EXPLAINING FOREIGN DIRECT INVESTMENT IN TRANSITION

by

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Abstract

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This paper, using a dataset containing information on OECD countries' FDI into transition economies, examines the nature and determinants of FDI as well as the possibility and instruments for two transition countries to compete for FDI from the same source. Estimation results based on the gravity approach revealed the vertical nature of FDI and show that along with traditional determinants such as markets' demand, interest rates, relative capital to labor ratio, and labor costs, exchange rate related factors are also significant and plausible. Countries with stable and floating exchange rate attract more FDI. Theoretical results also suggest that transition country's currency appreciation more than that of its rival can divert FDI inflows towards the competitor. Countries can also compete for FDI by having relatively higher economic growth rate, relatively lower interest rates and relatively lower unit labor costs. However, it appeared to be that the growth rate of relative unit labor costs affects FDI positively.

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GLOSSARY

FDI Foreign Direct Investment, is a category of international investment made by a resident entity in one economy (direct investor) with the objective of establishing a lasting interest in an enterprise resident in an economy other than that of the investor (direct investment enterprise). "Lasting interest" implies the existence of a long-term relationship between the direct investor and the enterprise and a significant degree of influence by the direct investor on the management of the direct investment enterprise. Direct investment involves both the initial transaction between the two entities and all subsequent capital transactions between them and among affiliated enterprises, both incorporated and unincorporated.

CEEC. Central and Eastern European Countries

MNE. Multinational Enterprise

GDP. Gross Domestic Product

CIS. Commonwealth of Independent States

CPI. Consumer price index

IMF International Monetary Fund

UNCTAD. United Nation Conference on Trade and Development

OECD. Organization for Economic Cooperation and Development

Chapter 1

INTRODUCTON

After several years of consolidation during the global economic slowdown the world's largest MNCs have resumed their expansionary activity.[1] UNCTAD research shows that the most preferred locations for expenditure within developed countries are the UK, the Netherlands and the US. At the same time there is an evident boost of investment flows into emerging countries. Huge and unconquered markets, an inexpensive and qualified work force, as well as abundant, cheap resources promise high returns though with certain risk.

Multinational enterprises have actively begun to enter the game thus bringing into new weak economies stable financial flows in terms of FDI. To distinguish from pure financial flows FDI has several important features especially relevant for transition economies: First of all FDIs provide higher stability and a long term commitment of financial flows (Bevan and Estrin, 2000). Financial resources that FDI brings are invested into the expansion of productive capacities (Kiyota and Urata, 2004); FDI brings technology and managerial know-how. FDI stimulates improvement in sales and procurement networks, which is of potential benefit to local producers. FDI also creates competitive pressure on local firms and induces a positive spillover effect.

Currently Brazil leads the developing countries list, with investments by 75% of the top 100 MNCs. Nearly as many, 72%, have affiliates in Mexico, 67% in Hong Kong and 65% in Singapore. South Africa leads the field among the African nations, with 43%. European transition countries are not in favour. Nevertheless, more recently competition for FDI among transition countries is growing fiercer. From Table 1 you can see that Poland, Hungary and the Czech Republic are the leaders of FDI

[1] http://www.fdimagazine.com/news/fullstory.php/aid/1504/TNCs_expanding_again.html

attraction in transition among developing European economies. Other countries accomplishments are similar, thus the competition in the FDI market is rather tough.

Table 1 Percentage distribution of OECD FDI in transition economies

FDI %	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Ukraine	0.00	0.00	0.02	0.22	1.60	0.52	1.04	1.80	2.41	0.74	0.51
Slovenia	0.00	0.00	0.47	2.47	1.26	1.18	1.01	1.87	1.53	1.28	0.84
Slovakia	0.00	0.00	0.00	1.86	2.52	2.55	3.47	2.32	2.79	2.09	5.42
Russia	2.43	10.78	12.31	13.02	18.87	11.38	23.12	17.76	12.92	10.85	0.39
Romania	0.42	0.54	1.45	0.83	2.34	2.31	1.39	5.00	3.40	3.55	2.9327
Poland	4.10	11.04	14.30	20.55	20.00	20.10	32.93	31.75	37.65	48.57	37.79
Hungary	92.82	75.93	41.80	41.34	27.11	35.08	21.65	20.54	23.29	14.14	37.95
Czech Republic	0.00	0.00	29.30	19.02	24.36	26.50	14.71	17.08	14.75	17.30	11.66
Bulgaria	0.23	1.71	0.35	0.69	1.94	0.37	0.68	1.87	1.27	1.48	2.52

Countries are expected to intensify their efforts in investment targeting in addition to offering more generous investment incentives and further liberalization.[2] Recently (see Table 2) Romania has made good progress in FDI attraction, Ukraine however, while lagging versus some of the states listed, has on the positive side, seen little retrogression. In addition, the country has made considerable progress recently in creating an FDI attractive environment. The former closed economic system has been opened for trade and investment and institutional changes have taken place. The total amount of FDI inflow rocketed to $7328 billion during 2005, which is about 45% of the current FDI stock of $16375,2 billions.[3] By January 1st the highest investment took place in wholesale and retail - $1771,4 million, metallurgy - $1232,3 million, and food and agriculture – $1169,3 million.[4] Even so, Ukraine receives far less FDI than many other similar neighboring countries. Furthermore, the major FDI is basically in the banking sphere, retail and raw material companies, which is definitely not secure for the state and does not benefit the country to a full extent.

[2] http://www.unctad.org/Templates/webflyer.asp?docid=5600&intItemID=2527&lang=1
[3] http://www.ukrstat.gov.ua/operativ/operativ2006/zd/ivu/ivu_r/ivu0106_r.htm
[4] http://www.podrobnosti.ua/economy/financial/2006/02/22/289024.html

Overall, there is an opinion that foreigners are ready to invest only in those industries which are developed enough, thus reducing the main FDI-related positive effects.

Table 2 South-East Europe and CIS: country distribution of FDI inflows by range, 2003-2004[5]

Range	2003	2004
	Economy	Economy
Above $5.0 billion	Russian Federation	Russian Federation, Romania
$1.0 – 4.9 billion	Azerbaijan, Romania, Bulgaria, Kazakhstan, Croatia, Ukraine, Serbia and Montenegro	Azerbaijan, Kazakhstan, Bulgaria, Ukraine, Croatia
Less than $1.0 billion	Bosnia and Herzegovina, Georgia, Albania, Belarus, Armenia, Turkmenistan, Macedonia, Moldova, Uzbekistan, Kyrgyzstan, Tajikistan	Serbia and Montenegro, Georgia, Bosnia and Herzegovina, Albania, Belarus, Armenia, Turkmenistan, Macedonia, Moldova, Uzbekistan, Kyrgyzstan, Tajikistan

[5] UNCTAD FDI/TNC database, www.unctad.org/fdistatistics

There is already broad consensus and certain evidence in the predominant literature that transition economies (Bevan and Estrin, 2000, Neuhaus, 2005), and Ukraine in particular (Lutz et al., 2005), benefit from FDI. Nevertheless it is worth stressing that a country benefits from FDI if it has firm economic strategy and attracts FDI accordingly. In places where the state relies on liberal policy and lays off the economic development of transnational corporations, FDI inflow does not contribute to sustainable economic growth and often leads to the decrease of national sovereignty. [6] There is therefore, a certain need of a sound and market-based strategy of foreign investment attraction with its main points in particular emphasizing FDI targeting and the creation of a FDI enabling environment. The competition policy should be built first of all on promoting institutional development, a positive international image of the country and macroeconomic tools. In other words, there is room in FDI attraction activity for raising the quality of FDI, as well as increasing its quantity.

In contemporary times, policymakers have FDI issues among their paramount targets and face challenges in elaborating attraction strategies. However, one cannot judge that CIS countries, and Ukraine in particular, have succeeded in the realm of FDI. Furthermore, despite abundant resources and low wages CIS countries are among the least attractive locations. (Cramon-Taubadel and Akimova, 2002) Economic researchers have actively begun to analyze FDI driven determinants, thus helping these countries to create FDI attracting environment.

Countries' macro fundamentals[7] are revealed to be of high importance as FDI attracting factors. However, recently more and more attention has been paid to the investigation of FDI determinants as instruments of FDI promotion. There are studies dedicated to FDI determinants for transition countries (Bevan and Estrin, 2000, Campos and Kinoshita, 2003, Baniak et al. 2005). A Number of studies consider country specific determinants of FDI. (Cheng and Kwan, 2000, Kral, 2004, Hryniuk, 2003, Walkenhorst, 2004). However, when a country strives for FDI a

[6] http://www.economix.com.ua/?page=full_theoryid&num=45

[7] Such as market size, economic growth, cheap labor, openness

government should know exactly what policy instruments it can utilize and how, in order to attract, or at least not distract, FDI. This research has its aim to thoroughly investigate the FDI issue in transition economies, determine the type of FDI, consider possible determining factors of macroeconomic policy and its influence on FDI attraction.

Stemming from the company motivation to invest abroad economic literature distinguishes three main FDI types (Dunning, 1993). Market-seeking (Horizontal) FDI aims at serving the local market and carries the export substitution idea in order to avoid customs duties. Resource- or asset-seeking takes place when firm invests abroad in order to attain the access to the resources scarce in the home country. This type could also be considered as vertical or export-oriented FDI (relocating part of the production chain to the host country). Efficiency-seeking FDI happens when the firm could gain from the utilizing the potential of economies of scale and scope (clustering or agglomeration effect). Different FDI types have different determining factors. For instance, for market-seeking FDI the main concern is the sales opportunities of the foreign market. On the other hand, vertical FDI are actually indifferent to potential demand, however, it can be attracted with potential cheap and abundant production factors. Thus, in order to build an effective investment attraction strategy it would be useful to determine the basic FDI type for transition economies as well as other following determinants.

According to Blonigen (1997), by the late 1970', FDI had been considered as a phenomenon of comparative costs issue. Later on, trade barriers (such as transaction and transportation costs) have found their niche in the FDI theory. However, it appears to be that these two concepts are not enough for a proper explanation of FDI flows. Recently, researchers in search of additional empirical explanation have turned to exchange rate movements. Portfolio investors do not care much about exchange rate regime as there always exists the opportunity to hedge by means of derivatives, although foreign direct investors need to consider this. FDI, unlike bond assets, generates returns in different currencies, thus both the level and exchange rate

variability can influence the expectation about future returns and location decision of FDI as well. (Benassy-Quere, 1999).

The extent and the direction of the influence depends on the particular FDI type. Market-seeking FDI and trade are basically analogous. Local currency appreciation reduces trade and increases FDI inflows because of the higher purchasing power parity of local consumers. Depreciation of the local currency real exchange rate increases FDI inflows because of the relative decline in the cost of local capital for foreigners. Efficiency seeking FDI (re-export oriented) are considered to be international trade complements, thus appreciation of the local currency reduces FDI inflows.

There is strong evidence in the literature concerning the adverse impact of exchange rate uncertainty on bilateral trade flows. The high probability of unanticipated changes in exchange rate usually drives away risk-averse international traders (Dell'Ariccia, 1999). Exchange rates fluctuations are not in favor with the governing structures of the states as well. They bring excessive uncertainty into international economic activity. However, the effect on international investment activity is still under discussion. Investment, that is basically the financial flow that is supposed to bring return. Portfolio investment can successfully and cheaply be hedged against the currency risk by means of forward contracts. The flows here are just amounts of money without any real sector reflection. Direct investment is actually a much more complicated thing and possesses the features of long-term commitment. Here, the investor incurs a certain amount of sunk costs and is usually interested in production costs and price setting. In the case of foreign investment, real exchange rate enters the game. Precisely for the reason that will be responsible for further investment project profitability.

Another interesting issue is competition for FDI. Many transition countries are neighbors with similar conditions, however countries may choose some economic, political, or institutional policy in order to create a favorable investment environment. These policy measures are usually based on the absolute FDI

determinants. However, there is a theory that countries can attract more FDI by choosing policy measures relative to other country competitors for FDI. For instance, by setting wages higher or lower than neighboring countries have, by exchange rates depreciation, or through the introduction of a certain regime.

Therefore, in this research several questions can be stated and approached. First of all, it is to reveal the nature of FDI into transition economies. Second, is to determine whether exchange rate related factors such as the level, volatility, exchange rate regime, or other factors have an effect on FDI. Third is to study the FDI competition issue in the framework of transition countries. For this purpose the information about international investment activity of the OECD countries' companies in the transition economies has been employed.[8]

The paper proceeds as follows. Chapter 2 gives the broad overview of the FDI related literature. In Chapter 3 the main theoretical framework of the research has been stated. Empirical models specification and data description is presented in Chapter 4. In Chapter 5 discussion of estimation techniques and results is provided. Main conclusions, policy implications and further research suggestions can be found in Chapter 6.

[8] The OECD countries are: Austria, Belgium, Denmark, Finland, France, Germany, Italy, Japan, Korea, Netherlands, Poland, Portugal, Spain, Sweden, Switzerland, United Kingdom, United States; the transition economies are: Czech Republic, Hungary, Poland, Bulgaria, Romania, Russia, Slovakia, Slovenia, Ukraine

Chapter 2

LITERATURE REVIEW

An understanding of FDI determinants can be attained from the consideration of two interrelated questions. The first one is why do firms invest overseas and, in connection with the second, why the particular destination has been chosen. (Wint and Williams, 2002). Markusen (1984) and Helpman et al (2004) suggested two very distinctive FDI motivations. First of all it helps to avoid trade frictions and to access lower resource costs (wages). Other reasons stems from the FDI as a production platform for exports to a group of countries, or re-exports (Eckholm, Forslid and Markusen, 2003, Bergstrand and Egger, 2004).

Firms, in deciding whether to become a multinational corporation, compare the costs of going abroad and potential benefits. The willingness and ability to undertake FDI by the firm can be explained in different theoretical frameworks.

Dunning's eclectic approach (OLI paradigm: "O" – ownership, "L" – location, "I" – internalization) introduced in 1958 and developed in the '70s up till the 90s was the major FDI explaination theory. (Dunning, 1981) According to it, the decision about geographical diversification of production is mostly dependant on the possible advantages that the certain ownership, location and internalization can offer:

"O" - if the ownership of a product, a production process, patents, commercial secrets, human capital, a superior quality reputation, or superior management increases investor's competitiveness then he will invest;

"L" – if the foreign location of production is more profitable because of customs barriers (transportation costs, customs duties), host country's cheaper productive factors, access to markets;

"I" – if the investor wants to internalize the location or ownership advantages rather than to exploit this advantage by licensing or cooperating.

Several researchers used the OLI concept in order to approach the problem of FDI determinants. Bevan and Estrin (2000) [9] studied FDI flows from 18 market economies to 11 transition economies in the eclectic empirical framework. Following Caves (1982) they have tested the hypothesis that the decision about FDI is basically made on the consideration of expected profitability and hence depends on the following primary factors of host and home countries: market size (especially of the host country), inputs costs (resources and labor), economic and political risk of the investment.

Galego et al (2004) have found the host country's per capita GDP and openness to affect bilateral foreign investment flows positively. As long as any negative influence revealed distance and relative labor force compensate investment. The research covered fourteen investing countries and twenty-seven destination countries from West and East Europe over a time period of seven years (1994-2000).

In addition to traditional GDP, destination and compensation level, the degree of freedom variable was introduced by Hryniuk (2003) in his study of Belarusian FDI determinants. Landsbury et al. (1996) and Holland and Pain (1998) focused on the business environment and the privatization process as primary determinants of FDI in CEECs. Nunnenkamp (2002) in his comprehensive overview of the FDI determinants' studies for developing countries highlighted the so called traditional driven factors, such as population of the host countries, GDP per capita, its growth rate, administrative barriers, entry restrictions and risk factors. However, the author also investigates the importance of other, non-traditional FDI determinants. He asserts that today such factors as the availability of local skills (human capital formation) and trade openness (revealed to be important for the manufacturing

[9] Bevan and Estrin (2000) used the data on bilateral FDI flows for the period 1994 to 1998 between the source countries (EU-14, Belgium and Luxemburg, Korea, Japan, Switzerland and the US) and the recipients countries (Bulgaria, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovac Republic, Slovenia and Ukraine).

sector) can enter the class of major traditional FDI driven factor. Furthermore, the author agrees with Kokko (2002) on the issue that today incentives, rather than determinants, can be increasingly important FDI driving factor.

Cheng and Kwan (2000) emphasized the significance of past FDI values and expressed it by means of Chow's partial adjustment model. They have studied the intertemporal linkages and regional distribution of Chinese inward FDI (period 1986-1995). Campos and Kinoshita (2003) used this model an found market size, labor costs, level of education and infrastructure to be significant FDI determinants for 25 transition countries (period 1990-1998). Further distinguishing between CIS and non-CIS countries revealed an absence of an agglomeration effect in CIS countries[10]. An abundance of natural resources and telephone lines were the main significance for CIS countries.

Kral (2004) revealed public expenditures in infrastructure, efficient public governance, regulatory framework, and flexible social system to be significant FDI determinants for the Czech Republic.

The relevance of involvement or prospective membership in different trade, customs and supra-national economic structures has been supported by the studies of Mexico's involvement in the North American Free Trade Area and Spain's membership in the EU (Martin and Velazquez, 1997). The significant influence of the prospective EU membership on transition economies' FDI has been revealed by Baldwin et al. (1997). Bevan and Estrin (2000) assert that host countries involvement into free-trade areas and custom unions positively influences the FDI inflows as third countries will invest into such areas in order to avoid tariffs on exports. Furthermore, the consequences from the economies of scale of integration, increase in growth rates, and trade volumes stimulates demand in the economy which positively affects expected profitability of investors.

[10] Agglomeration effect implies the presence of self-reinforcing effect of FDI on itself

Lucas (1993), Singh and Jun (1995) emphasized the importance of political and economic risk in their studying of the influencing factors of the emerging economies FDI. Here they included three main constituents of the riskiness: macroeconomic stability (growth, inflation, exchange rate risk,); institutional stability (policies towards FDI, tax regimes, legal transparency and corruption); political stability (indicators of political freedom, measures of surveillance and revolutions). In the transition framework Holland and Pain (1998) inspired by Wheeler and Mody (1992) estimated the investment risk via the principal components analysis across macroeconomic and institutional variables, Garibaldy *et al* (2000) utilized a variety of World Bank and EBRD indicators, Resmini *et al* (2000) used a synthetic risk indicator, Bevan and Estrin (2000) approached risk by the information available for investors at the time of decision making. They used the host country's credit rating derived from various issues of *Institutional Investor* magazine. In order to produce annualized data, they averaged bi-annual credit ratings which are on a scale of 0 to 100 (maximum creditworthiness). In order to approximate the macroeconomic stability in a country, inflation rate was used by Tobin and Rose-Ackermann (2005). They expected the impact of inflation to be ambiguous as unanticipated inflation benefits debtors which lent in the local currency; albeit, high inflation rates may indicate domestic policy failures that discourage both savings and investment. Regardless of the direction of causation, macroeconomic stability ought to be an important determinant of foreign investment.

Bevan and Estrin, (2000) approximated the liberality of the trade regime and as part of the potential export propensity of the multinational company in the host country by the openness of its economy. They took imports from the EU-15 as they considered export to be the subject to both domestic and EU-15 trade policy regulations. Furthermore, export can correlate with the announcement of the EU accession variable.

Caughlin and Segev (2000) discovered that neighboring provinces FDI helped encourage Chinese province FDI. Carstensen (2004) came to the same conclusion while taking into consideration the market of neighboring country in regard to the

market of host country. As opposed to this, Blonigen et al (2004) have found the negative influence of the neighboring-country FDI, however the positive effect of neighboring-country GDP.

Developing countries hope that bilateral investment treaties signal to foreign investors either a strong protective investment environment or a commitment that foreign investments will be protected through international enforcement of the treaty. (Tobin and Rose-Ackermann, 2005). Hallward-Driemeier (2003), analyzed bilateral FDI flows from OECD countries to developing nations and found little evidence of a connection between BITs and FDI flows, thus further concluding that "weak domestic institutions do not get significant additional benefits from signing BITs with OECD nations". Although Salacuse and Sullivan (2004) found a strong impact of signing a BIT and US outward FDI flows, Neumayer and Spess (2004) found that the more BITs a country signs, the greater the FDI flows to that country, suggesting that BITs can be used as a substitute for domestic institutions. With respect to BIT and FDI flows for transition economies strong positive interdependence has been shown by Goryunov (2004), however the hypothesis of whether BIT contributes more the riskier the investment environment is in a country has not been tested yet.

Santis et al, (2004) in their Tobin's Q idea in the domestic and foreign investment framework supposed that ownership advantage originates mainly from the firm-specific assets and proposed to estimate the factor through the number of patents granted to the euro area firms. They also considered location advantage to stem from the firms' desire to locate close to the market they wish to supply. They claimed the location advantage to increase with the information flows across the affiliates, therefore they proxied the location advantage by the volume of bilateral telephone traffic. They also tested whether the adjusted Tobin's Q, [11], the approximation for the domestic investment climate, adds additional explanatory power in addition to the variables included in the traditional capital-knowledge framework. It has been

[11] $\tilde{Q}_{it} = (r + h)^{-1} p_i^F F_k$

revealed the positive and significant influence of shadow capital value measured as suggested by Barro (1990) via the stock market price. The adjustment of Tobin's Q measure (the subtraction of the vertical location advantages) has been done by the regression of the real stock market indices of each euro area country on the real US stock market indices and using the residuals as the measure of adjusted Tobin's Q. However, there was a negligible difference whether one uses vertical location advantage free or just stock market indices.

Despite of the evident importance of movement in the exchange rate level for FDI decision most of the general studies on European FDI report the insignificance of the exchange rate related variables. A USAID-funded regression study of 67 emerging economies for the period from 1978 till 1995 (Wilhelms and Witter, 1998) revealed that FDI is much more influenced by the countries' policies rather than endowment or market size. Economic policies allowing for free open markets, investment and trade has been recognized as the key determinants of FDI inflows. Among the determinants of economic openness were little government interference, open import and export regimes and exchange rate that reflected a currency's true value, with no controls on currency exchange.

Thus, it is evident that a considerable amount of literature examines firm's FDI decisions in the context of partial equilibrium analysis based on industrial organization and finance. These studies usually examine how exogenous macroeconomic factors affect FDI decisions. According to Blonigen (2005) the main drawback of the partial equilibrium model is that it ignores important long-run factors influencing FDI location decisions, which can lead to an omitted variable bias in the empirical specification. This concern rises in particular when estimation is on the basis of cross-sectional data only.

Brainard (1997) in her attempt to develop theoretical background combined enterprise based OLI approach and general equilibrium trade models. The author derived an equation of the proportion of export sales by the MNE on the base of the two-country, two-factor general equilibrium model of horizontal MNE activity. The

investment decision was considered to be the product of a trade-off between incremental fixed costs of investing and costs of exporting. These costs are influenced with several of the described earlier OLI factors, such as market size, economies of scale, input costs, intangible assets, and with the gravity model factors such as distance variables. She uses cross-sectional data on sales of US affiliates and confirmed the importance of trade frictions and plant-level fixed effects for the content of exports in total sales. However, the model did not allow the determination of the importance of the country's size and factor endowment. Yaeple (2003) used the specification similar to Brainard (1997) but interacted factor endowments differences with industry factor intensities and uncovered both horizontal and vertical motivations. Significant factor endowment and trade costs influence consistent with the vertical FDI activity has been revealed by Hanson, Mataloni and Slaughter (2003) while studying the US affiliates in machinery and electronics industries.

Distance has been used as an approximation for transactional costs (transport and communication, personnel placed abroad, informational costs) that are supposed to be the increasing function of the former. However, Bevan and Estrin (2000) suspect this framework for transition economies to be inappropriate. For instance, German firms operating in the transition economies experience lower transaction costs because of tight historical relationships. The United States is the largest foreign direct investor of the world and hence will invest much more than could be predicted in the framework of the gravity model because of the exploitation of the economies of scale and learning effects. There can be also financial and capital constraints on the foreign investment activity, which they took into account via long run interest rates. They included models for Germany, the Baltic States and the US, which appeared to be statistically significant. Carstensen and Toubal (2004) consider it more opportune to take into account custom duties (the ratio between the income of custom duties and the imports, multiplied by the GDP of the host country), as an approximation to commercial costs. Their argument was that custom duties vary in time, but the physical distance remains unchanged. Results show a positive effect of the reduction of custom duties on FDI, but the degree of significance depends

on the size of the host country. They noticed a complementary relation between commerce and FDI in Bulgaria, the Czech Republic, Hungary, Poland, Romania, Slovenia, where they conclude from that FDI which were made between 1993 and 1999 were, in most cases, vertical foreign direct investments.

As a whole in the empirical literature on bilateral trade and FDI, distance is most frequently used as an approximation for transportation costs and has been know for its negative effect on both, thus implying complimentarity. However MNE and trade can be substitutes as well. (Markusen and Maskus, 1999) Thus, distance exerts impact on both and the effect is ambiguous. The theoretical framework used by Egger and Pfaffermyer (2001) suggest modelling the impact of distance stemming from its relevance for fixed plant set-up costs versus pure trade costs. The presence of common determinants like distance requests bivariate specification, which can be SUR framework.

An attempt to build a unified model of horizontal and vertical motivations of MNE activity has been undertaken by Markusen and co-authors in 1990s (Markusen, Venables, Eby-Konan and Zhang, 1996, and Markusen, 1997) and resulted in the "knowledge-capital model". Carr, Markusen and Maskus (2001) in their empirical estimation of the model provided the specification where affiliate sales in a host country is a function of GDP, trade and FDI costs and differences in the factor endowment of the two countries, however there were problems with the nonlinearity of the simulated results and far from white noise residuals. The authors captured this with GDP sum and GDP differences and interactions between the skill difference, the host country's trade costs and the GDP difference. Overall, the model substantially under-predicted affiliates' sales to developed countries, and over-predicted to less-developed countries, suggesting that they should be estimated separately.

Empirical literature on trade gravity models appeared to successfully predict the trade flows between countries. The flows are supposed to be the function of the GDP of each country and the distance between two countries. Theoretical foundation of the

gravity models of trade can be found in Deardorff (1998), Anderson and van Wincoop (2003).

Kleinert and Toubal (2005) derived FDI gravity on the basis of three different general equilibrium models three different specifications of gravity equations for the analysis of the activity of foreign affiliates. They have shown that gravity equations indeed can explain aggregate foreign multinational sales and come very close to the gravity equations applied for commodities.

Therefore it is evident that the empirically based eclectic OLI paradigm has been successfully approached theoretically on the context of partial and general equilibrium analysis. Thus, in order to study FDI in transition economies it appears to be appropriate to combine the general equilibrium framework with the OLI paradigm. A more extensive theoretical background of the research is presented in the next chapter.

Chapter 3

THEORETICAL FRAMEWORK

According to the extended analysis of existing FDI related literature the research is going to be held in the theoretical framework of the three following models.

Gravity model.

Following Kleinert and Toubal (2005) from the proximity concentration theory stems the following equation of total production in affiliates of country *i*'s firms in country *j*:

$$n_i p_{ij} x_{ij} = n_i p_{ii}^{1-\sigma} [(1-\alpha)\tau_{ij}]^{1-\sigma} (1-\mu) Y_j P_j^{\sigma-1} \quad (1)$$

with $\tau_{ij} - 1$ the proportion of output lost in shipping; μ, σ the parameters of the individual utility (aggregate and from foreign affiliates goods) functions , n_i the number of varieties produced by firms from country i ; x_{ij}, p_{ij} the quantity and the price of country *i* good in country *j*; $(1-\mu)Y_j$ the total demand in country *j*; α the parameter of the production function of foreign affiliate; P_j as the price index.. The term $n_i p_{ii}^{1-\sigma}$ following Redding and Venables (2003) can be considered as the supply capacity of the home country *i* and $(1-\mu)Y_j P_j^{\sigma-1}$ as the demand capacity of host country *j*. Thus by determining sales of foreign affiliates by $ASij$, s_i, m_j as supply and demand capacities and D_{ij} as distance costs they have come up with the gravity specification:

$$\ln(AS_{ij}) = \alpha_1 + \ln(s_i) + \ln(m_j) - \beta_1 \ln(D_{ij}) \quad (2)$$

where $\alpha_1 = (1-\sigma)[\ln(1-\alpha) - \ln\tau]; \beta_1 = (1-\sigma)$

They actually derived absolutely the same specification from the model with heterogonous firms and fixed costs increasing with distance.

$$\ln(AS_{ij}) = \alpha_2 + \ln(s_i) + \ln(m_j) - \beta_2 \ln(D_{ij}) \quad (3)$$

where $\alpha_2 = \frac{(k-(\sigma-1))}{\sigma-1}\ln\lambda; \beta_2 = \eta\frac{(k-(\sigma-1))}{\sigma-1}$

k is the shape parameter of the distribution of firms with respect to their productivity.

However the factor-proportion theory application for vertical MNE activity allowed for different specification. They derived the foreign affiliates output of intermediate good as $AS = \delta p_z \theta(1-\mu)Y$ where Y is the total demand for the final good in the economy, δ is the input of this intermediate good in the production of final good; θ is the fraction of the intermediate good outsourced abroad; $p_z \equiv \min[b_z, \tau_z \bar{b}_z]$, where $b_z, \bar{b}_z$ are unit cost functions at home and abroad respectively, τ_z is the trade cost.

Countries' size Y is a linear function h of Y_H, another effect of countries' size works through θ,

$$\ln(AS) = \alpha_3 + \zeta_1 \ln(Y_H) + \zeta_2 \ln(Y_F) + \beta_3 \ln(D) + \nu[\ln((\frac{K}{L})_H - \ln((\frac{K}{L})_F]$$

Thus, there are two gravity specifications, stemming from different FDI types: market-seeking and resource-seeking.

Gravity model extension with Tobin's Q and Dunning's OLI.

More understanding can be attained by incorporating to the standard gravity approach some inferences made by Santis et al (2004) [12] from the Tobin's Q idea developed in the domestic and foreign investment framework. They maximized the net real cash flow of a firm operating locally and multinationally.

$$V_t^j = \int_{s=1}^{\infty} e^{-r(s-t)} \left[p_s^F \left(F\{k_s, P_s\} - \frac{\delta^I}{2} \frac{I_s^2}{k_s} \right) - I_s + \frac{p_s^G}{x_s} \left(G\{k_s, P_s, K_s^j\} - \frac{\delta^{FDI}}{2} \frac{FDI_s^2}{k_s} \right) - FDI_s \right] ds$$

where p_s^F denotes the domestic good price, p_s^G denotes the foreign good price, x_s the exchange rate (host country currency relative to the home country currency), *r* – the constant real interest rate, δ^I and δ^{FDI} are the firm's cost parameters of adjusting its capital (training costs, bridge to cultural differences, understanding of local bureaucracy and institutions) respectively at home and at host country, I_s, FDI_s are the level of local and foreign investment respectively, $F\{k_s, P_s\}$ is the production function of the home company with the firm capital stock and multinational firm-specific asset (ownership advantage) as production factors, $G\{k_s, P_s, K_s^j\}$ is the production function the host company with the firm capital stock, multinational firm-specific asset (ownership advantage) and the knowledge capital in the host country (local advantage) to be the production factors, *h* – the depreciation rate in the economy.

[12] Santis et al (2004) used series of the twelve Euro Area countries FDI stocks in the US for the period 1980-2001.

Authors came up with the following expressions for the foreign investment under the assumption of the $F\{k_s, P_s\} = P_t k_t^{1-\alpha}$ and $G\{k_s, P_s, K_s^j\} = K_t^j F_k\{k_t, P_t\}$ with $0 < \alpha < 1$:

$$\frac{FDI_t}{k_t} = \frac{1}{\delta^{FDI}} \frac{x_t}{p_t^G} \left[(r+h)^{-1} (p_t^F F_k\{k_t, P_t\} \left(1 + K_t^j \frac{1}{z_t} \right) - 1 \right] \quad (6)$$

with the $q_t = (r+h)^{-1} (p_t^F F_k\{k_t, P_t\} \left(1 + K_t^j \frac{1}{z_t} \right)$ and denoting the shadow value of a unit of capital and z_t denoting the real exchange rate expressed in terms of the home currency. Therefore it can allow for better understanding if to enhance gravity model with Tobin's Q justification of exchange rate, adjusting capital and investment climate related factors.

Model of FDI competition.

In order to investigate the relativity issue, following Xing and Wan (2004), the expression for the relative FDI for competing countries can be derived from the partial equilibrium framework. The model assumes a two period time frame where the firm must decide about the capital investment in the current period. The realization of the profits is in the next period, which has uncertain price levels, nominal exchange rates and hence real exchange rates. It also assumes that firms believe in constant relative prices within each country. The firm maximizes the "certainty equivalent" of its future real profits expressed in domestic currency. The certainty equivalent can be expressed as

$$C = E(\pi) - \gamma Var(\pi) \quad (7)$$

where π is the future real profit, γ is the market price of risk ($\gamma > 0$ implies risk aversion). The production technology is assumed to be identical at every location and

is defined by standard Cobb-Douglas production function as $y = \gamma K^{\alpha} L^{\beta}$ Assume decreasing returns to scale $\alpha + \beta < 1; \alpha > 0; \beta > 0$; *K* and *L* capital and labor inputs respectively.

The profit function of the market seeking MNE in country *i* can be written as

$$\pi_i = p_i e_i (\gamma K_i^{\alpha} L_i^{\beta}) - e_i (r_i K_i + w_i L_i) \tag{8}$$

One can see that the level of the exchange rate does not affect the investment decision as it just cancels out during optimization. Variance of the future generated cash flows is important.

The profit function of the export oriented MNE in country *i* can be expressed as

$$\pi_i = p(\gamma K_i^{\alpha} L_i^{\beta}) - e_i (r_i K_i + w_i L_i) \tag{9}$$

Where p is the products price at the home country, p_i is the price level at the recipient country and measured at country's currency; r_i and w_i is the capital rent and labor wage respectively, both measured at the recipients' country currency; e_i denotes the nominal exchange rate between the recipient country currency and the home country currency; K_i represents the amount of investment;

The combined profit of the MNE having subsidiaries in different countries will be

$$\pi = p \sum_i \gamma_i K_i^{\alpha} L_i^{\beta} - \sum_i e_i (r_i K_i + w_i L_i) \tag{10}$$

Maximizing the profit with respect to K_i and L_i the following FOC is received for $\forall i$

$$\begin{cases} p\gamma\alpha K_i^{\alpha-1} L_i^{\beta} - e_i r_i = 0 \\ p\gamma\beta K_i^{\alpha} L_i^{\beta-1} - e_i w_i = 0 \end{cases} \tag{11}$$

Here there is profit maximization rather than certainty equivalent because in this type of investment variance does not affect the decision. Investment takes place once and then generates profits in the home country's currency.

The solution for two competing for FDI countries, e.g. A and B is:

$$\begin{cases} (1-\alpha-\beta)\log K_A = -[(1-\beta)\log(e_A r_A) + \beta\log(e_A w_A)] + \log(p\gamma) + (1-\beta)\log\alpha - \beta\log\beta \\ (1-\alpha-\beta)\log K_B = -[(1-\beta)\log(e_B r_B) + \beta\log(e_B w_B)] + \log(p\gamma) + (1-\beta)\log\alpha - \beta\log\beta \end{cases}$$

Subtracting of equations yields

$$(1-\alpha-\beta)\log\frac{K_A}{K_B} = -[(1-\beta)\log(\frac{e_A r_A}{e_B r_B}) + \beta\log(\frac{e_A w_A}{e_B w_B})] \tag{13}$$

This equation can be rewritten as

$$(1-\alpha-\beta)\log\frac{K_A}{K_B} = -[(1-\beta)\log(\frac{e_A r_A / r_H}{e_B r_B / r_H}) + \beta\log(\frac{e_A w_A / w_H}{e_B w_B / w_H})]) \tag{14}$$

Where r_H and w_H are capital rent and labor wage at the home country respectively. In equation (9), $e_A r_A / r_H$ denotes the relative price of the capital in country A in terms of the capital in the home country. The same manner $e_A w_A / w_H$ is the relative wage in the country A. Both expressions represent the real exchange rate between the currencies of the country A and the home country, though expressed in capital and labor prices. Therefore $\frac{e_A r_A / r_H}{e_B r_B / r_H}$ is in fact the ration of the real exchange rates.

Rearranging equation (9) gives an explicit function for relative FDI:

$$\log\frac{K_A}{K_B} = -(1-\alpha-\beta)^{-1}[(1-\beta)\log(\frac{e_A r_A / r_H}{e_B r_B / r_H}) + \beta\log(\frac{e_A w_A / w_H}{e_B w_B / w_H})] \qquad (15)$$

In the equation above one can see that the relative FDI into the country is a decreasing function of the weighted sum of the relative real exchange rates. Hence, theoretically, higher appreciation of the country's currency relative to the rival country causes decrease in the relative amount of export-oriented FDI to the country.

Next is the consideration of market-seeking investor's profit function:

$$\pi = \sum_i e_i p_i \gamma_i K_i^{\alpha} L_i^{\beta} - \sum_i e_i (r_i K_i + w_i L_i) = \sum_i e_i (p_i \gamma_i K_i^{\alpha} L_i^{\beta} - (r_i K_i + w_i L_i)) = \sum_i e_i \pi_i$$

If to assume that uncertainty comes only from exchange rate volatility and use the definition of the variance and covariance one can get

$$\text{var}(\pi) = \text{var}(\sum_i e_i \pi_i) = \sum_i \pi_i^2 \text{ var}(e_i) + \sum_i \sum_j \pi_i \pi_j \text{ cov}(e_i, e_j) \qquad (17)$$

Hence the certainty equivalent under maximization is:

$$C = E(\sum_i e_i \pi_i) - \phi(\sum_i \pi_i^2 \text{ var}(e_i) + \sum_i \sum_j \pi_i \pi_j \text{ cov}(e_i, e_j)) \qquad (18)$$

where $\pi_i \equiv p_i \gamma_i K_i^{\alpha} L_i^{\beta} - (r_i K_i + w_i L_i)$

It can be anticipated that as a result of optimization the relative amounts of capital in two competing countries will be the function of not only the relative level of real exchange rate but relative variance (it is assumed to be the exchange rate volatility) and covariance too.

Chapter 4

EMPIRICAL SPECIFICATION AND DATA

Following the previous chapter analysis and derived functional forms the following empirical models can be specified:

Two types of basic gravity models in order to check the FDI type and appropriateness of the theoretical models:

$$\ln FDI_{ij}^{t} = \alpha + \beta_1 \ln(GDP_i^{t}) + \beta_2 \ln(GDP_j^{t}) + \beta_3 \ln(Dist_{ij}) + \varepsilon_{ij} \quad (19)$$

$$\ln FDI_{ij}^{t} = \alpha + \beta_1 \ln(GDP_i^{t}) + \beta_2 \ln(GDP_j^{t}) + \beta_3 \ln(Dist_{ij}) + \beta_4 relkl_{ij}^{t} + \varepsilon_{ij} \quad (20)$$

Extended with Tobin's Q and Dunning's OLI gravity :

$$\ln FDI_{ij}^{t} = \alpha + \beta_1 \ln(GDP_i^{t}) + \beta_2 \ln(GDP_j^{t}) + \beta_3 \ln(Dist_{ij}) + \sum_k \gamma_k D_{kij} + \varepsilon_{ij} \quad (21)$$

In the model, the outward FDI flow from the home OECD country i to the host transition country j at the period t. converted into real 2000 prices, FDI_{ij}^{t}, is used as an approximation for the level of bilateral FDI. All the variables are used in logarithm. Furthermore, following Serbu (2005) $\ln(FDI_{ij}^{t} + 1)$ was taken as FDI flow is suspected to remain non-stationary after taking the logarithm. The home country market size is approximated by the home country GDP, in the model GDP_i^{t} stands for home country GDP expressed in the year 2000 prices). With respect to home country market size one can expect an ambiguous impact. Large domestic markets can encourage companies to utilize economies of scale and concentrate production in a single plant and export. However, economies of scale and scope of

logistics can also allow the placing the production capacities closer to the markets, thus making it more profitable to establish multinationals (Bevan and Estrin, 2000). According to Grossman and Helpman (1991) small developed countries are more likely to invest abroad, which suggests an inverse relationship between FDI and donor GDP.

Host country market size, as measured by the host countries GDP, are supposed to capture the potential economies of scale (Bevan and Estrin, 2000) and sales' perspectives of the new markets (Lankes and Venables, 1996). In the model it is GDP_j^t and expressed in the year 2000 prices).

Commercial costs of fulfilling the transactions can be approximated by the distance between the country of origin and the host country (often being the distance between two capitals), $Dist_{ij}$, and dummies for common language, $lang_{ij}$, and contiguity, $conting_{ij}$. In most studies, this distance has a significant negative influence when explaining FDI. The study undertaken by Resmini (1999) on European investments in CEEC is the exception: the results show here a minor role for the distance, which are even non-significant for FDI achieved in the traditional sector.

$$D_k \equiv \{erate_{ij}^t; Vol_{ij}^t; lang_{ij}; conting_{ij}; imports_{ij}^t; relkl_{ij}^t; relwage_i^t; relwage_j^t; irate_i^t; irate_j^t; Lab_i^t; Lab_j^t; \bar{r}_j^t; msci_i^t; msci_j^t, private\_share_j^t, \inf rastructure_j^t; price\_liberal_j^t; bank\_\sec t\_reform_j^t; legal\_ref_j^t; \sec ur\_mar_j^t)$$

Vector D_k contains additional explicatory variables, which are according to the analysis of the existing literature could be included in to the model in order to explain the nature of FDI better.

Here $erate_{ij}^t$ stands for the level of real bilateral exchange rate, calculated as the annual mean of the monthly exchange rates (the amount of host country currency per unit of the home country currency) in year *t*. CPI was used in order to come up with real terms. The coefficient by the real exchange rate allows the capturing the

link between multinational firms' exports and their FDI activities: the following of the home currency appreciation extension or reduction in FDI indicates substitutability or complimentarity of FDI and exports. The capital gain hypothesis, elaborated by Santis et al (2004), suggests a negative relationship between the FDI and home countries' real exchange rate. The imperfect-capital-market theory of FDI suggests the depreciation of the host countries' currency to be the FDI stimulating factor via the increasing of relative wealth of the foreigners. (Froot and Stein, 1991).

Exchange rate volatility, Vol_{ij}^{t}, is measured following Görg and Wakelin (2001) by the standard deviation of the logs of monthly changes in the level of real bilateral exchange rate. In order to assess the impact of exchange rate volatility and do not distort it with artificial regimes, e.g. peg, the cross term of volatility and floating exchange-rate dummy has been included into regression.

Production related factors have also been among the major FDI driven determinants. According to Bevan and Estrin (2000), labor is the key resource of the transition economies. However, labor costs can be the decisive factor only if it is not compensated by lower labor productivity or an overvalued currency. Thus unit labor costs denominated in a foreign currency (the ratio of the monthly average wage in manufacturing to the monthly per capita GDP), $relwage$, were chosen to use as the measure of input costs. Of course this measure is not the ideal one as it does not take into account social security expenditures incurred. Skilled labour abundance, Lab, has been included as recently foreign investors face the problem of lack of properly qualified personnel, therefore skill availability in the economy should be taken into consideration. Skills can be measured as the fraction of higher-educated workers in the labour force. Lab_{it} measures the relation of skilled to total labour in the country:

$$Lab_{it} = \frac{Edu_{it}^{3} + Edu_{it}^{2}}{Edu_{it}^{3} + Edu_{it}^{2} + Edu_{it}^{1}} \tag{22}$$

with Edu^h_{jt} being the gross education enrolment, h = 1; 2; 3, where h = 3 denotes tertiary education, h = 2 secondary education and h = 1 primary education.
As an approximation for the difference in relative factor endowment, the relative capital-labour ratio can be used. Capital is measured as gross fixed capital formation and labour as the working population. The sign of the coefficient here will give us to some extent the information about the type of FDI, horizontal or vertical. $relkl^t_{ij}$ measures the relative capital-labour ratio between countries and is used as an approximation for the relative economic potential of the country.

$$relkl^t_{ij} = \log \frac{gfcapform_i}{Labfor_i} - \log \frac{gfcapform_j}{Labfor_j} \tag{23}$$

where *gfcapform* stands for gross fixed capital formation in the economy and *Labfor* is the total labour force in the economy.

The amount of imports received from the OECD countries, $imports^t_{ij}$, has been introduced in order to capture countries' openness (as literature suggests[13] foreign investors prefer countries with relatively liberal trade regimes) from the one side and the extent of dependence of host economy on the home economy. Here the hypothesis is that the higher the dependence of the economy on imports, the lower the probability of different unexpected and undesirable foreigners related policy measures, thus a more reliable investment climate. Furthermore, the sign of the coefficient can point on the compliment or substitute nature of OECD exports and FDI.

In order to capture the opportunity costs of capital, real interest rates have been added in to the regression analysis. As an approximation for real interest rate, the long-term lending rate less the CPI based estimated inflation has been taken.

Investment climate according to Tobin's Q for FDI is approximated by the stock market price index in the economy. The measure of stock market price index for

[13] Balasubramanyam et al., 1996 and Edwards, 1998

most of the countries was the MSCI index, which measures the sum of the free float-weighted market capitalization returns of all its constituents on a given day. For some countries (Ukraine, Slovenia, Slovakia and Bulgaria) MSCI index is not being calculated and thus it was substituted with the local stock exchanges indices. Such constituents of the investment climate as structural and economic development are captured by the inclusion of index of price liberalization, level of infrastructure and securities' market development, index of banking and legal sector reforms. In an attempt to capture the speed of privatization the share of private sector in GDP was included (Holland and Pain, 1998). It would be also interesting to assess the impact of different exchange-rate regimes in the host economies, therefore dummies for currency board, peg, intermediate and float regimes, $\bar{r}_j^t$ have been included.[14]

In order to find out whether it is possible to attract more FDI by manipulating the FDI determining factors relative to the competing countries and how it can be done the model of FDI competition was estimated:

$$\log\frac{FDI_{jHt}}{FDI_{iHt}} = \alpha + \beta_1 \log(\frac{e_{jt}p_{jt}/p_{Ht}}{e_{it}p_{it}/p_{Ht}}) + \beta_2 \log(\frac{GDP_{jt}}{GDP_{it}}) + \beta_3 \log(\frac{e_{jt}w_{jt}/w_{Ht}}{e_{it}w_{it}/w_{Ht}}) + \\ + \beta_4 \log(\frac{stdev_{jt}}{stdev_{it}}) + \beta_5 \log(\frac{imports_{jt}}{imports_{it}}) + \varepsilon_{ij} \qquad (24)$$

Where FDI_{jH} and FDI_{iH} stands for the competing countries *i* and *j* FDI flow from certain home country; $\frac{e_{jt}p_{jt}/p_{Ht}}{e_{it}p_{it}/r_{Ht}}$ stands for the relative real exchange rates. Here CPI is used in order to come up with real terms. In the case of vertical FDI country' currency depreciation can induce more investment, albeit this can be the case that overwhelming depreciation can just the reverse distract investors. $\frac{stdev_{jt}}{stdev_{it}}$

[14] Intermediate regime implies exchange rates with crawling bands, crawling pegs, pegged exchange-rate arrangements within horizontal bands (at least 1%); peg implies fixed peg arrangements within a bond of at most 1%

stands for the relative real exchange-rate volatility. $\frac{GDP_{jt}}{GDP_{it}}$ is the relative GDP captures the relative market size effect. Countries with relatively bigger market size are expected to receive more market-seeking FDI. $\frac{imports_{jt}}{imports_{it}}$ captures the relative extent of the inclusion into the world economy, the higher the extent the less impediments for FDI, however the more the imports grows relative to other countries, the less FDI can take place because of the decrease in country's competitiveness and macroeconomic stability.

For the purpose of estimation data set of 17 OECD countries: Austria, Belgium, Denmark, Finland, France, Germany, Italy, Japan, Korea, Netherlands, Poland, Portugal, Spain, Sweden, Switzerland, United Kingdom, United States FDI outflows into 9 transition economies, which are: Czech Republic, Hungary, Poland, Bulgaria, Romania, Russia, Slovakia, Slovenia, Ukraine during the period 1990-2001 was employed. The main source of the data is OECD International Investment Yearbook, 2003, which contains balance of payments records on outward foreign investment. Out of this database, and information from other sources, the panel data set of bilateral FDI inflows has been created. There are records on 152 country-pairs across 12 years. Among the main advantages (more informative, allows for estimation of the specific panel-invariant effects) of panel data estimation is the possibility to obtain robust estimates even in the case of unbalanced data set, which is especially important for transition countries research (data for early years either not available or simply does not exist). In order to get real estimates, current prices FDI inflows, as well as other monetary terms, using the GDP implicit deflator in the monetary terms were expressed in prices for the year 2000. Explanatory variables have been taken from different sources. Thus, monthly exchange rates and CPI percentage changes, lending rates, labor force and gross fixed capital formation data have been retrieved from the IMF International Financial Statistics. Gross Domestic Product absolute and per capita have been obtained from the World Development Indicators statistics. Data on stock market indices have been retrieved from the

Morgan-Stanley Capital Index and other local stock exchanges.[15] Information about wages and compensation rates has been obtained from the International Labor Organization Statistics and WIIW Countries in Transition statistical yearbook. The latter was also the source of data on transition countries' imports from OECD countries. Information on structural and economic indicators (level of corruption, private sector share, level of infrastructure development) has been taken from the EBRD Transition report. Distance was measured as the distance between capitals and data as well as data on common language and contiguity have been downloaded from the www.indo.com/distance on-line calculator and CEPII site.

In order to estimate the competition model 273 source-competing country pairs panel data for 10 years have been computed designed on the base of all FDI which actually took place.

[15] www.msci.com

Chapter 5

ESTIMATION RESULTS

The empirical analysis was done in two stages. First, a gravity models was estimated. In the gravity equation specification panel data were used also called in the literature longitudinal data or cross-sectional time series data. Here FDI outflows for OECD country – transition country pairs were observed over 12 time periods (the years of 1990-2001). There are two pieces of information in the cross-sectional time-series data: the cross-sectional information reflected in the differences between objects of the analysis, and the time-series or within-object information reflected in the changes over time. While it is possible to use ordinary multiple regression techniques in the case of panel data, it may not be optimal since specific panel data regression techniques allow us to take advantage of these different pieces of information.

The estimates of coefficients from OLS regression may be subject to omitted variable bias - a problem that arises when there is some unknown variable or variables that cannot be controlled for that affect the dependent variable. With panel data, it is possible to control for some types of omitted variables by observing changes in the dependent variable over time. This compensates for omitted variables that differ between cross sections but are constant over time. Some country-pairs may have political, cultural or other unobserved preferences in their investment activity. It is also possible to use panel data to account for omitted variables that vary over time but are constant between cross sections, which are not a random sample. This issue can arise since we have the ordered data set of developed countries investing into transition countries.

The Stata 8.2 software package, which was used in order to estimate the specified models, provides a number of tools for the analysis of panel data. In order to use the appropriate estimation technique, the variables have to be first examined for stationarity in a panel context. If the variables are found to contain a unit root, the

variables are then examined for possible cointegration. In the event of cointegration between the variables, Fully Modified OLS (FMOLS) estimation technique should be used in order to obtain coefficient estimates. Although we have the unbalanced panel data it cannot be estimated by the input set into Stata panel tests for unit root.[16] For this purpose there is a special panel unit root test with unbalanced panel developed by Choi, but it was not possible to download it. That is why a visual test was performed and, after concluding that the data in logs were more or less stationary, common panel techniques were implemented.

In addition, it was necessary to choose between pooled OLS, fixed or random effect estimation techniques. Fixed effects regression is used in order to control for omitted variables that differ between cases but are constant over time. However, it is also reasonable to believe that some omitted variables may be constant over time but vary between cases, and others may be fixed between cases but vary over time, therefore the random effect technique should be used. Thus, it is clear that due to economic reasoning this FDI issue could be subject to different estimations. Hence, in order to end up with the best estimators, some statistical criteria have been employed. First, the F-test allows us to distinguish between panel regression and simple OLS. High F-statistic indicates that fixed effect should be preferred. Statistically, fixed effects always give consistent results, but they may not be the most efficient ones. Random effects procedure gives more efficient estimators with better *p*-values, and therefore, it is necessary to run random effects if it is statistically justifiable to do so. The Hausman test for random effects can help us to distinguish between fixed and random effect estimation since it checks a more efficient model against a less efficient, but consistent model. The essential hypothesis here is that the coefficients estimated by the efficient random effects estimator are the same as the ones estimated by the consistent fixed effects estimator. If they are (insignificant *p*-value>0.05) then it is safe to use random effects.

[16] Levin, Lin and Chu and Im, Pesaran and Shin

Models 1 and 2 are estimated as fixed effects panel regressions, and yield coefficient estimates for the basic variables of the gravity models specified earlier. Thus, the first specification is based on the model of foreign production with domestic intermediate inputs and fixed costs increasing with distance. The signs and significance of the coefficients allows inference about the inappropriateness of such a model for explaining OECD FDI into transition economies. Thus, the export substituting nature and market-seeking type of FDI can hardly be inferred. The second specification is based on the factor proportion theory model and assumes vertical FDI. Here, interpretation of the results is a bit different as are the conclusions. The signs and significance of estimated coefficients allows surmising about the appropriateness of such a model for explanation of OECD FDI into transition countries. The main inference is about vertical and therefore cheap and abundant resources seeking FDI. According to the model, domestic companies invest abroad in order to reduce overall costs of production. All the coefficients are significant and have impact with respect to the theory signs. Thus, negative coefficient by the home country GDP here represents the opposite relationship between the demand for the final good in the home country and international investment activity. The size of the foreign market represents the demand capacity for the final good as earlier and moreover, the supply capacity of the host country and also affects the investment activity positively. The relative factor endowment ratio in this model represents the minimum price of the intermediate good produced abroad and thereby the fraction of the output of intermediate good produced domestically and in the foreign country. The higher this fraction, the lower the level of FDI, it is exactly this which shows the estimation result. Fixed effects technique does not allow us to estimate the sign and significance of the distance variable as it has been excluded being time-invariant. However, from the positive sign of imports variable can be inferred that OECD FDI and exports are complements, which again confirms the vertical character of FDI.

Increase in a host country's real interest rate affects FDI negatively, which is quite rational as it needs higher returns in order to approve the investment. Estimation of the annual exchange-rate impact shows that currency depreciation indeed causes

more FDI. Negative sign and significance of the dummy variable for pegged regime indicates as well as positive and significant sign of exchange rate volatility suggests that FDI investors are in favour of floating exchange-rate regime. The increase in wages adjusted for productivity creates disincentive for FDI, especially as it raises production costs.

Table 3 Estimation results: gravity model				
Estimated Coefficients Standard errors of estimates	OECD countries' FDI into transition economies			
FDI inflow	Model 1	Model 2	Model 3	Model 4
Intercept	-7.463479 5.499994	-9.045214 5.540385	.4456782 5.184983	-4.909249*** .6810407
Distance	dropped	dropped	dropped	-1.088273*** .1392595
Home country GDP	-.1385892 .9103674	-3.30730*** 1.000171	-2.593189*** .9279216	-.3728523* .199802
Host country GDP	2.405274*** .4321005	5.767062*** .6765974	1.875767*** .7054441	2.035292*** .310321
Relative capital-labor ratio		-3.766472*** .5638736	-2.349691*** .5415247	-1.017652*** .2297248
Imports			2.406765*** .2059515	1.52786*** .127829
Annual bilateral exchange rate				.2395918*** .028534
Host country unit labor costs				.5966055** .2808118
Pegged exchange rate regime				-.2778229*** .0897264
Host country interest rate				-.6202273*** .1189515
Number of obs	965	950	948	755
Number of groups	134	134	134	119
Average Obs per group	7.2	7.1	7.1	6.3
F-test	6.91***	7.13***	7.20***	
Hausman chi-squared	6.44**	15.98***	19.96***	
R squared	0.0536	0.0346	0.3367	-1146.477[17]
*** 1% **5% *1% level of significance				

Indeed, freely floating and stable exchange rate can be the sign of sound economic environment and thus to be particularly attractive for investors.

Inclusion to the model of the home stock market price indices, host stock market price indices, skilled labor endowment and other exchange rate regime models does not contribute to the explanatory power of the model. After the extension of model 4 with the investment climate indices such as private sector market share, index of infrastructure and securities' market development, price liberalization, banking and legal sector reform indices make the host country market size insignificant. Therefore we can agree with the findings of Wilhelms and Witter (1998) and deduce that all the foreign investors from OECD countries pay much attention to proper, market consistent, institutional developments of transition economies. At the same time coefficients estimates by the private sector share in the economy, indices of trade liberalization, infrastructure, competition policy, securities market development and conduction of legal reforms appeared to be positive and statistically significant. Indices of price liberalization and enterprise restructuring have been excluded from the model due to Wald test of joint significance.

The problem of heteroscedasticity which can naturally occur in this estimation was approached by the conduction of the LR test.[18] Difference in fitted models with correction for heteroscedasticity, and without it, has been estimated with LR test and appeared to be insignificant. There is also potential problem of autocorrelation, as it can be that FDI inflows can be affected by previous periods. In order to check for autocorrelation a user-written program, called xtserial, written by David Drukker has been run in Stata Test statistic appeared to be insignificant thus implying absence of autocorrelation.

There is also a potential problem with the endogenous nature of imports and the level of exchange rate variables, as they can be determined by the model itself. In order to check for endogeneity the technique suggested by Wooldridge (1960) has been employed. That which is obtained from the regression of imports variable on all the explanatory variables used in the model and the instrument residuals are to be

incorporated into FDI explaining model. The instrument to be used is the stock market price index in the home economy for the reason that the more developed the companies, the more likely they are to export. The coefficient by residuals appeared to be significantly statistically different from zero, thus implying endogeneity. Therefore it can be better to instrument the imports variable. An instrumented fixed effect regression has been run; the results are also presented in the Appendix C. Variables' coefficients preserved their sign however host and home market GDP, dummy for floating regime, unit labour costs and interest rate appeared to insignificant. The question is whether maybe one should choose a better instrument.

The results of the extended with structural and institutional indices variables and corrected for heteroscedasticity model are provided in the Appendix C.

At the same time, there is an opinion that overall, it would be much better to estimate FDI issue using methodology. We have showed that FDI and imports are actually complementary and it is very hard to say what influences what, thus estimation within the VAR (VEC if cointegrated) framework would definitely give better results. But this is not possible now because of lack of a sufficiently long time-series; therefore panel data is the only available advanced estimation technique.

Let us turn to the model of competition for FDI. For better understanding it has been distinguished between the following competition areas. First, we consider competition for all OECD FDI between all transition economies (1). Second, we estimate competition for European OECD FDI (2), third is the Ukrainian competition for all OECD FDI (3) and the last one is competition between Ukraine and Russia (4).[19] Estimation procedure here has been done by the same algorithm as in the case of gravity model estimation. Estimation with the random effect has been chosen on the base of described above statistical testing procedure. The model has been tested for potential heteroscedasticity and appeared to have one. With the correction purposes FGLS estimators for heteroscedastic variances has been found and they actually have been reported.

Table 4 Estimation results: competition model				
Estimated Coefficients Standard errors of estimates	1	2	3	4
Relative unit labor costs	2.07154*** .1470374	1.761323*** .180432	.6531829 .5666208	-4.209013 4.092724
Relative annual exchange rate	.0760137*** .0089615	.0891767*** .0104865	.141036*** .0364628	.4250259 2.530464
Relative exchange rate volatility	.0487623* .026478	.0262582 .0479119	-.0526202 .1751957	1.971308*** .4605772
Relative interest rate	-.192202*** .0408161	-.2070222*** .047088	-.3833444*** .1308898	-.6717613 .4468663
Relative imports	.5593728*** .0317999	.584292*** .0359554	.7156966*** .1464913	.9633467*** .2186463
Relative market size	.5807548*** .0406644	.4671254*** .0497367	.4544263* .2716013	7.00823* 4.217095
***1%, **5%, *10% level of significance				

The competition model results show that OECD FDI inflows into transition economies are indeed subject to relativity issues. Thus it can be seen that for the whole sample level of exchange rate, unit labor costs, amount of imports, relative interest rates and countries' market size are significant. The coefficients' estimates obtained suggest that relatively higher to competitors exchange rate depreciation can positively influence the FDI inflow into the country. An interesting result is a positive and significant estimate of the coefficient near relative unit labor costs. This means that the higher the growth in productivity adjusted unit labor costs in the economy in comparison to other transition countries, the higher the growth in relative FDI inflow into the economy. Relative productivity adjusted unit labor costs in the economy can be a good approximation for the quality of economic development of the transition economy. The point is that transition countries in 1990s had basically similar initial conditions, however now there is some evident differentiation in the development. Thus, countries with more advanced technologies, developed IT and services sectors usually have higher labor costs while

productivity in figures can be the same. These countries can be more attractive for investors as they still provide the cost reduction opportunities (labor costs, which are anyway, lower than at home) whereas the quality of the labor force is higher.

These inferences however cannot be valid to full extent for Ukrainian competition as with the rest of the transition countries, so with its neighboring Russia. It has been revealed that Ukraine indeed can compete for FDI with the rest of transition countries by means of higher than neighbors' one exchange rate depreciation and lower interest rates. In the case of competition of Ukraine and Russia estimation has been done on extremely small sample (only 49) observations, thus inferences are perhaps cannot be considered to be valid. However the result obtained is that the higher the growth in relative volatility the more OECD FDI inflows can be attracted in Ukraine relatively to the ones attracted in Russia.

Chapter 6

CONCLUSIONS

According to the problems stated in introduction and methodology used in this study it is possible to make the following conclusions:

First of all, the main conclusion is the vertical nature of OECD FDI in transition economies, which is in accord with the findings of Carstensen and Toubal (2004). In this regard, FDI in transition countries can be explained using the factor proportion theory of FDI.

Second, FDI in transition economies is influenced by traditional, exchange rate related and transition specific determinants.

Therefore, any increase in aggregate demand in the source country, a rise of the interest rate in the host economy, or a fall in the amount of imports from the OECD countries negatively affect the inflow of FDI. Introduction of the exchange rate regimes into the model, as well as currency appreciation, also affect FDI. These findings are helpful to establish a sound FDI promotion strategy. Moreover, the established positive link between FDI and exchange rate flexibility contributes to the debate surrounding the inflation targeting in Ukraine. It can be also noted that an increase in the real interest rate negatively affects the amount of FDI inflow. In terms of the labour market policy implication, the growth in wages negatively affects FDI inflow when it is not supported by at least equal growth in productivity.

From the viewpoint of competition for FDI, the results show that countries can indeed attract relatively more FDI by having a higher economic growth rate, higher currency depreciation, and higher growth rates of the unit labour costs relative to other FDI competitor nations.

However, currently all these findings have rather restricted application for Ukraine and Russia, where macroeconomic factors of FDI attraction are still secondary to the formation of sound market oriented institutions through privatization, infrastructure and securities market development, legal reforms.

This study can be further extended by considering industry specific FDI determinants as well as opportunities for increased competition. Industry level data research in European countries showed that industry specific determinants do matter but extensive research has yet to been done in all industries except maybe for manufacturing and, to some extent, R&D sector. However, in order to attract FDI into some specific industry, which is relevant for the overall sound FDI attraction strategy, analysis of such determinants can be very useful. As well there is under-examined issue concerning special economic zones, their effectiveness in the scope of FDI attraction, and their influence on FDI location decision which might contribute to a better knowledge of the FDI determinants

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APPENDIX A

Table A1 Data sources		
Variable name	Label	Sources
Foreign Direct Investment	*FDI*	OECD International Direct Investment Statistic Yearbook, 2003 Edition
Gross Domestic Product	*GDP*	The World Development Indicators
Gross Domestic Product per capita	*GDPpc*	the Vienna Institute of International Economic Studies
Distance	*D*	www.indo.com/distance
Common Language	*Lang*	CEPII
Contiguity	*Cont*	CEPII
Relative Unit Labour Costs	*Rulc*	International Labour Organization, the Vienna Institute of International Economic Studies
Skilled Labor Ratio	*Labfor*	The World Development Indicators, International Labor Organization
Relative Factor endowments	*Relkl*	IMF International Financial Statistics
Structural indices: corruption, private sector share, legal and banking reform, infrastructure development		EBRD Transition Report
Exhange-rate regime		IMF International Financial Statistics
Exchange rate levels	*erate*	IMF International Financial Statistics
Stock market price index	*Msci*	www.msci.com, Slovenian and Bulgarian Stock Exchanges, Sigma-Bleyzer price index
Interest rate	*Irate*	IMF International Financial Statistics
OECD exports to transition countries	*Imports*	the Vienna Institute of International Economic Studies

APPENDIX B

Table B1 Summary Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
year	1824	1995.5	3.452999	1990	2001
id	1824	76.5	43.8897	1	152
fdireal	965	112.7426	292.368	.0091846	4147.293
mscihome	1808	1035.056	928.1146	36.76239	5550.737
mscihost	993	401.5742	523.4578	34.24448	1866.657
iratehome	1745	7.521547	5.501427	1.3	39
iratehost	1452	43.16879	50.17656	7.16	320.31
dumfloat	1495	.4428094	.4968847	0	1
labhome	1609	.2142841	.0935538	.0680231	.5225839
labhost	1416	.1530779	.0336397	.083884	.2066647
imports	1752	677.1258	1434.088	0	12472.68
homeavgmonw	1792	3191.058	1321.496	0	5709.326
hostavgmonw	1807	304.0458	242.5348	24.59469	1061.882
rgdp_home	1824	1108673	1913444	72282.36	9784959
rgdp_host	1824	87638.4	130369.1	0	633420.8
rgdppc_home	1824	27923.4	11692.63	2970.195	52702.33
rgdppc_host	1824	3902.438	2796.831	0	13454.61
distance	1824	2592.678	2641.697	56	9425
contiguity	1824	.0855263	.27974	0	1
common_lang	1824	.0131579	.113982	0	1
erate	1492	147.3164	715.0435	0	10851.59
vol	1454	.4940217	.1897989	.142168	1.491194
relkl	1682	-1.01904	.7410674	-3.102535	1.254173
private_se~e	1368	61.72149	12.89967	15	80
price_libe~n	1368	2.970541	.3239555	1	3.3
banking_re~e	1368	2.620102	.720774	1	4
legal_reform	760	3.330263	.5390471	2	4

APPENDIX C

Model 1

```
. xtreg logfdireal  logrgdp_home logrgdp_host logdistance relkl,fe

Fixed-effects (within) regression               Number of obs      =       950
Group variable (i): id                          Number of groups   =       134

R-sq:  within  = 0.0821                         Obs per group: min =         1
       between = 0.0372                                        avg =       7.1
       overall = 0.0346                                        max =        12

                                                F(3,813)           =     24.23
corr(u_i, Xb)  = -0.5177                        Prob > F           =    0.0000

------------------------------------------------------------------------------
  logfdireal |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
logrgdp_home |  -3.307307   1.000171    -3.31   0.001    -5.270529   -1.344086
logrgdp_host |   5.767062   .6765974     8.52   0.000     4.438979    7.095146
 logdistance |  (dropped)
       relkl |  -3.766472   .5638736    -6.68   0.000    -4.873291   -2.659652
       _cons |  -9.045214   5.540385    -1.63   0.103    -19.92036    1.829932
-------------+----------------------------------------------------------------
     sigma_u |  1.7167472
     sigma_e |  1.1012041
         rho |  .70848847   (fraction of variance due to u_i)
------------------------------------------------------------------------------
F test that all u_i=0:     F(133, 813) =     7.13            Prob > F = 0.0000
```

Model 2

```
. xtreg logfdireal  logrgdp_home logrgdp_host logdistance,fe

Fixed-effects (within) regression               Number of obs      =       965
Group variable (i): id                          Number of groups   =       134

R-sq:  within  = 0.0362                         Obs per group: min =         1
       between = 0.0930                                        avg =       7.2
       overall = 0.0536                                        max =        12

                                                F(2,829)           =     15.56
corr(u_i, Xb)  = -0.4285                        Prob > F           =    0.0000

------------------------------------------------------------------------------
  logfdireal |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
logrgdp_home |  -.1385892   .9103674    -0.15   0.879    -1.925485    1.648307
logrgdp_host |   2.405274   .4321005     5.57   0.000     1.557135    3.253414
 logdistance |  (dropped)
       _cons |  -7.463479   5.499994    -1.36   0.175    -18.25903    3.332074
-------------+----------------------------------------------------------------
     sigma_u |  1.5337336
     sigma_e |  1.1308214
         rho |  .64783163   (fraction of variance due to u_i)
------------------------------------------------------------------------------
F test that all u_i=0:     F(133, 829) =     6.91            Prob > F = 0.0000
```

Model 3

```
xtreg logfdireal  logrgdp_home logrgdp_host logdistance  relkl logimports,fe

Fixed-effects (within) regression               Number of obs      =       948
Group variable (i): id                          Number of groups   =       134

R-sq:  within  = 0.2124                         Obs per group: min =         1
       between = 0.4148                                        avg =       7.1
       overall = 0.3367                                        max =        12

                                                F(4,810)           =     54.61
corr(u_i, Xb)  = -0.1841                        Prob > F           =    0.0000

------------------------------------------------------------------------------
  logfdireal |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
logrgdp_home |  -2.593189   .9279216    -2.79   0.005    -4.414603    -.771774
logrgdp_host |   1.875767   .7054441     2.66   0.008     .4910526    3.260481
 logdistance |  (dropped)
       relkl |  -2.349691   .5415247    -4.34   0.000    -3.412649   -1.286734
  logimports |   2.406765   .2059515    11.69   0.000     2.002503    2.811026
       _cons |   .4456782   5.184983     0.09   0.932     -9.73191    10.62327
-------------+----------------------------------------------------------------
     sigma_u |  1.1732872
     sigma_e |  1.0169515
         rho |  .57101655   (fraction of variance due to u_i)
------------------------------------------------------------------------------
F test that all u_i=0:     F(133, 810) =     7.20            Prob > F = 0.0000
```

Model 4

```
. xtreg logfdireal  logrgdp_home logrgdp_host logdistance relkl logimports  loga
> vannerate  logiratehost  logrelwagehost   dumpeg,fe

Fixed-effects (within) regression               Number of obs      =       755
Group variable (i): id                          Number of groups   =       119

R-sq:  within  = 0.1885                         Obs per group: min =         1
       between = 0.2737                                        avg =       6.3
       overall = 0.2282                                        max =         9

                                                F(8,628)           =     18.23
corr(u_i, Xb)  = -0.7046                        Prob > F           =    0.0000

------------------------------------------------------------------------------
  logfdireal |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
logrgdp_home |  -3.408545    1.16201    -2.93   0.003     -5.69044    -1.12665
logrgdp_host |   6.158342   1.409597     4.37   0.000     3.390248    8.926436
 logdistance |  (dropped)
       relkl |  -3.200082   .9249737    -3.46   0.001    -5.016498   -1.383666
  logimports |   1.863815   .3968118     4.70   0.000     1.084577    2.643054
logavanner~e |   .1543078   .0564358     2.73   0.006      .043482    .2651336
logiratehost |  -.5028768   .1849268    -2.72   0.007    -.8660265    -.139727
logrelwage~t |  -3.116205   .8992348    -3.47   0.001    -4.882076   -1.350333
      dumpeg |  -.0103532   .1311173    -0.08   0.937    -.2678345    .2471282
       _cons |  -14.13225    6.73217    -2.10   0.036    -27.35254   -.9119573
-------------+----------------------------------------------------------------
     sigma_u |   1.970965
     sigma_e |  .97167726
         rho |  .80447626   (fraction of variance due to u_i)
------------------------------------------------------------------------------
F test that all u_i=0:     F(118, 628) =     6.36             Prob > F = 0.0000
```

Corrected for heteroscedasticity

```
. xtgls logfdireal  logrgdp_home logrgdp_host logdistance relkl logimports  loga
> vannerate  logiratehost  logrelwagehost   dumpeg, p(h)

Cross-sectional time-series FGLS regression

Coefficients:  generalized least squares
Panels:        heteroskedastic
Correlation:   no autocorrelation

Estimated covariances      =       119          Number of obs      =       755
Estimated autocorrelations =         0          Number of groups   =       119
Estimated coefficients     =        10          Obs per group: min =         1
                                                               avg =  6.344538
                                                               max =         9
                                                Wald chi2(9)       =   1822.94
Log likelihood             = -1146.477          Prob > chi2        =    0.0000

------------------------------------------------------------------------------
  logfdireal |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
logrgdp_home |  -.3728523    .199802    -1.87   0.062     -.764457    .0187524
logrgdp_host |   2.035292    .310321     6.56   0.000     1.427074    2.643511
 logdistance |  -1.088273   .1392595    -7.81   0.000    -1.361217   -.8153295
       relkl |  -1.017652   .2297248    -4.43   0.000    -1.467904   -.5673998
  logimports |    1.52786    .127829    11.95   0.000      1.27732     1.7784
logavanner~e |   .2395918    .028534     8.40   0.000     .1836662    .2955174
logiratehost |  -.6202273   .1189515    -5.21   0.000    -.8533681   -.3870866
logrelwage~t |   .5966055   .2808118     2.12   0.034     .0462245    1.146986
      dumpeg |  -.2778229   .0897264    -3.10   0.002    -.4536835   -.1019623
       _cons |  -4.909249   .6810407    -7.21   0.000    -6.244065   -3.574434
------------------------------------------------------------------------------
```

Imports instrumented

```
. xtivreg logfdireal  logrgdp_home logrgdp_host logdistance relkl (logimports=
> logmscihome)  logavannerate  logiratehost  logrelwagehost  dumfloat,fe

Fixed-effects (within) IV regression         Number of obs      =          755
Group variable: id                           Number of groups   =          119

R-sq:  within  = 0.0843                      Obs per group: min =            1
       between = 0.4523                                     avg =          6.3
       overall = 0.3406                                     max =            9
                                             Wald chi2(8)       =   8182.34
corr(u_i, Xb)  = -0.7965                     Prob > chi2        =    0.0000

------------------------------------------------------------------------------
  logfdireal |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
  logimports |    5.31707   1.599443     3.32   0.001     2.182219    8.451921
logrgdp_home |  -1.540381   1.467333    -1.05   0.294    -4.416302    1.335539
logrgdp_host |  -.1060743   3.349854    -0.03   0.975    -6.671667    6.459519
 logdistance |  (dropped)
       relkl |  -2.286588   1.128415    -2.03   0.043     -4.49824   -.0749361
logavanner~e |   .2106783   .0677358     3.11   0.002     .0779186    .343438
logiratehost |  -.0699567    .276383    -0.25   0.800    -.6116575    .4717441
logrelwage~t |  -.9952569   1.325883    -0.75   0.453     -3.59394    1.603426
    dumfloat |   .0046241   .1472482     0.03   0.975     -.283977    .2932253
       _cons |  -4.131073    9.29605    -0.44   0.657      -22.351    14.08885
-------------+----------------------------------------------------------------
     sigma_u |  2.1246552
     sigma_e |  1.0321749
         rho |  .80905522   (fraction of variance due to u_i)
------------------------------------------------------------------------------
F  test that all u_i=0:     F(118,628) =     5.73         Prob > F    = 0.0000
------------------------------------------------------------------------------
Instrumented:   logimports
Instruments:    logrgdp_home logrgdp_host logdistance relkl logavannerate
```

Estimation with exchange rate volatility

```
. xtreg lgofdi logrgdp_home logrgdp_host logdistance logavannerate logrelwagehos
> t relkl logiratehost logimports lvol,fe

Fixed-effects (within) regression               Number of obs      =       734
Group variable (i): id                          Number of groups   =       119
R-sq:  within  = 0.1907                         Obs per group: min =         1
       between = 0.3061                                        avg =       6.2
       overall = 0.2671                                        max =         9
                                                F(8,607)           =     17.88
corr(u_i, Xb)  = -0.6993                        Prob > F           =    0.0000

------------------------------------------------------------------------------
      lgofdi |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
logrgdp_home |  -2.853226   1.175825    -2.43   0.016    -5.162405   -.5440469
logrgdp_host |   5.788834   1.452598     3.99   0.000     2.936106    8.641561
 logdistance |  (dropped)
logavanner~e |   .1557647   .0570023     2.73   0.006      .043819    .2677105
logrelwage~t |  -2.952136   .8833242    -3.34   0.001    -4.686878   -1.217393
       relkl |   -2.72389   .9320783    -2.92   0.004     -4.55438   -.8934005
logiratehost |  -.3345289    .212827    -1.57   0.117    -.7524956    .0834377
  logimports |   1.981306   .3958593     5.01   0.000     1.203886    2.758726
        lvol |  -.1430018   .2294105    -0.62   0.533    -.5935366    .3075329
       _cons |  -15.57229   6.873633    -2.27   0.024    -29.07128     -2.0733
-------------+----------------------------------------------------------------
     sigma_u |  1.9709006
     sigma_e |  .95383036
         rho |  .81023226   (fraction of variance due to u_i)
------------------------------------------------------------------------------
F test that all u_i=0:     F(118, 607) =     6.54            Prob > F = 0.0000.
```

Further extension

```
. xtgls logfdireal  logrgdp_home logrgdp_host logdistance relkl logimports  loga
> vannerate  logiratehost  logrelwagehost   dumpeg private_sector_share  tradefo
> reign_exchange_system infrastructure enterprise_restructuring price_liberaliza
> tion competition_policy banking_refotminterest_rate_libe securities_markets le
> gal_reform,p(h)

Cross-sectional time-series FGLS regression

Coefficients:  generalized least squares
Panels:        heteroskedastic
Correlation:   no autocorrelation

Estimated covariances      =       116          Number of obs      =       408
Estimated autocorrelations =         0          Number of groups   =       116
Estimated coefficients     =        19          Obs per group: min =         1
                                                               avg =  3.517241
                                                               max =         4
                                                Wald chi2(18)      =   5059.43
Log likelihood             = -558.2062          Prob > chi2        =    0.0000

------------------------------------------------------------------------------
  logfdireal |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
logrgdp_home |  -.0140669   .2485755    -0.06   0.955    -.5012658    .4731321
logrgdp_host |   2.200044   .3680378     5.98   0.000     1.478704    2.921385
 logdistance |  -1.178844   .1835528    -6.42   0.000    -1.538601   -.8190876
       relkl |  -.9933561   .2829522    -3.51   0.000    -1.547932     -.43878
  logimports |   1.432877   .1432829    10.00   0.000     1.152048    1.713707
logavanner~e |    .119922   .0354433     3.38   0.001     .0504544    .1893896
logiratehost |   .0391148   .1335643     0.29   0.770    -.2226664    .3008961
logrelwage~t |   .6290386    .341971     1.84   0.066    -.0412122    1.299289
```

```
      dumpeg |  -.8582782    .180161    -4.76   0.000    -1.211387   -.5051691
private_se~e |   .0407484   .0074763     5.45   0.000     .0260951    .0554017
tradeforei~m |   .2800745   .1246868     2.25   0.025     .0356928    .5244562
infrastruc~e |   .5087788   .1187578     4.28   0.000     .2760177    .7415399
enterprise~g |  -.0365683   .2160104    -0.17   0.866     -.459941    .3868044
price_libe~n |  -.0321512   .1966426    -0.16   0.870    -.4175637    .3532613
competitio~y |   -1.20077   .2081132    -5.77   0.000    -1.608664   -.7928751
banking_re~e |   .1535936   .1579487     0.97   0.331    -.1559802    .4631674
securities~s |  -.5958165    .130676    -4.56   0.000    -.8519368   -.3396962
legal_reform |  -.2166882     .10109    -2.14   0.032     -.414821   -.0185555
       _cons |  -7.870459    1.28184    -6.14   0.000    -10.38282   -5.358099
------------------------------------------------------------------------------
```

After Wald test

```
. xtgls logfdireal  logrgdp_home logrgdp_host logdistance relkl logimports  loga
> vannerate  logiratehost  logrelwagehost   dumpeg private_sector_share  tradefo
> reign_exchange_system infrastructure competition_policy  securities_markets le
> gal_reform  lvol,p(h)

Cross-sectional time-series FGLS regression

Coefficients:  generalized least squares
Panels:        heteroskedastic
Correlation:   no autocorrelation

Estimated covariances      =       116          Number of obs      =       402
Estimated autocorrelations =         0          Number of groups   =       116
Estimated coefficients     =        17          Obs per group: min =         1
                                                               avg =  3.465517
                                                               max =         4
                                                Wald chi2(16)      =   3280.54
Log likelihood             = -545.4808          Prob > chi2        =    0.0000

------------------------------------------------------------------------------
  logfdireal |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
logrgdp_home |   .4069364   .2557562     1.59   0.112    -.0943366    .9082094
logrgdp_host |   1.964441    .359974     5.46   0.000     1.258905    2.669977
 logdistance |   -1.23496   .1838032    -6.72   0.000    -1.595208   -.8747126
       relkl |  -.7073503   .2779812    -2.54   0.011    -1.252183   -.1625171
  logimports |   1.358958   .1466781     9.26   0.000     1.071474    1.646442
logavanner~e |    .105747   .0343715     3.08   0.002     .0383801    .1731139
logiratehost |   .1673402   .1397994     1.20   0.231    -.1066616     .441342
logrelwage~t |   .8366797   .3341905     2.50   0.012     .1816784    1.491681
      dumpeg |  -.9673723   .1731684    -5.59   0.000    -1.306776   -.6279685
private_se~e |   .0498349   .0070491     7.07   0.000     .0360189     .063651
tradeforei~m |   .2504774   .0970392     2.58   0.010     .0602839    .4406708
infrastruc~e |   .7192098   .1101652     6.53   0.000     .5032899    .9351297
competitio~y |   -1.44434    .175997    -8.21   0.000    -1.789288   -1.099392
securities~s |  -.6834188   .1311964    -5.21   0.000     -.940559   -.4262786
legal_reform |  -.1646427   .0861298    -1.91   0.056    -.3334541    .0041687
        lvol |   .6679303   .1532142     4.36   0.000     .3676361    .9682245
       _cons |   -8.59346   1.058777    -8.12   0.000    -10.66862   -6.518296

------------------------------------------------------------------------------
```

APPENDIX D

For competition

```
. xtgls logfdi  logrelwage logimports logerate logrgdp_host logvol logiratehost
> logimports,p(h)
note: logimports dropped due to collinearity

Cross-sectional time-series FGLS regression

Coefficients:  generalized least squares
Panels:        heteroskedastic
Correlation:   no autocorrelation

Estimated covariances      =       262          Number of obs      =      1269
Estimated autocorrelations =         0          Number of groups   =       262
Estimated coefficients     =         7          Obs per group: min =         1
                                                               avg =  4.843511
                                                               max =         9
                                                Wald chi2(6)       =   3376.80
Log likelihood             = -1185.548          Prob > chi2        =    0.0000

------------------------------------------------------------------------------
      logfdi |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
  logrelwage |    2.07154   .1470374    14.09   0.000     1.783352    2.359728
  logimports |   .5593728   .0317999    17.59   0.000     .4970461    .6216995
    logerate |   .0760137   .0089615     8.48   0.000     .0584496    .0935779
logrgdp_host |   .5807548   .0406644    14.28   0.000      .501054    .6604556
      logvol |   .0487623    .026478     1.84   0.066    -.0031337    .1006583
logiratehost |   -.192202   .0408161    -4.71   0.000    -.2722001   -.1122039
       _cons |   .2942462   .0141204    20.84   0.000     .2665707    .3219216
------------------------------------------------------------------------------
```

For european OECD countries' investment

```
. xtgls logfdi  logrelwage logimports logerate logrgdp_host logvol logiratehost
> logimports,p(h)
note: logimports dropped due to collinearity

Cross-sectional time-series FGLS regression

Coefficients:  generalized least squares
Panels:        heteroskedastic
Correlation:   no autocorrelation

Estimated covariances      =       225          Number of obs      =      1084
Estimated autocorrelations =         0          Number of groups   =       225
Estimated coefficients     =         7          Obs per group: min =         1
                                                               avg =  4.817778
                                                               max =         9
                                                Wald chi2(6)       =   2195.99
Log likelihood             = -1009.675          Prob > chi2        =    0.0000

------------------------------------------------------------------------------
      logfdi |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
  logrelwage |   1.761323    .180432     9.76   0.000     1.407682    2.114963
  logimports |    .584292   .0359554    16.25   0.000     .5138208    .6547633
    logerate |   .0891767   .0104865     8.50   0.000     .0686236    .1097297
logrgdp_host |   .4671254   .0497367     9.39   0.000     .3696434    .5646075
      logvol |   .0262582   .0479119     0.55   0.584    -.0676473    .1201637
logiratehost |  -.2070222    .047088    -4.40   0.000    -.2993131   -.1147314
       _cons |   .2912698   .0169197    17.21   0.000     .2581078    .3244317
------------------------------------------------------------------------------
```

For Ukraine

```
. xtgls logfdi  logrelwage logimports logerate logrgdp_host logvol logiratehost lo
> gimports,p(h)
note: logimports dropped due to collinearity

Cross-sectional time-series FGLS regression

Coefficients:  generalized least squares
Panels:        heteroskedastic
Correlation:   no autocorrelation

Estimated covariances      =        44          Number of obs      =       191
Estimated autocorrelations =         0          Number of groups   =        44
Estimated coefficients     =         7          Obs per group: min =         1
                                                               avg =  4.340909
                                                               max =         8
                                                Wald chi2(6)       =    180.77
Log likelihood             = -168.6881          Prob > chi2        =    0.0000

------------------------------------------------------------------------------
      logfdi |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
  logrelwage |   .6531829   .5666208     1.15   0.249    -.4573735    1.763739
    logerate |    .141036   .0364628     3.87   0.000     .0695702    .2125019
logrgdp_host |   .4544263   .2716013     1.67   0.094    -.0779024    .9867551
      logvol |  -.0526202   .1751957    -0.30   0.764    -.3959975    .2907571
logiratehost |  -.3833444   .1308898    -2.93   0.003    -.6398838   -.1268051
  logimports |   .7156966   .1464913     4.89   0.000      .428579    1.002814
       _cons |   .2361783    .089798     2.63   0.009     .0601775    .4121791
------------------------------------------------------------------------------
```

For competition between Russia and Ukraine

```
. xtgls logfdi  logrelwage logimports logerate logrgdp_host logvol logiratehost
> logimports,p(h)
note: logimports dropped due to collinearity

Cross-sectional time-series FGLS regression

Coefficients:  generalized least squares
Panels:        heteroskedastic
Correlation:   no autocorrelation

Estimated covariances      =        14          Number of obs      =        49
Estimated autocorrelations =         0          Number of groups   =        14
Estimated coefficients     =         7          Obs per group: min =         1
                                                               avg =       3.5
                                                               max =         5
                                                Wald chi2(6)       =     33.71
Log likelihood             = -34.23111          Prob > chi2        =    0.0000

------------------------------------------------------------------------------
      logfdi |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
  logrelwage |  -4.209013   4.092724    -1.03   0.304     -12.2306    3.812578
  logimports |   .9633467   .2186463     4.41   0.000     .5348079    1.391886
    logerate |   .4250259   2.530464     0.17   0.867    -4.534593    5.384645
logrgdp_host |    7.00823   4.217095     1.66   0.097    -1.257125    15.27359
      logvol |   1.971308   .4605772     4.28   0.000     1.068593    2.874023
logiratehost |  -.6717613   .4468663    -1.50   0.133    -1.547603    .2040805
       _cons |  -6.749578   5.281064    -1.28   0.201    -17.10027    3.601117
------------------------------------------------------------------------------
```