

## **ANALYSIS OF FDI LOCALIZATION ON THE ROMANIAN REGIONS**

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### **Abstract:**

The choice of location is becoming increasingly important, requiring a better understanding of the internationalization process and of the factors influencing the spatial distribution of FDI.

There have been numerous empirical studies that have focused on the location choices of FDI in developed countries. Since early-2000s these studies have also started to concentrate on the transition economies within the CEE region. Despite the growing interest in the subject we shall propose to identifying the main determinants of FDI localization on the Romanian counties using the data provided by the National Trade Register Office of Romania for the period 2005-2010 and National Institute of Statistics.

### **1. ADEMINISTRATIVE DIVISIONS IN ROMANIA**

After 1990, Romania shifted its spatial policy from a central-based policy to a regional-based policy, in compliance with EU-standards. According to four criteria (number of inhabitants, surface, cultural identity and functional-spatial relations;) Romania was divided 1998 into eight Development Regions. The eight regions serve as NUTS-II units and as a framework for development policies while the counties serve as NUTS-III units. The NUTS-II units are: **North-East development region** (Bacau County, Botosani County, Iasi County, Neamt County, Suceava County, Vaslui County), **South-East development region** (Braila County, Buzau County, Constanta County, Galati County, Tulcea County, Vrancea County), **South development region** (Arges County, Calarasi County, Dambovita County, Giurgiu County, Ialomita County, Prahova County, Teleorman County), **South-West development region** (Dolj County, Gorj County, Mehedinti County, Olt County, Valcea County), **West development region** (Arad County, Caras Severin County, Hunedoara County, Timis County), **North-West development region** (Bihor County, Bistrita County, Cluj County, Maramures County, Satu Mare County, Salaj County), **Center development region** (Alba County, Brasov County, Covasna County, Harghita County, Mures County, Sibiu County), **Bucharest-Ilfov development region** (Ilfov County, Bucharest).

### **2. LITERATURE REVIEW: FDI REGIONAL DETERMINANTS**

Studies on the locational choices of FDI can be classified into two types in literature. First type explains the locational choices with some traditional locational factors like market potential, labour costs, economic growth, and government policies. Second type highlights a range of environmental variables that act as a function of political, economic, legal and infrastructural factors of a host country.

At this purpose, we consider captures three dimensions of each region: the market size, agglomeration economies, and infrastructure.

- a) **Market size** can be analyzed based on the two types of variables: demand side variables and supply side variables.

- a.1) **Demand side variables.**

According to Chakrabarti (2003), an expansion in the market size of a location leads to an increase in the amount of direct investment in that location through an increased demand. Foreign investors are likely to be attracted by large markets allowing them to internalize profits from sales within the host countries. According to Woodward (1992), Japanese-affiliated manufacturing investments in the USA during the 1980s to conclude that investors prefer states with strong markets and low unionization rates. The effect of specific market and regional growth characteristics are also taken into consideration in the spatial analysis of FDI in the United States, by Bagchi-sen and Wheeler's study. The population is a measure of the market size and it indicates the economics dynamics of a location and states market growth potential (Bagchi-sen and Wheeler, 1989).

The other important determinant of FDI which defines local market size is GDP, market demand being usually proxied by total or per capita regional GDP (Chung and Alcacer, 2002, Head et al., 1999).

**a.2) Supply side variables.** Two variables reflect the cost of production factors in each region: per capita wages and percent of population employed in manufacturing. Glickman and Woodward (1988) found that there was a negative relation between the interstate distribution of the value of foreign manufacturing investment and the index of state labor costs. Ondrich and Wasylenko (1993) found no evidence that wages affected the foreign new plant location.

The level of education of the labour force – measured by the number of third level students over total population – has been introduced in order to control for labour productivity. Cantwell (1989) states that knowledge-seeking investments vary across locations because they depend on location specific factors, such as the number of scientists and educated people in the area, previously established innovations, R&D intensity, the education system, and good linkages between educational institutions and firms. As a result, firms may supplement their existing technologies by expanding internationally to access new knowledge. This expansion may suggest two types of knowledge-seeking behavior between firms originating from leading versus lagging technical centers (Cantwell and Janne, 1999). Firms from lagging technical locations need to catch up and locate their research centers abroad in order to improve their existing technology. However, while firms from leading locations do not need to catch up, they may also locate their research centers abroad to source more diverse knowledge, since "... the acquisition of new skills, and the generation of new technological capacity, partially embodied in new plant and equipment, must be a goal of every firm"<sup>1</sup>. Due to the fact that knowledge is partially tacit and its transfer needs frequent interactions, knowledge-seeking investment requires physical proximity (Kogut and Zander, 1992). Moreover, efforts to search for knowledge-seeking investment are not carried out in isolation, but are strongly supported by various external organizations such as, for example, public research centers, universities or industry associations (Cantwell and Piscitello, 2005). The educational level of a country's citizens, alongside the existence of universities, research centers, science bases and other institutions that create knowledge in a region, has become increasingly important for the internationalization process, not only at the national level but also at the regional level (Cantwell and Iammarino, 2001, 2005; Chung and Alcácer, 2002). Kuemmerle (1999) shows empirically that firms in technology-intensive industries by establishing R&D facilities abroad can expand their technological capabilities. Florida (1997) finds that accessing new indigenous technology is more important than customizing existing technology for new markets.

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<sup>1</sup> Cantwell, J.A. (1989) *Technological Innovations and Multinational Corporations*, London: Basil Blackwell., p.9.

Bartlett and Ghoshal (1999) show that as firms establish their facilities abroad and allocate heterogeneous products to them, R&D sites in close proximity to factories are needed. This is due to the fact that these sites support the transfer of knowledge, which is an attractive factor for the location of multinational companies (Cantwell and Piscitello, 2002). In addition, specific regions within nations might be particularly attractive locations for knowledge-seeking investment (Jensen, 2004).

b) **Agglomeration variables.** The idea that firms may benefit from locating close to other firms is not new in economic theory. Such benefits may come from Marshallian technological externalities as well as pecuniary externalities, as recently stressed by Krugman (1991) and Fujita, Krugman and Venables (2000) among many other scholars belonging to the New Economic geography.. There is systematic evidence suggesting that multinationals are attracted to clusters of economic activities in their own and in closely related industries and activities (Glickman and Woodward, 1988; Head and Ries, 1996; The total number of industrial enterprises in a county, is expected to significantly attract FDI since the existence of industrial clusters signals a set of favourable conditions for foreign investors such as the presence of local suppliers, specialized labour and infrastructure (He, 2002). According to Coughlin, Terza and Arromdee (1991), the density of manufacturing activity was the important one of factors in location decisions of foreign firms in the US during 1981-1983. Head, Ries and Swenson (1995), examined the location choice of 751 Japanese FDI and observed strong agglomeration effects at the industry level. Agglomeration economies may work between domestic and foreign firms as well as among multinationals only. Foreign firms have imperfect information of foreign potential sites. Therefore, they rely on the presence of other multinational firms to uncover the expected profitability of each location (Head et al., 1999). Moreover, MNEs may prefer to interact with other foreign firms rather than with domestic firms if the perceived quality of the locally produced intermediates does not meet the needs of the firm.

The other variable related to agglomeration economies is population density. Population density represents urbanization economies. Both number of foreign-funded enterprises and population density are expected to have a positive effect on FDI. Economists and geographers have pointed out that the role of agglomeration economies in industrial activities is very significant. The locational attractiveness to foreign investments is likely to improve through agglomeration effects related to the infrastructure quality, the availability of specialized service suppliers and of skilled labour, location-related reputation effects and the development of industrial clusters (Porter, 1990; Wheeler and Mody, 1992; Dunning 1998).

### **c) Infrastructure**

The other important determinant of FDI is infrastructure. There is a positive relationship between infrastructure and inward FDI. Empirical studies support the importance of infrastructure in FDI location decisions is provided by Mariotti and Piscitello (1995) and He (2002). A location with good infrastructure is more attractive than the others (Wei and others, 1999; He, 2002).

## **3. VARIABLES SELECTION**

In this paper three criteria are used for classifying the Romanian counties and regions considering the potential to attract the foreign direct investments. These criteria are: the market size, the agglomeration economies, and the infrastructure.

The variables selected for measure of the three criteria are presented in the Table number 1.

Table 1: Description of variables

Criteria	Variable	Measurement	Source of data	Expected Sign
<b>Market size</b>				
Demand side variables	POP	Population in province (county)	<i>National Institute of Statistics</i>	+
	GDPG	GDP growth in province (2000-2005)	<i>National Institute of Statistics</i>	+
Supply side variables	WAG	Wages per capita	<i>National Institute of Statistics</i>	-
	NUMRES	Number of scientists	<i>National Institute of Statistics</i>	+
	RDEXP	R&D expenditure	<i>National Institute of Statistics</i>	+
<b>Agglomeration</b>	DENSPOP	Population density (person/km <sup>2</sup> )	<i>National Institute of Statistics</i>	+
	NUMFIRM	Number of the industrial enterprises in province	<i>National Trade Register Office of Romania</i>	+
<b>Infrastructure</b>	ROAD	Hard surface public roads	<i>National Institute of Statistics</i>	+
	RAILINE	Railway lines	<i>National Institute of Statistics</i>	+
	TEL	Telephone line (per1000 population)	<i>National Institute of Statistics</i>	+

#### 4. MODEL SPECIFICATION

The foreign direct investment in a province is assumed to be a function of the number of variables, which are likely to influence its location choices. The location model is specified as:

$$FDI = \exp (a + bPOP + c GDPG + dWAG + eNUMRES + fRDEXP + g DENSPOP + hNUMFIRM + kROAD + lRAILINE + mTEL)$$

where FDI represents the cumulative realized of foreign direct investment in a province in the period 2005-2009. FDI is a function of variables associated with market size (POP,

GDPG, WAG, NUMRES, RDEXP), agglomeration economies (DENSPOP, NUMFIRM) and infrastructure (ROAD, RAILINE, TEL) for each provinces (counties).

The location models are specified as:

$$Y_i = \alpha + \beta_i X_i + \varepsilon \quad i = 1, 2, \dots, 41$$

where;  $Y_i$  is the dependent variable, which is the cumulative realized FDI in a province in the 2005-2009 period;

$X_i$  is a explanatory variables including: POP, GDPG, WAG, NUMRES, RDEXP, DENSPOP, NUMFIRM, ROAD, RAILINE, TEL;

$\beta_i$  are the regression coefficients;

$\varepsilon$  is error term

A log-linear functional form is adopted to transform a likely nonlinear relationship between FDI and the independent variables into a linear one. It also decreases the outliers, non-normality and heteroscedasticity. Models take the following forms:

$$\ln FDI_i = \beta_1 + \beta_2 \ln POP + \beta_3 \ln GDPG + \beta_4 \ln WAG + \beta_5 \ln NUMRES + \beta_6 \ln RDEXP + \beta_7 \ln DENSPOP + \beta_8 \ln NUMFIRM + \beta_9 \ln ROAD + \beta_{10} \ln RAILINE + \beta_{11} \ln TEL + \varepsilon$$

## 5. EMPIRICAL RESULTS

The location model is estimated using ordinary least squares regression. The estimated equation is shown below:

$$\ln FDI_i = -9,60 + 1,37 \ln POP + 1,31 \ln GDPG - 0,97 \ln WAG + 0,37 \ln NUMRES + 0,23 \ln RDEXP + 1,06 \ln DENSPOP + 0,66 \ln NUMFIRM + 0,35 \ln ROAD + 0,14 \ln RAILINE + 0,30 \ln TEL + \varepsilon$$

The model performs very well with R squares with 0.772 (F= 10,179, %99 confidence level). According to result of regression analysis,  $\ln POP$ ,  $\ln WAG$  and  $\ln RAILINE$  are not significant. As expected, the coefficients for the population, GDP growth, the number of the industrial enterprises, the hard surface public roads and the telephone lines in province are positive. Model is consistent with expectations. The coefficients of five explanation variables are correctly signed and statistically significant at the % 1, %5 ,10% and 20%.

The positive relationship between the hard surface of the public roads, and the telephone lines and the cumulative realized FDI in a province in Romania in the period 2005-2009 supports the hypothesis that FDI favors cities better infrastructure.

According to model, all coefficients on the variables of agglomeration economies (DENSPOP and NUMFIRM) are positive and significant at 10% and 1% level indicating that agglomeration economies attract foreign direct investment.

The coefficients on local market measures are significant at the 5% and 10% and 20% level. GDP growth in a province is important to attract foreign investors. The number of scientist and the R&D expenditure are statistically significant at the 10% and 20%. The positive relationship between the number of scientist and the R&D expenditure and the cumulative realized FDI in a province in Romania in the period 2005-2009 supports the hypothesis that FDI favors cities with higher levels of knowledge. The coefficient on wages per capita is not statistically significant. According to the results of regression, there is not relationship between wages per capita and the cumulative realized FDI in a province in

Romania during the period 2005-2009. The statistical results indicate that foreign investor doesn't prefer the region with the lower levels of the wages per capita in this period in Romania.

Evidence from model shows that a region with higher GDP growth, higher population density, faster advances in agglomeration, quicker improvement in infrastructure, attract relatively more cumulative realized FDI in a province.

The White test does not indicate the existence of heteroscedasticity in the model.

To detect the autocorrelation in the residuals from regression, we have used the Breusch–Godfrey serial correlation LM test. The residuals are not autocorrelated because the test probability is 28.9% higher than 5% critical value.

## **6. CONCLUSION**

The study presents empirical evidence to support the hypothesis that location decisions of foreign investors are generally determined by agglomeration economies as population density and number of the industrial enterprises in the provinces, infrastructure and local market growth.

The analysis of the investment's location within Romania using the three criteria shows a very disparate distribution of FDI in the eight development regions. At the regions level, there are disparities determined by heterogeneous development areas, due to small, mono-industrial towns, strongly affected by the restructuring, reduced economical diversification of some big cities and due to the incapacity of some urban centers of becoming development vectors for adjacent areas. The under-developed regions are those dependant on agriculture, with great rural population where trans-border transport, is little developed, comparing to those in the opposed corner, whose dependence on the primary sector is reduced.

Such an approach in location analysis can aid formulation of specific growth strategies by policy makers as they plan to attract FDI to particular locations. According to this paper, policy makers in Romania should improve the business services and create investment opportunities for foreign investors especially in provinces that have the market size and growth potential. These lead to make provinces more attractive. To attract some investments particular locations in Romania, infrastructure has been only given the priority as general tendency, especially communication infrastructure. It is clear that this tendency is not sufficient solely to attract FDI to particular locations.

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