

UNIVERSITY OF ECONOMICS, PRAGUE
FACUTLY OF INTERNATIONAL RELATIONS

FDI to EU-15 and NMS
Comparative Analysis of Inflow Determinants

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M.A. Economics of International Trade and European Integration 2009/2010
October 2010

Abstract

A numerous amount of studies and economic practice have proved the strong correlation between GDP growth and FDI flows. The idea of the positive impact of the FDI inflows on the economic development supports the necessity of contemplation over investment determinants. The main objective of this paper is the detection of the FDI determinants in the EU countries with key presumption of differences between groupings of old and new member states. The econometrical approach of gravity based modeling was chosen as the most appropriate methodology to analyze the panel data set depicting FDI flows between sub groupings and extra-EU investment partners. The random effect model used here has proved the rationale of the diverse ground for FDI flows in the surveyed groupings, stressing the need for policymakers' attention and EU investment policy harmonization towards market equalization and competitiveness improvement of the whole region.

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INTRODUCTION

FDI transition may facilitate growth, promote technical innovation and accelerate enterprise restructuring in addition to providing capital account relief (EBRD). Some authors (e.g. Alguacil, Cuadros, 2008) are arguing about spillover effects of FDI, mainly from the technological point of view: spillovers depend on human capital development level and institutional capabilities. The extent to which FDI is expected to be growth enhancing seems to be dependent on the local conditions of the recipient countries. The level of the knowledge oriented workforce in EU15 member states is undoubtedly high, the case of new member states (NMS) is improving significantly by each year.

The overwhelming share of inward and outward FDI in the EU is operated by EU15 states, however NMS could be as well considered as the economies with big potential. A number of studies have focused on the prediction of growth in investment inflow into accession countries after the EU enlargement (Gorg, Greenaway, 2002). The other, more recent, studies (Borrmann, Jungnickel and Keller, 2005 or Bos and Laar, 2005) on the other hand are stating that after-accession announcement investment growth has reached its peak and FDI inflow is not expected to increase significantly (that is especially the case of Central European countries). However what are the determinants of the FDI inflow in those EU regions? Provided the determinants are the same, then why are EU15 countries absorbing a giant part of foreign capital not leaving a potential investment increase for NMS? Or the determinants are insofar that different therefore not letting NMS to reach such FDI volumes.

The main objective of this study is to detect the determinants of the direct investment in EU and identify their possible dissimilarities between old and new member states. In contrast to existing studies that examined investment patterns in EU15 and NMS separately, EU15 potential or NMS only from the view point of accession catch up process, this paper explores both country groupings. The panel data are regressed in a gravity approach model using the econometric methodology of fixed and random effects. A statistical dataset on annual FDI flows between 27 EU member states and 9 main extra-EU investing partners obtained from Eurostat and World Bank databases is the main surveyed source. The set of explanatory variables consist of three categories depicting size of the market, role of the distance and countries endowments.

One of the most crucial aspects of NMS are significantly lower labor costs, nevertheless production costs are increasing considerably fast and there is need for

corresponding policy changes, requiring modernisation of both general and specific investment promotion techniques, as well as efficient adjustment to Union rules.

The paper is structured as follows: firstly the short empirical overview and the list of existing literature on investment conditions in EU are provided. Secondly, theoretical premises for the main survey are defined, consequently the econometric fundamentals of the model framework are discussed. Ultimately, the actual research results are stated with compendious critics and evaluation of the survey findings.

1. EMPIRICAL OVERVIEW

The European population is enjoying very different income levels, the more to the East the lower is the income. General causality leads high income countries to specialize in the knowledge intensive production, while medium and lower income economies are the source of labor intensive production. The majority of EU15 countries are in the high income category operating with higher value added, while NMS are economies with significantly lower wages. There is a mutual relationship between GDP growth rates and FDI, the impact of FDI on GDP is proved to be substantially stronger than the other way around (Kalaman and Kalotay, 2004). Such dependence provides a challenge for the NMS in the catch up phase, however there is still a list of steps policymakers should adopt to improve the business environment to fully participate in inward investment.

The level of the integration of the EU area is denoted by UNCTAD (Kalotay, 2007) as a deep integration, in contrast to the shallow (trade based) integration, and should be a major direct attraction of the EU based transnational corporations and a major indirect attraction of external investors. In principle, new EU members could be attractive for FDI as they represent the unique combination of close access to a large single market (with a high purchasing power of consumers) and an efficient location from the cost viewpoint. Nevertheless, those favorable circumstances do not automatically represent high FDI inflow; the country specific characteristics could always influence real capital flow values and its spillover potential. The theory of trade creation affirms that economic integration provides efficient distribution of economic activities among the members. While the total volume of trade remains unchanged, but a more efficient location replaces a less efficient one, it is considered as successful trade creation (Viner, 1950). The same logic could be applied to FDI flows in case of EU integration – NMS are lower cost production countries and while being brought into the EU

production process the location of creation activities could be redirected from less cost-competitive older members, providing them the opportunity to use high-knowledge human capital in more sophisticated spheres. Such a scenario could lead into a win-win situation as each of the participants will increase output thanks to a better specialization on their comparative advantages, by that increases overall welfare. However the 12 new members have so far neither diverted significant FDI away from the 15 older members of the Union, nor improved their FDI position significantly relative to the older members (Kalotay, 2007). On the other hand, lower labor costs of NMS should be an attractive determinant, but not the only factor promoting region as this advantage is relative – costs are lower in comparison to the EU15, but absolutely already much higher than in CIS countries. Therefore, it is highly incompetent to base the long-term economic strategy only on the cost advantage. Nevertheless the above mentioned notion is not fully integrated into the policies of the EU members; the level of taxation could serve as a good example. The EU member countries enjoy a high degree of autonomy in the setting of their corporate rates according to their development priorities (Tupy, 2003). For example, those who are willing to attain high GDP growth rates as a spillover of the inward FDI, may set the tax rate relatively low, as well for the reason of stimulating further reinvestment of earnings into production. On the other hand, countries with higher per capita GDP and lower growth rates (however with large social safety nets) may maximize fiscal revenues by setting their rates relatively high. Another example that follows is the case of social dumping that could be initiated in EU15 as a protection from the price competitive wages in NMS. However it has been proven that the effect of any wage differential is stronger on unskilled labor, but limited on skilled labor (Busse, 2002) and any forms of social wages have only negligible effect on location choices, it is only specific issues such as strike intensity that affect the flow of FDI significantly (Alderson, 2004).

The May 2004 enlargement offered a certain degree of stability and security for the investors. It is possible to claim that NMS went through liberalization of trade and capital flows, already after the Europe Agreements signing, which led to a significant increase in FDI flows. A first wave of investment was due to cross-border mergers and acquisitions, especially driven by privatization processes. The influx of business services changed FDI patterns in the middle income countries (Czech Republic, Poland, Hungary) and initiated restructuring towards higher-value added activities (cost competition from Asia supported redirection of activities). Availability of flexible and skilled labor force and competitive production costs created the unique combination for business services allocation, in addition to its existing manufacturing facilities (e.g. Alcoa GE, DHL, Phillips, Siemens, Telenor, Alcatel). However

as Kalaman and Kalotay (2004) noticed, the knowledge intensive corporate sector can be established with relatively small capital investment. Nevertheless the existence of a favorable business environment with the predisposition of skilled and low cost labor is only beneficial for future investment. Such a development in NMS determined West European public opinion to adopt almost the commonplace assertion that the CEE are attracting away FDI from the current EU15 members. Researchers in that field are providing contradictive findings, e.g. Alguacil and Cuadros (2008) proved a different nature of the capital inflows, stating that in EU15 FDI are motivated by diversification objectives rather than by investment needs. Besides, the division of labor between the two sub regions still play a significant role and competition for projects from the same investment category seems to be distant. The predominating phenomena is reallocation of the activities from EU15 to NMS and replacing them by more skilled ones. Moreover, NMS receive only a small fraction of EU15 FDI. Therefore instead of internal competition there is a challenge to harmonize FDI promotion policies among EU countries and prevent a decrease in attractiveness of the whole region. NMS should make changes in non-conforming FDI instruments, such as long tax holidays, to make incentives accordant to the EU norms. Acting as a consistent entity is a solution to the decreasing interest of investors to enter the EU, and opting for Asian regions instead. The FDI diversion from NMS to other regions could as well negatively influence the stability of the region.

2. THEORETICAL PREMISES

Detailed analysis of the FDI (Foreign Direct Investment) phenomenon appeared after and was influenced by an enormously dynamic growth of international capital flows. The profound theoretical concept originated during the 1960s and 70s, however the topic undoubtedly remains as controversial as ever. The basic questions of the FDI theories are ultimate (who – typology of the investor, what – classification of the FDI, why – determinants of the FDI, where – localization of the FDI, when – timing of the investment and how – the mode of the entry), nevertheless the answers are not that trivial and certainly differentiate among regions, industries and economies. Therefore, ambiguous outcomes of empirical research provide a wide range of theoretical conclusions both on micro and macro level. For the need of the present dissertation we will leave out the exploring of the theoretical field explaining investment in developing and emerging markets. Firstly, the macro and micro view on

theories and FDI classification will be provided, secondly the author will focus on the eclectic framework and knowledge-capital model and then FDI determinants and impacts will be discussed.

2.1 Macro and micro level theories

Two of the oldest hypotheses explaining global investment flows are the capital market theory explaining FDI through an interest rate determinant and theories based on exchange rates. Calvet (1981) presents these above mentioned theories in the common set of market disequilibrium hypotheses:

- foreign exchange disequilibrium – production of tradable goods in the undervalued markets with overvalued money, once exchange rate reaches the equilibrium, FDI flow should stop,
- capital market disequilibrium – different rates of profitability initiate capital flows (relevant for portfolio capital), as well as a self-destructive process by interest rates equalization,
- labor costs disequilibrium – a transitory effect of FDI, equalization follows the following intuition: higher demand in low labor cost countries hikes up the wages.

He also defines generally accepted FDI determinants coming from government imposed distortions – conditions set to foster foreign investment in various forms of tariff and non-tariff barriers, tax and wage policies, price and profit regulations or antitrust laws.

On the other hand we can observe the interconnection of trade and investment theories in gravity approaches (contrary to the disequilibrium approach) – the closer two countries are in terms of geographical, economical or cultural factors, the higher is the probability of FDI (or trade) flows between them. Economic geography explores the tendency of investment clusters creation on the basis of technological innovations.

Fundamental ideas about international operations of firms on micro level were introduced by Hymer (1976) and later Kindleberger (1969), who defined firm's specific advantages (economies of scale, access to raw material, intangible assets protection, reduction of transition costs by internalization etc.). The crucial backbone for those concepts is the market imperfection paradigm (imperfections on goods and factor markets, economies of scale and government imposed obstacles), questioning FDI existence in the neoclassical pure competition model, where the only form of international cooperation is trade. Industrial organization theory of FDI led to numerous MNEs (Multinational Enterprises) theories and

further synthesis of both concepts. Among dominant MNEs theories are Magee's appropriability theory based on the idea that profit is generated from information and Buckley and Casson's internalization theory (influenced by Coase and later developed by Dunning), stating that the market is imperfect and therefore flows in form of knowledge and expertise should be under common control of the firm – internalized). Hymer as well argues about substitution of the market by a firm - an organization should internalize activities and advantages which result from their possession. Intra-firm integration of foreign activities within one hierarchical parent-subsidiaries scheme is more autonomous and flexible in comparison with several cooperating firms (e.g. contractual, market based agreements). Among other themes there is the diversification theory defining risk reduction by equity market arbitrage in different countries. Further widely examined determinants are market structure and market failure imperfections, such as existence of monopolistic and oligopolistic characteristics (where vertical FDI respond to barriers of all kinds), external effects, public goods, question of social efficiency and market performance.

2.2 Eclectic (OLI) paradigm and knowledge capital model

A nowadays very popular model based on the transaction cost theory is the eclectic paradigm, or OLI model. The model combines both a micro and macro view on FDI and therefore is classified in a separate sub-chapter. Dunning (1977, 1988) develops the OLI factors:

- Ownership advantages: possession of firm specific capital defined as knowledge capital – patents, license, brand, trademark, technology, reputation, managerial skills,
 - Localization advantages: low cost inputs, circumvention of trade barriers, economizing on transport costs, producing close to final customer,
 - Internalization advantages: contracting and production by licensing or joint ventures,
- into complex internalization theory where the precondition for international activities (export, FDI, licensing and sub-contracting) is discussed. According to the theory the more of O and I advantages a company holds and more L advantages will be created abroad on a host market, the more FDI will be undertaken. FDI typology (alternative classification provided in the next sub-chapter) based on the OLI theory and determined by the benefits of localization on a specific host market were derived by Behrman (1972) and explain different objectives:
- resource seeking FDI (inflows driven by availability of particular resources),

- market seeking FDI (location in close proximity to customers or contemporaneous production and distribution, exploiting new markets),
- efficiency seeking FDI (driven by competitiveness, comparative advantages, efficient allocation of international activities within global sourcing and structuring, rationalized specialization and risk diversification),
- strategic assets seeking FDI (originates in O advantage, strategic purchase operations of existing firms or assets through acquisitions).

As part of the eclectic paradigm the investment development path (IDP) could be mentioned (Dunning, 1981, 1986). This states that the international investment position of countries fluctuates according to their level of product per capita (the higher the GDP the higher is the FDI flow, where the causality works vice versa with even stronger impacts). Dunning depicts five stages of IDP. When initially both outward and inward FDI flows are low, then the net inward position is increasing, followed by a period of dominating outward investment and reaching balanced outward and inward FDI on a high level. The concept of change in FDI flow and type in the process of industrial and income growth was well depicted by Kalotay (2004), who made a linkage between IDP and flying geese theorem (originally described by Kojima). This means that when host countries (originally low or middle income groups) industrialize and upgrade skills by learning, the FDI flowing from the home countries change their pattern towards high-skill production and activities gradually flow out from relatively advanced host countries to newcomer host countries (which could be the case of NMS very soon).

Another representative of the industrial-organization approach to international trade (new trade theory) is the knowledge capital model defined by Markusen (1984, 2002). This model markedly follows OLI paradigm advantages, especially ownership advantages in the form of so-called knowledge capital (blueprints, patents, procedures or marketing assets, such as trademarks, brands or reputation). This theory questions why such capital is associated mainly with multinationals and why their comparative advantage is foremost in services of knowledge capital and not in services of physical capital. The explanation comes in three assumptions:

- knowledge capital is easily transported to foreign affiliates,
- knowledge based assets are skilled labor intensive, and therefore R&D and managerial headquarters could be located separately from the production (that can be fragmented in cheap input regions),

- knowledge capital could be viewed as a public good within one firm, for example a chemical formula is costly to produce, but once it was invented it could be relatively cheaply implemented in foreign affiliates.

As well the issue of internalization of knowledge capital is raised – companies transfer knowledge internally and maintain the value and uniqueness as the market is imperfect and could ruin reputation and decrease profits of the company.

2.3 FDI classification, determinants and impacts

Resulting from different theoretical approaches there is as well diversity in FDI classification. FDI could for example be viewed either from the investor or host country perspective. Caves (1971) structures the investor perspective categorization as follows:

- vertical FDI (backward vertical: exploiting host country resources, forward vertical: reaching consumer through acquisition of distribution outlets),
- horizontal FDI (production of similar goods abroad in host economy as in home country, oligopoly and monopoly approach),
- conglomerate FDI – connection of both above mentioned types.

Moosa (2002) provides a simple classification from the investment recipient perspective: import substituting FDI, export increasing FDI and government initiated FDI (e.g. aimed at balance of payment deficits elimination). Kojima (1973) divides FDI into trade-oriented and anti-trade-oriented and Chen and Ku (2000) divide it into expansionary (exploiting home specific advantages) and defensive FDI (searching cheap labor force and other resources at the host market). Forms of FDI as well differ from greenfield (investment with job creating potential and value added output), brownfield (acquisition leading to further greenfield investment) to mergers and acquisition or joint ventures.

Apart from theoretical and terminological richness it is crucial to assess the FDI inflow determinants and impacts on the host economy. Moose (2002) provides a wide summary of determinants initiating FDI inflow: the need for markets (or search for higher profit margin markets), the need for production efficiency (utilizing relatively cheap resource inputs, the need for raw material among them), the need for information technology, the need to minimize or diversify risk, integrating operations (the whole set of production process), non-transferable knowledge, protecting knowledge, protecting reputation, capitalizing on

reputation, avoiding tariffs and quotas, exchange rate considerations and relationships with other MNEs (following home market partners).

Policy makers should be aware of the international investment motives and create the lucrative environment for both parties – incentives for the investor and benefits for the country. There is common belief that attracting long-lasting greenfield investments of large firms is better as they are more robust and stable with a major impact on the economy. This is as well a country-specific question and should not have to be a dogma. The awareness of impacts on the host economy is on the same level as depiction of determinants of FDI and could significantly redirect the policy making decisions in that field. Enderwick (2005) defined FDI impacts within two groups of effects – direct and indirect. Direct effects are further assorted into primary impacts:

- increase in development and the competition level (as well as the developing of completely new activities by displacing declining industries with lower value added),
- increased export potential,
- increased productivity and competitiveness (through innovative technologies and processes, it is as well proved that uni-national firm are generally less productive),
- upgrading and economic clustering.

Secondary impacts could come in the form of creation of linkages with domestic firms (making them local suppliers) and spillover demonstration effects of clustering. The tertiary impacts are the further formation of an institutional structure which can lead to economic efficiency (especially important for transition economies and NMS, New Member States). Indirect effects are not observed that transparently and appear on a longer time span and include: a change in competition and industry structure (here greenfield investment is more powerful), demonstration effects (activities of foreign affiliates provide valuable knowledge to the domestic firms), the creation of business clusters encouraging further specialization (this effect could explain the dominating financial intermediary sector on the list of industries attractive for foreign investment in EU 15).

2.4 Theoretical hypotheses for empirical research

Policy makers determine the impacts of FDI by any interventions, therefore it is crucial to find out on what theoretical premises EU investment in reality is based on. In this paper the following theoretical hypotheses are deduced for further empirical research:

- investment flows into EU sub-regions (EU-15 and NMS) are in most cases determined by different motives,
- in terminology of the OLI paradigm, the EU-15 is mainly a magnet for efficiency seeking and strategic asset, capabilities seeking FDI while NMS are more inclined to be a destination for resource and market seeking FDI,
- The EU-15 subregion is a good example of the gravity approach and knowledge capital theories (investment relationships among developed countries, appealing investors into same industries by existing clustering, relationships among MNEs – investor in one industry brings home country partners, such as financial intermediaries, on a new market),
- NMS should not headlong compete for the same FDI categories with highly developed EU-15 countries, but focus on its own clustering by so-called selective targeting (focus on particular industries or even particular companies),
- causation of increasing FDI and growing GDP could inherently change the FDI character towards higher skilled and knowledge intensive production
- in the long run FDI could help to eliminate disequilibrium in the income and development level between two EU groupings and take a share in the EU economy harmonization process.

3. ECONOMETRIC SPECIFICATION AND MODEL FRAMEWORK

3.1 Gravity model approach

FDI flows are generally inconstant and significantly vary between economies without a clear time trend. The **gravity modeling** is frequently used in order to explain that phenomenon, recent studies of Bevan and Estrin (2004), Hejazi and Safarian (1999), Borrmann, Jungnickel and Keller (2005), Sova (2009) could serve as an illustration. The gravity model suggests that elements of abroad production costs and costs of exports are captured by the relative market sizes of two economies and their distance from each other.

Originally inspired by physics, basic gravity models were constructed to interpret bilateral trade flows and further developed into FDI models with the gravity approach. Common usage of this approach could be explained by relative simplicity and remarkable predictive power. A substantial proportion of gravity models are based upon Linnemann (1966) equation for bilateral trade flows, later adjusted by various authors, e.g. Breuss and Egger (1997). The basic equation derived by Deardorff (1995) (in Bos, Laar) focuses on the FDI flow from home country i to host country j , with three categories of explanatory variables: size of the market (GDP_i , GDP_j or number of population in the countries), distance between the economies ($DIST_{ij}$) and a set of specifying factors (T_{ij} , such as taxation rate, common border etc.):

$$FDI_{ij} = A_{ij} * ((GDP_i * GDP_j) / DIST_{ij}).$$

Bos et Laar (2004) identify the equation as a long-run equilibrium condition where estimated value of FDI_{ij} equals to the actual value of FDI_{ij} ($\hat{FDI}_{ij} = FDI_{ij}$). In case of $\hat{FDI}_{ij} > FDI_{ij}$, investment inflows into the economy are lower than the gravity model predicted and vice versa for $\hat{FDI}_{ij} < FDI_{ij}$. The logarithmic form of the equation:

$$\ln FDI_{ij} = \beta_0 + \beta_1 \ln GDP_i + \beta_2 \ln GDP_j - \beta_3 \ln DIST_{ij} + A_{ij} + E_{ij},$$

generally advocates that with zero market size (measured either in money units or number of population) existence of capital flows is impossible, and distance (from geographical point of view) is expected to have negative influence. Therefore sign of the β_1 , β_2 coefficients are traditionally expected to be positive (the larger is market size, the larger is the received investment) and the distance coefficient β_3 is negative. However a number of studies showed that effects could be very ambiguous, depending on dominating effects: distance could represent increasing trade costs and therefore FDI flows on the other hand could serve as a complement. Moreover comprehension of distance could vary from geographical, cultural to economical, and is not necessarily used in the model, e.g. Bevan et Estrin (2000) in Bos. A smaller GDP size (or per capita purchasing power) should not automatically mean negative effects on FDI flows, as production costs in a particular economy could lead to comparative advantage and market size of surrounding economies would satisfy expected value of sales. The same logic can be implemented on population size – larger population does not always lead to larger FDI inflows, when small countries could receive relatively more investment

3.2 Panel data – general description and dataset specification

The models data input is based on a two dimensional balanced panel – country pairs between the most significant world investors (extra-EU) and EU member states observed in consecutive 9 years, from 2000 to 2008. The extra-EU investors chosen for the purpose of this study are: USA, Japan, Switzerland, Russian Federation, India, China, Hong Kong, Brazil and Canada. Mentioned economies participate on world investment with share of 40% (average percentage of total outflows and stock during 2000-2008, UNCTAD FDI database) and are major trade and investment partners of majority EU members. Extending the data to other donor countries would result in a high portion of zeros and missing values and create disproportional number of time series for different panel groupings. The number of observations has decreased from expected amount of 2187 due to zero or negative value of yearly FDI flow statistics and further adjustment of functional form of regression and consists of 560 observations. To prevent a bias from the pooling of countries that are structurally different (level of development, size of economy) and depict the distinction between old and new member states, two country groupings were created – EU15 (old member base) and NMS (block of new member states that joined EU after 2004 and 2007 enlargements). As a main data source statistical series published by Eurostat and World Bank were used.

The regression performed in this paper uses a panel data setting, which is becoming increasingly popular, especially while constructing models for dynamic changes in FDI and GDP, for numerous advantages. Panel data enables to avoid misspecification problems involved in individual heterogeneity, while at the same time it allows country specific differences and provides more degrees of freedom, higher variability, less collinearity and therefore greater efficiency, Hsiao (2006).

3.3 Model Framework

The variables included into the constructed gravity approach model, to determine factors of investment appeal of the EU15 and NMS countries, could be divided into three sets (likewise categorization in Borrmann, Jungnickel, Keller (2005)). First two sets are designed from the traditional gravity approach, the third group is derived from new theories of FDI:

- market related variables (GDP, GDP growth rate, existing FDI stock),

- distance related variables (economical distance, trade performance, openness of imports, political and economic risk),
- endowment related variables (unit labor costs in host country, per capita income).

Denoting the year by t , home country by i and host economy by j , we estimate the following specification:

$$FDI_{ijt} = f(\text{lag}FDI_{ijt}, FDI_{stock_ijt}, GDP_{jt}, GDP_{it}, GDP_{pc_it}, GDP_{pc_jt}, GDP_{growth_jt}, Import_{ij}, Export_{ji}, DIST_{ijt}, LC_{jt}, IR_{jt}, INFL_{jt}, EDUC_{jt}),$$

where FDI_{ijt} is an explained variable of annual bilateral investment flows from extra-EU country i into EU member country j (in mln EUR), $\text{lag}FDI_{ijt}$ represents one year lagged FDI_{ijt} , FDI_{stock_ijt} is the existing value of investment stock created by country i in country j , GDP_{jt} (GDP_{it}) is the gross domestic product (in mln EUR), GDP_{pc_it} (GDP_{pc_jt}) is the gross domestic product per capita (in EUR per capita), GDP_{growth_jt} is annual growth rate of GDP (in %), $Import_{ij}$ is the amount of inflow trade from country i into j and $Export_{ji}$ is the amount of trade outflow from i to j (both in mln EUR), $DIST_{ijt}$ represents economical distance between home and host country (distance is calculated as a difference between per capita GDP in quadratic form), LC_{jt} is the hourly labor cost (industry and services sectors) in host economy (in EUR per hour), IR_{jt} is the annual average of long term interest rates (in %), $INFL_{jt}$ is the annual average inflation rate, measured as HICPs (annual average rate of change in Harmonized Indices of Consumer Prices for EU countries and national consumer price indices for extra-EU countries), $EDUC_{jt}$ is a variable for skills of the population (measured as a tertiary enrollment percentage of gross enrollment).

To control the investment determinants differences between EU15 and NMS, an intercept dummy variable was introduced. After proved significance of intercept dummy, a variable set of interaction dummies was included to observe the slope of particular regressors.

Lagged variables for FDI_{ijt} flows (FDI_{ijt-1}) and **existing FDI stock**, unlike in model of Döhrn (1996), were introduced as independent regressors to prevent the bias from existing difference in starting levels of investment. The empirical foundation is obvious: two groupings have got a different investment history background and the existence of significantly large FDI stock in EU15 could serve as a considerably relevant determinant for further trends in investment accumulation. By including lagged regressors, a dynamic model is created, which can help to avoid non-stationary residuals and eliminate serial correlation as any shocks take time to work through the system. The FDI flows occur some time after

decisions have been made, process of choosing and implementing investments abroad is time consuming, some information is becoming available only with a lag (Bevan and Estrin, 2004).

The market size of the investment partners is expressed by the GDP variable and is a proxy for the product demand and the potential for growth and the capacity to supply, both GDP variables are expected to be positive. Same is the rationale of per capita GDP showing purchasing power of the local consumer.

Trade (export and import variables observed separately) is included to observe the relevance of existing economic cooperation and potential for further investment complementarity or subsidiarity. The variable is as well designed to capture the openness of the host economies. Openness and FDI should be positively related, multinationals have a higher propensity to export and the market is more liberal, therefore a positive coefficient for trade is expected e.g. in the Helpman model (1984).

The distance parameter is viewed from an economic prospective only as geographical understanding of distance, and in contrast to trade, it does not clearly represent a negative factor. For the FDI distance variable it could be an impediment (coordination cost could increase with distance) as well as an incentive (ability to avoid transportation costs or trade barriers). Statistically distance represents a very ambiguous determinant – insignificance of obtained coefficients does not necessarily mean unimportance (for some investors higher distance could be a very positive and for some highly negative factor). The econometric foundation for geographical distance omittance is a specificity of fixed effect panel regressions: the time invariant variables are not considered, therefore classical distance and **population** from the classical gravity model specification is not appropriate. Moreover, a population parameter is not included as it is perfectly collinear with GDP and GDP per capita variables.

Hourly labor cost is one of the investment **profitability** determinants; where the expected sign of the coefficient is negative as with growing labor costs the level of profit is decreasing. The variables for the **inflation, interest and growth rate** could serve a helpful set of parameters describing stability. Skills and amount of sophisticated labor force could be measured by the tertiary enrollment variable and are positively related especially with the investment into the service sector.

Before running the regression a set of diagnostics tests should be done to detect possible misspecification: individual tests for normality, serial correlation and heteroscedasticity. Above mentioned assumptions of normality, non existence of serial correlation and homoscedasticity are crucial for the robustness of the model estimators and

power of the econometric specification. Any violation of the assumptions leads to consequences that could not be neglected. Serial correlation in the residuals invalidates the fitted values used in the auxiliary regressions for other diagnostic tests and as well leads to biased and inconsistent estimators. When autocorrelation in the residuals is identified, one of the correction procedures is the creation of the dynamic panel analysis by adding a lagged variable (Baltagi, 1999). Such a modification could handle both balanced and unbalanced panel data and is usual technique used in fixed and random effects models (Arrelano and Bond, 1991). Failure of normality does not lead to bias of estimations, they are still BLUE (Best Linear Unbiased Estimators), however statistical testing relying on distribution of standard errors is seriously affected. As a most common solution to non-normality, adjustment of functional form into log or semi-log version is used, while the usage of generalized least squares (GLS) could also lead to improved results (Greene, 2003). Heteroscedasticity is linked to non-normality and results in unbiased estimators, but inefficient standard errors. To avoid the heteroscedasticity problem the method of GLS as well as functional form change is recommended, as a log transformation compresses the scale in which the variables are measured.

After diagnostics tests were proceeded and any of the misspecifications appeared (null hypotheses for normality, no serial correlation and homoscedasticity was rejected), adjustments were made. The model went through the following corrections: lagged form of dependent variable was added to prevent autocorrelation, as well as log-log functional form and estimation with usage of the GLS to preclude heteroscedasticity and non-normality consequences.

The panel data sets are now most commonly analyzed by techniques of the fixed effects or random effects models. The fixed effects model has a strong advantage of cancelling out time-constant unobserved heterogeneity (the group-specific error components are now uncorrelated with explanatory variables). However, such a fixed effects estimation by its logic does not allow the inclusion of time-invariant explanatory variables used in traditional gravity models, e.g. geographical distance. The second technique of random effects on the other hand assumes random variation across entities (uncorrelated with dependent variables) and therefore with the existing influence of differences among groupings on dependent variable it is more appropriate. To chose between fixed and random effects we can use Hausman test that states in null hypothesis appropriability to use random effects model, where the alternative is therefore the fixed effect model (Greene, 2008). In the case of our gravity approach model this test proved a significant difference between two effects and did

not allow rejecting of the null hypothesis. The random effects models use pooled-GLS, which is appropriate adjustment to prevent misspecification of our model. When having a large number of entities as well, this gives preference to the use of the random effects model.

4. RESULTS FROM ESTIMATING THE GRAVITY MODEL

After running our regression by the random effects technique following results were observed: there is a difference between two observed groupings, expressed by the dummy variable and the same set of independent variables for both is groups is viewed as significant to explain the FDI flow phenomena. As was expected, the presence of accumulated FDI stock during previous years has a positive influence on further investment flows (both in EU15 and NMS), GDP of the investor has a positive sign (both in EU15 and NMS), trade expressed by export is positively correlated with capital flows and increasing labor costs have a negative influence on FDI flows in both groupings. However different results were obtained for the GDP growth parameter, in case of EU15 this variable has a negative sign and NMS shows a positive relation between investment flow and product growth (here variable is less significant than in case of EU15). An analogical difference is found for the GDP per capita variable of host economies: increasing per capita GDP is a very significant explanatory variable of EU15 investment flows with a positive influence, while NMS per capita GDP increase tends to lower incoming FDI flows.

The overall fit of the model is relatively high – chosen independent variables are explaining 70.71 % of observed FDI flows. Chi-2 as well proved that all coefficients in the model differ from zero and major part of the independent variables are significant at least at the 10 % level (1%, 5% and 10% level of significance variables are mentioned in the Table 1 - Significant determinants, the complex output of the regression is presented in the Appendix).

Table 1. Significant determinants

Variable	EU15		NMS	
	Coef.	p value	Coef.	p value
Intercept/dummy	-29.984	*** ¹	-0.184	**
FDI stock	0.474	***	0.695	**
GDP it pc	0.363	***	0.004	*
GDP jt pc	3.253	***	-0.002	**
GDP growth	-0.289	*	0.042	
Export	0.574	***	0.029	***
Labor Cost	-2.984	***	-0.229	**
Inflation	-0.394	*	-0.081	

¹ *** 1%, ** 5% , * 10%

Existing **FDI stock** is a significant determinant of the investment flows both into countries from EU15 grouping and NMS countries. The more FDI an investor has created in previous years, the more it is expected to receive in future years. That is a very positive finding especially for EU15 countries as their FDI stock is much higher than in the case of NMS. This determinant represents an existing bond between investment partners and is a result of the long-run cooperation. Investors from such category had already proved profitability and stability of their capital inputs, the host market allows them either permanent sales locally or represents an interesting production base (e.g. advantages of sophisticated labor and clustered service background in case of the EU15) used for further re-exporting. In NMS the identical variable has almost the same size of coefficient with comparable significance, however knowing the existing FDI stock size in those countries; it is more the matter of future challenge than a recent advantage.

Somewhat surprising are results for **GDP per capita** coefficients, according to theory it is expected to detect a positive relationship between investors GDP per capita and his FDI outflows, however growing GDP per capita of host country residents has ambiguous outcomes. In EU15 the determinant of per capita income has a very high significance and explains a relatively large portion of the FDI flows. High income of the host country population represents higher values of purchasing power and a potential increase of demand. Such an interpretation supports without doubt the case of EU15, high income countries, where the majority of the FDI goes into service sector, mainly financial intermediation and real estate business services (EU FDI Yearbook, 2008). On the other hand there is a different

situation in the NMS: nevertheless the coefficient is much lower than in EU15 countries, growing per capita GDP in NMS could negatively influence FDI flows. There could be several explanations for such, at first sight contradictory, result: a substantial part of the NMS FDI inflows is directed into the manufacturing sector, and considering the correlation with significant positive export and negative labor cost coefficients, growing per capita income represents increasing labor costs for foreign production that is located in NMS territory mainly with the idea of further re-exporting (under condition that local market demand is outweighed by the other trade destinations). Contrariwise such negative scenario is rather sector-specific, which means that the above mentioned explanation is relevant for the existing type of investment flows (into less sophisticated sectors) and any income increase could shift recipient countries into a different level in terms of sector of FDI interest (from manufacturing and basic services into higher value added sectors).

The per capita income coefficient interpretation provides us a strong ground for the **labor costs** variable understanding. In both country groups increasing labor costs represents a significantly negative influence on investment inflows. This negative sign of the coefficients shows as well cost sensitivity of the investors. An indicator for certainty of long lasting and persistent profitability is macroeconomic stability of the host country, which was always considered to be an important decision making factor for investment, especially in case of the transition economies (Henisz, 2000). However, in the case of the EU15 economies, any percentage increase leads to a much higher decrease in FDI flows than in NMS states. That is in conformity with economic reality as labor cost base in EU15 is reaching a very high level already and there is not much of freedom left for a further increase and being competitive without additional qualitative improvement of labor. Such a tendency is to a certain degree positive for the NMS that are the source of relatively skilled but still cheap labor force. A certain amount of the high value added services could be redirected to the NMS and substituted by even more sophisticated sectors in EU15.

Export appeared to be the only significant coefficient representing the trade relations between countries, leaving import in the category of variables with lower explanatory power. However, while theoretical rationale expects firms export entrance on the market as a pre-stage of FDI entry, it is not necessarily the case of EU countries. The model has revealed the existence of some substitution effects between FDI and trade inflows, nevertheless complementarity of investment into the economy and further increase in host country exports is the matter. Such feature could be explained by the re-exporting of produced goods back into the home economy. In the case of the EU15 countries the role of re-exporting of companies

operating abroad is highly significant in the explanation of the FDI flow values. Under such rationale, companies investing in NMS markets tend to leave production on the EU market or re-export it indirectly. Analogous results were revealed in Bos and Laar's (2004) gravity model. Free trade is undoubtedly an important factor in the increasing of the FDI level, assuming the complementarity characteristics which open-up trade increase FDI flows and further higher FDI stock in the country again leads to higher trade.

An opposite polarity has been detected in the coefficient for **GDP growth rates**, while NMS investment is positively correlated with total GDP growth rates (representing dynamics of economy and increasing market size) the contrary is the case of EU15. Coefficients were expected to have the same direction of influence as the per capita GDP variable, however reverse results have been found. A negative influence of GDP growth rates in EU15 could be explained by the overall increase in expenses in the investment destination, when investment to a particular sector is interrelated with the further purchases of locally offered, and therefore expensive, services and production (that is definitely the case of EU15). While expressed in nominal values there is a strong correlation with the variable for influence rate.

The low variance in **inflation time series and interest rates** produces coefficients with lower statistical significance, determinants of stability are therefore not important for our model. Countries from the EU15 block are without any doubt a safe investment destination with a high level of institutional development and NMS have already improved their image in the catching-up process. Relative capital costs expressed by the interest rate variable have insignificant coefficients, perhaps because investors rely on their own resources and capital markets in their own home countries. The educational level variable has as well a low statistical significance.

5. CRITICAL OVERVIEW

One of the main constraints of the econometric methodology of the gravity approach model is the existence of null or missing values of capital flow observations between surveyed investment partners. Those null and missing observations are treated in the random effects models as the dropped observations and the country observations sets tend to differ. As well due to the statistical data availability constraint only 9 home countries were selected which

could lead to neglecting already existing investment linkages among certain countries (and not all the countries from the EU groupings).

Secondly the time span of the observations is relatively limited to 9 years, which entails an even amount of years before and after EU enlargement. Therefore to maintain the idea of an equal amount of observations after EU enlargement the earliest observations could not be older than the year 2000. The related limitation of longer time series is the non-existence of the high rate FDI statistics from NMS before their accession or of the investment register of FDI according to other statistical methods (e.g. no distinction between net and gross flows).

The problem that occurred during stationarity diagnostics is non-normality (functional form adjustment did not improved diagnostic results). However, a relatively high amount of observations and data specificity as well as non-existence of a straightforward theoretical underpinning of the normality assumption for the gravity equation, e.g. provided by Deardorff (2006), show that we can regress the model without fear of significant bias.

It is definite from obtained empirical results that there is significant difference in investment determinants between various economies in the EU, i.e. between two groupings of EU15 and NMS. However due to the extent of this paper and immensity of the approach the dissimilarities within the groups are not observed, even though intuitively we can state for certain that the investment potential of 4 CEE economies (Czech Republic, Hungary, Poland and Slovakia) differ from the rest of NMS and in the nearby future could represent economies reaching the specificity of investment determinants of nowadays EU15 countries. Thus the fact that a country is located in a good performing region does not necessarily mean the country is doing well in attracting FDI (Bos, Laar, 2004). That is without doubt an important aspect and the subject for future research in the field of investment determinants assessment.

CONCLUSION

The paper provides a study on investment determinants estimation using the gravity model approach methodology and random effects modeling. The main task of the empirical study was to define whether there is a rivalry between groupings as FDI destinations judging by the determinants of the capital inflows. The results of the model could provide more information on how to improve competitiveness of the subregions and EU as a whole entity. The theoretical premises for the research are based on the eclectic paradigm and the

knowledge capital models as well as the doctrine of investment role in the process of the market equalization and harmonization processes.

The main technique enabling the investigation of the two EU groupings within the united gravity approach model is the usage of the intercept dummy. The econometric results obtained from the random effect model showed statistical significance of the intercept dummy and by that substantiated the theoretical hypothesis for the different motives of the investment flows into EU subregions. The second hypothesis set was aimed at the categorization of the FDI inflows, e.g. market or efficiency seeking investment, or in other words investment searching for output distribution or cost minimization. For that purpose the group of interaction dummies was created for all observed variables to detect which determinants as a matter of fact differ.

One of the most interesting results is the significance of the per capita GDP variable which has a contrary influence on investment inflows in the researched groupings. That conclusion strengthened the hypothesis that the EU15 region is a source of skilled and high purchasing power customers and employees, so that the growing per capita income is a positive investment determinant. The cost efficiency seeking investment in NMS prevailing by now could be slightly endangered by per capita GDP increase. The labor costs variable states the same notion – extra-EU investors are cost sensitive. The issue of export and investment complementarity revealed that EU15 and NMS countries tend to operate with production in a different way – apparently more sophisticated production from EU15 tends to return into the country of the home investor, however NMS output is mostly distributed in the European region or at least does return into the country of the original capital flow provider. The total GDP growth is as well the subject of different effects on the investment development in the two regions – EU15 FDI from the same categories would not persist with a growing economy and would probably be substituted by other industries, which is expressed by the hypothesis for the change in FDI character towards more skilled and knowledge intensive production. The NMS still have high potential in the GDP growth and the model results state positive influence on FDI inflows – that supports the initially suggested hypothesis proposing industry clustering and preference of selective targeting to unreasonable competition for the FDI categories circulating in neighboring EU regions.

The depiction of the main strengths and weaknesses of the two subregions in investment determination is crucial not only for the individual countries, but for the whole integration primarily. If cooperation in the investment policies of the members would be more harmonized, more equalized and competitive EU integration could be created.

APPENDIX

Econometric Results for the RE Model

(Time Period: 2000-2008, Dependent Variable FDI_{ijt})

	EU 15 estimate		NMS estimate	
$FDI_{ijt(t-1)}$	0.04	$(-0.05)^2$	-0.02	(0.07)
FDI_{ijt} stock	0.47 *** ¹	(-0.06)	0.22	(0.09)
GDP_{it}	-0.11	(-0.10)	0.12 **	(0.14)
GDP_{it} per capita	0.36 ***	(0.13)	-0.36	(0.20)
GDP_{jt}	0.05	(0.18)	0.16 *	(0.25)
GDP_{jt} per capita	3.25 ***	(1.23)	-3.26	(1.43)
GDP_{jt} growth	-0.29 *	(0.16)	0.33 **	(0.23)
$Import_{ijt}$	-0.09	(0.15)	0.13	(0.20)
$Export_{ijt}$	0.57 ***	(0.19)	-0.55	(0.21)
$DIST_{ijt}$	-0.03	(0.04)	-0.01 ***	(0.10)
LC_{jt}	-2.98 ***	(1.07)	2.75	(1.25)
$INFL_{jt}$	-0.39 *	(0.24)	0.31 **	(0.28)
IR_{jt}	0.07	(0.42)	-0.22	(0.57)
$EDUC_{jt}$	0.48	(0.65)	-0.88	(0.79)
intercept	-29.98 ***	(10.41)	29.80 **	(12.23)
Number of observations:	560		Wald chi2(29):	712.91
R-sq: within	0.13			
between	0.83			
overall	0.71			

1 The standard errors are reported in brackets.

2 * significant at 10%, ** significant at 5%, *** significant at 1%.

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