Foreign Direct Investment Drivers in Romania

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Foreign Direct Investment (FDI) represents a condition sine qua non for a sustainable development of Romania, taking into consideration the fact that the domestic capital is not enough to assure a positive and significant growth. The present study uses the multiple linear regression to determine the main factors which influence FDI level in Romania. The international reserve and the capital market index BET have a direct and positive impact on the foreign investment flow, while the short, medium and long private and public external debt proved to influence direct, but in a negative way, the FDI.

Keywords: Linear multiple regression, Foreign Direct Investment (FDI), International reserve, Capital market index BET, Short, medium and long term public and private external debt

1. Introduction

According to the National Bank of Romania (NBR), the foreign direct investment is seen as a “long term investment relation between a resident and a non-resident entity, which implies that the investor has a significant managerial influence in the company he has invested in.” Are considered to be FDIs: the paid-up capital and the reserves owed by a non-resident investor, who holds at least 10% of the subscribed capital of a resident company, the loans given by this investor to the organization he has invested in, as well as the reinvested profit.

According to the contribution foreign investors bring in a company, FDIs classify as:
- Greenfield: starting a business from zero by/with foreign investors;
- Mergers and acquisitions: the total/partial takeover of a company by foreign investors from residents;
- Companies’ development: foreign investors hold the majority in the company.

The subject of FDIs, and more precisely of the factors influencing their level, remains extremely debated in the specialized literature. Economists from all over the world have tried to identify the reasons behind FDI flow in their countries, in order to help increase their level.

FDIs are extremely important for the economic growth of any country, especially of a developing one. The lack or the insufficiency of the domestic capital is balanced by such FDIs. Romania is no exception. For our country as well, FDIs represent the development leverage.

The present study aims at identifying the specific factors that determine FDIs in Romania and the extent to which FDI level depends on them. In this direction, we analyzed a series of 16 factors considered important in terms of their influence on the FDIs. However, after significance tests have been conducted, especially the t-Statistic test, only three of them proved to influence FDIs: the international reserve, BET and the external debt.

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Article History:
Received 06 December 2013 | Accepted 22 December 2013 | Available Online 29 December 2013

Cite Reference:
2. Literature review

Specialized literature distinguishes two categories of factors that influence FDIs, external and internal. External factors, the so-called “push factors” (Tapsoba, 2012), include the economic conditions in the countries from where FDIs come and reflect the opportunity cost of investing in a specific country. Internal factors, the “pull factors” (Tapsoba, 2012), refer to the macroeconomic conditions and the institutional environment in the countries towards which FDIs are directed.

A low inflation rate determines a favorable climate for investments and puts the basis of a sustainable economic development. (Fischer & Modigliani)

Shamsuddin (1994) analyzed in his paper FDIs’ drivers in 36 less developed countries during the year 1983. The conclusions were that the highest influence on FDI is the host’s country (the country where the foreign capital flow enters) Gross Domestic Product (GDP)/capita, followed by the workforce cost and the investment climate, represented by the public debt/capita, price volatility and resources’ availability in the host country. The exports, the imports, the national infrastructure and various types of risk (country risk, political risk, interest rate risk) are other factors that influence FDI levels.

Balasubramanyam’s study (1996) concludes that host’s country trade policy represents a crucial factor in attracting FDIs. The explanation lays in the fact that the foreign capital flow has a higher impact on the economic development of countries promoting the exports, against those promoting the import.

Borenzstein (1998) shows that FDIs support the economic development of the host country by the technology transfer from the higher developed countries. Moreover, the study explains the differences in terms of FDIs’ influence on the host’s country economic development, based on the different capacities to absorb newly introduced technologies.

In his paper “FDI and inflation: theory and evidence”, Sayek (1999) sustains that the relation inflation-FDIs is a negative one. Thus, he concluded that a 3% inflation growth in Canada determined a reduction of the USA’s FDIs in Canada with 2%, and that a 7% inflation growth in Turkey determined a reduction of the USA’s FDIs in Turkey with 1.9%. Price stability is an indicator of the economic stability. Usually, high inflation rates translate in a reduction of the FDI’s Return on Investment (ROI).

Nnadozie (2000) reveals that the most important factors which trigger USA’s FDIs in Africa are GDP, public debt, natural resources, inflation rate and political risks. Asiedu’s (2002) study confirms that FDIs in Africa are influenced by its natural resources, low inflation rates and market dimension, adding two more factors: a good infrastructure and a general framework which favors investments. On the other hand, corruption and political instability represent two barriers.

Niel and Robert (2003) realized a study on 67 less developed countries between 1970 and 1995, concluding that FDIs contribute to a host country economic growth only if the financial system of that country is a developed one.

Bushra, Hussain and Chaudhary (2003) sustain that countries which aim at attracting a high investment flow need to make efforts for increasing their trade’s openness and for diminishing external debt and the imbalances on the internal and external markets.

Kiat’s (2007) study, which analyzed FDI’s evolution in 30 countries between 1981 and 2007, concluded that inflation does not directly affect FDIs. It influences the unemployment, population’s wages and the economic growth, factors considered to be important in the investment decision making process. Also, the study shows that high inflation rates have a negative effect on FDIs.

Duasa (2007) examined FDI and GDP in Malaysia and it proved to be no clear evidence of a relation between them. Consequently, FDI does not influence country’s economic growth. It only contributes to its stability.

Abbas (2011) realized a study on the countries forming the South Asian Association for Regional Cooperation on the period 2001-2010, whose conclusions were that there is a positive and significant relation between GDP and FDI and an insignificant relation between the inflation rate and FDI.

Tapsoba’s empirical study (2012) realized between 1980 and 2007 on 53 developing countries shows that central banks’ monetary policy of inflation targeting determines a high level of FDIs. Why this? Because it increases country’s credibility and economic environment stability.

A recent paper of Saleem, Zahid, Shaoib, Mahmood and Nayab (2013) on Pakistan economy in the period 1990-201 argues that FDIs are in a direct and positive relation with inflation rate and GDP. Another paper of Shahzad and Al-Swidi (2013) analyzed Pakistan between 1991 and 2011, and it concluded that political stability, GDP, exchange rate and exports positively influence FDIs, while inflation rate has no significant impact on FDIs.
If at global level there is a series of studies analyzing FDIs’ drivers, in Romania, the subject was not enough “exploited”, even if it is of a real interest. This explains the reduced number of studies debating this issue.

A study of Pirtea and Miloș (2009) analyzed FDIs’ influence on the economic growth in Romania between 2000 and 2007, using the simple linear regression. The dependent variable was considered to be GDP’s real growth rate, while the independent variable was FDIs’ growth rate. Study’s conclusions were that FDI variation has a moderate impact on the economic growth.

Bakos, Sisak, Vlad and Voica (2010) realized in their paper a number of correlations: GDP-FDI, inflation-FDI, unemployment-FDI, exports-FDI and imports-FDI. The conclusion was, on one hand, that there is a strong correlation between GDP, exports and imports and the FDI growth. On the other hand, there is a low correlation between inflation rate, unemployment and GDP.

Other factors that foreign investors take into consideration when they take the investment decision in Romania include the relative low cost of workforce and resources, as well as a high educational preparation level of the workforce.

Ludoșean (2012) shows, with the help of Value at Risk (VaR) model, that between Romanian economic growth and FDI level, there is a negative relation. Consequently, FDI level does not determine economic growth in Romania. However, it represents an important factor in attracting FDIs in Romania.

3. Study motivation

Observing the existence of numerous studies at international level regarding FDIs’ drivers, we concluded that the specifics of each country make different factors influence the foreign investment flow. The present study aims at identifying, using the multiple regression, the factors which determine the foreign investment flow in Romania.

The paper’s objective is to analyze and test new hypothesis. Also, as it took into consideration macroeconomic coordinates from 2000 to 2012, it allows highlighting some conclusions to date.

4. Methodology and data used

Prediction is the process of forecasting the value of one variable using a variable whose value is known. Although there are no perfect relations in the real world, such forecasts can be done using regression. Regression refers to a quantitative estimation of the causality relations between economic variables. It is mainly based on probability theory and statistics inference.

First regression models date from 1877, the method being introduced by Francis Galton, who tried to determine to what extent children’ height is influenced by parents’ height. Even if he did not apply the method in economy, regression was rapidly embraced by economists. George Udny Yule in 1895 and Reginald Hawthorn Hooker in 1901 were among the first to use correlation to analyze the relation between economic variables.

The relation between variables is described by a linear equation, the regression equation, which has as geometric correspondent the regression line. Depending on the number of factors involved, the regression can be:

- Single/simple factor regression, which can be linear or curved;
- Multi factor regression, with the two alternatives: linear and curved.

The objective of multiple regression is to highlight the relation between a dependent variable (explained, endogen, resultant) and a variety of independent variables (predictors, explicative, exogenous). Linear multiple regression was first used in economy in 1901, by the Italian statistician Rodolfo Benini.

The usage of the regression function in prediction involves several phases: choosing the shape of the function, determining the parameters, validating the function through statistical tests and in the end, establishing the prediction. Also, the partial determination coefficients need to be computed, as they show each independent variable contribution to the dependent variable.

The equation of the multiple linear regression is practically an extension of the simple linear regression, with the following format:

\[ \hat{y}_t = a + b_1 x_{1t} + b_2 x_{2t} + \cdots + b_k x_{kt} \]

where:
- \( \hat{y} \) – estimated value for the dependent variable
- \( a \) – origin of the line (constant)
- \( b_k \) – parameters for the k predictor variables
- \( x_k \) – independent variables
t – time variable, t = 1, n

Real observed values will know a deviation from the theoretical values, expressed as: \( Y_t = \bar{Y}_t + \varepsilon_t \)

Where \( \varepsilon_t \) – estimation error represented by a random variable normally distributed from average, 0 and the constant variable.

For computing the parameters a and b, the following equation system is used:

\[
\begin{align*}
    n \cdot a + b \sum x_1 + c \sum x_2 + d \sum x_3 &= \sum y \\
    a \sum x_1 + b \sum x_1^2 + c \sum x_1 x_2 + d \sum x_1 x_3 &= \sum y x_1 \\
    a \sum x_2 + b \sum x_1 x_2 + c \sum x_2^2 + d \sum x_2 x_3 &= \sum y x_2 \\
    a \sum x_3 + b \sum x_1 x_3 + c \sum x_3^2 + d \sum x_3 x_3 &= \sum y x_3
\end{align*}
\]

For the easiness of calculations, the two parameters can be automatically computed using Excel, Eviews, Spss or other similar software. Interpreting such variables represents the second stage from the regression process. The coefficient “a” shows the value \( Y \) has when \( X \) is zero. The coefficient “b” (regression slope) shows the extent to which \( Y \) is influenced when \( X \) increases with a unit.

The prediction for the period \( n+1 \), if we consider \( n \) to be the present moment, is realized:

\[
\hat{Y}_{n+1} = a + b_1 x_1, n_1 + b_2 x_2, n_1 + \cdots + b_k x_k, n_1
\]

To determine the prediction threshold, maximum and minimum limits will be computed, as follows:

Inferior limit: \( \hat{Y}_{n+1}^l = \hat{Y}_{n+1} - \Delta y \)

Superior limit: \( \hat{Y}_{n+1}^u = \hat{Y}_{n+1} + \Delta y \)

where: \( \Delta y \) - admitted deviation compared to the predicted level of the dependent variable. Its level is computed:

\[
\Delta y = t_{q/2}^* \sqrt{\frac{\sum_{t=1}^{n}(y_t - \hat{Y}_t)^2}{n - (k + 1)}} \sqrt{1 + C(X'X)^{-1}C}
\]

\( y \) – admitted deviation compared to the predicted level of the dependent variable

\( t_{q/2}^* \) – statistics \( t \) value with Student distribution related to a level of significance \( \alpha /2 \)

\( n \) – number of historical observations

\( C \) – coefficient’s matrix

\( X' \) – transposed matrix of independent variables

\( q \) – significance level (risk, the probability for the real value to be outside the thresholds), \( q = 1 - p \)

\( P \) – confidence level (the probability for the real value to be in the predicted threshold). The higher the \( P \) value, the wider the prediction threshold. Most used values are: 0.90; 0.95; 0.99.

5. Results

To develop the regression equation, a number of 16 variables was used, including: GDP (m lei), Minimum wage (euro), Exports (b euro), Tax revenues to the state budget (b euro), Short, medium and long term public and private external debt (b euro), Inflation rate (%), BET (leu), Official exchange rate leu-dollar (average), Unemployment rate (%), International reserve (b lei), Real interest rate (%), Electricity consumption (b kWh), Budgetary deficit (%), Budgetary expenses (b lei), Market capitalization (b lei) and Workforce with tertiary education (according to the World’s Bank methodology, tertiary education includes the faculty) (%).

The period considered was between 2000 and 2012. The selection of the independent variables introduced in the model was done through the regressive method, as follows:

- the linear multiple regression equation was generated including all the 16 independent variables;
- taking into consideration the results of the statistics significance test, variables with a p>0.05 were eliminated, beginning with the maximum value;
- this procedure was repeated for the variables left in the model;
- in the end, in the model were only left three variables: capital market index BET, international reserves and the short, medium and long term public and private external debt, each of them with a p>0.05.

BET is the reference index of the capital market in Romania, being the first index developed by the Bucharest Stock Exchange. It is a free float weighted capitalization index of the most liquid 10 companies listed on the Bucharest regulated market. The Romanian international reserve is formed from gold and foreign currencies, being administered by NBR. The short, medium and long term public and private external debt indicates Romanian indebtedness on the international market.

These three variables were afterwards analyzed in terms of descriptive statistics, whose results are presented in the table below:

<table>
<thead>
<tr>
<th>Foreign Direct Investments (b euro) (y)</th>
<th>BET (leu)</th>
<th>International reserves (b euro)</th>
<th>The short, medium and long term public and private external debt (b euro)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>3.787923077</td>
<td>Mean 4330.998462</td>
<td>Mean 20.90007692 Mean 40.34615385</td>
</tr>
<tr>
<td>Standard Error</td>
<td>0.613727738</td>
<td>Standard Error 766.9521451</td>
<td>Standard Error 3.486639925 Standard Error 7.96965089</td>
</tr>
<tr>
<td>Median</td>
<td>5.183</td>
<td>Median 4364.71</td>
<td>Median 22.935 Median 28.6</td>
</tr>
<tr>
<td>Sample Variance</td>
<td>4.896602577</td>
<td>Sample Variance 7646802.707</td>
<td>Sample Variance 158.0365536 Sample Variance 825.699359</td>
</tr>
<tr>
<td>Kurtosis</td>
<td>1.650952875</td>
<td>Kurtosis 0.211412705</td>
<td>Kurtosis 1.705944062 Kurtosis 0.66390822</td>
</tr>
<tr>
<td>Skewness</td>
<td>0.057271811</td>
<td>Skewness 0.45684352</td>
<td>Skewness 0.105865067 Skewness 0.779399767</td>
</tr>
<tr>
<td>Range</td>
<td>6.353</td>
<td>Range 9281.38</td>
<td>Range 33.608 Range 86.2</td>
</tr>
<tr>
<td>Minimum</td>
<td>1.147</td>
<td>Minimum 544</td>
<td>Minimum 3.643 Minimum 11.7</td>
</tr>
<tr>
<td>Maximum</td>
<td>7.5</td>
<td>Maximum 9825.38</td>
<td>Maximum 37.251 Maximum 97.9</td>
</tr>
<tr>
<td>Sum</td>
<td>49.243</td>
<td>Sum 56302.98</td>
<td>Sum 271.701 Sum 524.5</td>
</tr>
<tr>
<td>Count</td>
<td>13</td>
<td>Count 13</td>
<td>Count 13</td>
</tr>
<tr>
<td>Confidence Level (95.0%)</td>
<td>1.337197868</td>
<td>Confidence Level (95.0%) 1671.045172</td>
<td>Confidence Level (95.0%) 7.596735793 Confidence Level (95.0%) 17.36437759</td>
</tr>
</tbody>
</table>

Source: Own calculations

The **mean** indicates the average of each indicator values. The **median** divides the series in two equal parts. If the mean were equal to the median, the distribution would be a normal one. However, there are differences between the two indicators, which express an abnormal distribution. FDI’s mean is 3.79b euro, while the median is 5.18b euro. BET has a mean of 4330.90 lei and a median of 4363.71 lei. The international reserve is of 20.9 b euro and the median of 22.93 b euro, while the external debt has a mean of 40.34b euro and the median of 28.6b euro.

The fact that the distribution is not a normal one is also expressed by the two indicators **Kurtosis** and **Skewness**, which show the flattening and the inclination of the distribution. A normal level for the two indicators would have been 3 for Kurtosis and 0 for Skewness. The four factors have a flat distribution, as Kurtosis has levels of -1.65, -0.21, -1.70 and -0.66. In what concerns the inclination, the distribution is inclined to the left in the case of the international reserve, as Skewness has a negative value (-0.105). For the other factors, the distribution is inclined to the right, Skewness having positive values (0.057 for FDIs, 0.456 for BET and 0.77 for the external debt).

**Standard error** refers to the average of each factor’s errors, the so called “ε” in the model. FDIs have a level of 0.613, BET – 766.95, international reserve – 3.486 and the external debt – 28.74. The quite high level of this indicator can be explained by the high variation of the variables in the observed period.
In what concerns the indicators for measuring dispersion, **sample variance** indicates the relative spread of the data and **standard deviation** shows the values' distribution around the mean. Standard deviation is the square root of the variance, and its levels are of 2.21b euro for FDIs, of 2765.28 lei for BET, of 12.571 b euro for the international reserve and of 28.73 b euro for the external debt.

The **range** is the difference between the **minimum** and the **maximum** levels for each observation. FDIs have a range of 6.353b euro, BET - 9281.38 lei, the international reserve - 33.61b euro and the external debt - 86.2b euro.

The **confidence level** shows with a probability of 95%, that FDIs can deviate from the mean with ± 1.34b euro, BET with ± 1671.04 lei, international reserve with ± 7.59 euro and the external debt with ± 16.36b euro.

The next step was to obtain the results of the regression analysis, results that are presented in the table below:

**Table 2. Regression Analysis**

<table>
<thead>
<tr>
<th><strong>SUMMARY OUTPUT</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Regression Statistics</strong></td>
</tr>
<tr>
<td>Multiple R</td>
</tr>
<tr>
<td>R Square</td>
</tr>
<tr>
<td>Adjusted R Square</td>
</tr>
<tr>
<td>Standard Error</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>ANOVA</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>df</td>
</tr>
<tr>
<td>---</td>
</tr>
<tr>
<td>Regression</td>
</tr>
<tr>
<td>Residual</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Coefficients</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Standard Error</strong></td>
</tr>
<tr>
<td>t Stat</td>
</tr>
<tr>
<td>Lower 95%</td>
</tr>
<tr>
<td>Intercept</td>
</tr>
<tr>
<td>BET</td>
</tr>
<tr>
<td>International reserve (b euro)</td>
</tr>
<tr>
<td>Short, medium and long term external public and private debt (b euro)</td>
</tr>
</tbody>
</table>

**Multiple R** represents the correlation coefficient between the dependent variable observed (y, effective FDIs in the period 2000-2012) and the dependent variable calculated (ŷ, FDIs computed based on the regression equation). In this case, the indicator has a level of 92.41%, which expresses a strong correlation between effective FDIs and the calculated FDIs, computed with the help of the regression equation.

**R Square** represents the variance percentage in the dependent variable (criteria) determined by the simultaneous variation of the independent variables (predictors). The analysis indicates a level of 85.41% for $R^2$, which translates into the fact that FDIs’ variation in Romania is influenced by 85.41% by BET, international reserve and external debt variations.

**Adjusted R Square** is practically R Square corrected for the number of predictors. In this case (13 observations) to compute this indicator, the division is done by 12. The obtained value, 80.55%, higher than the
minimum level considered compulsory for a strong relation between variables (75%) reveals a 80.55% FDIs’ dependency on the independent variables. **Standard Error** represents the errors’ average and it has a level of 0.67.

R statistics significance is computed with a variance test (F), which in this case has a value lower than 0.0004. This emphasizes the validity of the regression model, as it is below 0.05.

As aforementioned, **P-value** has for each variable, levels below 0.05, the highest level being 0.021 for BET. The international reserve has a P-value of 0.00067 and the external debt of 0.0010.

Thus, the regression function has the following format:

\[
Y' = 1.077106526 + 0.000342628 \times X_1 + 0.203726121 \times X_2 - 0.083153003 \times X_3
\]

where

- \( Y' \) – estimated value for FDIs
- \( X_1 \) – BET
- \( X_2 \) – international reserve
- \( X_3 \) – short, medium and long term public and private external debt

Computing FDIs’ values in the period 2000-2012, based on the regression equation, leads to the following results:

**Table 3. Residual Output**

<table>
<thead>
<tr>
<th>Observation</th>
<th>Predicted Foreign Direct Investments (billion euro) (y)</th>
<th>Residuals</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1.032780174</td>
<td>0.114219826</td>
</tr>
<tr>
<td>2</td>
<td>1.335500783</td>
<td>-0.041500783</td>
</tr>
<tr>
<td>3</td>
<td>1.84279855</td>
<td>-0.63079855</td>
</tr>
<tr>
<td>4</td>
<td>2.041863231</td>
<td>-0.095863231</td>
</tr>
<tr>
<td>5</td>
<td>4.539944765</td>
<td>0.643055235</td>
</tr>
<tr>
<td>6</td>
<td>5.007357996</td>
<td>0.200642004</td>
</tr>
<tr>
<td>7</td>
<td>6.729604746</td>
<td>0.770395254</td>
</tr>
<tr>
<td>8</td>
<td>6.580662639</td>
<td>-0.880662639</td>
</tr>
<tr>
<td>9</td>
<td>4.664272307</td>
<td>0.835727693</td>
</tr>
<tr>
<td>10</td>
<td>4.632384072</td>
<td>0.767615928</td>
</tr>
<tr>
<td>11</td>
<td>4.219216632</td>
<td>0.980783368</td>
</tr>
<tr>
<td>12</td>
<td>2.89064678</td>
<td>-1.07564678</td>
</tr>
<tr>
<td>13</td>
<td>1.915159353</td>
<td>0.222840647</td>
</tr>
</tbody>
</table>

Source: Authors’ calculations

The quality of the model is facilitated by the Residual Plot graphs for each of the independent variables, presented as follows:

**Figure 1. Residual Plot – International reserves**

Source: Authors’ calculations
It can be observed that for each independent variable, residuals’ graphic representation can be translated into a horizontal line that does not contradict the hypothesis of the errors’ normality. The uniform line reflects the constant dispersion of the residuals all over the independent variable domain.

6. Conclusions

Thus, we can assert that there is a direct and positive relation between FDIs, the capital market index BET and the international reserves. This is indicated by the positive coefficients of 0.00034 and 0.203726 that exist between these variables. On the other hand, FDIs are negatively influenced by external debt level, the coefficient related to this variable being -0.08315.

What do these numbers indicate? That in order to attract a higher level of the foreign investment flow in Romania, the external debt level should be a reduced one, corroborated with high levels of the capital market index BET and of the international reserves. A reduced level of the external debt reflects a better asset management and it expresses the country’s ability of auto finance. A high level of the international reserves indicates prudence and the capacity of facing crisis, while a high BET level reflects a financial market in expansion.

All this data in nothing else but signals regarding the country’s economic stability, its capacity of overcoming crisis, as well as the financial market maturity level.
7. References


