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## AN ORIGINAL ECONOMETRIC MODEL OF FDI IN ROMANIA

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### **Abstract**

The central theme of this paper is, as the title itself shows, the econometric modelling of Foreign Direct Investments (FDI), based on the concept Euromoney's country risk rating. This article contains three sections, the first part or the introduction is an approach of investment risk and, in particular, introduces a new element in modelling investment, namely country risk rating. Thus, a bridge is created towards the second section, which essentially deals with the econometric modelling of foreign direct investment (FDI) in Romania, after 1996, based on Euromoney's data (ECR). The originality of this paper is underlined by the presence of a final model which includes, as an exogenous variable, country risk rating in assessing the FDI share of GDP as an endogenous variable. A final remark comments, from an economic perspective, the results of the econometric modelling.

**Keywords:** foreign direct investment (FDI), economic growth, investment risk, country risk rating, econometric modelling (ECR).

### **The country risk rating as factorial variable of Foreign Direct Investments (FDI)**

*The motivation* of approaching such an important subject as foreign investment in general, and foreign direct investments, in particular, lies on the complexity of the research carried out through a careful, systemic and transdisciplinary analysis, and also by means of an econometric modelling of a phenomenon of exceptional scale, predicted at the beginning as possible in a double time universe (i.e., an increase in FDI to such a level as that achieved over the last two decades, was considered possible in at least four decades by

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world economy specialists, immediately after 1996).

Over the last two decades, Romania has constantly moved towards an investment-based economy (with inherent upward oscillations in the periods of economic boom, and downwards, in times of crisis or recession), analyzing the same share of GDP represented by gross capital formation (GCF), gross fixed capital formation (GFCF) and gross domestic savings (EIB), the national economy enjoying a much more heterogeneous evolution than the European and world levels, caused by the transition to a market economy (under the downward impact of savings and investment, specific to restructuring and privatization in the first decade, and upwards in the previous period, and the period immediately subsequent to EU accession).

In a detailed analysis, it can be conclusively noted that no investment theory is explanatorily single-factor and distinctively delimited from all the older or more recent economic theories of foreign direct investment, as they are all, to a smaller or larger extent, unexpected theoretical mixtures or original syntheses with multi-impact assessment.

The most complex example is the eclectic theory, or John Dunning's OLI model that focuses on the paradigm of eclecticism, i.e. an apparently new concept, which is in fact a mixture of previous concepts, a non-homogeneous system of thought, with no original ideas, still taking over the significant ideas in various theories or approaches, also synthesizing the microeconomic and the macroeconomic segments of the FDI theory, bringing together the international trade theory and the theory of investment localization, and combining factors and arguments from the theory of monopolistic advantage and internalisation theories.

Our option and at the same time preference, resulting from a comparative analysis and a fairly extensive theoretical confrontation, is marked by Real Business Cycle theory (RBC), which I think will remain one of the longest-lasting theories about macroeconomic evolution (favourable, as by growth, or unfavourable, through recession), and has been able to explain thoroughly and adequately both the first global recession of major impact, which began in 1929, and the last one of the same type, whose inception was recorded in 2008, perhaps longest time in which an economic theory survived by its arguments and originality. The model of the real business cycle, chained causally, which is representative of the Austrian school of economics, is conducted with the involvement of investment processes that: begin by, first, lowering interest rates, which tend to stimulate bank lending, and boosting investment followed by an increase in money supply, through the creation of money in a reserve banking system (saving exceeds investment). Then, the excessive growth of money supply leads to a monetary boom that is unsustainable, and artificially

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stimulates lending, thus virtually reducing real investment opportunities (profitable investment stagnates in relation to the dynamics of interest rates), -only to conduce, ultimately, to the unsustainable monetary boom causing an erroneous allocation of capital resources in areas that would not attract investment if the money supply remained stable (profitable investment is reduced).

An important consequence of the evolution of FDI, focusing on Romania's specific dynamics, can be derived from the theory of FDI of Czech economists Josef Brada and Vladimir Tomsik, with respect to their model of FDI financial life cycle, actually a stylized relationship between profits, dividends and reinvested earnings, a model containing three phases: emergence, growth and profit repatriation. In general theoretical lines, which are valid for our country and for all Central and Eastern European countries, it has been evaluated that the second phase begins 10-12 years after the beginning or entry of the main FDI wave into the host country. If the second phase starts earlier, the explanation lies in the unusually large profits made by foreign direct investment in that economy. In a causal manner, this seems to be the case in Romania, still in the second stage of the life cycle of investment development, considering its integration into the European Union (the expectation of high profits can be detected as a major cause), but unfortunately placed a deep downward phase.

Sadly, there is also an additional impediment, namely that the massive penetration of foreign capital in the form of FDI, between 2004 and 2008, was not directed to a greater extent towards the activities that incorporate a high content of local resources, especially technology, qualification and knowledge, which would have favoured an improvement in the quality of the existing production factors in the national economy, specializing them, while the prolonged recession after 2008 severely reduced that process. Romania will come too soon into the third stage, which raises the question of a new and substantial deficit, in addition to the already high deficit of trade balance.

The fundamental and original assumption of the paper is connected to country risk rating as a signal of the oscillations of FDI dynamics. The major investor behaviour holds true for all investments, slightly more nuanced for FDI, defined by a corollary based on the assertion that "fear is stronger than greed".

This psychological approach explains why, in practice, FDI collapse faster than they expand or grow, the credible signal of expected variability of FDI being established, over the last two decades, by country risk rating set by specialized agencies, for the direct investor and direct investment companies.

Once this truth applicable to the Romanian economy, especially after

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1996 when the FDI level reached the order of the billions of dollars, i.e. the hypothesis being also validated and tested in the national economic cybernetic system, FDI can be shaped, in a profoundly novel, unique manner, with final facets of forecasting and simulation of great practical utility. What we tried and managed to do in the applied section was to correlate in a multiplicative (eclectic) model the score and dynamics of country risk score with the FDI as an absolute, or relative level, or simply with FDI as a share of the GDP.

CRA's have credibility in the market and capture the impact of relevant macroeconomic variables adequately, generating a distribution of FDI in relation to the recognized competitiveness of savings, seeking more profitable investment placing. Eight major macroeconomic variables can be distinguished, which are correlated with FDI and hence country risk rating, to which their contribution is significant: income per capita, GDP growth, inflation, fiscal balance, external balance, external debt, economic development and the history of payment failure. Country risk rating is highly correlated in statistical terms with per capita income growth, inflation, external debt, economic development and the history of payment failure (generating changes in the tax regime), and the ratings have correctly anticipated the impact of these variables over time.

#### **The method, data bases and econometric model of FDI based on Euromoney's country risk rating (ECR)**

As for the data used by the statistical and mathematical apparatus, there is no single data base containing representative macroeconomic indicators and country risk assessments simultaneously, which could provide the necessary comparability needed for modelling, given the unitary character of its methodology, between the various existing databases (NSI, Eurostat, CIA, World Bank, etc.), the World Bank data (<http://data.worldbank.org/>) were chosen, based on the fact that it has the largest number of indicators that meet the requirements of comparability and homogeneous treatment, and also for the data provided by the databases of the Euromoney Agency (<http://www.euromoneycountryrisk.com/>).

The identification, the specification and the parameterization of a number of econometric models of FDI in Romania are done in an eclectic yet harmonized manner. An interesting and novel, original class of econometric models of FDI is based on country risk rating.

The originality of the paper's econometric approach is lent by three major aspects. Firstly, it is the genuineness of the statistical methodological approach meant to ensure comparability. Secondly, I believe that the study

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also includes an original working method, in that competitive models are selected, which are finally subjected to the detailed validation tests. Based on the theoretical grounding of FDI economic theories, while taking advantage of statistical and mathematical criteria of the values of the correlation and determination ratio, derived from the classical econometric matrices, while also facing the reality of economic relationship, the new method of presentation and validation, through an inter-model competition, can become, I think, a further step in the econometric modelling of complex phenomena in the theory of general econometric modelling. This second argument of my original contribution is prefaced, and further substantiated, through the conclusions to the competitive FDI models, no less than the less, or least competitive ones, in Romania after 1990. Thirdly, integrating, for the first time, the country risk rating (score) into the econometric model of FDI, as an exogenous variable, was done as a pioneering act, in Romania, through the present study, which is also valid for the scope of the European Union, which is in fact the essence of the originality of the thesis compared to many other similar treatments of the FDI phenomenon in the domestic and international literature.

From the three models based on country risk rating, we detailed in this paper only the one related to ECR (Euromoney's country risk):

$$\text{FDI net inflows (\% of GDP)}_i = \alpha + \beta \times \text{World gross savings (\% of World GDP)}_i + \gamma \times \text{ECR}_i + \varepsilon_i$$

and after the model is parametrized using the method of least squares:

$$\text{FDI net inflows (\% of GDP)}_i = -32,82166 + 1,299426 \times \text{World gross savings (\% of World GDP)}_i + 0,207089 \times \text{ECR}_i + \varepsilon_i$$

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### The econometric model of FDI net inflows in Romania

Dependent Variable: SER01- Method: Least Squares Sample: 1998 2010				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-32.82166	7.386695	-4.443349	0.0012
World GDPi	1.299426	0.309634	4.196651	0.0018
ECR i	0.207089	0.052565	3.939656	0.0028
R-squared	0.743404	Mean dependent var		4.715385
Adjusted R-squared	0.692085	S.D. dependent var		2.460300
S.E. of regression	1.365223	Akaike info criterion		3.659687
Sum squared resid	18.63834	Schwarz criterion		3.790060
Log likelihood	-20.78797	F-statistic		14.48589
Durbin-Watson stat	2.263559	Prob(F-statistic)		0.001112

*Soft utilizat: EViews*

From testing heteroscedasticity to testing the normality of the residual series generated by the proposed models, validation confirmed their qualities. Many restrictions have been exceeded both in the classic manner, and originally, with reference to those related to securing comparability, selecting a single, more consistent database, the option for two types of data series caused by the different order of magnitude of FDI values in Romania over the last two decades, modelling in distinct series of indicators, either absolute, or value-related, relative or structural, the trend towards selecting strictly ranked factors and the trend towards selecting different factors, the compromise between the number of factors and the potentiality of their multi-collinearity over the model, the fast-paced globalization of various categories of indicators belonging to different areas (be they national, Union, or of the European Community, worldwide), but also of national trends sharply uneven in relation to global trends, the factor diversity affecting the performance of the determination model, etc.

### Conclusions

The diversity of modelling such a complex economic phenomenon as the one of investment clearly shows a natural finding concerning the viability of the theme, the fact that, by having recourse to the analysis of FDI life cycle, the specific level fluctuations, the structural changes, and especially in the context of the third stage of life where repatriation of FDI profits will not be compensated, unfortunately the few foreign investments made by the national economy in other economic areas, which means a new major deficit of billions of Euros, which Romania will face, along with the overall trade

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balance. Identifying in practice which are the main factors that can contribute to the location of a greater inflow of FDI in Romania, modelling the FDI developments, simulating policies to attract FDI by means of different models, represent a set of fast, major impact solutions in sustainably developing the national economy.

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