

FOREIGN DIRECT INVESTMENT AND REGIONAL DEVELOPMENT IN BULGARIA: A PANEL DATA ANALYSIS FOR THE PERIOD 2008- 2016

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Abstract: *The paper presents selected results from an empirical analysis of the interrelation between the regional level of economic development and foreign direct investment (FDI) stock in the regional economies for the period 2008-2016 in Bulgaria. Data from the regional statistics of the Bulgarian National Statistical Institute has been utilized. Panel data regression models have been estimated for this purpose using variables for the real regional Gross domestic product and a selection of determinants of the regional development. This way the models control for other variables in order to evaluate the net effects of the FDI influx on the level and growth of the regional labour productivity for the chosen period.*

Key words: *Foreign direct investment, regional growth, Bulgaria.*

1. INTRODUCTION

As is well known, foreign direct investment (FDI) has a large share in the internationalization of economic activity. They are one of the most important aspects of globalization.⁶ In this area, the largest studies are made by researchers like Sala-I-Martin⁷ and Barro⁸. Their techniques are applied when looking for growth determinants between regions in a given country. Regional imbalances are a problem that affects every country. States are making a lot of effort to create a regional policy that balances growth and brings about convergence between regions.

The problems related to the economic development of the regions in Bulgaria during the period of market transformation of the Bulgarian economy are constantly in the focus of economic research and analysis. Essentially, attention was focused on these processes in relation to the country's integration into the EU in 2007, when a significant targeting of European pre-accession funds to support regional development was realized.

The main idea of this study is to investigate the relationship between the regional level of economic development and the foreign direct investment (FDI) stock in the regional economies for the period 2008-2016 in Bulgaria. The country consists of 28 areas with different growth and development. From there, there are immense differences between them, with many determinants describing their growth. One of the most significant is the inflow of foreign capital, which has an ambiguous influence on regional development. Therefore, this study

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⁶ Bajo-Rubio O., Diaz-Mora C. and Diaz-Lora C. 'N, Foreign Direct Investment and Regional Growth: An Analysis of the Spanish Case. *Regional Studies*, Vol. 44.3, pp. 373–382, April 2010

⁷ Sala-I-Martin, X. "I Just Ran Two Million Regressions". *AEA Papers and Proceedings* 87 (1997): 178-83.

⁸ Barro, R.J. and X. Sala-I-Martin. "Convergence across States and Regions". *Brookings Papers on Economic Activity* 1 (1991): 107-82.

makes this connection more complicated by controlling determinants to be able to prove the relevance of the relationship and measure it. Taking into account the studies of the above-mentioned authors, the impact of FDI on growth is expected to be clear and fundamental.

2. INFORMATION BASIS OF THE STUDY

The data used in the current study is provided basically from the information system INFOSTAT of National Statistical Institute of Bulgaria. The utilized statistical data is annual on the demographic and socio-economic conditions at the regional level. Some of used variables are taken directly from the platform. The other are transform for the aim of the research. The all data is collected for all 28 areas of Bulgaria during 2008-2016.

The dependent variable is represented from:

- GDP by economic area and sector over the period per employed 2008-2016

It is transform from two variables. First is GDP by economic area and sector over the period and second is employed. GDP per employed is a key economic indicator for measuring regional growth.

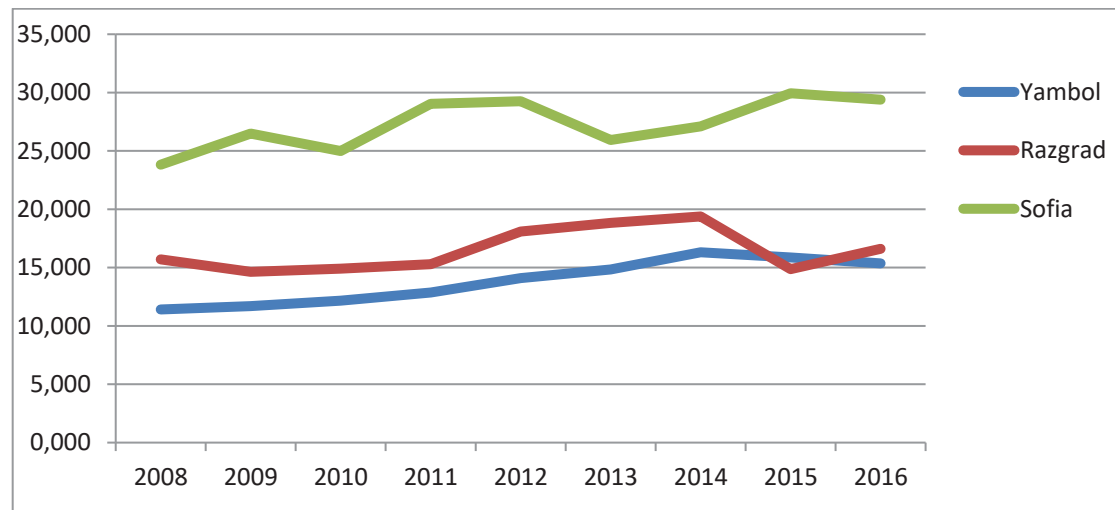


Figure 1: Dynamics of the GDP by economic area and sector over the period per employed 2008-2016 for Yambol, Razgrad and Sofia

Figure 1 shows the dynamics of real GDP per capita GDP for the period 2008-2016 for three regions of Bulgaria.

- Sofia Region is the representative of the regions with the highest levels of real GDP per employee.
- Razgrad is one of the districts in Bulgaria with average levels of real GDP per employee.
- Yambol is an area characterized by low levels of indicator values. In all three areas there is an increase in real GDP per employee between 2008 and 2016.
- In Yambol and Razgrad the highest values of the indicator are in 2014. As between 2008 and 2014, both real GDP growth rates were seen as a real GDP growth rate. After this

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period, the indicator falls in both regions, as in 2015 the levels in Razgrad are lower than those in Yambol. In 2016 Yambol again managed to overtake Razgrad.

- In the region of Sofia there have been downturns and ups and downs, but the general trend of growth is preserved.

Independent variables were selected to control socio-economic determinants. They are :

- Foreign direct investment in non-financial enterprises (Thousand FDI stock at 31.12, per employed in the district)
- Average annual gross salary of employees (AS, bgn)
- Solved crimes against the person and property (SC, % of those registered during the year in the district)
- Economic activity coefficient, population 15-64 years (EA, %)
- Net enrollment ratio, basic school V-VIII (NE, %)

This study explores the relationship between the regional level of economic development, which is represented by the real regional Gross domestic product of the population employed and the FDI of the employed by the population in the regional economies for the period 2008-2016 in Bulgaria. Panel data regression models⁹ have been estimated for this purpose using variables for the real regional Gross domestic product and a selection of determinants of the regional development. This way the models control for other variables in order to evaluate the net effects of the FDI influx on the level and growth of the regional labour productivity for the chosen period.

3. A PANEL DATA ANALYSIS OF FOREIGN DIRECT INVESTMENT AND REGIONAL DEVELOPMENT

To take into account the **panel nature of the data**, groups of dummy variables were created and included in the model - for time and for the districts:

- one time-independent dummy, "fixed" for each district;
- one district-independent dummy, "fixed" for each year.

After evaluating a fixed-effect model and a random-effects model, the **Fixed-Effect** model was best selected. Due to the presence of autocorrelation and heteroscedasticity, during the diagnosis and the fact that in the fixed effects model there are regression coefficients that are statistically insignificant, a "fixed effects" model with recalculated robust assessments was chosen for the best. The specification of the "fixed effects" model with recalculated robust standard errors has the following form:

$$\ln Y_{it} = \beta_0 + \beta_1 \ln K_{it} + \beta_2 \ln AS_{it} + \beta_3 \ln SC_{it} + \beta_4 \ln EA_{it} + \beta_5 NE_{it} + \beta_6 \ln Y_{it-1} + \sum_{r=2}^{28} \delta_r DR_{rt} + \sum_{s=2}^9 \lambda_s DT_{it} + \varepsilon_{it} \quad (1)$$

In Table 2. the results of the model are presented.

⁹ Jeffrey M. Wooldridge, Introductory Econometrics a modern approach, 5th edition, *Michigan State University*, 2009 South-Western, Cengage Learning, 2013

| Variables | Regression coefficients | | Student's test | Sig(t) |
|--|-------------------------|--------|----------------|--------|
| | B | SE(B) | | |
| Constant β_0 | 2.169 | 0.271 | 8.016 | <0.000 |
| β_1 K[i,t] | 0.010 | 0.006 | 1.790 | 0.075 |
| β_2 AS[i,t] | 0.001 | 0.0005 | 1.954 | 0.0523 |
| β_3 SC[i,t] | 0.001 | 0.001 | 1.109 | 0.2689 |
| β_4 EA[i,t] | -0.005 | 0.002 | -2.940 | 0.004 |
| β_6 NE[i,t] | 0.001 | 0.002 | 1.109 | 0.2689 |
| β_7 Log [GDPpe]_1 | 0.266 | 0.07 | 3.824 | 0.0002 |
| Зависима променлива: Ln(GDPper[i,t]) N.T=224 | | | | |

Table 2 The results of the multifactor model with fixed effects with recalculated robust standard errors

where the delta coefficients measure the fixed effects for the districts (without one chosen for the reference unit) and the lambda coefficients measure the fixed effects for the years (excluding $t = 0$ for 2008). In Table 3.1. the model results obtained using specialized econometric software (Gretl) are presented.

Tests on the parameters for the region "dummy" variables and the years "dummy" variables show that the zero hypothesis of negligible delta and lambda parameters can be rejected at 5% risk ($p\text{-value} = 0.000 < 0.05$), which means, that their inclusion in the model has a statistically significant effect for increasing explanatory ability.

Student's tests on the parameters β_0 , β_1 , β_2 , β_3 , β_4 , β_5 , β_6 and β_7 suggest that five regression coefficients of the equation are statistically significant due to the fact that $\text{Sig}(t) < \alpha = 0,1$. These are the coefficients in front of:

- Constant variable,
- Foreign direct investment in non-financial enterprises (Thousand FDI stock at 31.12, per employed in the district),
- Average annual gross salary of employees (AS, bgn),
- Economic activity coefficient, population 15-64 years (EA, %),
- Lag variable for real GDP per employed.

$$\ln Y_{it} = 2.169 + 0.010 \ln K_{it} + 0.001 \ln AS_{it} + 0.001 \ln SC_{it} - 0.005 \ln EA_{it} + 0.001 NE_{it} + 0.266 \ln Y_{it-1} + \sum_{r=2}^{28} \delta_r DR_{rt} + \sum_{s=2}^9 \lambda_s DT_{it} + \varepsilon_{it} \quad (2)$$

From the obtained results, the following conclusion can be drawn for the period 2008-2016:

- at the unit higher level of annual regional investment (represented by the variable Foreign direct investment in non-financial corporations as of 31.12 on employed by the population), the regional GDP per employed increased on average by 0,010%.
- at the unit higher level of the "Average annual gross salary of employees under labor and employment relationship", the regional GDP per employed increased on average by 0,001%.
- at the unit higher level of the "Economic activity coefficient - 15 - 64 years", the regional GDP per employed decreased on average by 0,005%.
- The coefficient for the lag dependent variable is statistically significant at a very low risk of error. Its relatively high value shows strong momentum in changing regional GDP.

This conclusion is valid when eliminating changes in average GDP per employed under the influence of factors during the survey period.

4. CONCLUSIONS

The presented empirical results are indicative about the objectively existing interrelations between regional level of economic development and foreign direct investment (FDI) stock in the regional economies for the period 2008-2016 in Bulgaria. The inclusion of the selection of determinants in the model controls the assessment of the net effects of FDI inflows on the level and the growth of regional labor productivity for the period 2009-2016. It is established at the unit higher level of annual regional investment, the regional GDP per employed increased on average by 0,0140%.

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