THE EFFECTIVENESS OF FDI PROMOTION IN TRANSITION ECONOMIES

by

Dmitry Goryunov

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Abstract

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Chairperson of the Supervisory Committee: Ms. Svitlana Budagovska,
Economist, World Bank of Ukraine

The paper examines how effectively FDI promotion instruments are functioning in our region. Unlike the whole world, transition economies demonstrate steady rise of FDI flows. However, globalization processes (such as EU enlargement) put extra challenges for investment policies of Eastern European countries. For example, governments should be certain that usually limited resources allocated to investment promotion are used in efficient ways. However countries of Central and Eastern Europe sometimes exploit FDI promotion instruments, which were proven not to be very effective in the developed world. That's why it would be useful to test if the world "experience" of using those tools is valid for transition economies. Using several models I show that in the case of this region, all tools (Bilateral Investment Treaties, Double Taxation Treaties and Investment Promotion Agencies) are effective. However, the most productive are Investment Promotion Agencies, which complies with other researchers' findings.

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GLOSSARY

BIT. Bilateral Investment Treaty

CIS. Commonwealth of Independent States

FDI. Foreign Direct Investment

GDP. Gross Domestic Product

ILO. International Labor Organization

IMF. International Monetary Fund

MNE. Multinational enterprise

OECD. Organization of Economic Cooperation and Development

OLS. Ordinary Least Squares

R&D. Research and Develop ment

UNCTAD. United Nation Conference of Trade and Development

WTO. World Trade Organization

Chapter 1

INTRODUCTION

The rise of the world economy's efficiency in last centuries would be impossible without the global division of labor. Nowadays multinational enterprises account for the lion's share of international trade. Frequently, MNEs are formed via foreign direct investment. According to OECD (1996), FDI "reflects the objective of obtaining a lasting interest by a resident entity in one economy in an entity resident in another economy". There are two types of foreign investment, vertical and horizontal. Horizontal (market-seeking) investment means that MNE acquires an enterprise that produces some output for domestic market. This type of FDI is assigned to substitute exports in order to avoid paying customs duties. In turn, vertical (efficiency-seeking) investment comes to industries for further supply of goods into investor's country. This type of FDI takes advantage of, for example, cheap labor of host country.

The fact that economy benefits from foreign investment was confirmed more than once. For example, Borensztein and De Gregorio (1995) run regression for 69 developing countries over 1970-1989 years to investigate the effect of foreign direct investment on economic growth. They found that FDI, being one of the channels for technology diffusion, is beneficial for GDP growth. Moreover, in this sense, FDI is more effective than domestic investment. Still, there is a condition for this rule to apply: country should meet some minimal level of human capital. But for transition economies, these conclusions get rather weak support from Mykytiv (2000). The author suggests that legislative chaos and other factors may prevent FDI from accelerating economic growth.

At the micro level the economic effect of FDI was also studied by numerous authors. For example, Yudaeva, Kozlov, Melentieva and Ponomareva (2001) tackled this issue for Russia. These authors concluded that foreign firms are more productive than domestic ones (exact effect depends on the level of reforms in a region). Besides, there are positive spillovers to the horizontally related Russian firms, but negative spillovers for vertically related ones. For contemporary Ukraine, similar research was conducted by Talavera (2001) and Rybalka (2001). They both confirmed that FDI is beneficial for performance of Ukrainian firms. By means of spillovers, foreign direct investment increases labor productivity.

Another advantage of FDI is that this type of investment is more stable than other international forms of capital formation (portfolio investment or bank loans). For example, Chuhan, Perez-Quiros and Popper (1996) used capital flows in 15 countries to show that short-term investment is more sensitive to various disturbances. Research of Wei and Wu (2001) includes much more extensive sample (103 countries, 1980-1996) to demonstrate that volatility of FDI is less than volatility of portfolio flows and bank loans (in terms of standard deviation and coefficient of variation). At last, Lipsey (2001) investigated three financial and exchange rate crises (Latin America, 1982, Mexico, 1982, and East Asia, 1997). It turned out that during these crises FDI behaved in more stable way than other types of investment.

Despite mentioned advantages, foreign direct investment falls during last years. At least, this is true for the whole world economy. According to UNCTAD (2003), FDI more than halved in 2002 comparing to 2000, from $1.4 trillion to $650 billion. This trend embraced almost all countries, both developing and developed ones (especially United States and United Kingdom). For example, FDI in OECD countries in 2002 decreased by 20% from 2001 (see OECD (2003)). However, global decline was uneven across countries and continents.

Fortunately for us, world trends passed sideways transition economies: inflows to the Central and Eastern European countries rose to $29 billion in 2002. This stability may be explained by EU accession; the effect however is valid for both accession and non-accession countries. Moreover, in this region FDI has larger share of gross capital formation, 18% instead of 12% for developed countries. But again, distribution of FDI dynamics across these CEE countries is uneven: only 9 out of 19 countries experienced growth of foreign direct investment.

Those anxious trends make experts to devote special attention to FDI policies, both national and international ones. Not surprisingly, that the latest World Investment Report, UNCTAD (2003) was focused on policy issues of FDI attraction. This issue is also important for CEE region. "The region's EU-accession countries will have to harmonize their FDI regimes with EU regulations. The non-accession countries have to update and modernize their FDI promotion to benefit from being a "new frontier" for efficiency-seeking FDI" (UNCTAD (2003), p.59). Among those policies are Bilateral Investment Treaties, Double Taxation Treaties and Investment Promotion Agencies.

The goal of Bilateral Investment Treaties (BITs), under the auspices of the International Monetary Fund and the Bank for Reconstruction and Development (World Bank), was to provide protection to foreign investors. These treaties give them better legal protection, than guarantees provided by national legislation. Since 1959, the date of first BIT, the number of these treaties has grown significantly. Especially rapid growth was observed during last two decades. There were two boom waves of BIT ratification in the 1990s: between developed and developing countries, and between developing countries. Now there are 2181 BITs in the world, including 716 in Eastern and Central Europe.

Double Taxation Treaties (DTTs) provide even more favorable investment regime by exclusion of double taxation of an investor. He should not pay income and/or capital taxes twice (at home and in host country). This is especially crucial if total tax rate exceeds 100%, thus leaving foreign investor with negative income. Starting from 1977, there were totally 2255 DTTs concluded in the world, including 606 in Eastern and Central Europe.

While treaties are just legal documents for investment protection, there are also active entities, Investment Promotion Agencies. According to Wells and Wint (2001), there are four types of investment promotion efforts: image building, investment targeting and generation, provision of investment services (both pre- and post-investment), and policy advocacy. There are about 160 IPAs in the world, both national and sub-national ones. Near half of them were established in the latest ten years (UNCTAD (2001)).

All three policy practices are used in Ukraine. For example, last summer president Leonid Kuchma has told government to create Investment Promotion Agency. Also Ukraine's continues to conclude new treaties, not counting already functioning 40 BTTs and 49 DTTs (see *Appendix A1* and *Appendix A2*, respectively). For example, during 2003-2004 (i.e. period not included in my regressions) Kiev signed and ratified BITs with Portugal, Arab Emirates, Syria, Kuwait, Oman, Libya, Tajikistan, Albania and Sudan. Besides, there are plans to sign these treaties with Norway, Island and Brunei. As for DTTs, during the same period Ukraine signed such treaties with Kuwait, Arab Emirates, Cuba, Slovenia, South Africa, and Thailand, ratified DTTs with Syria and Tajikistan. Authorities had also announced plans to conclude such treaties with such countries as Libya, Philippines, Jordan, and Israel.

Another interesting international issue is FDI from offshore countries. As many Ukrainian and international analysts mention, there is rather large volumes of capital flight from our country. Usually, these financial resources settled just exactly in offshore countries like Cyprus (2nd place in list of Ukrainian investment leaders, with total amount of FDI accumulated by Ukraine equal to $544 million) and Virgin Islands (7th place and $317 million, respectively). For example, as officials of National Bank of Ukraine say, in 2002 capital flight constituted about $2.4 billion. When some of this money returns to motherhood, officially this process is treated as foreign investment.

The primary goal of my research is to analyze if FDI promotion tools used by governments of transition countries in Central and Eastern Europe are effective. Namely, I use panel data on bilateral FDI flows into 14 CEE states in 1993-2002 to discover if Bilateral Investment Treaties, Double Taxation Treaties and Investment Promotion Agencies really boost foreign direct investment. In addition, I check the effect of offshore jurisdiction on FDI dynamics. In order to perform those tests, I employ several models. Some of them (and corresponding determinants of FDI) were never used for transition economies before.

The paper proceeds as follows. Chapter 2, the "Literature Review", gives broad overview of extant literature in FDI issues. Chapter 3, the "Theoretical Framework" contains technical details of main theories exploited in my work. Data description, peculiarities of used models and econometric issues are given in Chapter 4, the "Methodology and Data". Results of empirical investigation are presented in Chapter 5, "Empirical Tests and Results". The last chapter, "Conclusions", summarizes obtained results, suggests policy implications and outlines possible extensions of this research.

Chapter 2

LITERATURE REVIEW

This section describes both theoretical and empirical studies devoted to FDI, investment flows into transition economies and some specific factors. The "Theory overview" gives brief (non-technical) description of the theory papers on multinational enterprises and FDI. The "Empirical studies" part deals with general empirical studies while the "Specific factors" part describes some special determinants of FDI. At last, the "Policy determinants" contains a review of papers devoted to factors that have direct relation to my research.

2.1 Theory overview

Usually investigators apply Dunning's (1977) OLI paradigm to theoretically substantiate their models used for FDI-related research. The theory assumes three types of advantages that attract companies to investing abroad. The first is ownership, which arises from firm's size and access to market and resources; it includes patents, trade secrets and reputation. Internalization uses the imperfections of foreign market. At last, location advantages mean the differences between countries (government policies, transportation and import tariffs). The presence of only the first two advantages implies exporting, while if there is only ownership, a company will prefer contractual agreements. Thus, the absence of some location factors alienates a company from FDI, making a choice in favor of exports. Moreover, this group of factors is actually the only thing local government may directly alter. However, this theory is managerial and thus qualitative. Quantitative approaches were developed by other authors.

Helpman (1984) elaborated a simple theory that describes how factor proportions imply the existence of multinational corporations. It is an extension to the Hecksher-Ohlin neoclassical model of international trade. The author developed a general equilibrium model that exploits the idea that some assets may be used in places (countries) remote from where they are physically located. If factor-proportions differences are large, multinational corporations emerge. However, the model does not take into account the existence of transport costs, trade barriers, and tax and other differences, which limits the application of the framework. Besides, it explains only vertical-type investments.

Brainard (1993a) developed a simple theory to explain how a company will choose between investments (i.e. establishing an affiliate) and exports (i.e. domestic production). The model assumes only horizontal (market-seeking) type of FDI. The main point of the model is the so called concentration-proximity trade-off. From the one hand, increasing returns to scale imply that domestic production and further exports is preferable. From the other hand, transportation costs (including import tariffs) speak in favor of affiliate production. Depending in the parameters, the model allows for purely national, purely multinational, and mixed equilibria. Later, Brainard (1993b, 1993c) tested the proximity-concentration hypothesis empirically (using data for US affiliate sales). He confirmed the expectations that share of affiliate sales in total amount of sales (i.e. with exports) is larger, if freight costs and trade barriers are larger and if scale economies and investment barriers are lower.

The knowledge-capital model developed by James Markusen and his colleagues combines allows for both types of MNE (Markusen and Venables (1995), Markusen, Venables, Konan and Zhang (1996), Markusen (1997), Markusen and

Maskus (1999)). The model has three main assumptions. "First, services of knowledge… activities… can be separated geographically from production and supplied to production facilities at low cost. Second, these knowledge-intensive activities are skilled-labor intensive relative to production. These characteristics give rise to vertical multinationals… Third, knowledge-based services have a (partial) joint-input characteristic, in that they can be supplied to additional production facilities at low cost. This characteristic gives rise to horizontal multinationals." (Carr, Markusen and Maskus (1998)). In the latter paper authors successfully tested the model empirically.

There is also Real Options theory, which describes each investment decision as purchase of financial call option (by investor). "The investors pay a premium price in order to get the right to by an asset for some time at a price (exercise price) predetermined, and eventually different from the spot market price of the asset (strike price). Analogously, the firm, in its investment decision, pays a price (the cost of setting up the project) which gives her the right to use the capital (exercise price), now or in the future, in return for an asset worth a strike price" (Altomonte (1998)). Three main point here are uncertainty (risks), delay of FDI (an investor should analyze an enterprise, which takes time) and at least partial irreversibility of investment (sunk costs).

2.2 General empirical studies

As for pure empirics, amongst recent researchers who investigated FDI into transition countries were Bevan and Estrin (2000). They used a dataset for 1994-1998 years, EU-14, Korea, Japan, Switzerland and USA as source countries and 11 economies from Eastern Europe as recipients (including Ukraine). The primary goal of the paper was the determination of the factors that influence FDI flows into transition economies. Except standard gravity factors, the authors

tested variables, that described properties of recipient country only. They found that country risk (credit rating was used as a proxy), labor cost and market size account for dynamics of FDI. Besides, an interesting observation was made about European Union accession of countries. The announcement of the accession also increases FDI inflows.

Christie (2003) also used recent data and the gravity model to investigate FDI from 9 Western European countries to 5 Southeastern European (Bosnia-Herzegovina, Bulgaria, Croatia, Macedonian and Romania) and 5 Central European states. However, not flows but stocks were used as dependent variable. The author found that investments accumulated in those recipient countries are mainly of vertical type. Another conclusion is that FDI in this region is much lower than in Central Europe (taking into account gravity factors). This difference, as Christie pointed out, is explained by such variable as the index of economic freedom. To remind, this index is calculated by the Fraser Institute starting from 1986, and now covers 123 countries. It is comprised of 38 government policies in five major fields – size of government; legal structure and security of property rights; access to sound money; freedom to exchange with foreigners; regulation of credit, labor and business.

Ukraine also was the subject of economic research from the point of view of foreign investments. Oleksiv (2000) used the gravity model and dataset for 1994-1999 to test whether tax holidays imply more FDI or not. The result is that corporate tax rate, import tariff and total income of employed people (as a proxy for market share) affect FDI flows, while tax holidays (took place in 1994-1996) did not have any effect on investments. Possible explanations of this phenomenon include incredibility of the tax policy in general and weak fundamentals for FDI attraction. In turn, fundamentals include GDP growth,

financial stability (inflation and exchange rate behavior), and development of market institutions.

Which powers drive FDI into Ukrainian economy was also the topic of research made by Kudina (1999). Her approach was considerably different from those mentioned above. The author asked 13 big transnational companies about their motives and, vice-versus, obstacles for investing money in our economy. Vast majority of the respondents (92%) reported market-seeking as primary objective, while resource-seeking and efficiency-seeking being not more than secondary ones. As will be described later, this assumes horizontal FDI only. But remember, that it was 1999, when FDI stock to Ukrainian economy constituted only $2.8 billion, which is more than twice smaller than now. From that period, the economy renewed the growth trend, import tariffs were lowered, and the exports/GPD ratio rose from 44% to more than 60% (which may indirectly imply a significant increase in vertical investments). As for constraints for further investing, the most important were economic uncertainty, inferior legislation and political instability.

2.3 Specific factors

Sokolov (2002) used a dataset covering OECD members as source countries and transition states as destination ones to provide evidence if trade liberalization promotes FDI flows. Time period covered was 1980-1998 years. The problem was that different types of FDI may react differently to trade openness (for example, WTO membership). Horizontal investment is a substitute of imports, so reduction of import tariffs will decrease FDI. Vertical investment goes to export-oriented industries, and, being export complements, should demonstrate a positive effect of export tariff reduction. Using gravity model, he found that if a country becomes a WTO member, annual FDI will increase by $200 million per source country and by $4 billion totally. At least, this is true for FDI from

developed countries to developing and transition ones. In general case (at the world's scale), this result was not supported by Rose (2003). An additional finding of Sokolov's study is that the development of institutions is beneficial for investment attractiveness.

A similar research with specific focus on Ukraine was made by Mankovska (2001), who also investigated the relationship between trade and investment. However, not trade openness, but the very trade flows were of her interest. The author argues that the motivation of FDI into primary Ukrainian industries (like ferrous metals or chemistry) are cheap natural resources, while FDI into secondary industries (e.g. food production) are caused by cheap labor and growing internal market. All these results are for EU countries as donors, whereas investments from states of Eastern Europe are purely horizontal (i.e. import-substituting). But at the aggregate level, complementary relationship dominates.

The interconnections between FDI and regional integration were investigated by Blomström and Kokko (1997). These authors investigated three cases of regional integration: Canada joined CUSFTA, Mexico's accession to NAFTA and creation of MERCOSUR. However, the positive effect of those processes on dynamics of investments is affected by other consequences of integration very much. Namely, domestic liberalization and macroeconomic stabilization are the major improvements that increase the effect of regional integration on FDI flows. No formal (regression) research method was involved.

Di Mauro (2000) addresses the issue of European integration using a special version of the gravity equation (to be described in corresponding section of the thesis). The author argues that tariffs, non-tariff barriers (NTBs) and exchange rate stability do not have impact on FDI. Besides, FDI are found to be mostly horizontal in Europe.

Already mentioned institutional factors also were subjects to research, For example, it is widely believed that corruption in a country distracts investments from its economy. Usually, Corruption Perception Index (CPI), calculated by Transparency International starting from 1995, is used as a proxy of corruption level. The author of the index, Lambsdorff (2003) claims that CPI is a valuable tool for investment decision-makers. More closely this issue was studied by Wei (1997), who argues, that corruption may be compared to tax increase. An increase of corruption from level of Singapore to level of Mexico (CPI is decreased from 9.3 (out of 10) to about 3) is equivalent to raising tax rate by more than 20%. Sokolov (2002) predicts that if Russia had as low corruption as Poland, it would have $20 million more FDI annually from each developed country and $400 million more totally. At last, Wei and Wu (2001) argue that higher corruption causes shift from FDI to bank loans. Possible explanations of the phenomenon include better availability of FDI for corrupt officials and better level of protection of bank loans.

The whole set of institutional determinants of FDI with respect to transition economies was subject of research done by Chabanovych (2002). He investigated how political stability, corruption civil freedoms, legal and judiciary development etc (10 variables) affected foreign investment in 7 countries Central and Eastern Europe during 1992-1999 (Ukraine not included). Most institutional and social factors are found to affect FDI, while two of them (presence of external conflicts and ethnic tensions) do not matter. Most important determinants are corruption as well as political and social freedoms.

2.4 Policy determinants

Purely bilateral factors are represented by international treaties only (except gravity factor "distance"). Except studies on interdependence of taxation issues and foreign investments (e.g. Hamada (1966), Hartman (1985), Bond and

Samuelson (1989), Altsheler and Newlon (1991), Hines (1992)), first attempts to track effects of Double Taxation Treaties on FDI dynamics was made by Blonigen and Davies (2000, 2001). The result was quite surprising: it turned out, that DTTs do not promote FDI, and even reduce them. They supposed that the reason of zero effect is that treaties prevent tax evasion (by means of transfer pricing and treaty shopping). Negative effect is short-term and is related to uncertainty (new rules of a game are to be tested in the courts). Authors argue that creation of a new such treaty decreases FDI flows by about $350 million. At least, under certain conditions (relatively old treaties), there is positive effect, but it is not significant. But in the context of my research, authors used dataset for 1982-1992 years only, while most transition countries of Eastern Europe emerged afterwards. Anyway, even states, existing in that period (such as Poland, Romania or Hungary), usually concluded DTTs approximately in the middle of 90's. Thus, in this paper I will check if mentioned results will be supported for transition economies.

As for Bilateral Investment Treaties (BIT), there are only two research works concerning the influence of these treaties on FDI flows. At least, there are two economic papers, not numerous others are law ones. So, UNCTAD (1998) used dataset for 133 countries and 200 BITs to show that there is rather weak correlation between the existence of a treaty and an increase in FDI. However, this research used only cross-sectional data (for year 1995), and rather few control variables. Last year Hallward-Driemeier (2003) presented much more detailed research on Bilateral Investment Treaties. Her estimation covers FDI flows from 20 OECD countries to 31 developing countries in 1980-2000 years. She also found that the conclusion of a BIT is not necessarily associated with larger flows of investments. The author states that "such treaties act more as complements rather than as substitutes for good institutional quality and local property rights". The statement was tested using the influence of three institutional parameters on

BIT effect on FDI. But in the context of my research, she used only OECD FDI data, which implies only 9 of 18 CEE countries.

Foreign investment promotion instruments have become a subject of researchers' interest only last years. Main works in this area were conducted under the auspices of FIAS (Foreign Investment Advisory Service) of the World Bank and UNCTAD. For example, UNCTAD (2001) presents a survey of investment promotion practices. Wells and Wint (2001) give comprehensive description of how investments are being attracted worldwide. According to this paper, there are four types of investment promotion efforts: image building, investment targeting and generation, provision of investment services (both pre- and post-investment), and policy advocacy. The authors discuss the role of those techniques, proper organizational structure of the promotion office and effectiveness of investment promotion. The latter part of the paper includes also numerical estimation, conducted using 50 countries during 1960-1985 (as in Blonigen and Davies (2001), before transition in Eastern Europe). The effect of promotion (dummy variable) on FDI was found to be statistically significant at the 1% level; it is higher for (1) developed countries and (2) vertical investments.

More thoroughly the issue of agencies' effectiveness was analyzed in Morriset and Andrew-Johnson (2003). They use more detailed characteristics of these institutes as independent variables. First of all, size matters for investment promotion agencies: larger budget and staff usually implies better attraction of FDI. In turn, the very effectiveness is positively correlated with the quality of business environment in a recipient country. Besides, allocation of an agency's resources between four main abovementioned functions is not optimal: policy advocacy's share of budget is only 7%, while elasticity of FDI flows to variation of this spending is the largest. At last, as for organizational structure of the agencies, they perform well if both government and private sector is involved. Morriset (2003)

just uses updated data on budget, staff and internal characteristics of agencies. However, he used only cross-section data (on year 2001) Besides, in the context of transition economies, the author included only some of them – namely, Armenia, Bosnia and Herzegovina, Bulgaria, Czech Republic, Estonia, Georgia, Latvia, Slovakia, and Slovenia (i.e., only 4 FSU countries). Obviously, we should check for all FSU and Eastern European countries (see *Appendix 3*).

At last, as for off-shores, there no studies dedicated to this topic. However, several authors mentioned this issue, but rather as a problem. For example, Christie (2003) points out that there are large FDI flows into Eastern Europe from "tax heavens" like Cyprus, Liechtenstein etc. Offshores may be used by foreign as well as domestic investors. But instead of studying this issue, the author tries to reallocate FDI back to original source countries. If it was impossible to keep track of some flows, they were just dropped. Mankovska (2001) also mentioned this issue, but without practical consequences. Almost the same is true for Hryniuk (2003), who mentioned that Cyprus is third largest investor country into Belarus. The only difference is that Hryniuk excluded data for Cyprus, Luxembourg, and Bahamas from his sample.

To conclude this chapter, its worth mentioning that the role of multinational corporations in international trade has become subject to quantitative research only last 20 years. That's why formal investigation of foreign direct investment is the achievement of last decades. The analysis of investment into transition countries is still in progress. The same is true for policy determinants of FDI in general. The intersection of these two subsets is even less investigated, which leaves room for my research.

Chapter 3

THEORETICAL FRAMEWORK

This chapter will show how connection between FDI and other macroeconomic, geographic and policy variables is substantiated theoretically. First we consider pure vertical and horizontal models of international trade with the presence of multinationals.

Among the former is the factor-proportions model of Helpman (1984). There are two countries (1 and 2), two sectors (homogenous product Y and differentiated product X), and two factors (labor L and general purpose factor H). The production function of the homogenous product (whose consumption level is Y) is assumed to be linear and homogenous, the corresponding cost function is $c_Y = (w_L, w_H)$. The price of this product, taken as a numeraire, equals unit cost: $1 = c_Y(w_L, w_H)$. The production of differentiated product is more sophisticated. A company should hire some amount of H and at some cost adapt it to its own needs. When this is done, it becomes firm-specific asset suited for the production of this variety of differentiated product only. As Helpman (1984) mentioned, in reality, it may be management, distribution and R&D. From the other side, this factor may not be geographically located at the plant and even in the same country. Corresponding cost function is $C_X = (w_L, w_H, x)$, x being amount of differentiated product. Assuming Chamberlenian-type monopolistic competition, equilibrium conditions are $px = C_X(w_L, w_H, x)$ and $R(p,n) = \theta(w_L, w_H, x)$. Here p is the price of every variety of the differentiated product, n is a number of these varieties (and, correspondingly, of the very corporations), $R()$ is average

revenue divided by marginal revenue, $\theta()$ is average cost divided by marginal cost. As the author points out, these conditions are quite common, but the difference is that in the production of the differentiated product, there is a specific asset that can be applied anywhere.

Then, various initial endowments of the factors across two countries will generate various patterns and volumes of trade. There are also equilibria in commodity and factor markets. The commodity equilibrium is irrelevant for decision making, it serves only descriptive role and that's why is not considered in Helpman (1984). Equilibrium in factor market is described by following conditions: $a_{LY}(w_L, w_H)y + A_{LX}(w_L, w_H, x)n = L$,

$a_{HY}(w_L, w_H)y + A_{HX}(w_L, w_H, x)n = H$, where

$a_{iY}(w_L, w_H) = \partial C_Y(w_L, w_H)/\partial w_i$, $A_{iX}(w_L, w_H, x) = \partial C_X(w_L, w_H, x)/\partial w_i$, $i = L, H$, y is output of homogenous product. There is also the additional assumption that homogenous product is more labor-intensive than differentiated product, or $a_{LY}/a_{HY} > A_{LX}/A_{HX}$.

Now patterns of trade can be described using an Edgeworth box, where the horizontal axis represents labor, and the vertical axis represents general purpose factor. Despite position of initial endowment (vector O_1E), O_1Q is equilibrium distribution of factors for production of X, while O_1Q' corresponds to product Y. Due to the symmetry, from now we consider only regions above diagonal O_1O_2. So, in the region O_1QO_2 there is factor price equalization and no need to shift production of differentiated product abroad. But if endowment point is located above, there arises incentive to establish affiliates in other country. Thus, under the presence of large factor-proportions differences, multinational corporations exist. In turn, in O_1DQ and O_2QDF factor prices are equalized, while it is not the case for DIF, under strong factor-proportions difference. As

for factors, observable in real world, those proportions are derived from relative size of countries (for example, proxied by GDP) and relative factor endowments. Thus, one can use GDP and some proxies for factor proportions (for example, share of skilled labor) as regressors for FDI flows.

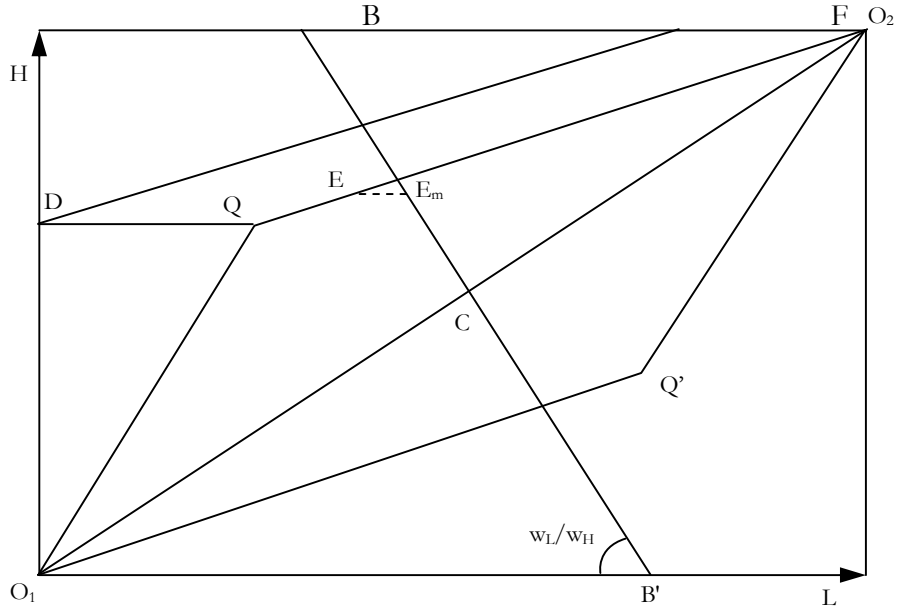


Figure 1. Edgeworth box for factor-proportions model

Source: Helpman (1984)

The "horizontal" hypothesis in Brainard (1993a) assumes that there are two countries (A and B), with distance D between them. Also, there are 2 goods – agricultural (homogenous) and manufactured (differentiated, with identical consumers' preferences: elasticity of substitution is constant and equal to σ). We mark these products as Q and Y and their shares of expenditures as E_Q and E_Y. Then, q_{is} and P_{ia} are the quantity and the price of variety *i* (of differentiated good) produced in country *a*, n_a is the number of varieties from country *a*. P_Y stands for the price of agricultural product, I denotes income. If we assume Cobb-Douglas

utility function ($Q^{\delta}Y^{1-\delta}$), then solving utility maximization problems yields: $E_Q=I\delta$, $E_Y=I(1-\delta)$.

As for production, there are two factors, labor (universal) and land (used only in the production of agricultural good). Factors endowments are distributed evenly across the countries: $L_i = \overline{L}, G_i = \overline{G}$. Wages are w_i. The price of the homogenous good is used as a numeraire. Agriculture has constant returns to scale and perfect competition. Manufacture has increasing returns to scale and therefore is monopolistic competition (of Chamberlenian type). This sector has two activities, corporate (unique for each variety) and production ones. Let's assume that corporate activities are R&D and denote it as *r*. The production stage has increasing returns to scale at the plant level, and has fixed (F) and variable (V) costs. Production costs are: $C^Q(w_i, r, q_i) = F(w_i) + V(w_i, r, q_i), \partial V(.)/\partial r < 0$. Besides, only in differentiated sector there are transport costs, modeled by the fraction of output lost during transportation: surviving part of shipment is $q_a e^{-Td_{ij}}$, $d_{aa} = 0, d_{ab} = D$, T is transport cost. Solving for market equilibrium, we have several scenarios of multinational production, depending on the parameters. Now we describe possible outcomes.

$$\frac{F(w)}{F(w)+C^r(w,r)} > \frac{(1-e^{TD(1-\sigma)})}{(1+e^{TD(1-\sigma)})}\frac{n_t(1+e^{TD(1-\sigma)})-e^{TD(1-\sigma)}}{n_t(1+e^{TD(1-\sigma)})+1-e^{TD(1-\sigma)}}$$

In this case, all firms have single plant; there is no incentive to expand abroad. So, single-plant scenario arises if fixed production costs are high, transport costs and distances are low. Number of firms located in each country is $n_t = \frac{\delta I}{\sigma[F(w)+C^r(w,r)]}$.

$$\frac{2F(w)}{2F(w)+C^r(w,r)} > \frac{2n_m(1-e^{TD(1-\sigma)})-(1-e^{TD(1-\sigma)})}{2n_m-(1+e^{TD(1-\sigma)})}$$

Here we have purely multinational equilibrium (all firms have two production facilities). This scenario arises if fixed production costs are low, transport costs and distances are high. Number of plants in each country is equal, and is $n_m = \frac{\delta I}{\sigma[2F(w)+C^r(w,r)]}$.

At last, in the intermediate range of model parameters, we have mixed equilibrium: single-plant and dual-plant configuration coexist. The share of single-plant firms is:

$$a = \frac{2}{1-e^{TD(1-\sigma)}} - \frac{\delta I}{\sigma n_c(F(w)+C^r(w,r_2)-C^r * w,r_2)}$$

Introduction of the third stage of production (sales) allows for intra-firm, intra-industry flows of intermediates that may substitute trade of final goods. Incorporation of factor proportions produces even more complex patterns of trade and investment.

In contrast to previously mentioned research, some new factors have been added here. Namely, Brainard (1993a) theoretically proved that distance and other barriers to trade and to investments should affect FDI.

At last, knowledge-capital model (e.g., Markusen and Venables (1995) and other related papers mentioned in the "Literature Review" section) of multinational enterprise allows for both horizontal and vertical investments. There are two

countries (h, home, and f, foreign), two homogenous goods (Y, taken as numaraire, and X) and two production factors (L, unskilled labor, and S, skilled labor). L is mobile between industries but immobile between countries, while R is used only in production of Y. There are also six types of firms: national n_i, vertical multinational v_i and horizontal multinational m_i, where i=h,f. The production function for Y is: $Y_i = (aL_{iy}^{\varepsilon} + (1-a)S_{iy}^{\varepsilon})^{1/\varepsilon}, i = h, f$, L_{iy} and S_{iy} are amount of labor used in Y-sector of country i.

Next, we define cost components. F_i^j represents skilled requirements for j-type firm, drawn from headquarters (i=1) and non-headquarters (i=2) country. G_j is unskilled labor requirements for j-type firm. Beside, there are four assumptions concerning fixed costs. First, skilled labor need is the same for national and vertical multinational firms: $F_1^n = F_1^v + F_2^v$. Also, $F_2^v > 0$. Second, skilled labor need for horizontal firms is somewhat higher than for national and vertical firms: $2F_1^n > F_1^m + F_2^m > F_1^n$, which reflects joint-input nature of knowledge capital. Also, $F_1^m > F^n$. Third, unskilled labor need is the same for all firm types: $G^m = G^n = G^v$. At last, to reflect the cost of separating plant and headquarters, and also to avoid degeneracy, fixed costs of vertical firm is 1% higher than for national firms: $F_1^v + F_2^v = 1.01 * F_1^n, G^v = 1.01 * G^n$. Now, we can construct costs functions. Here X_{ij}^k is sales of k-type firm, located in country i, in country j. L_{ij}^k and S_{ij}^k are demands of unskilled and skilled labor of i-country k-type firm in country j . w_i and z_i are wages of unskilled and skilled labor in country i, c is constant marginal production cost, t is the transport costs in terms of unskilled labor.

National firm:

$$w_i L_i^n + z_i S_i^n = w_i[cX_{ii}^n + (c+\tau)X_{ij}^n + G^n] + z_i F_1^n,\ i, j = h, f, i \neq j$$

Horizontal multinational firm:

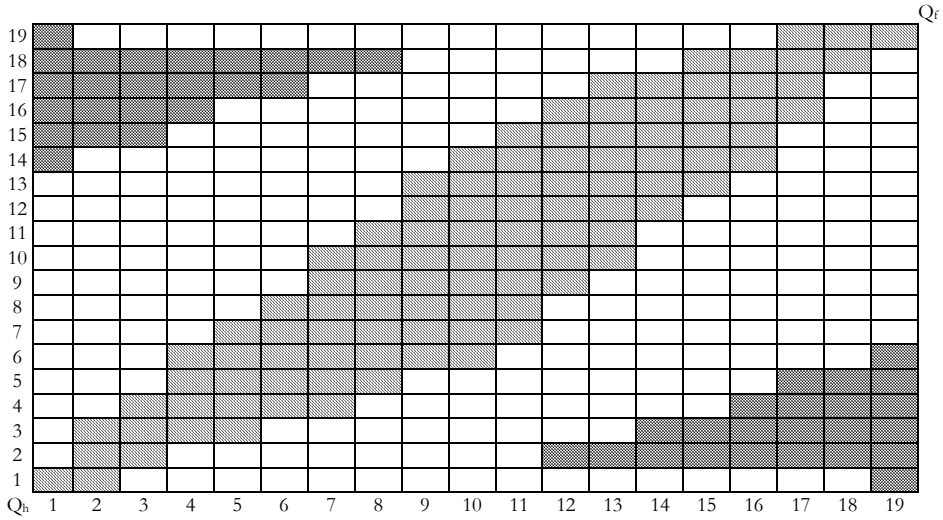
$$w_i L_{ii}^m + w_j L_{ij}^m + z_i S_{ii}^m + z_j S_{ij}^m = w_i[cX_{ii}^m + G^m] + w_j[cX_{ij}^m + G^m] + z_i F_1^m + z_j F_2^m$$

Vertical multinational firm:

$$w_j L_{ij}^v + z_i S_{ii}^v + z_j S_{ij}^v = w_j[cX_{jj}^m + (c+\tau)X_{ji}^v + G^m] + z_i F_1^v + z_j F_2 v$$

Then we use Cobb-Douglas utility functions, pricing equations (where marginal revenue equals marginal cost), free-entry conditions and Cournot model with homogenous products. Together, there are twelve inequalities for output, the same number of inequalities for markups, six inequalities for number of firms, and equations for goods prices, factor prices and income levels. Even partial equilibrium version of the model involves 30 non-linear inequalities, while full version has 51 of them. Analytical solution of such a complex system is impossible, so it can be solved only by numerical simulations.

τ=0.00



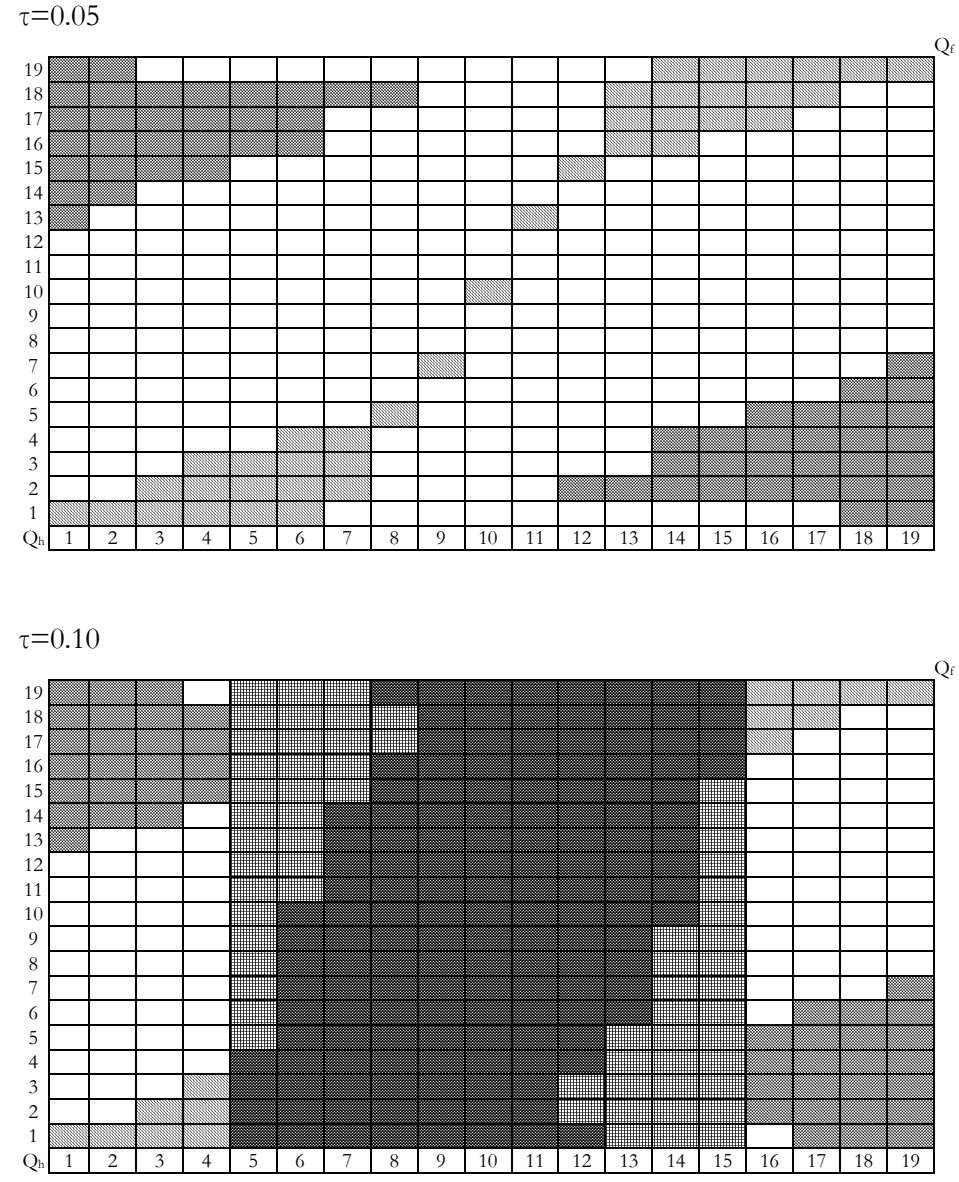


Figure 2. Regime diagram for Knowledge-Capital model.
Source: Markusen, Venables, Konan, and Zhang (1996)

The results are following, see Markusen, Venables, Konan and Zhang (1996). "… single plant national firms … dominate when the countries are similar in relative endowments and dissimilar in size. They can also arise when sizes are similar provided trade costs are low. Vertical multinationals … dominate when the countries are sufficiently dissimilar in relative endowments but somewhat similar in size. Two-plant horizontal multinationals dominate when the countries are similar in size and in relative endowments, and trade costs are moderate to high". These qualitative results are of special importance: they again confirm that such showings as economy sizes, factor endowments and distance affect foreign investments.

Also we can look at the investment process from decision making viewpoint. Then, source country GDP means the number of decision makers. Host economy size, presence of something in common (like common border, language or membership in various blocs) affects country reputation and availability of specific investment projects. The presence (and of course activity level) of investment promotion agency also influence the popularity of a host country. Other factors have effect on decisions. First group (e.g. growth rate, tax policy, DTT) influence profitability, while second group (factors such as credit rating, BIT) is related to risks.

Chapter 4

METHODOLOG Y AND DATA

4.1 Empirical Models

Cumbersome theoretical models described in the theory background section usually lead to rather simple empirical models. For example, Brainard (1993c) used the so called gravity model. The model was developed approximately forty years ago by Tinbergen (1962) and Poyhonen (1963). Originally, it was used to analyze only trade flows between countries. The idea of the gravity model is that amounts of bilateral resource flows will positively depend on size of source/destination countries (usually represented by GDP, sometimes by population size or land area, or even all mentioned factors are used simultaneously), which just reflects potential supply/demand, and negatively by transportation costs (that is reverse proportional to physical distance between countries). Despite of relative simplicity, gravity models are still used to examine various international trade theories. As Deardorff (1995) mentioned, even the simplest version of the gravity model works for neoclassical (i.e. Hecksher-Ohlin) trade theories. Usually, gravity equation takes the log-linear form:

$$\ln(FDI_{ij}) = \alpha + \beta_1 \ln(GDP_i) + \beta_2 \ln(GDP_j) + \beta_3 \ln(DIST_{ij}) + \sum_k \gamma_k D_{kij} + \varepsilon_{ij}$$

In order to take into account other factors, control dummy variables are usually used. For example, one should use common language, common border, membership in various organizations (for example, trading blocs like WTO) and being former colony or colony owner. One can check theories and hypotheses by

introducing new variables that represent new influences. For example, Blonigen and Davies (2000) used tax treaty as dummy variable.

Di Mauro (2000) used slightly different version of the gravity model:

$$\ln FDI_{ij} = a + \beta_1 \ln(SUMGDP_{ij}) + \beta_2 SIMSIZE_{ij} + \beta_3 RELENDOW_{ij} + \beta_4 DIST_{ij} + \sum_k \gamma_k D_{kij} + \varepsilon_{ij}$$

Here *SUMGDP*, *SIMSIZE* and *RELENDOW* represent total economy space, the measure of size similarity (taking values from –∞ to –0.69) and relative factor endowments:

$$SUMGDP_{ij} = GDP_i + GDP_j$$

$$SIMSIZE_{ij} = \ln\left[1 - \left(\frac{GDP_i}{GDP_i + GDP_j}\right)^2 - \left(\frac{GDP_j}{GDP_i + GDP_j}\right)^2\right]$$

$$RELENDOW_{ij} = \left(\ln\frac{GDP_i}{Pop_i} - \ln\frac{GDP_j}{Pop_j}\right)$$

The author suggests that both economic space and size similarity should have positive impact on FDI. The effect of relative endowment is twofold: similarity in factor endowments should stimulate horizontal FDI but suppress vertical FDI.

This modification of the gravity model is similar to the specification used by authors of knowledge-capital model in their empirical paper (Carr, Markusen and Maskus (1998)). It was also used by Blonigen and Davies (2000, 2001). The former paper is interesting because it uses both gravity and knowledge-capital models. It turned out that Markusen's model has more explanatory power: difference in R^2 is from 0.01 to 0.11 (depending on data). So, the equation is as follows:

$$FDI_{ij} = \alpha + \beta_1 SUMGDP_{ij} + \beta_2 (GDPDIF_{ij})^2 + \beta_3 SKDIFF_{ij} +$$
$$+ \beta_4 (GDPDIFF_{ij} * SKDIFF_{ij}) + \beta_5 INVC_j + \beta_6 TC_j + \beta_7 (TC_j * SKDIF_{ij}^2) + \beta_8 TC_i$$

Here SUMGDP and GDPDIF are simply sum and difference of countries' Gross domestic products. SKDIFF is skilled labor abundance in country i relative to country j. INVC and TC are investment and trade costs. There are also interactions of some variables used as independent variables.

$SUMGDP_{ij}$ is expected to have positive effect on FDI, while $GDPDIF_{ij}^2$ should be negatively correlated with investments. The coefficient near $SKDIFF_{ij}$ should be positive: headquarters are usually located in developed countries. The effects of investment and trade barriers are obvious: coefficients of $INVC_j$ and TC_j are expected to be negative and positive, respectively, because (horizontal) investment and i–>j trade flows are substitutes. The effect of TC_i should be negative because higher j->i trade cost suppresses vertical investment. The theory predicts that first interaction term, GDPDIFF*SKFIFF, should be negatively correlated with dependent variable. At last, "the interaction term between trade costs and squared endowment differences is designed to capture the fact that trade costs may encourage horizontal investment but not vertical investment and that horizontal investment is most important when relative endowments are similar. The coefficient should therefore be negative, weakening the direct effect of host-country trade costs". (Carr, Markusen and Maskus (1998)).

However, this equation was initially developed for affiliate sales as a measure of multinational activity. The problem is that data for affiliate sales are available for United States and Sweden only. Still, the equation may be used for FDI stock and (to less extent) to FDI flows as well, as was shown in Blonigen and Davies (2000). The authors cited following data for US: "… there are strong, statistically-

significant correlations between affiliate sales and FDI stock: in our sample, pairwise correlation is 0.88 for inbound FDI activity and 0.92 for outbound. Likewise, the pairwise correlation for FDI flows and affiliate sales are high statistically-significant (0.75 for inbound and 0.66 for outbound)". Correspondingly, explanatory power is different: R^2 is 0.63, 0.38 and 0.30, respectively (for knowledge-capital version applied to inbound FDI).

I will use all three models for my needs, choosing the one with the best explanatory power. For example, there are contradictory evidences concerning applicability of the gravity model to transition economies. Christie (2003) exploited this model for Southeast Europe successfully, while Altomonte (1998) in his research of FDI in CEE counties found that such gravity factor as market demand (in terms of GDP per capita) does not have an effect on foreign direct investment. As for variation of the gravity model in Di Mauro (2000), as Christie (2003) points out, this version has slightly better fit, but is less solid from econometric viewpoint.

As for knowledge-capital model, this is its first testing for transition economies. In other words, it is the first attempt to test the effect of factor proportions (in terms of skilled labor) on FDI activity of Eastern European countries. The only similar study is Manaenkov (2000a), but it is related to Russia only. The author states that the amount of skilled labor (measured as share of population with secondary education) effect FDI attracted to a region.

At last, empirical estimation of Real Options theory requires micro-level (at least industry-level) data, because one should know if there are sunk costs associated with particular FDI flow. At least two dummy variables are usually used: the presence of advertisement and of R&D in an industry. That's why I cannot employ it.

4.2 Data Description

FDI, our dependent variable, is used as measured by annual basis. First of all, bilateral FDI flows are not available by the quarter for every destination country. But the main concern is "inconvenient" FDI distribution through a year. For example, in 2002, last quarter accounts for about half of FDI inflow into Ukraine. Thus "by-the-quarter" data do not represent a meaningful trend. The reason may be that investments plans are developed annually by decision-makers, whereas the distribution of those funds through the year is stochastic. The source of data is OECD FDI flows' database, as well as central banks and investment promotion agencies of countries. I use multiple sources because every single one has its own limitations. For example, there are only 28 OECD countries; some of them (Greece, Iceland and Ireland) do not report outflows. Moreover, the list of OECD partner countries includes only 9 of 18 CEE countries.

Table 1. FDI data coverage

Country	Years	Count-ries	Volume Coverage	Obser-vations	Zero	Negative	NetObs
Ukraine	9	17	86%	153	1	12	140
Belarus	10	23	98%	230	15	0	215
Czech	10	13	94%	130	7	6	117
Bulgaria	11	24	92%	264	43	9	212
Slovenia	8	24	99%	192	7	48	137
Croatia	6	10	93%	60	0	4	56
Poland	7	30	99%	210	1	15	194
Estonia	9	30	99%	270	103	65	102
Lithuania	5	40	99%	200	12	39	149
Hungary	8	33	99%	264	37	59	168
Russia	9	22	94%	198	56	19	123
Romania	9	16	95%	144	48	9	87
TOTAL				**2432**	**332**	**285**	**1815**

First problem with FDI data is related to sign of each value. Due to the log-linear nature of the gravity model, it cannot be applied for zero and negative (due to the abundance of capital repatriation or reverse investment) observations. Thus, the number of effective observations is reduced (see *Table 1*); in my case reduction

constitutes about 25%, from 2432 to 1815. Despite simplicity and obviousness of this issue, it was mentioned only in recent studies, by Christie (2003) and Hallward-Driemeier (2003). Fortunately, panel data estimators allow for discontinuous (unbalanced) datasets. For example, as Verbeek (2000) mentions, with some adjustments to computations, unbalanced panel dataset should provide us with consistent estimations. Without adjustments, selection bias may appear.

Another problem concerns data comparability. Recently, Borrmann (2003) summarized all issues concerning quality of FDI statistics of European countries (including East Europe). Most severe problems are related to the very definition of FDI. First, not all countries applied 10% threshold for identification of foreign direct investor all the time, using other percentage instead. Besides, treatment of indirect ownership differs across the countries. Inclusion of reinvested earnings also may substantially affect comparability of FDI data. Another severe problem is reverse investment. At last, there is number of concerns related to data sources and data collection methods. By the way, some problems exist not only in transition economies, but even in developed countries: they have their own long-term tradition of handling these data, so they rather slowly adopt new standards recently proposed by IMF and OECD.

Standard gravity factors are taken from various sources. For instance, I take GDP values from IMF International Financial Statistics. GDP is then divided by US FDP deflator. Population and labor endowments characteristics are taken from publications of World Bank and International Labor Organization. Capitals, common borders and common language are taken from CIA World Factbook 2003. Common border may affect the amounts of capital flows, though effect is predicted to be much lower than for trade flows. Following Carr, Markusen and

Maskus (1998), all money variables (FDI, GDP and GDP per capita) are converted to 2000 U.S. dollars.

Distance between countries is proxied by distance between capitals, computed using online calculator available at www.indo.com/distance. Obviously, it should be less than for trade flows. Still, the effect should be negative, because an investor knows less about remote countries. But from the viewpoint of transportation costs, the effect of this variable is ambiguous. Greater distance should discourage vertical FDI and promote horizontal investment. In practice, researchers usually obtain negative values for this variable's coefficient.

The data on Bilateral Investment Treaties and Double Taxation Treaties were taken from UNCTAD Database Online, available for all countries and for all years. Important issue: one should use not the date of signature, but the date of ratification (whereupon a treaty comes into effect). The question is that sometimes these two dates may be separated by several years. Moreover, as Hallward-Driemeier (2003) mentioned, Brazil concluded 13 BITs, but all of them were not ratified. Exact date of ratification is available, but since I use only by-year quantization, I assign a treaty to next year (after year of signature), if it was concluded after 30 June. Some countries do not have some type of treaties at all. For instance, Bosnia and Herzegovina, Slovakia have no DTTs. Obvious advantage is that rather large amount of treaties were concluded during time range covered by my sample. Actually, 84 Bilateral Investment Treaties and 82 Double Taxation Treaties were concluded in years covered by sample.

There is a treaties-oriented problem related to emerging countries. For example, Russia's (Double Taxation) treaties sometimes mean treaties signed by Soviet Union. The same is true for Ukraine: until the conclusion of new treaties, old Soviet DTTs with Cyprus, Italy, Japan, Malaysia, Mongolia and Spain remain in

force. Besides, treaties concluded by Czechoslovakia are valid for Czech Republic. The associated problem is that those treaties were concluded before our sample begins, thus increasing the number of old treaties. As Blonigen and Davies (2001) mentioned, data on such treaties have smaller contribution to investigation of the effect of treaties on FDI. When we compare different pairs of countries, differences in FDI may be explained by some unobserved factors.

Another problem is multicollinearity due to the correlation between dates of signatures of BIT and DTT between two counties, when pair of treaties was concluded during a rare meeting of some high officials of two countries. The coefficient of correlation is 0.6, varying from –0.05 for Czech Republic to 0.57 for Ukraine. This multicollinearity may decrease significance of corresponding estimated coefficients. If they will be insignificant at all, it would be useful to run separate regressions for BITs and DTTs.

The problem was how to model trade costs. Weighted average of import duties could be the best possible answer, but those tariffs are not the only trade restrictions. So, following Blonigen and Davies (2001), trade openness was proxied by ratio of trade turnover to country's GDP, and cost is just reciprocal number. These data were taken from Penn World Table version 6.5. Dataset was augmented for years 2001-2002 using data from World Bank. For some source countries (especially offshore ones – Bahamas, Bermuda, Gibraltar, Liechtenstein, and Virgin Islands) data on trade openness were unavailable, so corresponding flows were dropped from the estimation of the Knowledge-Capital Model. The same problem is true for investment costs. Carr, Markusen and Maskus (1998) used unpublished data on investment impediments from Global Competitiveness Report (calculated by World Economic Forum). These data are unavailable for public use, so I employed similar proxy, GDP/FDI ratio.

Also, memberships in various trading and other blocs are used as control variables. CIS membership variable are of specific interest in my model. It is obvious that the states of the former USSR were tightly connected by industrial cooperation, and after 1991 cooperation links won't break in one moment. Actually, such common characteristic as standard system, relatively low quality of produced goods and also political ties are rather strong even after more than ten years of independence. But I decided to extend this issue and check how intra-transition flows differ from FDI to transition economies from developed countries.

In order to check the hypothesis of "domestic foreign" investment, I should use control dummy variable for offshore country of investment origin. That is, if a country is treated as offshore jurisdiction, I should point out this fact in the model. Exact list of such jurisdictions is issued and annually updated by Cabinet of Ministers of Ukraine (by corresponding government regulations). Due to forthcoming accession of Cyprus to European Union, starting from this year the Cyprus begins to raise its tax rates, but for previous years this country should be obviously regarded as offshore.

Chapter 5

EMPIRICAL TESTS AND RESULTS

5.1 Specification Tests

I used Stata 6.0 software package to perform all calculations (see *Appendix 4* to view my do-file). First, we should determine which estimator to use, pooled OLS, random effects or fixed effects. To distinguish between pooled and panel data regressions, we can use the F-test. It checks the hypothesis if all constant terms are equal. We calculate this statistics according to the formula:

$$F(n-1, nT-n-K) = \frac{(R_u^2 - R_p^2)/(n-1)}{(1-R_u^2)/(nT-n-K)}$$

Here n is the number of groups (country pairs, in my case), T is the number of time periods (years), K is the number of independent variables. Besides, u denotes FE and p means pooled OLS. If the value is greater than critical value for given degrees of freedom, we should not use pooled regression. In all our cases, we reject pooled OLS estimation (see *Table 2*).

Then we need to select between random effects and fixed effects (when we have separate dummies for each group). Besides, the sample may be grouped by country pairs (332 groups) or by host country (12 groups). In first case, distance, common border and language, and source country being offshore or transition economy are replaced with constants in FE. Random effects regression is more efficient, but it can produce inconsistent estimators. That's why we need to run Hausman specification test in order to check if there is non-zero correlation

between individual effects and exogenous variables. Corresponding statistics is calculated as follows: $[b_{FE} - b_{RE}]'[Var(b_{FE}) - Var(b_{RE})]^{-1}[b_{FE} - b_{RE}] = \chi^2(K)$

Table 2. Tests for regressions types

	Gravity		Di Mauro's		Knowledge-Capital	
	Pairs	Host	Pairs	Host	Pairs	Host
F-test	0.0000		0.0000		0.0000	
Hausman test	0.0036	0.9947	0.0000	0.0000	0.0017	

This test's results differ for different models. For ordinary gravity it is in favor of random-effects GLS estimation (host country grouping) and fixed effects (pairs). For Di Mauro's and Knowledge-Capital specification, both groupings lead to fixed effects. However, fixed-effect specification produces much lower R squared (even less than 1%) and incorrect signs of several variables (for example, for GDP sum in Knowledge-Capital model).

5.2 Regressions' results

First I present results for usual gravity. Here host grouping (with random effects) is obviously preferred (on the basis of R squared). Therefore I choose this specification as a benchmark for further elaborations. In general, it has appropriate goodness of fit. All coefficients are significant and have expected signs. The effect of host (destination) GDP is greater than for source GDP. This means that demand is more important than supply here.

As for my promotion dummies, all of them are significant and positive. Coefficients for treaties exhibited almost the same magnitude and significance. And the IPA coefficient is four times greater and also has ultimate significance. In monetary terms this means that the presence of BIT or DTT will increase

particular bilateral FDI flow by 25%. And IPA will more than double amount of FDI. Moreover, this is true from each source country.

Table 3. Summary for Standard Gravity Model

Model	Exp. Sign	Pooled OLS	FE, Pairs	RE, Hosts
Ln(Gdp1)	+	0.4432 ***	-0.4074 ***	0.4378 ***
Ln(Gdp2)	+	0.6354 ***	0.0721 ***	0.6099 ***
Ln(dist)	–	-0 .6635 ***	(dropped)	-0.6683 ***
Border	+	0.7410 ***	(dropped)	0.5667 ***
Language	+	- 0.0514	(dropped)	0.6211 **
BIT	**+**	**0.3153 ** **	**0.2525 * **	**0.2189 * **
DTT	**+**	**0.3872 *** **	**-0.1634 **	**0.2079 * **
IPA	**+**	**1.1200 *** **	**1.0369 *** **	**0.8658 *** **
Offshore	+	1.6678 ***	(dropped)	1.3954 ***
Transition	–	-1.1693 ***	(dropped)	-1.1447 ***
Adj. R^2		*0.4484*	*0.0170*	*0.4457*

* – 10% significance, ** – 5%, *** – 1%

Di Mauro's model, where economy sizes are treated in slightly different way and relative factor endowments proxy is added, exhibited quite expected results. Again, we choose pair grouping (but FE, as was already mentioned). Economic space and size similarity have positive (and significant) effect on FDI. Other gravity variables (distance and common border) also demonstrate significance and predicted signs. Relative endowment variable is significant and positive, which implies dominance of vertical-type investment in the region. The point is that factor proportions usually matters only for vertical FDI. As for my promotion dummies, again, all of them are significant and positive. However, coefficient for BIT is about 50% higher than for DTT, which is unexpected. By definition, exclusion of double taxation seems to be more convincing policy than just general "legal protection".

Table 4. Summary for Di Mauro's Gravity

Model	Exp. Sign	Pooled OLS	FE, Pairs	FE, Hosts
Sumgdp	+	0.9530 ***	0.2067	0.6583 ***
Simsize	+	0.4115 ***	-0.4041	0.1682 **
Relendow	?	0.3075 ***	-0.9450 ***	0.3347 ***
Ln(dist)	–	-0.6198 ***	(dropped)	-0.5656 ***
Border	+	0.8683 ***	(dropped)	0.62825 ***
Language	+	-0.0309	(dropped)	1.0337 ***
BIT	+	**0.3262 *** **	**0.2387 * **	**0.3041 *** **
DTT	+	**0.4744 *** **	**-0.1659**	**0.2118 * **
IPA	+	**1.4241 *** **	**1.0141 *** **	**0.9202 *** **
Offshore	+	1.7728 ***	(dropped)	1.0962 ***
Transition	–	-0.4952 ***	(dropped)	-0.4820 ***
Adj. R^2		*0.4578*	*0.0050*	*0.4379*

* – 10% significance, ** – 5%, *** – 1%

At last, I run regressions for Knowledge-Capital Model that is the most contemporary and includes the greatest number of explanatory variables. By the way, this model is not log-linear and therefore we can restore zero and negative FDI values, thus increasing number of effective observations. Again, host grouping (with FE) is preferential here. First of all, the model exhibited more than three times lower adjusted R squared than previous models, namely, about 13%. One possible reason for this is that, as was already mentioned, initially the model was developed for affiliate sales. As Blonigen and Davies (2001) noted, goodness of fit for FDI stocks is lower, and even lower for FDI flows.

All significant coefficients exhibited expected signs. From the other hand, some results were surprising. Two "core" model variables that include Skilled Labor Difference were insignificant. This is despite I used the best possible data for this variable (from International Labor Organization, like creators of the model did). For comparison, Blonigen and Davies (2000, 2001) employed World Bank's data on education attainment. One possible explanation for this insignificance is that

vertical FDI are not dominant in the region. As was already mentioned, factor proportions affect only vertical investment. However, this result contradicts results of Di Mauro's regression. Trade and investment barriers for host country are not significant. Some magnitudes are high, but this is still linear model.

But in the context of my research, the main problem with Knowledge-Capital model is that it failed to reveal how investment promotion instruments affect FDI flows. All corresponding variables (BTT, DTT and IPA) were insignificant. The only exception is pooled OLS (rejected by F-test) which exhibited strong evidence that the presence of IPA is beneficial for FDI.

Table 5. Summary for Knowledge-Capital Model

Model	Exp. Sign	Pooled OLS	FE, Pairs	FE, Hosts
Sum	+	0.1157 ***	-0.1452 **	0.0950 ***
$GDPdif^2$	–	-9.64e-06 ***	7.79e-06	-7.85e-06 ***
SKdif	+	245.07 **	115.09	209.49 *
GDPdif*SKdif	–	0.0499	-0.093	0.0315
INVC	–	-48.443 ***	-28.683 *	-16.147
TC2	+	4192.4 ***	-1630.2	-874.46
TC1	–	-6623.0 ***	-7300.7 **	-6124.8 ***
$TC2*SKdif^2$	–	-63199	-30007	-28424
Ln(dist)	–	-32.308 ***	(dropped)	-0.0042 *
Border	+	137.61 ***	(dropped)	153.07 ***
BIT	+	**23.064**	**-38.507 ***	**10.078**
DTT	+	**-0.3827**	**-25.422**	**-2.9715**
IPA	+	**44.534 *****	**-1.3448**	**-7.2023**
Offshore	+	8.0249	(dropped)	5.8646
Transition	–	-106.48 ***	(dropped)	-91.683 ***
Adj. R^2		*0.1563*	*0.0074*	*0.1360*

* – 10% significance, ** – 5%, *** – 1%

Then I deal with multicollinearity (for treaties). This problem was solved using separate regressions for BITs and DTTs (for standard gravity, host-grouped, FE).

The separation produced quite expected results, see *Table 6*. Both magnitudes and significance of the coefficients increased, however not drastically.

There is also a potential problem of endogeneity: a treaty may be concluded during drop of FDI flows, just to overcome this problem. So, we need instrumental variable for treaties. One can use number of concluded treaties as this instrument. As Hallward-Driemeier (2003) mentions, "The willingness of a host to ratify a BIT, as measured by the number of outside BITs, should be correlated with the probability it signs with this particular host country, but shouldn't affect the amount of FDI that particular source country would send. Thus, when US investors are considering investing in India, their decision would not be affected by whether India has ratified treaties with the UK or France. However, that India has entered other treaties would be expected to influence their willingness to enter such a treaty with the US".

Thus, I use instrumental variables (2SLS) approach, with number of outside treaties as instruments. The coefficients of correlation between treaty dummies and suggested instrumental variables are about 45% for BIT and 60% for DTT. These numbers are appropriate, so we can use those variables as instruments. Unfortunately, I failed to find appropriate instrument for IPA, whose effect on FDI also may be subject to reverse causation. However, instruments for treaties produced an excessive magnitude, which prejudices their appropriateness. Actually, when I use IV for both treaties simultaneously, the DTT coefficient becomes negative. Separate regressions for both treaties produce positive coefficients but they are much higher than without IV. The only possible explanation is that selected instruments are not valid.

Table 6. Multicollinearity- and endogeneity-corrected estimations (gravity)

Coef.	Random Effects			Instrumental Variables		
	Both	BIT	DTT	Both	BIT	DTT
BIT	0.2189 (0.060)	0.2727 (0.011)	–	12.46 (0.000)	3.7825 (0.000)	–
DTT	0.2079 (0.096)	–	0.2343 (0.042)	-9.52 (0.000)	–	1.8644 (0.000)
R^2	*0.0170*	*0.0174*	*0.0103*	–	*0.1910*	*0.4082*

A separate note should be made regarding offshore and transition countries as source economies. With exception of last model, all other ones showed strong evidence (in terms of both size and significance) that, controlling for gravity factors, offshores provide excessive amounts of FDI. This is despite the fact that for some host countries (e.g. for those whose data on FDI flows I obtained from OECD database – Russia and Romania) I don't have inflows from such jurisdictions. Obviously, these funds are just officially from those countries, while their true origins are other economies, including host countries.

Second, and this was less obvious than previous finding, I also got strong evidence (in this case without exceptions) that transition economies invest abroad less. Possible explanations include sufficient amount of local possibilities to invest because of privatization (or vice-versus, fund deficit) in those countries, lack of managerial skills to develop foreign affiliates network and lack of credit of owners (including authorities) to sell enterprises to investors from other neighboring, not western countries.

Detailed results (Stata 6.0 output) of the most efficient estimation technique for each model are presented in *Appendices 5-7*. Its worth mentioning that I included also time effects, but this don't change the results significantly. However, positive time trend exists.

Chapter 6

CONCLUSIONS

The main finding of my paper is that, unlike the whole world in general (where only IPAs are productive), all FDI promotion tools are effective. At least, most used specifications support this conclusion. However, a note should be made concerning effect ranking of promotion instruments. The effect of treaties is found to be relatively small. And the most effective are active entities, Investment Promotion Agencies. In this sense, my results are correlated with others' findings (like Morriset and Andrew-Johnson (2003)), because IPAs are found the only "real" instrument (among considered three).

Thus, the evidence for treaties' effectiveness is rather weak. Actually, for some model and specifications the results are not significant. Moreover, CEE countries have already concluded treaties with most major investors. Now total FDI flows are covered by BITs and DTTs by about 90%. Thus, conclusion of new treaties lacks practical use. Their marginal effect will be even less than of existing ones.

Policy implications

So, obvious policy implication for Ukrainian authorities would be to stop paying much attention to conclusion of new treaties and to switch efforts to Investment Promotion Agency (in terms of both political will and funds). However, recently Ukrainian government decided to create an IPA. The decree was issued by President Leonid Kuchma in July 2003, but government started to implement it only recently. But this should be done cautiously and using classical practices.

The problem is that our country actually already had investment promotion agency. During 1995-2000 there was state corporation Gosinvest. But its powers were excessive. State shares (up to 30%) of some very attractive enterprises were passed to private companies (including not foreign ones). Among them were, for example, NPK Galochina, Naftohimik Prikarpattya. But when Gosinvest was closed, State Property Fund of Ukraine could not recover those shares. Thus, we cannot consider Gosinvest as classical IPA (and actually, I didn't include it into my regression). The only real investment project was creation of joint enterprise AutoZAZ-Daewoo.

Further development

Besides, I would like to suggest several possible ways of how this research could be enhanced. For example, one should somehow analyze those tools more thoroughly, not just using dummies for them. The simplest extension of this kind will be to use not the presence of Investment Promotion Agency, but also their budget, staff and set of functions. Actually, this was performed by Morriset and Andrew-Johnson (2003), but for year 2001 only and only for some transition economies. And of course, data on more countries and better proxies for some variables are needed.

Another possible extension is to analyze some more specific FDI policy tools, like regional instruments. For example, it would be useful to test if the presence of free economic zones or territories of preferential treatment will affect distribution of foreign direct investment across regions of a country. For example, Kachur (2002) performed similar research, but for Ukraine only and for total investment, not for FDI. The study of Manaenkov (2000b) was devoted to foreign direct investment, but for Russia only.

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APPENDIX 1

Bilateral Investment Treaties with Ukraine (effective)

Country	**Date of entry into force**
China	29.05.1993
Denmark	29.04.1994
Egypt	10.10.1993
Finland	30.01.1994
Mongolia	05.11.1992
Germany	29.06.1996
Poland	14.09.1993
United Kingdom	10.02.1993
Uzbekistan	06.06.1994
Armenia	07.03.1996
Bulgaria	10.12.1995
Canada	24.06.1995
Czech Republic	02.11.1995
France	26.01.1996
Greece	04.01.1997
Hungary	03.12.1996
Israel	18.02.1997
Kazakhstan	09.01.1997
Lithuania	06.03.1995
Netherlands	01.06.1997
Slovakia	03.04.1996
United States	16.11.1996
Viet Nam	08.12.1994
Argentina	06.05.1997
Belarus	11.06.1997
Chile	29.08.1997
Cuba	04.12.1996
Estonia	05.06.1995
Georgia	24.04.1995
Italy	12.09.1997
Moldova	20.05.1996
Sweden	01.03.1997
Switzerland	21.01.1997
Austria	01.12.1997
Indonesia	22.06.1997
Korea	03.11.1997
Turkey	21.05.1998
Azerbaijan	09.12.1997
Latvia	30.12.1997
Serbia and Montenegro	14.08.2001

Source: UNCTAD

APPENDIX 2

Double Taxation Treaties with Ukraine (effective)

Country	Date of entry into force
Austria	20.05.1999
Azerbaijan	03.07.2000
Armenia	19.11.1996
Belarus	30.01.1995
Belgium	25.02.1999
Bulgaria	03.10.1997
United Kingdom	11.08.1993
Hungary	24.06.1996
Viet Nam	19.11.1996
Georgia	01.04.1999
Denmark	21.08.1996
Egypt	27.02.2002
India	31.10.2001
Indonesia	09.11.1998
Iran	21.07.2001
Kazakhstan	14.04.1997
Canada	22.08.1996
Kyrgyzstan	01.05.1999
China	18.10.1996
Latvia	21.11.1996
Lithuania	25.12.1997
Macedonia	23.11.1998
Moldova	27.05.1996
Netherlands	02.11.1996
Norway	18.09.1996
Poland	24.03.1994
Korea, republic of	19.03.2002
Russian Federation	03.08.1999
Romania	17.11.1997
Slovakia	22.11.1996
United States	05.06.2000
Turkmenistan	21.10.1999
Turkey	29.04.1998
Uzbekistan	25.07.1995
Finland	14.02.1998
France	01.11.1999
Germany	04.10.1996
Croatia	01.06.1999
Czech republic	20.04.1999
Switzerland	26.02.2002
Sweden	04.06.1996
Estonia	24.12.1996
Yugoslavia	29.11.2001.

Source: State Tax Administration of Ukraine

APPENDIX 3

Investment Promotion Agencies in Transition Economies

Country	Agency	Year	Status
Poland	Polish Agency for Foreign Investment	1992	A
Czech Republic	CzechInvest	1993	SA
Slovenia	Slovenian Trade and Investment Promotion Agency	1995	NA
Hungary	Hungarian Investment and Trade Development Agency	1993	NA
Bulgaria	Bulgarian Foreign Investment Agency	1995	A
Bosnia & Herzegovina	Foreign Investment Promotion Agency	1998	SA
Estonia	Estonian Investment Agency	1994	SA
Lithuania	Lithuanian Development Agency	1997	NA
Russia	National Agency for Foreign Investment	1998	NG

Status: A – autonomous, SA – semi-autonomous, NA – non-autonomous, NG – non-governmental

APPENDIX 4

STATA do-file

```
use "D:\Thesis\_thesis\FDI.dta"
tis Year
iis ID
(and all listed below for "iis ID2")

gen lfdi=log(FDI)
gen lgdp1=log(GDP1)
gen lgdp2=log(GDP2)
gen ldist=log(Distance)

gen sumgdp=log(GDP1+GDP2)
gen simsize=log(1-(GDP1/(GDP1+GDP2))^2-(GDP2/(GDP1+GDP2))^2)
gen relendow=(log(PC1)-log(PC2))

gen sum=GDP1+GDP2
gen GDPDIF2=(GDP1-GDP2)^2
gen SKDIF=Lab1-Lab2
gen inter1=(GDP1-GDP2)*SKDIF
gen _TC1=1/TC1    ;    gen TC2_=1/TC2    ;      gen _INVC=1/INVC
gen inter2=TC2_*(SKDIF^2)

xtreg lfdi lgdp1 lgdp2 ldist Border Language Off BIT DTT IPA Trans, re
xthaus
xtreg lfdi lgdp1 lgdp2 Distance Border Language Off BIT IPA Trans, re
xtreg lfdi lgdp1 lgdp2 Distance Border Language Off DTT IPA Trans, re

xtreg lfdi sumgdp simsize relendow Distance Border Language Off BIT DTT IPA Trans,
re
xthaus
xtreg FDI sum GDPDIF2 SKDIF inter1 _INVC _TC2 _inter2 _TC1 Distance Border
Language Off BIT DTT IPA Trans, re
```

APPENDIX 5

Stata output for Standard Gravity, host grouping, random effects

```
> xtreg lfdi lgdp1 lgdp2 ldist Border Language Off BIT DTT IPA Trans, re
```

```
Random-effects GLS regression                   Number of obs      =      1835
Group variable (i) : ID2                        Number of groups   =        12

R-sq:  within  = 0.2955                         Obs per group: min =        46
       between = 0.5544                                        avg =     152.9
       overall = 0.4457                                        max =       309

Random effects u_i ~ Gaussian                   Wald chi2(10)      =   1011.04
corr(u_i, X)       = 0 (assumed)                Prob > chi2        =    0.0000

------------------------------------------------------------------------------
        lfdi |      Coef.   Std. Err.       z     P>|z|       [95% Conf. Interval]
-------------+----------------------------------------------------------------
       lgdp1 |   .4378109   .0262615     16.671   0.000       .3863393    .4892824
       lgdp2 |   .6098892   .0615646      9.906   0.000       .4892248    .7305536
       ldist |  -.6683396    .055133    -12.122   0.000      -.7763982   -.5602809
      Border |    .566717   .1682673      3.368   0.001        .236919    .8965149
    Language |   .6210861   .3148524      1.973   0.049       .0039866    1.238185
         Off |   1.395449   .1432842      9.739   0.000       1.114617    1.676281
         BIT |   .2189731   .1163327      1.882   0.060      -.0090349     .446981
         DTT |    .207903   .1248001      1.666   0.096      -.0367007    .4525067
         IPA |   .8657985   .1153871      7.503   0.000        .639644    1.091953
       Trans |   -1.14473   .1573333     -7.276   0.000      -1.453097   -.8363624
       _cons |   1.628257   .4845683      3.360   0.001       .6785202    2.577993
-------------+----------------------------------------------------------------
     sigma_u |  .17286557
     sigma_e |  1.7120087
         rho |  .01009252   (fraction of variance due to u_i)
------------------------------------------------------------------------------
```

APPENDIX 6

Stata output for Di Mauro's Gravity, host grouping, fixed effects

```
> xtreg lfdi sumgdp simsize relendow ldist Border Language Off BIT DTT IPA Trans, fe

Fixed-effects (within) regression               Number of obs      =      1835
Group variable (i) : ID2                        Number of groups   =        12

R-sq:  within  = 0.3195                         Obs per group: min =        46
       between = 0.6007                                        avg =     152.9
       overall = 0.4379                                        max =       309

                                                F(11,1812)         =     77.32
corr(u_i, Xb)  = 0.3407                         Prob > F           =    0.0000

------------------------------------------------------------------------------
        lfdi |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
-------------+----------------------------------------------------------------
      sumgdp |   .6583179   .0610478     10.784   0.000       .5385864    .7780494
     simsize |   .1682707   .0700141      2.403   0.016       .0309539    .3055875
    relendow |   .3347291   .0548708      6.100   0.000       .2271123    .4423458
       ldist |  -.5655688   .0569763     -9.926   0.000       -.677315   -.4538226
      Border |   .6282496   .1567216      4.009   0.000       .3208756    .9356236
    Language |   1.033709   .2937026      3.520   0.000       .4576776     1.60974
         Off |   1.096167   .1329934      8.242   0.000       .8353302    1.357003
         BIT |   .3041197   .1096327      2.774   0.006          .0891    .5191394
         DTT |   .2118138   .1199174      1.766   0.078       -.023377    .4470046
         IPA |    .920185   .1369243      6.720   0.000       .6516389    1.188731
       Trans |  -.4820278   .1718596     -2.805   0.005      -.8190916   -.1449641
       _cons |   .7924927   .5427412      1.460   0.144      -.2719714    1.856957
------------------------------------------------------------------------------
     sigma_u |  1.2237426
     sigma_e |  1.6851729
         rho |  .34526719   (fraction of variance due to u_i)
------------------------------------------------------------------------------
F test that all u_i=0:     F(11,1812) =    70.56            Prob > F = 0.0000
```

APPENDIX 7

Stata output for Knowledge-Capital, host grouping, random effects

```
> xtreg FDI sum GDPDIF2 SKDIF inter1 _INVC _TC2 _inter2 _TC1 Distance Border Language Off BIT DTT IPA Trans, fe
```

```
Fixed-effects (within) regression               Number of obs      =      1231
Group variable (i) : ID2                        Number of groups   =         9

R-sq:  within  = 0.0982                         Obs per group: min =        40
       between = 0.5232                                        avg =     136.8
       overall = 0.1360                                        max =       204

                                                F(15,1207)         =      8.76
corr(u_i, Xb)  = 0.1996                         Prob > F           =    0.0000

------------------------------------------------------------------------------
         FDI |      Coef.   Std. Err.       t     P>|t|       [95% Conf. Interval]
-------------+----------------------------------------------------------------
         sum |   .0950195   .0166732      5.699   0.000       .0623078    .1277311
     GDPDIF2 |  -7.85e-06   1.87e-06     -4.201   0.000      -.0000115   -4.18e-06
       SKDIF |   209.4957   127.4069      1.644   0.100      -40.46785    459.4593
      inter1 |   .0315285   .0542882      0.581   0.562      -.0749813    .1380382
       _INVC |   -16.1475   19.48745     -0.829   0.407      -54.38055    22.08554
         _TC2 |  -874.4675   2477.631     -0.353   0.724       -5735.41    3986.475
     _inter2 |  -28424.91   53847.06     -0.528   0.598      -134069.1    77219.31
        _TC1 |  -6124.831   1352.906     -4.527   0.000      -8779.139   -3470.523
    Distance |  -.0042448    .002391     -1.775   0.076      -.0089358    .0004462
      Border |   153.0773   23.25303      6.583   0.000       107.4565    198.6982
    Language |  (dropped)
         Off |   5.864573    21.5895      0.272   0.786      -36.49255     48.2217
         BIT |   10.07877   16.98444      0.593   0.553      -23.24354    43.40107
         DTT |  -2.971531   18.42351     -0.161   0.872       -39.1172    33.17414
         IPA |  -7.202264   24.04721     -0.300   0.765      -54.38124    39.97671
       Trans |  -91.68369   22.13929     -4.141   0.000      -135.1194   -48.24793
       _cons |   127.7259    39.1175      3.265   0.001       50.98001    204.4717
-------------+----------------------------------------------------------------
     sigma_u |  74.895356
     sigma_e |  213.83632
         rho |   .1092682   (fraction of variance due to u_i)
------------------------------------------------------------------------------
F test that all u_i=0:     F(8,1207) =    11.31                 Prob > F = 0.0000
```