COUNTRY RISK EVALUATION IMPACT ON FDI FLOW. MEDIUM RUN EVIDENCE FROM ROMANIA

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ABSTRACT: *During the last two decades, Romanian economy suffered numerous changes, with direct impact in the socio-economic and political life. This affected also the investment environment, the degree of attractiveness for investors and the flow of FDIs. As the economic system has a global dimension, the need of evaluating different countries from a risk perspective (that will serve as starting point for investor's decision) has increased the role of rating agencies, especially in the economic crisis context. Therefore, by applying two econometric models, we will determine in which degree the risk rating (using the Euromoney index) is influencing the FDI flow in Romania, having as evidence the period 1996-2012.*

KEY WORDS: *country risk, FDI, rating agencies.*

JEL CLASSIFICATION: *E10, E17.*

1. INTRODUCTION

In the actual economic context, the relations and interconnections between countries are becoming stronger and sophisticated. The wealth of a country is not depending now only on internal governance, but in a big extent depending on the quality of external relations with other countries and their economic situation (Dachin & Burcea, 2013). Strong evidence for this is represented by strong implications arises from the crisis situations in the modern period. In the financial domain and not only, a solution for this problem is represented by calculating the country risk. There are numerous definitions for this term- in big lines, this is representing the possibility of having financial lose while collaborating with a country partner.

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In practice, country risk evaluation is extremely useful for core decisions of transnational corporation or other generators of foreign investments. By knowing the country risk level and the potential loses to which they are exposing, companies or other economic agents will decide if is opportune to enter on that market or not. Also, based on this, the investor can decide if he will create own structures in that country, will associate with local partner or will use pre-existent structures. This is off course directly affecting the FDI flow (NBR, statistics).

2. COUNTRY RISK EVALUATION- EUROMONEY METHOD

Rating agencies are evaluating the risk associated with the bonds released by a sovereign country and traded on the international market. They are releasing ratings or scores by taking into consideration 3 different categories of indicators: economic, social and political. When evaluating the country risk, there are used combined techniques as: statistical methods, scenarios, systems of fast alarm and country studies. The conclusions resulted are represented as indices of risk or classifications of sovereign risk. There are extremely important as they have a determinant role in establishing the finance access conditions at international level for a country. In the bellow table we will synthetize the advantages and disadvantages of risk rating (table 1).

Table 1. Advantages and disadvantages of calculation models used by rating agencies

Advantages	Disadvantages
Allowing comparisons between countries	Are simplistic
Allowing comparisons in time	The ratings of different agencies are in general convergent- market consensus
Merging numerous indicators in one rating	Reduced predictive ability
Suitable for a linear evolution of risk	Subjectivity

Source: own manipulation

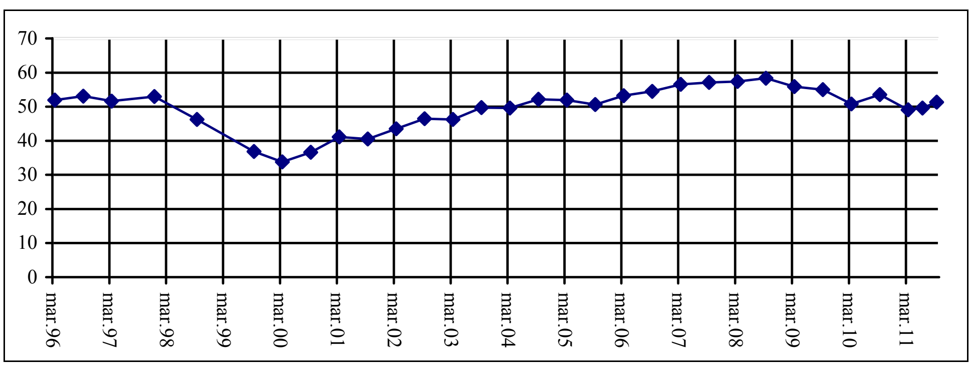
The main rating agencies are Standard and Poor's, Moody, Euromoney, Institutional Investor, International Country Risk Guide, Political Risk Services, Coface, Economist Intelligence Unit, Fitch.

Country risk notation has been realized historically and by using methodologies belonging to different specialty publications. Therefore, Euromoney utilized detailed set of indicators followed by pondering coefficients (Cp) specific for obtaining an agreed evaluation of country risk in percentage. The scale is differing from one agency to another, but it can be integrated according to Euromoney (Săvoiu, 2013).

The European synthetic method, used by Euromoney, is incorporating scores given by approx. 5000 experts six categories of indicators, three qualitative risk types: political risks (30%), economic performance (30%) and structural evaluation (10%), and other three quantitative indicators: external debt indicators (10%), credit ratings (10%) and the access to capital via banks or capital markets (10%):

- ✓ political risk (30%), defined as the sum between the risk of default or the risk of not honoring the external debt, which is coming from corruption, default risk of non-return capital, government stability, access / transparency information, institutional risk, regulated environment- the general indicator being obtained from the average values given by the risk analysts (from a scale of 0 (highest risk) to 10 (lowest risk));
- ✓ economic performance (30%), defined as an average of predictions for the current year and the next one, the score varying between 0 (very bad economic situation) and 10 (the strongest economy);
- ✓ structural evaluation (10%), derived from the evaluation of indicators referring to demography, heavy and light infrastructure, workforce market/ industrial relations;
- ✓ external debt indicators (10%), calculated based on the information published by World Bank "World Debt Tables" for the external debt service/ exports (A); current account balance/NDP (B); external debt/NDP (C), with the final score =C+(A*2)-(B*10);
- ✓ credit rankings (10%), determined as average of sovereign risk ratings established by Moody's, Standard & Poor's and Fhitch (10%);
- ✓ access to capital via banks or capital markets (10%), quantified by the accessibility rate of each country on the external markets.

It can be determined also the qualitative average country risk, by combining the political risk (43%), economical (43%) and structural (14%) from the expert analysts. The dynamic of the rating remains one of the main aspects at the level of a national economy.



Source: http://www.euromoneycountryrisk.com /Countries/Romania

Figure 1. Country rating dynamic for Romania- Euromoney 1996-2011 (absolute position in the ratings)

Euromoney method is considered as one of the simplest methods, from both conception point of view, but also from the application point of view and has a higher degree of objectivity comparing with other international agencies measuring the risk (their score is taken as average in one indicator). The extreme simplification of economic, politic and social characteristics of the analyzed countries does not intervene with the interest of investors to use also individual methods to measure the investment attractiveness (Romanian case in figure 1). The logic behind the rating is simple: as the score is bigger, more the favorable is the situation of the analyzed country for attracting FDI's.

The main consequence of a better country rating is represented by the accessibility increase of the economy on the international markets. The pertinence of rating agencies grades is giving them the quality of main source for offering the statistical information used by investors, local authorities and government.

At the end of 2013, Euromoney published the latest assessment for Romanian country risk, the results being illustrated in the bellow table (table 2).

Table 2. Country Risk Credit in Romania- Euromoney- December 2013

Average score	50.10
Economic assessment	51.20
Political assessment	50.07
Structural assessment	46.84
Access to capital	61.30
Credit ratings	41.70
Debt indicators	25.70

Source: http://www.euromoneycountryrisk.com /Countries/Romania

3. THE MODEL

As described in the first part of the paper, the country risk rating is playing a decisive role in the process of attracting foreign direct investments. After a period when Romania increased significantly considering the FDI flow (until 2008), the next period showed that we are extremely sensible as an economy integrated in the global one, which determined an alarming decrease of foreign investments (Burcea & Ungureanu, 2011).

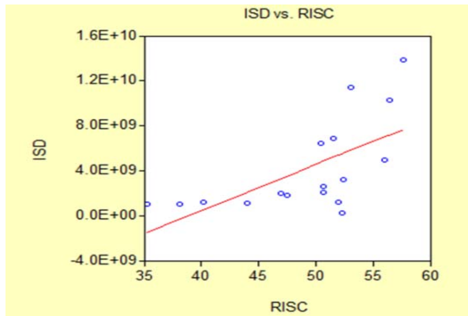
In order to quantify the impact of country risk impact on FDI flow, we will present 2 models: first one based on a simple regression (considering as main variables FDI and the risk rating given by Euromoney) and the second one on a multiple regression, adding the GDP as variable on top of the one's from the first model (Dragomir, 2014).

3.1. Simple regression model

The equation resulted from applying the simple regression has the form: $Yi = \alpha + \beta xi\ 2 + \varepsilon i$, where: yi – FDI (ISD) in Romania in the period 1996-2012; x2i – Country risk (RISC) rating given by Euromoney in the period 1996-2012.

a. Hypothesis 1: Model linearity

According to the figure 2, we can notice that this hypothesis is satisfied, the point distribution (x,y) can be represented as linear, the gradient being positive- therefore we have a direct correlation between the two variables, and the values are not dispersed.



Source: created by co-author Oana Dragomir

Figure 2. Model Linearity

b. Hypothesis 2: Absence of error measures in the observed values xi and yi

For validating the hypothesis we will create for each variable the interval for the 3 sigma's, therefore:

$$x \in (\bar{x} \pm 3\sigma_x) \text{ and } y \in (\bar{y} \pm 3\sigma_y)$$

Table 3. Descriptive statistic of the two variables

	RISC	ISD
Mean	49.14294	4.20E+09
Median	50.72000	2.03E+09
Maximum	57.66000	1.38E+10
Minimum	35.25000	2.63E+08
Std. Dev.	6.414890	4.16E+09
Skewness	-0.827244	1.155139
Kurtosis	2.745340	3.027987
Jarque-Bera	1.984879	3.781204
Probability	0.370671	0.150981
Sum	835.4300	7.13E+10
Sum Sq. Dev.	658.4130	2.77E+20
Observations	17	17

Source: created by co-author Oana Dragomir

From the descriptive statistic we can highlight the following values for the mean and for the standard deviation of the two analyzed variables.

Table 4. Mean and standard deviation values

Risk average 49.14294	**FDI average** 4196602352.94
Std. Dev. Risk 6.414890	**Std. Dev. FDI** 4161642364.57

Source: created by co-author Oana Dragomir

The obtained intervals are:

RISK: (29,89827;68,38761)
FDI: (-8648324740.77;16681529446.65)

As the values obtained for the endogenous variable FDI and for the exogenous variable RISK are under the created intervals, we can conclude that there are not measurement errors, the hypothesis being validated.

c. Hypothesis 3: Errors mean is equal to 0 (or tends to 0)

Table 5. Correlation matrix for the econometric model

Correlation Matrix			
	RISC	ISD	
RISC	1.000000	0.631214	
ISD	0.631214	1.000000	

Source: created by co-author Oana Dragomir

The resulted correlation matrix is highlighting the relation intensity between the two variables. The value of variation coefficient (0,631214) belongs to the interval (0,5 ; 0,75) and is showing an average statistical relation between RISK (endogenous variable) and FDI (endogenous variable).

Using the correlation matrix we validated the single regression model.

Table 6. α and β parameter estimation

Dependent Variable: ISD
Method: Least Squares
Date: 05/19/14 Time: 21:22
Sample: 1996 2012
Included observations: 17

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1.59E+10	6.44E+09	-2.474887	0.0257
RISC	4.09E+08	1.30E+08	3.151954	0.0066

R-squared	0.398431	Mean dependent var	4.20E+09
Adjusted R-squared	0.358327	S.D. dependent var	4.16E+09
S.E. of regression	3.33E+09	Akaike info criterion	46.80268
Sum squared resid	1.67E+20	Schwarz criterion	46.90071
Log likelihood	-395.8228	F-statistic	9.934816
Durbin-Watson stat	0.837482	Prob(F-statistic)	0.006580

Source: created by co-author Oana Dragomir

By simulating the equation having as variables FDI and RISK, we obtained the following values for α and β:

α= -15927362126.5

β= 409498576.961

The regression model becomes:

$\hat{y}i = -15927362126.5 + 409498576.961 x_i$

α→ shows the level of FDI when the RISK is 0. Generally speaking, α is representing the average effect on FDI (of all other factors that are not included in the model).

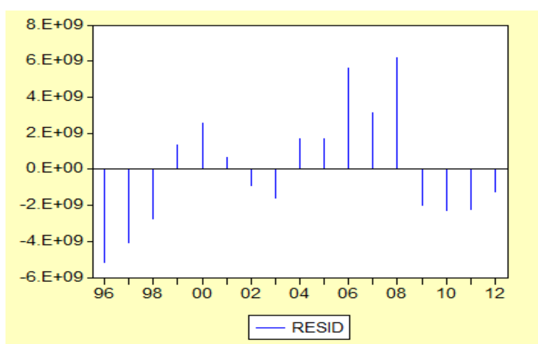
B→ represents the regression gradient and shows that in the case of RISK values equal with the ones obtained in the period 1996-2012, and then this indicator is increasing with one unit. FDI will increase in average with 409498576,961. β value is positive and reveals once again the positive relation between the two variables.

The following table (table 7) is showing the descriptive statistic for the residual value. We can notice that the Residual average tends to 0- therefore the hypothesis is verified. Also, considering the results showed by figure 3 we can notice that the residual values are both positive and negative, and by mutual cancelation the average will tend to 0.

Table 7. Residual descriptive statistic

	RESID
Mean	-7.29E-07
Median	-9.47E+08
Maximum	6.16E+09
Minimum	-5.24E+09
Std. Dev.	3.23E+09
Skewness	0.368109
Kurtosis	2.326837
Jarque-Bera	0.704909
Probability	0.702960
Sum	-6.91E-06
Sum Sq. Dev.	1.67E+20
Observations	17

Source: created by co-author Oana Dragomir



Source: created by co-author Oana Dragomir

Figure 3. Residual values

d. Hypothesis 4: Model homoscedasticity: we will verify the existence of constant variance of residual variable in relation to any other value of the exogenous variable – RISK.

Table 8. White test results

White Heteroskedasticity Test:

F-statistic	4.432669	Probability	0.032259
Obs*R-squared	6.591232	Probability	0.037045

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 05/19/14 Time: 21:29
Sample: 1996 2012
Included observations: 17

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.78E+20	1.27E+20	1.400859	0.1830
RISC	-8.45E+18	5.53E+18	-1.529196	0.1485
RISC^2	1.01E+17	5.92E+16	1.701009	0.1110

R-squared	0.387720	Mean dependent var	9.81E+18
Adjusted R-squared	0.300251	S.D. dependent var	1.16E+19
S.E. of regression	9.74E+18	Akaike info criterion	90.44208
Sum squared resid	1.33E+39	Schwarz criterion	90.58911
Log likelihood	-765.7576	F-statistic	4.432669
Durbin-Watson stat	2.463065	Prob(F-statistic)	0.032259

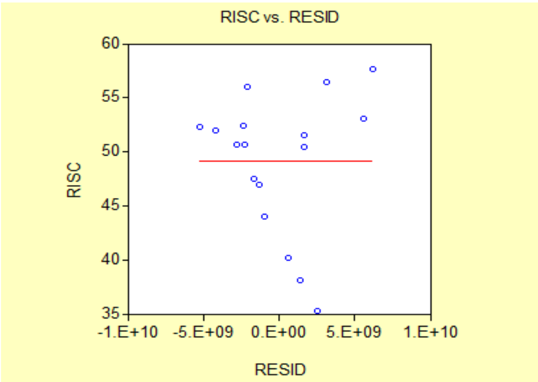
Source: created by co-author Oana Dragomir

P(*Obs*R-squared*) = 0.0370452132769 => tends to 0, therefore the model is homoscedastic.

e. Hypothesis 5: residual variable is independent in report with xi/non-correlated errors.

Durbin-Watson stat = 0.837482 belongs to the interval [0; d1] => we have a positive auto-correlation $\{d_1=1,13;d_2=1,38\}$.

f. Hypothesis 6: The residual variable is independent in relation with the exogenous variable.



Source: created by co-author Oana Dragomir

Figure 4. Linearity between the exogenous variable and the residual value

The above figure is highlighting the fact that between the residual value and the exogenous variable is no relation.

Also, the value of correlation coefficient tends to 0 (according to the bellow correlation matrix in table 9), therefore the homoscedasticity of the model is verified

Table 9. Correlation matrix for the exogenous variable vs the residual value

Correlation Matrix		
	RESID	RISC
RESID	1.000000	2.00E-15
RISC	2.00E-15	1.000000

Source: created by-coauthor Oana Dragomir

g. Hypothesis 7: the number of observations n is bigger than the number of estimated parameters in the model.

The hypothesis is verified by every single regression model where the condition is n>1.

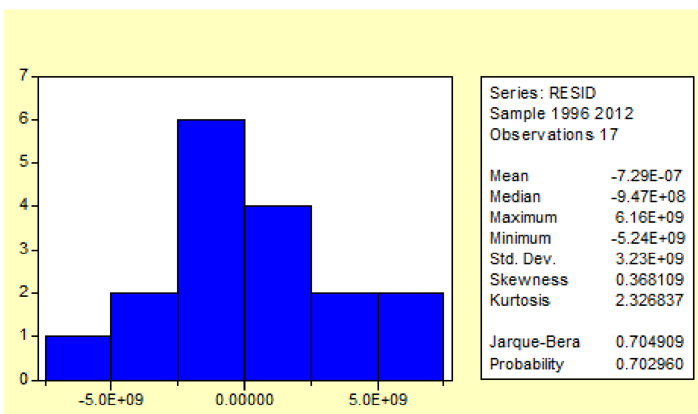
h. Hypothesis 8: variance of exogenous variable xi

It can be observed that the obtained values for xi are not identical.

i. Hypothesis 9: the residual variable is normally distributed.

As we can observe in figure 5, the statistical value of

Jarque Bera=0,704909 < Table value for $X_{,05;2}$=5,99 => the residual variable is normally distributed.



Source: created by co-author Oana Dragomir

Figure 5. Descriptive statistic for the residual value

The validity of regression model:

- If $F_{calc} \leq F_{\alpha,k,n-k-1}$, then we accept H0 and the model is not statistical significant;
- If $F_{calc} > F_{\alpha,k,n-k-1}$, then we reject H0, we accept H1, therefore the model is statistical significant (valid).

In the present case, we obtained F Significance equal with 0.006580< 0,05, resulting the fact that the model is statistical significant.

F_{calc}= 9.934816

$F_{critical}$= $\mathbf{F_{\alpha,k,n-k-1}}$ **=** $\mathbf{F_{0,05;1;15}}$ =4,54.

Therefore F_{calc}> $F_{critical}$ => model is valid, which can be translated as following: the relation between the two variables is significant.

Testing the statistical significance for the parameters of the model

a. Testing the statistical significance for the parameter β

Testing hypothesis:

H_0: $\beta = \beta_0 = 0$ (parameter *β* is not significant);

H_1: $\beta \neq 0$ (parameter *β* is significant).

The trusted interval α = 5% (0,05) □i $t_{crt} = t_{\alpha/2;17-2} = t_{0.025;15} = 2.131$;

$(t_b)_{calc.}$ = 3.151954> t_{crt} => w reject the null hypothesis and therefore *β* is statistical significant.

b. Testing the statistical significance for the parameter α

Testing hypothesis:

H_0: $\alpha = \alpha_0 = 0$ (parameter α is not significant);

H_1: $\alpha \neq 0$ (parameter α is significant).

The trusted interval α = 5% (0,05) □i $t_{crt} = t_{\alpha/2;17-2} = t_{0.025;15} = 2.131$;

$(t_a)_{calc.}$ = -2.474887< t_{crt} => we are accepting the null hypothesis, therefore α is not statistical significant.

3.2. The multiple regression model

GDP represents the most important macroeconomic indicator, largely used in all the studies regarding economic growth, investments and is also a basic indicator taken into consideration by investors. Therefore, we decided to include GDP in the present model.

j. **Hypothesis 10**. Multicolinearity of exogenous variables is missing

$y_t = \alpha + \beta * x_{1t} + \gamma * x_{2t} + \varepsilon_t$, where:

- y_i – Romanian FDIs (ISD) in the period 1996-2012;
- x_{1i} – Romanian GDP (PIB) in the period 1996-2012
- x_{2i} – Country risk rating given by Euromoney (RISC) in the period 1996-2012.

By manipulating the data using Eviews, we obtained the following results for the regression:

The multiple regression model will have the following representation:

$\hat{y} = -10822846402.2 + 0.02496084 * x_{i1} + 255270640.519 * x_{i2} + \varepsilon_i$

Durbin-Watson *stat* = 0.773746 belongs to the interval [0; d1] => we have a positive auto-correlation → $\{d_1=0,95; d_2=1,54\}$.

R^2 = 0.487679 which is showing the fact that 48,7679% is the percentage in which the FDI variation is explained by GDP and Risk given to Romania by Euromoney agency.

Table 10. Parameter estimation

Dependent Variable: ISD
Method: Least Squares
Date: 05/20/14 Time: 19:48
Sample: 1996 2012
Included observations: 17

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1.08E+10	6.96E+09	-1.554460	0.1424
PIB	0.024961	0.015983	1.561673	0.1407
RISC	2.55E+08	1.59E+08	1.609499	0.1298

R-squared	0.487679	Mean dependent var	4.20E+09
Adjusted R-squared	0.414490	S.D. dependent var	4.16E+09
S.E. of regression	3.18E+09	Akaike info criterion	46.75974
Sum squared resid	1.42E+20	Schwarz criterion	46.90678
Log likelihood	-394.4578	F-statistic	6.663299
Durbin-Watson stat	0.773746	Prob(F-statistic)	0.009264

Source: created by co-author Oana Dragomir

Validity of multiple regression model

- If $F_{calc} \leq F_{\alpha,k,n-k-1}$, then we accept H0 and the model is not statistical significant;
- If $F_{calc} > F_{\alpha,k,n-k-1}$, then we reject H0, we accept H1, therefore the model is statistical significant (valid).

In the current case, we obtained S*ignificance F* equal with 0.009264< 0,05 from which results the fact that the model is statistically significant.

F_{calc} = 6.663299

$F_{critical}$= $\mathbf{F_{\alpha,k,n-k-1}} = \mathbf{F_{0,05;2;12}}$ =3,88.

Therefore $F_{calc} > F_{critical}$ => the model is valid, which means that the relation between the three variables is significant.

4. CONCLUSIONS

Romania constantly evolved in the last two decades in the direction of an economy based on investments (with inherent oscillation- either ascendant, during the economic positive growth period, or descendant, during crisis or recession period).

As showed in the above econometric models, the FDI flow is in a good extent influenced by the country risk rating and the internal economic climate (GDP taken as macroeconomic variable). Therefore, if Romania wants to benefit from foreign capital, the policy makers need to improve the investment quality, the socio-economic and political environment, therefore creating a more stable and reliable climate for investors.

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