of the paper presents the conclusions of the analysis.

2. METHODOLOGY AND DATA

The regression model is used to measure the impact of FDI on GDP of Montenegro. In the model GDP is the endogenous variable, while FDI inflow and households consumption are independent variables. Gross domestic product measures the value of economic activities in the country. MONSTAT calculates GDP on an annual and quarterly basis for the economic territory of Montenegro employing the production and expenditure approaches. According to production method GDP is calculated as the sum of values added of all resident institutional units, that is the difference between output and consumption intermedia. The advantage of this method is the possibility to identify the contribution of individual activities to the overall economic growth of the country. GDP by expenditure approach is calculated as the sum of household consumption, government consumption, investment, changes in inventories and net exports of goods and services. The calculation of GDP by production method was developed in constant and current prices.

The data are obtained from MONSTAT and from Central bank of Montenegro. The data are of the time-series form, i.e. the quarterly data on gross domestic product, gross foreign direct investments and household consumption for the period from the first quarter of 2005 to the last quarter of 2013.

The method of model estimation is the Ordinary Least Square (OLS) technique. The OLS is a statistical technique used to estimate structural parameters of the model in such a way as to minimize the sum of the deviations of the actual observation from their model estimated values. It is one of the most commonly used methods in estimating relationships in econometric models and it produces best, linear, unbiased estimates (BLUE) (Koutsoyiannis, 1997).

According to standard econometric procedure it is necessary to firstly check the data for possible non-stationary. This need arises from the fact that if a time series data is non -stationary, the regression performed on variables with unit root would be "spurious" (Granger and Newbold, 1974) or "dubious" (Phillips, 1987). A series is stationary if its mean and variance are constant over time and the value of covariance between the two time periods depend only on the distance or lag between the two periods and not the actual time at which the covariance is computed (Gujarati, 2004). To test stationary several tests can be used. In this paper the Augmented Dickey Fuller (ADF) and Phillips Perron (PP) tests are implemented, depending on the results of Breusch-Godfrey Serial Correlation LM test. Secondly, it should be tested whether the identified non-stationary series are co-integrated. The variables are said to be co-integrated if they satisfy the condition that there exist at least (k-1) co-integrating equations i.e. stationary linear combinations of individually non-stationary variables. (Maddala and Kim, 1998)

After the model is estimated several econometric tests have to be done in order to check for the possible problems of heteroscedasticity, autocorrelation and multicolinearity in the estimated regression model. Hence, White Heteroscedasticity test, Breusch-Godfrey Serial Correlation LM test and correlation martix were em-

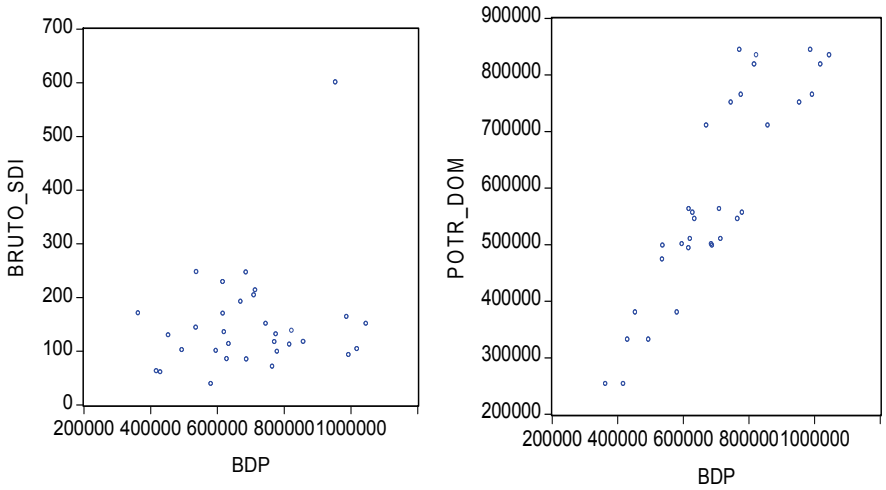
ployed. For the purpose of this research we will follow the effects of FDI inflow on the level of GDP of Montenegro, assuming that FDI inflow had positive effect on overall economic performance of the country measured by GDP.

3. EMPIRICAL RESULTS

Before the model is specified and estimated a detailed analysis of the series that are used in the research is necessary. Therefore, the tests for normality and stationary of the time series used are employed.

Firstly, the scatter diagrams are checked. The scater diagrams clearly indicate that there is an almost linear relationship between GDP and household consumption, while the relationship between FDI inflows and GDP is in the hyperbole from.

Figure 3. Scatter diagrams



3.1 Normality test

In evaluating the model, among others there is the presupposition of normality. The assumption of normal distribution of errors regression is necessary in order to perform hypothesis testing. According to the central-limit theorem, if there are a large number of independent and identically distributed random variables, distribution of their sum tends to normal distribution when the number of such infinitely variable increases. However, a variant of the CLT states that, even if the number of variables is not very large or if the variables are not strictly independent, their sum can still be normally distributed. It is this feature that is important for a model used in this paper, i.e. a model with small number of variables and limited number of observations.

Table 1. Empirical distribution tests of normality

Empirical Distribution Test for GDP Hypothesis: Normal Sample: 2005Q1 2012Q4 Included observations: 32				
Method	Value	Adj. Value	Probability	
Lilliefors (D)	0.078474	NA	> 0.1	
Cramer-von Mises (W2)	0.030954	0.031437	0.8273	
Watson (U2)	0.029294	0.029751	0.8243	
Anderson-Darling (A2)	0.253794	0.260300	0.7104	
Method: Maximum Likelihood - d.f. corrected (Exact Solution)				
Parameter	Value	Std. Error	z-Statistic	Prob.
MU	697664.4	31895.84	21.87321	0.0000
SIGMA	180430.1	22914.64	7.874008	0.0000
Log likelihood	-432.2052	Mean dependent var.		97664.4
No. of Coefficients	2	S.D. dependent var.		180430.1
Empirical Distribution Test for FDI_INFLOW Hypothesis: Normal Sample: 2005Q1 2012Q4 Included observations: 32				
Method	Value	Adj. Value	Probability	
Lilliefors (D)	0.196311	NA	0.0029	
Cramer-von Mises (W2)	0.352515	0.358023	0.0001	
Watson (U2)	0.305256	0.310025	0.0001	
Anderson-Darling (A2)	2.257186	2.315048	0.0000	
Method: Maximum Likelihood - d.f. corrected (Exact Solution)				
Parameter	Value	Std. Error	z-Statistic	Prob.
MU	149.5672	17.36805	8.611626	0.0000
SIGMA	98.24855	12.47758	7.874008	0.0000
Log likelihood	-191.7060	Mean dependent var.		149.5672
No. of Coefficients	2	S.D. dependent var.		98.24855

The data suggests that there are structural breaks in 2009. However, Chow Breakpoint Test does not confirm that.

Chow Breakpoint Test: 2009Q3			
F-statistic	1.064043	Probability	0.358601
Log likelihood ratio	2.344107	Probability	0.309730
Chow Breakpoint Test: 2009Q2 2009Q4			
F-statistic	0.627717	Probability	0.647022
Log likelihood ratio	2.950044	Probability	0.566220

There are no structural breaks in the third quarter of 2009, nor from the second to the fourth quarters of 2009.

Empirical Distribution Test for CONS_HOUS Hypothesis: Normal Sample: 2005Q1 2012Q4 Included observations: 32				
Method	Value	Adj. Value	Probability	
Lilliefors (D)	0.171922	NA	0.0171	
Cramer-von Mises (W2)	0.155270	0.157696	0.0189	
Watson (U2)	0.155249	0.157675	0.0122	
Anderson-Darling (A2)	0.890724	0.913557	0.0201	
Method: Maximum Likelihood - d.f. corrected (Exact Solution)				
Parameter	Value	Std. Error	z-Statistic	Prob.
MU	584331.4	32040.34	18.23737	0.0000
SIGMA	181247.5	23018.46	7.874008	0.0000
Log likelihood	-432.3498	Mean dependent var.		584331.4
No. of Coefficients	2	S.D. dependent var.		181247.5

Three used series meet the requirement of normality so they can be used reliably for further analysis.

3.2 Stationary test

Having tested the normality of the series it remains to check whether the series included in the model are stationary. Most economic time series are far from stationary when expressed in their original measure units. Non-stationary can have important consequences for regression models and inference. That is why Unit-root tests should be performed on all used time series before the model specification. Following the results of Breusch-Godfrey Serial Correlation LM test the Augmented Dickey Fuller (ADF) or Phillips Perron (PP) unit root tests were performed with the results presented in Table 2.

Table 2. Unit root tests

Variable	ADF test statistic	p-values	PP test statistic	p-values	Order
GDP			5.941406	0.0002	I(0)
FDI_INFLOW	2.060628	0.0395			I(0)
CONS_HOUS			4.273232	0.0103	I(0)

Test results indicate that series GDP, FDI and household consumption are stationary in absolute form. Estimation of the model. Based on the previous analysis the model is specified as follows

$$GDP_t = \alpha + \beta_2 FDI\_INFLOW_t + \beta_3 CONS\_HOUS_t + \varepsilon_t$$

The OLS estimates of the regression model are presented in Table 3.

Table 3. OLS Estimates of the regression model

Dependent Variable: BDP Method: Least Squares Sample: 2005Q1 2012Q4 Included observations: 32				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOG(FDI_INFLOW)	34768.92	11147.94	3.118865	0.0040
HOUS_CONS	0.900276	0.089333	10.07774	0.0000
R-squared	0.775679	Mean dependent var		697664.4
Adjusted R-squared	0.768201	S.D. dependent var		180430.1
S.E. of regression	86868.95	Akaike info criterion		25.64265
Sum squared resid	2.26E+11	Schwarz criterion		25.73426
Log likelihood	408.2824	F-statistic		103.73692
Durbin-Watson stat	2.001199	Prob (F-statistic)		0.000000

From the estimated model, it is obvious that all coefficients came out with the right and expected signs; all exogenous variables are statistically significant at less than 1% significance level. Moreover, the estimated F-statistic proves whole model to be the significant one, i.e. joint influence of the explanatory variables, FDI and household consumption, on the variation of GDP (78%) is highly significant.

3.3 Econometric tests

White Heteroscedasticity test is employed under the null hypothesis that errors in regression model have constant variance regardless of the X_i value, i.e. stochastic errors are homoscedastic.

Table 4. White Heteroscedasticity test

F-statistic	3.620875	Probability		0.017337
Obs*R-squared	11.17244	Probability		0.024693
Test Equation: Dependent Variable: RESID^2 Method: Least Squares Sample: 2005Q1 2012Q4 Included observations: 32				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	4.20E+10	6.05E+10	0.693843	0.4937
LOG(FDI_INFLOW)	-1.50E+10	2.45E+10	0.610413	0.5467
(LOG(FDI_INFLOW))^2	1.08E+09	2.44E+09	0.440997	0.6627
HOUS_CONS	17436.96	42718.84	0.408180	0.6864
HOUS_CONS ^2	0.005398	0.036013	0.149902	0.8820

R-squared	0.349139	Mean dependent var	7.07E+09
Adjusted R-squared	0.252715	S.D. dependent var	7.11E+09
S.E. of regression	6.15E+09	Akaike info criterion	48.05961
Sum squared resid	1.02E+21	Schwarz criterion	48.28863
Log likelihood	-763.9538	F-statistic	3.620875
Durbin-Watson stat	2.503753	Prob(F-statistic)	0.017337

Results of the White test indicate that stochastic errors are heteroscedastic, i.e. the error variance is not equal for all values of the explanatory variables.

Breusch-Godfrey Serial Correlation LM test is applied to check for the auto-corelation of errors in the regression model.

Table 5. Breusch-Godfrey Serial Correlation LM Test

F-statistic	5.998618	Probability		0.006789
Obs*R-squared	9.582060	Probability		0.008304
Test Equation:				
Dependent Variable: RESID				
Method: Least Squares				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOG(PRILIV_SDI)	-7389.790	11086.00	-0.666588	0.5105
POTR_DOM	0.062297	0.090686	0.686954	0.4978
RESID(-1)	-0.077894	0.187689	-0.415016	0.6813
RESID(-2)	-0.587323	0.169857	-3.457757	0.0018
R-squared	0.299439	Mean dependent var		2274.423
Adjusted R-squared	0.224379	S.D. dependent var		85425.10
S.E. of regression	75233.31	Akaike info criterion		25.41104
Sum squared resid	1.58E+11	Schwarz criterion		25.59426
Log likelihood	-402.5767	Durbin-Watson stat		1.852726

Results of the test indicate absence of the serial autocorrelation in stochastic errors of the model. This result was expected since the estimated value of DW statistic is very close to 2.

Finally, the correlation matrix of explanatory variables is computed in order to check for the multicolinearity among the explanatory variables in the model.

Table 6. Correlation coefficients matrix

	FDI Inflow	Households Consumption
FDI Inflow	1.000000	0.196093
Households Consumption	0.196093	1.000000

The correlation coefficient between two explanatory variables has very small value leading to the conclusion that multicolinearity is not a problem in the estimated regression model.

The employed econometric tests revealed that the estimated model suffers only from the problem of heteroscedasticity while the problems of autocorelation and multicolinearity are not detected in the model.

4. CONCLUSION

After gaining independence in 2006, Montenegro experienced "economic boom", accompanied by a high increase in FDI, double-digit rates of economic growth, a surplus in budget etc. Soon after the global economic crisis emerged, FDI inflows have sharply declined, which brought to the surface all national economic problems, emphasizing the high dependence of the Montenegrin economy on foreign capital, since the level of domestic national savings is very low. One of the main problems causing sudden drop in FDI inflows is the very structure of FDI, dominated by the real estate sector, which after the economic crisis suffered a fiasco.

We studied the dynamics and impact of FDI on GDP of Montenegro for 2005–2012 period focusing on the FDI impact. Our econometric analysis of Montenego time series quarterly data in the observed period showed that FDI have dropped significantly in 2010 due to the economic crisis and that recovery started in 2012. FDI certainly play a role in generating economic prosperity and our empirical findings indicate that change in FDI inflow results in a positive and significant change in the gross domestic product thus confirming a widely accepted notion that FDI promote economic growth of the host country. The estimated model is an empirical evidence of the positive effect of the FDI inflow on the GDP of Montenegro.

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