CORRELATIVE ANALYSIS BETWEEN FDI AND GDP IN THE REPUBLIC OF MACEDONIA

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Abstract: The entry of FDI in the country brings with it a number of effects on the host countries, starting from the local workforce through increased employment opportunities, higher wages by foreign companies; the effect of the transfer of resources, where foreign firms can contribute by providing capital, technology and management; effects on trade and balance of payments, where the balance of payments benefits from any capital inflow and FDI increases competition in the country forcing domestic companies to bring better quality products and services as well as technology and more efficient administration.

No doubt that for Macedonia these investments are very important as a country in transition, which should follow the footsteps of neighboring countries, which benefited from these investments, offering, above all, a genuine climate of investment through improvements in implementation of structural economic reforms, reforms in the legislative sector, elimination of corruption, organized crime, security of property and sustainable political stability, reaching a compromise for the name with Greece and improving relations with other neighbors. The purpose of this paper is to show the correlative analysis between FDI and GDP in the Republic of Macedonia and some EU countries from 2000 – 2009. The results of this paper show us a significant positive correlation between FDI and GDP in the Republic of Macedonia. The coefficient of determination $r = 0.317$, indicating that 31.7% GDP is dependent on the inflow of foreign direct investment in the country and 68.3% by other factors.

Keywords: FDI, the country benefits from FDI, GDP, correlation analyses

I. INTRODUCTION

Foreign direct investment and economic growth

Many studies show a positive correlation of FDI and economic growth. This can be evidenced by the fact that the countries, which have attracted more foreign direct investment associated with higher economic growth. With the development of economic globalization, FDI are increasingly being recognized as an important factor in the economic development of countries. The largest increase occurred in recent years, which has resulted from several factors, especially the more open attitude of governments to investment inflows, privatization and the growing interdependence of the world economy. Attitudes and government policies on FDI, as well as its characteristics have changed significantly over time.
Different studies provide different effects of FDI on economic growth. A recent survey of the literature of FDI, Hanson (2001), argues that evidence for FDI to generate positive effects for the host countries are weak. In a summary of micro data on the effects of FDI in economic growth, Gorg and Greenwood (2002) conclude that the effects are mostly negative. Lipsey (2002) takes a more favorable view of literature review of micro and argues that there are positive effects results.

But a study by Laura Alfaro (2003) at Harvard Business School, about FDI and economic growth if it is an important sector of investing foreign investors or not, has come to the conclusion that the effect of FDI on economic growth depends on the sector in which to invest. This study shows that FDI flow into different sectors of the economy, in the primary sector, manufacturing sector and in the services sector, which exert different effects on economic growth. FDI in the primary sector tend to have a negative effect on economic growth, while FDI in the manufacturing sector have a positive effect. Regarding to FDI in the services sector there is no clear evidence.

But from another study done on FDI to by Selin Sayek (2006) at Bilkent University, the results show that the same level of growth of FDI, regardless of the reason for that growth, generates three times more economic growth in countries financially more developed compared to countries with weaker financial development.

There is no doubt that FDI and economic growth have a positive relationship, but it is important that especially developing countries, it is Republic of Macedonia, to ensure an environment of sustainable economic, political and legislative framework to attract more FDI following steps of other countries who benefited from the advantages of these investments, but analyzing which sectors they will have the greatest effects on economic growth.

II. METODOLOGY

For this research is using the Coefficient of determination and the Correlation coefficient of FDI and GDP in Macedonia and some EU countries, that best express the interdependence between these variables. In economic theory and empirical analysis found that there is interdependence
between FDI and GDP. Interdependence between these variables will count through parabolic regression functions and Coefficient of determination and correlation coefficient.

These coefficients are calculated according to the following formula:

**Coefficient of determination:**

\[
R^2 = \frac{\sum(\hat{Y}_i - \bar{Y})^2}{\sum(Y_i - \bar{Y})^2}
\]

Coefficient of determination expresses the adequacy of the data with the regression line. \(Y_i\) represents the estimated function, \(\bar{Y}\) represents the average value of the variable \(Y\) and \(Y_i\) represents the value of the dependent variable in years.

The coefficient of the alliance:

\[
R^2 a = 1 - R^2 d
\]

**Correlation coefficient:**

\[
R = \sqrt{r^2 d}
\]

- \(R = + \sqrt{r^2 d}\) where \(b\) is positive
- \(R = - \sqrt{r^2 d}\) when \(b\) is negative

**General regressive parabolic function:**

\[
Y = a + bx + cx^2
\]
Variables calculated in the above function are made from actual data on employment and foreign direct investment in the country and in some countries of the European Union in the period 2000-2009, are presented in the following tables:

**Table 1:** GDP of Republic of Macedonia and some countries of UE for the period 2000-2009

<table>
<thead>
<tr>
<th>Years</th>
<th>Finland (000 000)</th>
<th>France (000 000)</th>
<th>Greece (000 000)</th>
<th>Germany (000 000)</th>
<th>Italy (000 000)</th>
<th>Slovenia (000 000)</th>
<th>UK (000 000)</th>
<th>Macedonia (000 000)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>122,073</td>
<td>1,333,254</td>
<td>127,604</td>
<td>1,905,795</td>
<td>1,100,563</td>
<td>19,990</td>
<td>1,480,527</td>
<td>3,589</td>
</tr>
<tr>
<td>2001</td>
<td>124,669</td>
<td>1,341,254</td>
<td>131,144</td>
<td>1,892,595</td>
<td>1,118,318</td>
<td>20,413</td>
<td>1,471,396</td>
<td>3,437</td>
</tr>
<tr>
<td>2002</td>
<td>135,563</td>
<td>1,463,457</td>
<td>147,910</td>
<td>2,024,060</td>
<td>1,223,236</td>
<td>23,119</td>
<td>1,614,699</td>
<td>3,763</td>
</tr>
<tr>
<td>2003</td>
<td>164,440</td>
<td>1,804,407</td>
<td>194,990</td>
<td>2,446,885</td>
<td>1,510,055</td>
<td>29,095</td>
<td>1,862,770</td>
<td>4,628</td>
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<tr>
<td>2004</td>
<td>189,166</td>
<td>2,060,576</td>
<td>231,022</td>
<td>2,748,821</td>
<td>1,730,095</td>
<td>33,756</td>
<td>2,203,575</td>
<td>5,368</td>
</tr>
<tr>
<td>2005</td>
<td>195,966</td>
<td>2,147,773</td>
<td>243,378</td>
<td>2,793,232</td>
<td>1,780,781</td>
<td>35,807</td>
<td>2,282,888</td>
<td>5,814</td>
</tr>
<tr>
<td>2006</td>
<td>207,989</td>
<td>2,270,364</td>
<td>264,263</td>
<td>2,921,266</td>
<td>1,865,112</td>
<td>38,990</td>
<td>2,447,682</td>
<td>6,370</td>
</tr>
<tr>
<td>2009</td>
<td>238,607</td>
<td>2,656,378</td>
<td>330,780</td>
<td>3,338,675</td>
<td>2,118,264</td>
<td>48,600</td>
<td>2,178,856</td>
<td>9,371</td>
</tr>
</tbody>
</table>


**Table 2:** The entry of FDI in Republic of Macedonia and some UE countries for the period 2000-2009

<table>
<thead>
<tr>
<th>Years</th>
<th>Finland (000 000)</th>
<th>France (000 000)</th>
<th>Greece (000 000)</th>
<th>Germany (000 000)</th>
<th>Italy (000 000)</th>
<th>Slovenia (000 000)</th>
<th>UK (000 000)</th>
<th>Macedonia* (000 000)</th>
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<tr>
<td>2000</td>
<td>8015</td>
<td>42930</td>
<td>1089</td>
<td>198276</td>
<td>13375</td>
<td>137</td>
<td>118764</td>
<td>35673.075</td>
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<tr>
<td>2001</td>
<td>3732</td>
<td>52623</td>
<td>1560</td>
<td>21138</td>
<td>14871</td>
<td>369</td>
<td>52623</td>
<td>63907.725</td>
</tr>
<tr>
<td>Year</td>
<td>FDI (Million Denar)</td>
<td>GDP (Million Denar)</td>
<td>Coefficient of Determination</td>
<td>Correlation Coefficient</td>
<td></td>
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<tr>
<td>2002</td>
<td>7920</td>
<td>49035</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2003</td>
<td>3296</td>
<td>42498</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>2004</td>
<td>4648</td>
<td>24318</td>
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<tr>
<td>2005</td>
<td>4750</td>
<td>84951</td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>2006</td>
<td>5481</td>
<td>78154</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>2007</td>
<td>12384</td>
<td>96221</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>2008</td>
<td>-1974</td>
<td>62257</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2009</td>
<td>2551</td>
<td>59628</td>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>

*Million denar


III. RESULTS

Correlative analyses between FDI and GDP in Macedonia and comparison with some EU countries

Coefficient of Determination and Correlation coefficient of investment and GDP in Republic of Macedonia and some EU countries

Coefficient of determination and correlation coefficient are the indicators that best express the interdependence between investment and GDP of the country. Therefore, the interdependence of these variables will be analyzed through these coefficients in some EU countries as well as in Macedonia, making a comparison between them.

Calculated parabolic regression functions of GDP and the entry of foreign direct investments in Macedonia and some European Union countries are as follows:
Finland GDP = 234,919.30 - 22,085 + 0.0017 FDI FDI²
France GDP = 1714.73 - 0.0027 0.00000013 FDI FDI + ²
Germany GDP = 2, 765.60 + 0.0028 FDI - FDI 0.00000003²
Greece GDP = 131,400.41 + 80.46 FDI - FDI 0.0090²
Italy GDP = - 1,213.80 + 0.2322 FDI - FDI 0.00000383²
Slovenia GDP = 35 924.96 - 16.66 + 0.0118 FDI FDI²
United Kingdom GDP = 1 + 727.90 + 0.0029 0.00000001 FDI FDI²
Macedonia GDP = 4 + 472.99 + 4.0135 0.0027 FDI FDI²

Calculated by regressive parabolic functions between GDP and the entry of foreign direct investments in the country, we see that, in the analyzed period from 2000-2009, an inverse relationship observed only in Finland, in proportion (1: 22,085) in France in proportion (1: 0.0027) and in Slovenia in proportion (1: 16.66), which means that the economy of Finland, France and Slovenia, during this period, with the increase of direct foreign investments in the country, GDP decreased. But in all other countries surveyed, including Macedonia, expressed a dependency positive GDP and foreign direct investment in the country, which means that the economies of these countries with increasing foreign direct investment in the country will result increasing of GDP in these countries. Calculated parabolic function for Macedonia shows that a monetary unit growth in the entry of foreign direct investment, GDP grows by 4 monetary units.

Regarding the regression dependence of GDP and foreign direct investment in the country, which is expressed by coefficients of determination and alliance generally analyzed countries and the period of 2000-2009, there is also a dependence on relatively strong correlation between GDP and foreign direct investment in the country. Of all the countries analyzed in this period slightly larger dependence regression between these two variables observed in Italy at a rate of determination r²d = 0.602, meaning that during the period analyzed 60% of GDP is dependent from entry of foreign direct investment and 40% by other factors (r² = 1- 0602 = 0398). Then follows Greece with coefficient of determination r²d = 0528 shows that 52.8% of GDP is
dependent on the inflow of foreign direct investment and 47.2% of the other factors, Finland coefficient of determination \( r^2_d = 0.518 \) shows that 51.8% of GDP is dependent on the inflow of foreign direct investment and 48.2% by other factors; UK \( r^2_d = 0.345 \), indicating that 34.55 GDP is dependent on the inflow of foreign direct investment and 65.5% of the other factors and Macedonia \( r^2_d = 0.317 \), indicating that 31.7% of GDP is dependent the entry of foreign direct investments in the country and 68.3% by other factors. But a less dependent regression observed in France \( r^2_d = 0.269 \), 26.9% GDP is dependent on the inflow of direct foreign investments in the country and 73.1% of the other factors and Slovenia with \( r^2_d = 0.226 \) dependence of GDP of 22.6% from the entry of foreign direct investments in the country and 77.4% of the other factors and Germany \( r^2_d = 0.184 \), GDP is dependent 18.4% of foreign direct investment and 81.6% by other factors uninvolved.

The figure below presents a linear function of the impact of foreign direct investment in GDP in the Republic of Macedonia in the analyzed period 2000 - 2009, which reveals a large dependency of these investments in Macedonia's GDP during this period.

Meanwhile, Paerson coefficients (correlation) show the connection that had these countries between GDP and foreign direct investment in these countries in the analyzed period since 2000-2009. The correlation coefficients of these countries also show a relatively strong connection between GDP and foreign direct investment in the country. The coefficients of correlation between GDP and FDI's in Italy with \( r = 0.776 \), in Greece with \( r = 0.727 \), show a strong relationship between these variables. In the UK \( r = 0.587 \), 0563 Macedonia and Germany \( r = r = 0.429 \) shows a relatively strong connection between these variables. Meanwhile, in Finland \( r = -0.720 \), \( r = -0.519 \) France and Slovenia with \( r = -0.0476 \) show a negative correlation between GDP and FDI's.

There is the regressive function, in terms of employment and the impact of FDI in GDP in the Republic of Macedonia, in the analyzed period 2000 - 2009:

\[
\text{GDP} = 30913.5 + 0.2478 + 1.260 \text{IDH}^2 \text{Employment}
\]

\[
t \text{stat (0.312) (1.319) (9.342)}
\]
This feature shows a correlation between employment, FDI and GDP in Macedonia in the period analyzed. Employment marks a proportional dependence (1: 0.2478), indicating that the increase in employment for 1 unit, GDP will grow by 0.25 currency units, while FDI to record a dependency in proportion (1: 2.9238), which It shows that the growth of FDI's for 1 monetary unit, GDP will grow by 1.3 monetary units. From this function we see that the growth of direct foreign investments in Macedonia have a huge impact on the growth of GDP.

III. CONCLUSION

The entry of FDI in the country brings with it a number of effects on the host countries, starting from the local workforce through increased employment opportunities, higher wages by foreign companies; the effect of the transfer of resources, where foreign firms can contribute by providing capital, technology and management; effects on trade and balance of payments, where the balance of payments benefits from any capital inflow and FDI increases competition in the country forcing domestic companies to bring better quality products and services as well as technology and more efficient administration.

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Regarding the regression dependence of GDP and foreign direct investment in the country, which is expressed by coefficients of determination and alliance generally analyzed countries and the period of 2000-2009, there is also a dependence on relatively strong correlation between GDP and foreign direct investment in the country.

Also, from the regression function we see a correlation between employment, FDI and GDP in Macedonia in the period analyzed. Employment marks a dependence proportional (1: 0.2478), indicating that the increase in employment for 1 unit, GDP will grow by 0.25 currency units, while FDI to record a dependency in proportion (1: 2.9238), which It shows that the growth of FDI's for 1 monetary unit, GDP will grow by 1.3 monetary units. From this function we see that the growth of direct foreign investments in Macedonia have a huge impact on the growth of GDP.

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