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Determinants of FDI and its Motives in Central and Eastern European Countries

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Abstract The paper analyses FDI determinants in 10 Central and Eastern European Countries. It is argued that the selected countries should predominantly experience positive effects of FDI because of their specific characteristics. With panel regression analysis it aims to explain the differences of FDI inflow levels to the countries. The significant determinants found are private sector, openness (share of trade in GDP), R&D expenditures and infrastructure. An extensive discussion is also lead on GDP and labour costs. Furthermore, the paper attempts to sort the determinants of market-seeking and resource-seeking and finds that the significant determinants represent both groups.

Keywords: FDI · Central and Eastern Europe · EU · market size · labour costs

Introduction

Attracting Foreign Direct Investment (FDI) is an important objective of every economy that has long-term goals of economic welfare. FDI increases the host country's wealth as well as it encourages economic growth if certain conditions are met. FDI flows can partly be affected by active country policies and this implication brings a responsibility on each country of managing FDI. The paper applies the macroeconomic perspective and analyses the determinants of foreign direct investment inflow levels to 10 Central and Eastern European Countries (CEEC-10, see Appendix 1). The selected countries are transition economies that according to the theory are an exceptionally advantageous environment for positive effects of FDI inflows. Thus attracting foreign investment for these 10 countries should also accelerate the process of convergence with the developed countries. At first sight, the countries seem to possess similar characteristics and thus should receive comparable levels of FDI inflows. However as observed in statistics the differences in FDI inflows to CEEC-10 are great. The main question of this paper is thus what determinants explain these differences in FDI inflow levels to CEEC-10. Finding an answer to this question would indirectly suggest a strategy of higher economic growth in this region.

Additionally, the paper divides FDI determinants depending on the investor's motives. Intuitively, a country would not be able to offer low labour costs together with highly trained labour force at length. FDI in countries with low production costs normally invest in the manufacturing of intermediate goods that are transported to other affiliates for final production. On the other hand, the countries with high levels of technology and human capital would produce final goods for the domestic market. This is a simplified picture that is going to be discussed on more extensively. The paper however aims at answering what motive the FDI in the 10 Central and Eastern European countries has. Do CEEC-10 specialise

at low production costs or at offering self-sufficient labour force for the domestic market production?

The thesis is structured as followed: main theories for the existence of FDI are presented in part 1 followed by a discussion on the effects on host economies. Part two will argument for the choice of countries while the FDI determinants are discussed in part 3. The data, empirical method and the results follow in part 4. Part 5 concludes the results in a short fashion.

1. FOREIGN DIRECT INVESTMENT

1.1 Definition of FDI

FDI investment is a unique type of capital flow to a host country as it is lasting and involves a certain amount of influence from a foreign company or individual. There are two main strategies of investing in a foreign country (Lahiri, 2009):

- Greenfield Investment - an investment is made to set up new facilities in the host country;
- M&A (Mergers and Acquisitions) – a foreign investor takes over an existing company;
- A foreign company could as well choose a form of International Joint Venture. However this process is either made with Greenfield investment or M&A.

These different types of FDI will not be attached much significance to in the empirical model. This distinction is though useful for several discussions led in the paper. It also illustrates the involvement in the host country economy and politics that FDI indicates. In times of recessions or crises in the host country the foreign investor is affected to the same extent as the domestic investors and cannot close down the business immediately. In contrast to this situation a portfolio investment is more sensitive to economic cycles and can be withdrawn as soon as financial, political or other type of instability occurs. As a result of this feature foreign direct investment requires long-term strategies choosing host countries and the country specific characteristics are crucial in this decision-making. Therefore in order to explain differences in inflow levels of FDI among countries the specific country features are going to be a focus of this paper.

1.2 Motives of FDI

Analysing the determinants of FDI inflows more significance will be attached to the motives of foreign investment. It would hopefully help us to obtain a rough picture about the specialisation of the selected countries on certain goods. The determinants are mainly divided into two categories:

- Market seekers

This type of FDI represents horizontal integration and is common for developed countries with high incomes (Birsan and Buiga, 2009). The main objective of this investment is to reach a large market and substitute for exports to that region by producing final goods. The production of final advanced goods apart sufficient demand requires high technology and educated labour force.

- Resource seekers:

Resource-seeking multinational enterprises aim at reducing production costs in a certain part of the production chain. Mostly it is common for vertical integration in less-developed host countries (Botrić and Škuflić, 2006). Resource-seeking multinational companies (MNCs) or individuals produce cheap intermediate goods to export to another affiliate later on. This is based on a condition that the transportation costs are low enough not to offset the decrease in the production costs and thus requires additional qualities from the host countries.

The motives of FDI inflows and the important determinants for each category will be discussed in part 3. Main theories on FDI will be presented prior to this. To understand the importance of FDI on host country economies the static and dynamic effects of FDI will also be discussed. Based on these effects the choice of the countries will be discussed for more explicitly in part 2.

1.3 Theories on FDI

The first attempt of explaining the existence of FDI was by applying Heckscher-Ohlin neoclassical trade theory that assumes perfectly competitive markets, constant returns to scale and zero transportation costs (Faeth, 2009). FDI flows appear between countries with different capital intensities as capital-abundant countries move production to labour-abundant countries with higher returns to capital and lower returns to labour. This process proceeds until returns to labour and capital are equalised over countries. The neoclassical theory was questioned because of the nature of multinational companies (Faeth, 2009). MNCs are the

central actors in direct investment flows and the companies are described by economies of scale, specialisation through high expenditures on R&D and marketing. Thus there was a need of a model that would consider these specific features.

A major model with firm-level and trade theory perspective was first presented by John H. Dunning in the Investment Development Path (IDP). The theory describes five different stages of development that are helpful for predicting if a country would be a net outward or net inward direct investor. The key factors for attracting FDI in IDP are ownership specific (competitive), location-bound and internalisation advantages (Dunning and Narula, 1996). That is why the model in literature is also called *OLI* (Ownership-Location-Internalisation).

According to the model the investing enterprise has to possess an advantage over locally owned companies (Ownership). This advantage could for example be explained by technical knowledge, advanced R&D centres and in most cases an already established brand through international marketing. Furthermore, the host country is chosen because of location specific advantages that are attractive for foreign multinationals (Location). It could be qualities that are "underlying" and hard to influence such as a market with a large demand or closeness to potential importing countries. It could as well be economic and political environment and incentives that countries can affect over time. Finally, there should be a benefit of incorporating the new affiliate in the enterprise system rather than accessing markets through licensing (Internalisation). Beneficial internalisation implies unique and productive corporate governance that for example lowers transaction costs and decreases imperfect information.

Discussion in part 3 about determinants of FDI is partly influenced by OLI model. However, the focus of this paper is what affects the extent of FDI not the factors that decide the existence of it. Thus the Location advantages will be discussed aiming to find out the attractive characteristics of the host countries. Ownership and Internalisation advantages are more a focus of microeconomic studies why they are not going to be considered.

1.4 Role of FDI for host countries

To stress the significance of FDI for the researched countries and lead to the discussion on their specific characteristics the literature on host country effects of FDI will shortly be reviewed. To start with, there is an important distinction between static effects that are observable in short-term and dynamic effects that affect economies over a longer period of time depending on the specific cases.

Static effects imply that FDI has a direct impact on capital accumulation that as a result raises the potential level of production (Alquacil et al, 2008). Greenfield investment is particularly positive as it obliges the foreign investor to create new facilities. A fact that might add on the positive static effects is the argument that FDI tends to "crowd in" domestic investment in developing countries (Razin et al 1999).

However, a more important consequence of FDI for the host economy is the dynamic effects as it brings economic growth over a longer period of time. Much of foreign direct investment comes from multinational companies with high R&D expenditures. Technology in the context of MNCs includes production techniques and process machinery as well as a unique management and marketing system. In rapidly changing branches new technology is the key to success while in more mature industries organisational skills and marketing give this type of advantage (Blomström and Kokko, 1998). In both cases the unique resources of the enterprise are spread to the newly established affiliates in the host country. An important feature in this process of technology is that it could be seen as a public good. It directly benefits all the company's affiliates and moreover it is difficult to exclude other players in the market from using it (Blomström and Kokko, 1998). Patents and other ways of protecting intellectual property prevent technology to be applied directly in other companies.

However certain positive externalities still appear and are called productivity spillovers. They may appear in a company through the process of learning-by-doing where the workers observe and learn new ways of production and management. A similar spillover effect might happen in horizontal level as local companies with the similar production might for example hire personnel form MNCs or interact with them in other situations. Another positive externality would be spin-offs when employees leave the MNCs to start their own companies and use the experience gained in the multinationals (Alfaro and Rodriguez-Clare, 2004).

MNC's linkages to local companies, either backwards or forwards in the production process create positive externalities through market transactions, in contrast to knowledge spreading (Alfaro and Rodriguez-Clare, 2004). An example would be an introduced demand for input production, thus a backward linkage. The newly introduced input in turn creates a larger variety on the intermediate goods and therefore could increase the profit of downstream producers. The linkages are expected to be greater as the cultural and geographical distance between the investing country and the host country increases (Rodriguez-Clare, 1996).

An additional positive externality emerges through increased competition (Blomström and Kokko, 1998). An entry of an MNC disturbs the market equilibrium and forces other MNCs and local companies to adapt through specialisation, increased productivity or other processes. Especially high spillover effect could be expected in highly concentrated industries with high entry barriers. MNCs per definition require high initial capital and are economies of scale which means that they can challenge domestic markets that suffer from low competition. An interesting research by Blomström and Sjöholm on Indonesian industry reveals that the most competitive pressure is put on non-exporting domestic companies as the domestic exporting companies already face international competition (Blomström and Sjöholm, 1999). The increased competition might cause concern in host countries that MNCs would ruin domestic companies which results in barriers and opposition to establishment of new affiliates.

A foreign entry into a market might finally cause "market access spillovers". It is not uncommon that MNCs are pioneers in exporting certain goods to foreign markets, especially if the companies are driven by resource seeking motives. In this process MNCs open the way for domestic companies to export because of the gathered initial information, lobbying for lower tariffs or improved infrastructure. This process requires high fixed costs, international experience and means a certain risk that could be impossible for smaller domestic companies to handle (Blomström and Kokko, 1998).

Although the spillover theory is universal for all the countries, there are certain features that encourage the positive externalities of FDI. De Mello (1999) suggests that new technologies brought by FDI need to be complemented by old (domestic) technologies in order to create dynamic effects. He also finds that spillovers are greater in countries where technology gap between the investor and the receiver countries are lower. This possibly suggests that less technologically developed countries have difficulties assimilating advanced technological methods and experience a decrease in productivity (de Mello 1999).

The next section analyses specific characteristics of the CEEC-10 that imply particular FDI effects in the region and thus makes studies on FDI determinants in these countries more suggestive.

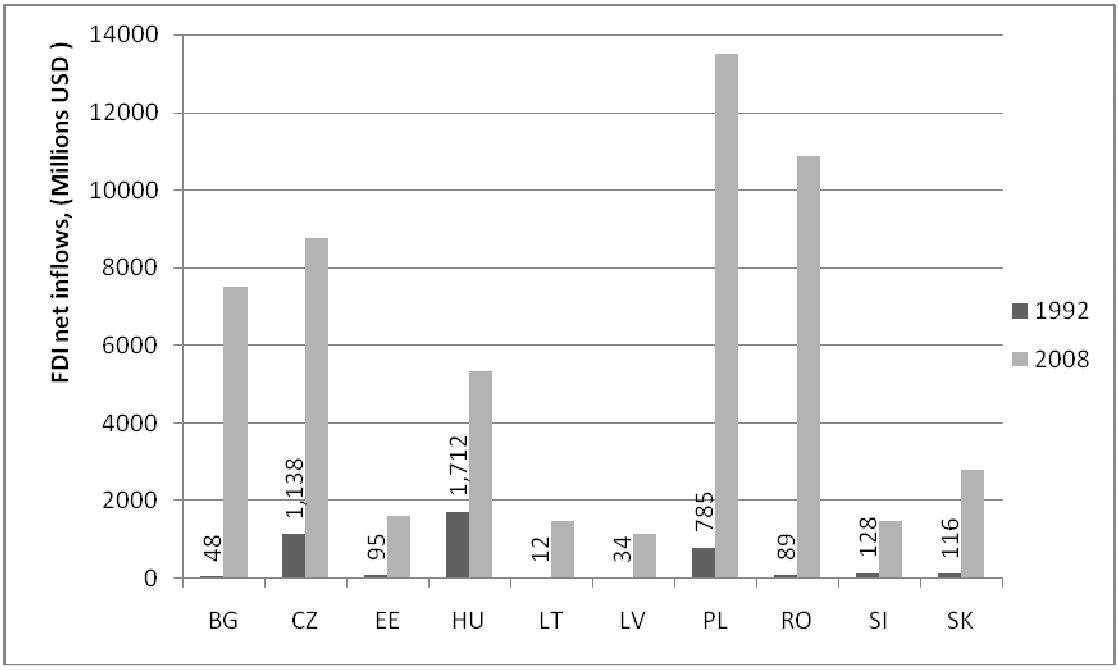
2. THE CHOICE OF COUNTRIES

The thesis analyses FDI determinants in 10 new EU member countries: Bulgaria, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovak Republic and Slovenia (see Appendix 1 for abbreviations). Alternatively they are going to be called 10 Central and Eastern European Countries (CEEC-10). In this part discussion on spillovers is going to be extended to the particular features of CEEC-10.

As late as in the 80's all the selected countries were plan economies with minimal levels of foreign direct investment and highly controlled capital flows. Since the 90's all of them (except for Slovenia periodically) had become net FDI receivers partly because of gradually or even radically reformed legislation on capital flows. In CEEC-10 today foreign investors are free to take over or establish any kind of company in most of the sectors. There are only limitations or a requirement for state license in "vulnerable" branches (such as transport, defence production or gaming in certain countries) (FDI Database, b). With legislation changed for the advantage of the foreign investors the countries had to complement the reforms with economically more attractive investment environment.

Table 2.1 illustrates FDI net inflows in CEEC-10 in 1992 compared to 2008. All the countries received less than 2 billion dollars of FDI in 1992 with Czech Republic, Hungary and Poland being the biggest receivers. In 2008 the differences between countries are great and the leading countries are slightly changed as well with Bulgaria and Romania among the leaders. The FDI net inflows are measured in the millions USD in constant prices which of course brings largest countries among the leaders. However the proportions are not that clear-cut and there are apparently other significant factors. The empirical part of this paper will hopefully be a source of explaining these differences.

Table 2.1 Levels of FDI inflows to CEEC-10 in 1992 and 2008



However, the privatisation of state-owned companies needs to be mentioned when it comes to the particular characteristics of the CEEC-10. In the centralized system that existed in CEEC-10 there was a significant amount of vertical integration that created large monopolies. The market liberalisation required division of the production chain to smaller and more competitive companies by privatising (Barrell and Holland 2000). Table 2.2 below illustrates the change of the market structure from 1990 to 2009. The reform has been gradual and was organised by different means in the selected countries but in all the cases MNCs have played a significant role.

In a process of privatisation MNCs have taken over a part of already existing companies and have restructured them. This is the M&A type of FDI that does not necessarily require investment in new facilities as it might simply mean a change in ownership. However in the case of the CEEC-10 it likely meant a lot of reforms. Firstly, the machine park in the countries had to be replaced so the new owners had to invest in new technology (Alquacil et al 2008). Secondly, as argued by Rodriguez-Clare (1996), positive effects of foreign direct investment increase as the cultural difference increases. Therefore the entering of MNCs from other countries than the former soviet bloc should have introduced significant market spillovers. To begin with, FDI put competitive pressure on host country's markets. The former centrally planned economies had many sectors with large monopolistic companies and did not face any competition under planned economy. Even after the market liberalisation

competition was limited in most of the sectors because of high entry barriers. The international enterprises could compete in these stagnated markets and introduce more competition.

The multinationals most likely introduced market access spillover as well. With limited trade to the countries outside the former Soviet bloc companies in CEEC-10 had little experience of entering new markets. In contrast, the MNCs per definition export the intermediate or final goods to the other countries in this way simplifying this process for the domestic companies. Finally, productivity spillovers are likely to be larger if the receiver country already has a large stock of human capital and a well-trained workforce (Alquacil et al 2008). The selected countries indeed had exceptionally good values of human capital for their low income level and therefore substantial positive externalities should have occurred.

Hence in theory CEEC-10 should have experienced positive externalities because of the privatisation process. However, table 2.2 demonstrates high shares of private sector in 2009. This indicates that the privatisation motive for FDI in CEEC-10 is mainly ceased and the countries have to attract "underlying" FDI instead (Demekas et al 2007). The new type of FDI inflows also requires different kind of performance from the host countries. This paper is thus going to analyse to what extend the privatisation can be an important determinant to FDI inflows even in the future and what the other required factors for the "underlying" FDI are.

Table 2.2 Private sector share of GDP (%)

	BG	**CZ**	**EE**	**HU**	**LT**	**LV**	**PL**	**RO**	**SI**	**SK**
1990	10	10	10	25	10	10	30	15	15	5
2009	75	80	80	80	75	70	75	70	70	80

Source: EBRD, Structural Change Indicators, 2009 a

Another feature of the examined countries is that they all are new members of European Union and receive a large part of their FDI from the other member countries. The countries are also defined by lower levels of income than the EU-15 countries. The possible effects of economic integration on FDI inflows are discussed in detail in part 3. To generalise the effects, the lower level of income in CEEC-10 does not necessary suggest a disadvantage in attracting FDI. On the contrary, the CEEC-10 could specialise on resource-seeking FDI searching for cheaper production costs or even market seekers that want to establish in a rapidly growing market and gain original advantage

Having these circumstances in mind the aim of the paper is to find the determinants of FDI in CEEC-10. What can explain the differences in FDI among these countries that on the surface seem to be a homogenous region? Furthermore, could one make a conclusion about the nature of FDI in this region out of the significant variables? Answering these questions would have an important implication for the region. FDI brings overwhelmingly positive effects (even if very small, as some argue) to host countries. The relationship between FDI and economic growth in CEEC-10 certainly has to be studied more explicitly. However finding main determinants for FDI is a possible chance of finding important determinants for economic growth in the region. This could be seen as an indirect aim and encouragement for further research of this paper.

3. FDI DETERMINANTS

The determinants of FDI are structured depending on the motives of investment. It is a simplified scheme because one enterprise can combine different types of FDI. The division however is still useful as there are distinctive features for each strategy. For example in a long-run it would be difficult for a country to keep low labour costs while GDP is growing fast. This simple situation illustrates natural specialisation in different factors for countries with different income levels. Table 3.1 sorts the FDI determinants broadly depending on the investment motive. It also shows the interaction between the level of FDI and the determinant in brackets (+ means a positive relationship, - a negative). The determinants are further going to be discussed more closely with a perspective of selected CEEC-10 and this specific organisation of variables will be considered. This part presents a broad discussion with the most common determinants in literature. Part 4 will narrow the determinants to the ones used in the empirical knowledge and describe the used data.

Table 3.1 FDI determinants grouped according to the motives of FDI

Market seekers	**Resource seekers**
• Geographic and cultural closeness (+) • Market size: GDP, GDP growth; Population (+) • Economic integration (with a third country) (+) • Human capital (+) • Technology (+) • Privatization, private sector share (+)	• Trade (+) • Labour costs (-) • Infrastructure(+), Transport costs (-)
Mixed motives	
• Macroeconomic stability (+) • Taxes (-) • Political environment: Corruption (-); Easiness of doing business (+)	

3.1 Geographic and cultural closeness

Foreign direct investors have to explore new markets before the decision to invest. It is done easier if both parts speak the same language or have similar legislation. These factors make countries “natural” receivers if a foreign company starts investing abroad. Depending on the product it is also easier to introduce a good into a similar market without any adjustments. Cultural closeness could even define similar income levels which results into similar

technology levels and similar demand. Therefore geographic and cultural closeness is sorted as a market-seeking determinant.

The problem to test for cultural differences is to measure them. An interesting attempt was done by Bhardwaj et al (2007) by measuring the importance of trust ("the expectation of regular, honest cooperative behaviour") and uncertainty avoidance ("the extent to which the members of a culture feel threatened by uncertain or unknown situations"). The variables are measured by indexes set from international surveys. A multiple regression with data for 43 countries proved that FDI increases with lower levels of uncertainty avoidance while trust was significant when analysed independently.

In the case of CEEC-10 the cultural differences among the countries are too small to affect investment decisions significantly. They all are former plan economies that had to deal with similar economic problems of transition. A possible measure that is more precise in the case of CEEC-10 would be a dummy variable for whether the country is bordering an EU-15 member country or not. This would analyse if EU (the major foreign direct investor in the region) prioritises neighbouring countries.

3.2 Market size

In the first section FDI effects on GDP and GDP growth were discussed. The argument goes that FDI increases capital accumulation as well as it creates positive externalities and encourages productivity growth. Thus FDI could be an explanatory variable for GDP growth (Chowdhury and Mavrotas, 2006).

There are though good reasons to claim that the relation is bi-directional. One can use real GDP as a determinant of FDI to measure market size which is an important factor for market-seeking FDI. MNCs choose to invest into markets with high GDP to substitute for exports. They produce final goods in the local market for the local demand. Such affiliates require high fixed costs and to make the production worthy the demand has to be big enough to bring the production costs down through economies of scale.

One could argue that GDP per capita is a better measure for the demand. However in the case of the selected Central and Eastern European countries real GDP will be used to approximate the potential size of the market. These economies have been growing fast over nearly 20 years and are expected to continue catching up with EU-15. Additionally there is no reason to believe that certain small economies of CEEC-10 would totally outperform big countries in the region. A market of 38 million inhabitants (Poland) has more consumers that

are well off and can afford the products of MNCs than an economy of 1,3 million (Estonia) does and the proportion is unlikely to reverse in the future. Therefore real GDP indicates a large market that is most likely going to expand in the future and keep the leading position.

Population is an alternative measure of the market size as it is an approximation of level of demand for MNC products. However, this measure would not be used for CEEC-10 as these are transition economies with a relatively low income. Depending on the product of the multinationals one could make an assumption that there is an income threshold that inhabitants have to pass to afford some goods (such as electronics or IT-services). Therefore population could be a misleading variable for some of the large countries in the Central and Eastern Europe that still have not reached a sufficient demand for the goods.

3.3 Economic integration and trade

The effects of trade and economic integration on levels of FDI are going to be considered jointly because they depend on each other and are difficult to separate. The two variables belong however to the different motives of FDI. Market-seeking outsider investors hope to enter the markets with a high level of economic integration so that they can reach several economies from one country. They are not affected by the trade within the union or with a third country because as soon as they make their first horizontal investment in the union they obey the same rules as the insiders and can expand within the region. Resource-seeking outsider investors are more concerned about the outcome of economic integration. Vertical integration is based on transport costs that are low enough not to offset cheap labour costs (Sayek, 2009). Reduced trade with a third part increases trade costs of the intermediate goods and makes the foreign direct investment in the host country less worthy. Following paragraphs describe the theoretical processes in CEEC-10 more in detail. It is however still a generalised picture of the real effects.

All the studied countries are new members of the European Union and have negotiated their membership since the early 90's. The prospect of the membership and the entry affected FDI flows in a complex way because FDI itself is a form of economic integration. The effect would depend on the nature of the initial FDI and the initial investors. To make the discussion less complex it is going to be assumed that the selected countries are entirely receiver countries and that there are no FDI outflows. In fact, the effect on the inward FDI is the actual focus of this paper. Furthermore, this assumption is rather realistic as the outward FDI in CEEC-10 countries is relatively low compared to the inward FDI.

Thus a host country that had recently joined a customs union will, on the one hand, experience higher market-seeking FDI inflows from the third country (outsiders), as both tariff and non-tariff barriers are reduced. Kindleberger (1969, p. 88) has described this process as "investment creation" which appears together with trade diversion inside the union. As trade barriers are reduced the inside trade in EU increases and gets more attractive for foreign investors outside the union. The idea of larger markets and economies of scale would attract newcomers as well as higher levels of FDI from already established MNCs (Blomström and Kokko, 1997). This would be an effect on market-seeking FDI. Resource-seeking outsider FDI would however be discouraged by lower levels of trade and would find it less profitable to search for sources of cheap labour.

On the other hand, bigger inside market means that number of affiliates from MNCs could be reduced to maintain the Single Market. The production gets concentrated to one member country and the other countries could experience loss in outside FDI (Blomström and Kokko, 1997). This effect (caused by trade creation) would be felt on market-seeking FDI and is called "investment diversion" by Kindleberger (1969). The size of the contrary effects is difficult to predict and depends on the structure of the inside market, outsider companies and other factors. It is most likely that the overall FDI to the union would not decrease but it would negatively affect certain countries.

Resource-seeking FDI would conversely be affected by lower transport costs inside the union. MNCs would be able to locate their production more efficiently and decrease production costs in the EU if the intermediate goods are exported to other EU countries for the final production. An interesting paper by Gorg and Ruane (2000) analyses possibilities for the peripheral countries to gain from economic integration. It takes Ireland as an example for attracting outsider FDI. It claims that economic integration in combination with economic incentives and marketing bring an advantage to the peripheral countries by reducing transportation costs and encouraging resource-seeking FDI. CEEC-10 could in fact be seen as peripheral countries and thus gain from the integration by attracting resource-seeking FDI.

3.4 Human capital and technology

Human capital has mixed effects on FDI depending on the investors' motives. It is likely that market-seeking MNCs would choose countries with higher level of human capital. Horizontally integrated affiliates have to deal with the whole production chain. A multinational that seeks for an affiliate to produce technologically advanced products could choose a country with high labour costs but higher human capital levels. Otherwise the

company would have to put resources into training the personnel and would risk its brand by producing goods of lower quality. However when the MNC is solely producing intermediate goods (that are not particularly highly technological) human capital would not be as crucial because it increases productivity and in turn drives up the wages. As low wages are the superior priority for resource-seeking FDI human capital could even decrease foreign direct investment. This is however an indirect and a long-term relationship. Human capital is therefore placed under market-seeking category with a positive sign. Resource-seeking FDI prefers low-wages and does not prioritise high levels of human capital. In reality however this might depend on a certain good and the investors' future strategy.

Technology is grouped together with human capital for a reason. Technology should affect FDI in the same way because a high level of technology is mainly a product of high human capital. It as well requires financial resources and thus means a trade-off between advanced technology and low production costs. A company could not get high technology in a domestic country without high human capital and vice versa. And high human capital as discussed requires reward by higher wages.

CEEC-10 have high human capital levels for their low income level. The wages in the plan economies of CEEC-10 were also unrepresentative for the levels of the human capital. It was possible because of the general unproductiveness in the plan economies and a highly controlled labour market. Right after the market liberalisation the MNCs could theoretically invest in goods produced by a low-paid labour force with a decent level of education. Predicting the effect of human capital on FDI in CEEC-10 would be uncertain because of these distortions. However over the period of 19 years human capital has likely affected the wages and thus it has the expected positive effect on market-seeking FDI.

Finally, it is also important to mention that FDI could affect human capital itself. In a panel data analysis over Chinese provinces Basu and Yao (2009) find that human capital is affected by FDI inflows. It is as well consistent with the theory because MNCs bring spillover effect to host economies in form of new technology, means of production and management. High human capital is however an important incentive for FDI producing advanced goods and is thus going to be included in the empirical model.

3.5 Private sector

As explained in part 2, privatisation has been a direct cause of FDI in CEEC-10. Foreign enterprises saw the market liberalisation as an opportunity to set foot in new regions. A question raised here however is if there is causality between levels of private sector and FDI,

in other words, if the foreign investors find markets with a high degree of privatisation attractive. The relation is based on the assumption that foreign firms are more effective than the domestic ones. Furthermore, markets where MNCs invest are imperfect because of economies of scale. In this case the privatisation raises output of a foreign firm that gains a larger share of the market and therefore encourages Greenfield FDI (Mukherjee and Suetrong, 2009).

This theory indicates that privatisation would be important for market-seeking FDI because it is not driven by the lower costs of production but by a possibility to gain a larger market share. The criticism to the theory is however the possibility that the domestic firms would be the winners in the privatisation process. Mukherjee and Sinha (2007) argue that privatisation of domestic firms can decrease FDI if the domestic firm reduces costs and pushes the foreign investor to choose export. In the case of CEEC-10 it is not a likely assumption, as the previous national companies tended to be largely monopolistic and unproductive. It is also confirmed by the Enlargement Papers (2001) from the European Commission which estimate that almost half of the historic FDI in Central and Eastern Europe has been concentrated on non-tradable sectors such as telecommunications and financial institutions. Thus privatisation has been placed as a positive determinant of market-seeking FDI.

3.6 Labour costs

Labour costs is a major determinant for resource-seeking multinationals. Since resource-seeking FDI aims at reducing production costs it is obvious that higher labour costs should affect FDI negatively. However it is a complex variable that depends on several factors. Firstly, it consists largely of wages that capture marginal productivity of labour in the economy and therefore indicates whether a country is labour-rich or labour-poor. Labour productivity in turn increases when for example human capital increases as discussed before. Secondly, differences in labour costs between countries could also indicate different tax structure as higher taxes should increase labour costs. Finally, it is important to examine real labour costs because nominal wages and therefore even nominal labour costs increase when the expected inflation increases. Confusion of real and nominal terms could therefore instead capture price changes.

Bellak et al (2008) make an informative review of the research on labour costs as a determinant of FDI. The majority of the papers prove labour costs to be negatively significant on FDI while others find the variable to have a positive effect. The explanation given for the

positive effect of labour costs on FDI is either flawed data or underlying factors that affect labour costs. Golub (1995) discusses labour costs and uses similar analysis. A so called "sweatshop labour" argument claims that countries with low wages and poor regulations create an unfair advantage in attracting foreign investors. This argument is poor in economic point of view as low wages reflect low productivity. As a result of this reasoning foreign direct investment should drive up wages in host countries. This could complicate the causality between labour costs and FDI. The argument will be analysed in the empirical part. Until then the labour costs variable is placed under resource-seeking FDI with a negative sign because it is the most expected outcome theoretically and empirically.

3.7 Infrastructure

Resource-seeking FDI locate production in foreign countries to decrease production costs. The less technologically advanced intermediate goods are then transported to the other affiliates to produce the final goods. This type of FDI is thus only possible if transport costs are low enough not to offset the reduction in production costs. Well-functioning and available infrastructure is therefore a crucial complement for the developing host countries with low labour costs.

Cheng and Kwan (2000) estimated a dynamic panel regression and found that the infrastructure is important even for the location decisions within China. For simplicity, assume that CEEC-10 is a single European economic region with the same labour costs. The countries are all members of the European Union with a similar degree of border control. The important factor in analysing differences among these countries is thus not the costs of importing/exporting the goods but their domestic network of communications. A positive change in the infrastructure network is thus expected to attract more resource-seeking FDI.

3.8 Macroeconomic stability

- Exchange rate

In theory FDI could be affected both by relative changes in the exchange rate levels and by the volatility of host country's currency. Before any further argument it is important to name that expected exchange rate is the one affecting firms' decisions.

One of the main theories explaining changes in the real exchange rate is the purchasing power parity (PPP). The absolute PPP predicts that exchange rates are adjusted according to the price level in the country and therefore should not affect FDI. The more dynamic relative PPP predicts that exchange rates offset differences in relative inflation

between the source and the home country. The exchange rate adjusted by relative inflation keeps the investor's earnings constant measured in the home currency (Dewenter, 1995).

The empirical work done on the effect of exchange rates on FDI is disputed. There is some evidence that FDI is more stable over time than the other forms of capital flows despite the volatility of exchange rates (Blonigen, 2005). It certainly depends on the engagement and long-term goals that foreign direct investment involves. However, there are researches that have proved the exchange rate being important for FDI flows and especially the timing of investments (Blonigen, 2005). Because of the lack of theory explaining FDI dependency on exchange rates and the nature of the exchange rates being volatile its relationship to FDI will not be analysed in the model. Furthermore because according to relative PPP theory exchange rates depend on the relative inflation, the next explanatory variable will partly catch this effect.

- Inflation rate:

Inflation rate is not a measure of the real economy because it measures the change in the price level. However, it is a common determinant of FDI flows in literature. The researches are based on a theory that the expected inflation introduces a tax on keeping money because it erodes the purchasing power of the currency.

This paper makes an attempt of estimating the effect of inflation on FDI inflow levels in CEEC-10. However analysing other works it is apparent that empirical models estimate contrasting effects of inflation. Asiedu (2006) have analysed FDI inflows to Sub-Saharan Africa. In a panel fixed effect model a lagged value of infrastructure (also a measure of macroeconomic stability) proved to be significantly negative for FDI inflows. On the other hand, Botrić and Škuflić (2006) present only one example of the unexpected results. They have estimated Panel GLS on seven South Eastern European countries and eight different Central and Eastern European countries and find inflation to have no significant effect on FDI in any of the regions.

There are some possible explanations to why this could be the case. Firstly, foreign direct investors might disregard inflation if it is only a matter of a few percents. In other words, inflation is only a secondary determinant. Secondly, what matters for the foreign investors is the relative inflation and therefore source country inflation could be an explanation of the poorly significant inflation variable (Sayek, 2009). Lastly, a more technical explanation might be extreme values of inflation over short periods of time in the transition economies. OLS estimator is sensitive to large outliers when trying to minimise residual

squares (Stock and Watson, 2007, p.203). These extreme values might shift the regression curve to the direction that is actually not accurate.

3.9 Fiscal and financial incentives

Over the past 20 years FDI inflows to CEEC-10 have gradually increased and their governments have become more experienced in this field. In UNCTAD's website for FDI (FDI Database, b) there is explicit information on each countries' FDI policies. In case of Bulgaria, Estonia, Lithuania and Slovenia there are no expressed incentives for investing multinational companies. The rest six countries of this paper offer incentives in form of tax reductions or tax holidays for companies investing in sensitive sectors or making a good economic performance (FDI Database, b). These differences in fiscal incentives would be an interesting field to study while explaining the differences in FDI inflows among countries.

Another possibility to study financial incentives is to look more precisely at what taxes MNCs face in different countries. This would give the most comparable picture over time and countries. It is however difficult to measure taxes for foreign direct investors as a whole because it is a game between host government and MNCs. The multinationals are usually big companies that have enough market power negotiate for specific investment conditions (Faeth, 2009).

Another fact that complicates the picture is the taxes in the parent country. Hartman (1984) uses a time-series analysis on FDI to USA as a host country and finds that new investment decisions are not significantly responsive to host country taxation which he concludes as an underlying influence of parent country tax policies. It implies that taxes affect companies differently depending on the policies of parent country and the negotiated taxes in the host country.

Country governments may attract FDI by low taxes and beneficial tax incentives. However, FDI as well depends on the functioning of financial institutions. Well-functioning financial markets are growth enhancing for the whole economy as well as the separate company because they allocate resources in the projects that yield the highest returns and reduce the transaction costs (Alfaro et al, 2009).Thus developed financial markets is a necessary complement for the fiscal incentives.

3.10 Political environment

FDI is a particular form of investing because it binds the investing company to the laws and politics of the host county. Each company planning to invest in a host country has some

negotiating power and can affect the conditions of investing. However FDI remains uncertain because MNCs are unable to prevent the political environment from changing later on (Azzimonti and Sarte 2007). The expected role of institutions is to produce public goods that otherwise would not exist (Blonigen, 2005). They set taxes, watch over property rights and prevent criminality. Poor institutions fail to create and maintain these public goods and this responsibility falls of each individual or each company. The resources and time spent to compensate for poor institutions obviously decrease productivity and discourage new investments. A risk of expropriation or corrupt bureaucracy thus has to be compensated by attractive features for a multinational company to invest.

Unfortunately, the difficulty with researching on political environment is measuring it. It is difficult to quantify the measures in order to compare them over time and countries. The most common method is to use surveys and ask the investors themselves. The problem with survey-based researches is however lack of comparability among countries because the surveys are answered of different individuals with different cultural experiences and values. While one individual might experience an act as corrupt another one would not reflect about it that way because of his/her background.

However, the attempted researches on the causality between corruption and FDI have confirmed the theory by empirical methods. Using double-log linear model Shang-Jin (2000) finds strong negative effect of corruption on bilateral FDI flows. She combines different corruption indexes to increase the reliability of the research and bases the research on 12 source countries and 45 host countries. Khamfula (2007) also found that corruption affects FDI negatively by using OLS period fixed effect regression. The countries analysed in this model were 18 largest FDI receivers in the world, mostly Asian and South American countries. The results hence are expected and prove that quantifying political environment can bring significant knowledge.

The generalisation on the FDI determinants discussion is that the countries have to specialise in attracting a certain kind of FDI. Human capital rich countries with high levels of technology might attract mostly market-seeking FDI while labour-abundant countries attract resource-seeking FDI and therefore they specialise on different products. These two kinds of countries might have the same levels of FDI but the motive would only be apparent looking at the determinants or statistics over the kind of product that foreign investors invest in.

4. EMPIRICAL TESTING

In this part the effect of different variables on inflow levels of FDI to CEEC-10 will be tested by using a panel regression. Following sections explain the estimation in detail and lead to the final conclusions of the paper.

4.1 Variable choice and data

Possible determinants of FDI that are common in literature were discussed in the previous section. The choice of countries explained in part 2 and limitation of data have however influence the type and number of variables that are used. The period of time 1990-2008 is also affected by the choice of countries as they were all plan economies before 1990 and the data for the 80's is unavailable or unreliable.

The dependent variable in the regression is net inflow levels of foreign direct investment (*FDI*). Data over foreign direct investment net inflows in thousands USD is obtained from the World Bank's World Development Indicators (WDI) Online. The available data is from the balance of payments for the time period 1990-2007 in USD, current prices. The inflows of FDI are adjusted to constant prices by using GDP deflator from the same source. Furthermore, the data for some countries for year 1990-1992 was not available. It is completed by analysing statistics on FDI (net) from European Bank of Reconstruction and Development (EBRD b). Outward flows of foreign direct investment for CEEC-10 in the early period of the data were insignificant thus it is assumed that net FDI equals net inflows of FDI and therefore the missing values are completed with EBRD statistics. FDI levels for year 1990 and 1991 were however unavailable for Estonia Latvia and Lithuania in neither of the sources – this could be explained by a lack of statistical data gathering in these newly independent countries or by strict controls of capital flows. Furthermore values for 2008 are added for all the countries from UN data (FDIstat). Comparing the data for other time periods it was noticed that net inflows in UN and WDI were equal. The data could not be taken solely from the UN database as it covered a shorter period of time. Appendix 2 shows the data on FDI inflows more explicitly.

The combination of the three sources on FDI bears certain risks. The decision was however taken in a confidence that the errors would be insignificant as they don't distort the relative levels over countries or the evolution of FDI inflows over time. To understand other possible misspecifications in FDI data it is crucial to name the components of FDI. Statistics over FDI inflows are publicised in the balance of payments and consists of equity capital,

reinvested earnings and other capital. Statistics over FDI in CEEC-10 all report investments in companies where at least 10% of shares or of voting power are owed by foreign enterprises or individuals and therefore eliminates a chance for inequalities over countries in this area (FDI Database, b). Reinvestment data however is collected by company surveys and it could be a significant source of measure errors (FDI Database, a). These errors are of course difficult to trace and a possibility of measurement inaccuracy over time and among countries still exists.

GDP data (*GDP*) in thousands USD in constant prices is attained from World Bank's WDI. Data for the Estonian GDP was incomplete and therefore the values for period 1993-1999 were taken from the website of Estonian Statistics Department (ESD). The values were expressed in USD current prices so they were adjusted with US GDP-deflator.

There are different ways of measuring openness but the selected CEEC-10 countries are specific in a way that they have all entered the European Union during the examined period of time. To become members of the customs union they all had to equalise tariffs to the third part. Therefore it is probable that the tariffs were affected by the prospect of becoming an EU member. There are also different measures of non-tariff barriers (for example number of days it takes to get import licence or standards on imported goods) but they are difficult to measure and data is scarce for the selected countries.

As a result openness is measured by the level of trade (*TRA*). Trade statistics on share of trade in GDP is from EBRD (2009 a) structural indicators. The variable is measured as the sum of imports and exports divided by GDP.

As well for human capital there were a number of variables to choose from. However because of the selection of countries the studied time period is only 18 years. The problem with such a short period of time is that human capital requires long-term and continual resources from the government and companies as education or training need time. It then takes additional time for foreign companies to evaluate the change and adjust their investment strategies. Additionally, as discussed in the previous section technology and human capital should effect FDI decisions hand in hand. Research and development (*RD*) is therefore a good indicator of both technology and human capital. Research requires already educated people with special knowledge and innovative ideas. At the same time it creates new technology that decreases the technological gap to other countries. It is a signal for foreign investors that the host country has already reached the level of human capital needed for an independent technology progress.

The variable in this paper is an indicator of expenditure on Research & Development as a share of GDP. It is acquired from World Bank's WDI Online. The data initially was available for a period 1996-2006. The missing values are estimated by using the average percentage change over the observed period for each country. The risks of the estimation done for 6 years back in time were taken into account. After analysing the data however it is obvious that there is an R&D expenditure trend in every country as well as there are no extreme changes over a year. Therefore estimating the values does not change the patterns within the country or over time.

Data over labour costs (*L_C*) as total labour costs in local currencies (millions) was obtained from OECD's statistics (OECD). Total costs were firstly adjusted to thousands of local currency to match the dependant variable. Secondly, total costs were converted to USD by using average exchange rate (local currency to USD) gained from World Bank's WDI Online. Lastly, GDP deflator was used to attain real labour costs. These steps could bring inaccuracy to the data because the average exchange rate could be seen as a determinant of FDI itself as discussed in the previous section. Changes in it could affect labour costs without the labour costs actually changing. The average exchange rate is however the factual exchange rate that foreign investors are applying and thus could be used for approximating labours costs compared to the investors currency. Another problem with the variable of labour costs is the limited number of observations. In most of the countries the values were available for a period of 14 years but in the case of Bulgaria there were only 10 observations. In a lack of better sources this data is going to be kept.

Measure of infrastructure was difficult to decide on. There is no superior measure that would capture different parts of infrastructure, both physical and institutional. Eventually the data from World Bank WDI Online on goods transported by railway (millions of tons per km) (*RAIL*) is chosen. This is a measure that is important both for the marine and inland countries and it is possibly correlated with the other sectors of physical infrastructure.

Macroeconomic stability is measured by inflation (*CPI*) in the model because of the reasons explained in the previous section. Inflation data is obtained from Word Bank's WDI Online as a Consumer Price Index (year 2005=100).

Corruption Perceptions Index (*CI*) is set by organisation Transparency International. It is based on surveys on corruption in public and private sectors that are answered over a two-year period. The possible values are 0 to 10, where value 10 indicates no corruption. Hungary was the only country that had Indexes set for the period 1995-2008. As the Index values don't change drastically over only one year the Indexes were estimated back in time till 1995 to

gain more observations. The estimation was done by using average annual percentage change in the Index over the available period. At most it was estimation for four years back in time (for Lithuania). The reason that the estimation was not executed further back is the estimation error that might increase. As mentioned above, Index values don't change dramatically over a year. This is also intact with the reasoning that corruption is hard to fight and requires a long-term persistent battle. However, early 90's was the period of dramatic change in the selected countries. The sudden change in the bureaucracy and the political system in CEEC-10 might have meant drastic changes in corruption that are hard to estimate.

Table 4.1 summarises variables in the model and shows the expected sign of the coefficient based on the theoretical discussion. However, not all the variables discussed in the previous part are included. The first omitted variable is geographical closeness where dummy variables for countries depending on if they are bordering an EU-15 country or not were intended to be used. This intention was however not possible with a cross-section fixed effect panel regression, because it caused perfect multicollinearity.

The second variable that was refused is taxes. With the limited time an appropriate tax measure that would cover a decent period of time was not found. The most covering data found was in World Bank's WDI Online for taxes on income, profits and capital gains that covered only a period of five or seven years for most of the countries. When it comes to taxes in these transition countries it is complicated to estimate them. The taxes can be changed easily over one year and in fact they have been changed why estimation would not have represented the real picture. With the data transformations that are explained in a following section there would only be a few observations left. In a case of a more directed research on the impact of taxes on FDI flows or more time it would obviously be necessary to gain data from different sources. However in this particular case the variable was dropped.

Table 4.1 Variables in the empirical model, their sources and the expected results

Variable (units of measurement)	Abbreviations	Data source	Expected sign
Level of inflow of FDI (thousands USD, constant prices)	*FDI*	WDI; completed with UN data (FDIstat); EBRD (2009 b)	Dependent variable
Real GDP (thousands USD)	*GDP*	WDI, completed with Estonian Statistics Department (ESD)	+
Trade (share of trade in GDP, %)	*TRA*	EBRD (2009 a)	+
Technology R&D expenditures (% of GDP)	*RD*	WDI	+
Labour costs (total annual real labour costs in USD, thousands)	*L_C*	OECD (in local currencies, exchange rate from WDI)	-
Infrastructure Goods transported by railway (millions of tons per km)	*GDP*	WDI	+
Macroeconomic stability Inflation, CPI (%, 2005=100)	*CPI*	WDI	-
Corruption Corruption perceptions index (0-10, increase in index illustrates less corruption)	*CI*	Transparency international	+

4.2 Method

For previously discussed reasons ten former plan economies in Eastern and Central Europe were chosen to be analysed. Because of the countries' history the data is first available in year 1990. Thus the estimated panel regression has 10 cross-sections and 19 time periods. In addition a considerable amount of explanatory variables was chosen to be tested. Consequently an empirical problem of few observations over time and half as many cross-sectional observations occurred. A choice of panel data was therefore a way of expanding number observations and possibly reducing multicollinearity (Basu and Yao, 2009). All the estimations are done in the EViews statistical package.

The aim of setting up a panel regression is to analyse how a change in an independent variable affects inflow levels of FDI. The most obvious way would be to use log-log model. Natural logarithm would be applied on the dependant variable and the explanatory variables that are not already expressed in percent. This would simplify the interpretation of the

regression results as the coefficient of logged variables would capture partial elasticity, namely percentage change in FDI levels when an independent variable changes one per cent.

However, the initial panel estimation proved to be flawed. It suffered from non-stationarity of the variables. This is the case when the historical relationship between the variables cannot be used for the future. With non-stationary series OLS t-statistic might have non-normal distributions even in large samples and thus the conventional inference and forecasting becomes unreliable (Stock and Watson, 2007, p.554).

A possible way of removing non-stationarity from the data would have been to use cointegration. Cointegration predicts a long-run relationship between the variables and thus makes it possible to find a combination of them that is stationary (Stock and Watson, 2007, p.655). However, the data available for the model is only over a period of 19 years. Moreover, all the selected countries started with low levels of GDP, FDI, labour costs, private sector and high levels of corruption. After the liberalisation of the market all the variables were bound to develop to a certain direction. It is therefore likely that the cointegration found in the data only holds in the period of transition. It is possible that the relation would disappear when the 10 members of EU reach a higher economic standard and the variables would progress less alike. Therefore, instead of exploiting possible cointegration of the variables the data is going to be transformed.

One way of reducing non-stationarity in the series is by using the first difference (Stock and Watson, 2007, p. 530). This method is best applicable on random walk models where the dependent variable is explained by a lagged value of itself (Stock and Watson, 2007, p. 556). In the case of this paper however there is a larger amount of explanatory variables and some of them affect FDI in longer term. Keeping this in mind a possible way to remove non-stationarity would be to differentiate the series and then use an average values. Based on the economic theory the most correct would be to use averages over 5 years or even more because the determinants are possibly affecting FDI over this length of a period. However with a total time period of only 19 years or even less in case of certain series this would generate too big loss of observations. Therefore three-year averages are chosen. First, it was intended to apply three years' averages of differentiated original variables. This method would allow using logarithm on the desired variables only while leaving others unchanged. However this transformation generated negative values in case of decreasing average values and therefore could not be logged to use partial elasticities.

The method chosen as a result is to use natural logarithms of each variable, differentiate them over a one-year period and then calculate three-year averages. A value for

year 2000 for example represents average of differentiated values for a period from 1998 to 2000. This method decreases the number of observations and thus efficiency as well. However it also adjusts the sample from non-stationarity. The method has also created links between variables over three-year periods. FDI flows are too complex to affect over a single year as the foreign investors need to adjust their investment strategies. The common way to solve that would have been to introduce lagged variables into the model. In the new model there is no longer any need to do that. Omitting the lagged variables helps to keep down the number of explanatory variables and therefore not to reduce efficiency. Furthermore, natural logarithm measures the proportional change in the variable over time. Differentiating logarithmic values over time thus represents approximate growth in the variables (Stock and Watson, 2007, p. 530). The transformed variables can be interpreted as approximate average growth rates over three-year periods.

Next question in estimating the panel regression is whether to use random or fixed effects. In models with few observations, which is the case of this paper, these two estimations might give very different results. A possible way of choosing the method is considering the nature of the data. Random effects analyse individuals with respect to the whole population while fixed effects emphasise the differences of each individual (Verbeek, 2008, p.367). Indeed, 10 individuals are analysed that are large players and therefore are expected to have specific characteristics rather than represent a certain group of countries. Therefore fixed effects estimation is used in the empirical model of this paper.

Fixed effects include unknown parameters into the model and estimate their effects on the individuals and over time. Period fixed effects include dummy variable for each period of time. It catches the effects of a particular period that are common for all individuals. In the case of this paper it might be an economic recession in the main foreign investing economies that reduces the level of FDI inflows to all the countries. Without period fixed effects the regression would not be able to explain these changes of FDI flows. Fixed cross-section effects on the other hand catch omitted variables that are different for countries but do not vary over time. (Verbeek, 2008, p. 364) Thus fixed effects estimation is a useful way of increasing the fit of regression by including the omitted variables.

Thus the most appropriate method for the data is decided on and the following regression is analysed:

$$FDI_{it} = \alpha_i + \mu_t + \beta_i x'_{it} + u_{it}, \quad (4.1)$$

where x'_{it} is a K-dimensional vector of independent variables. The usual intercept term β_0 is changed by fixed individual effects α_i that is invariant over time and period fixed effects μ_t invariant for individuals. It is not imposed that α_i or μ_t are uncorrelated with x'_{it} however it is assumed that all x'_{it} are independent of all u_{it}. (Verbeek, 2008, p. 357) This regression is going to be used as the original equation. Further adjustments are however needed for correct interpretation of the results. These modifications are done as we analyse the results and therefore are presented in the following section.

4.3 Results

In this section the problems of the empirical model and solutions to them are going to be discussed. Later on the final output of the fixed effects panel regression is going to be presented and explained. Discussion part analyses the results and explains them with a perspective of the economic theory.

4.3.1 Stationarity

Transformation of the variables explained in the previous section was performed to remove non-stationarity. To make sure that the transformed data is reliable a unit root test was conducted on each variable. It tests for autoregressive model with a lag of first degree AR(1) with a root equal to 1:

$$Y_t=\beta_0+\beta_1 Y_{t-1}+u_t. \qquad (4.2)$$

In the case of unit root ($\beta_1=1$) Y_t has a stochastic trend and therefore is non-stationary (Stock and Watson, 2007, p. 557). Tests based on Augmented Dickey-Fuller (ADF) test statistics are used. They assume a non-standard distribution under null hypothesis of autoregression. The distribution has a long left-hand tail so that the critical values are smaller than for the usual t-distribution and therefore the unit root is accepted more often (Verbeek, 2008, p. 390, 283). In the unit test root for variables in the model individual country effects were assumed as it is very likely that each country has different levels of selected determinants. The ADF has a null hypothesis that there is a unit root with a coefficient $\beta_1=1$, thus the series are non-stationary. Most of the variables were proved to be stationary. However, table 4.2 presents unit root tests for these variables that have a probability of a unit root that is larger than 0.01.

Table 4.2 Unit Root tests for variables CI, CPI and FDI

Null Hypothesis: Unit root (individual unit root process)
Sample: 1990 2008
Exogenous variables: Individual effects
User specified lags at: 1
Total number of observations: 99
Cross-sections included: 10

CI:

Method	Statistic	Prob.**
ADF - Fisher Chi-square	16.667	0.6745
ADF - Choi Z-stat	0.365	0.6425

CPI:

Method	Statistic	Prob.**
ADF - Fisher Chi-square	19.386	0.4969
ADF - Choi Z-stat	-0.204	0.4192

FDI:

Method	Statistic	Prob.**
ADF - Fisher Chi-square	32.861	0.0349
ADF - Choi Z-stat	-2.558	0.0053

It is observable in table 4.2 that Corruption Index (CI) and Consumer Price Index (CPI) are still strongly non-stationary. Because of the advanced method of correcting the fault in data these variables are unfortunately going to be dropped. This is done to be able to analyse the data properly and to make correct conclusions.

The p-values for unit root test for FDI could be interpreted in different ways. Choosing significance level of 1% there is only Choi's test of Z-statistics that rejects null hypothesis of unit root. However at a significance level of 5% (or even 3.5%) both tests reject the null hypothesis. There is another argument that speaks for FDI being stationary. The null hypothesis assumes $\beta_1=1$, thus perfect autocorrelation. In case of $\beta_1<1$ but close to one, the test would have low probability of rejecting unit root. With p-value being so small and a probability of β_1 not being exactly 1 stationarity in FDI is going to be assumed. After correcting data from non-stationarity the distribution of t-statistics in following outputs is asymptotically normal and the inference is reliable. However, there are other problems presented below that can lead to inconsistent inference.

4.3.2 Correlation

Another important feature for the data that needs to be discussed is high correlation between certain initial variables. Correlations above 0.80 are marked bold in the table 4.3. Corr(L_C;GDP)=0.947, corr(L_C;FDI)=0.834 and corr(RAIL;GDP)=0.859. These high levels of correlation are most likely going to cause problems of multicollinearity. In practice high correlation makes it impossible to estimate a coefficient of one variable while keeping the correlated variable constant. This in turn expands the variances and makes inference less reliable. (Stock and Watson, 2007, p. 209)

The correlations in brackets are of the transformed variables. There are no large correlations after the transformation why all the six explanatory variables are going to be used in the panel regression analysis. We are however going to be cautious for the signs of multicollinearity when interpreting the results.

Table 4.3 Correlation of the variables in the initial and transformed models

	RD	FDI	GDP	L_C	P_SEC	RAIL	TRA
RD	1.000						
FDI	-0.017 (0.099)	1.000					
GDP	-0.018 (0.575)	0.772 (-0.282)	1.000				
L_C	0.098 (-0.037)	**0.834** (0.232)	**0.947** (0.123)	1.000			
P_SEC	0.073 (-0.132)	0.322 (0.347)	0.111 (-0.335)	0.129 (-0.114)	1.000		
RAIL	-0.189 (0.394)	0.529 (-0.348)	**0.859** (0.484)	0.768 (-0.170)	-0.074 (-0.600)	1.000	
TRA	0.505 (-0.029)	-0.149 (0.076)	-0.431 (0.077)	-0.343 (-0.122)	0.486 (-0.170)	-0.632 (0.162)	1.000

4.3.3 Heteroskedasticity

The selected CEEC-10 countries all have different levels of FDI and the cross-sectional differences are apparent over time as well. This diversity of values brings a possibility of heteroskedasticity. Heteroskedasticity violates the assumption of OLS constant residual variance over all values of explanatory variables (however, the error terms are still mutually uncorrelated). With higher values the spread of the error terms might increase as well. Opposite to high correlation, heteroskedasticity does not change the asymptotical normality of OLS estimators. Yet standard errors are counted incorrectly if homoskedasticity is assumed when it is not the case. In turn incorrect standard errors produce inference that leads to

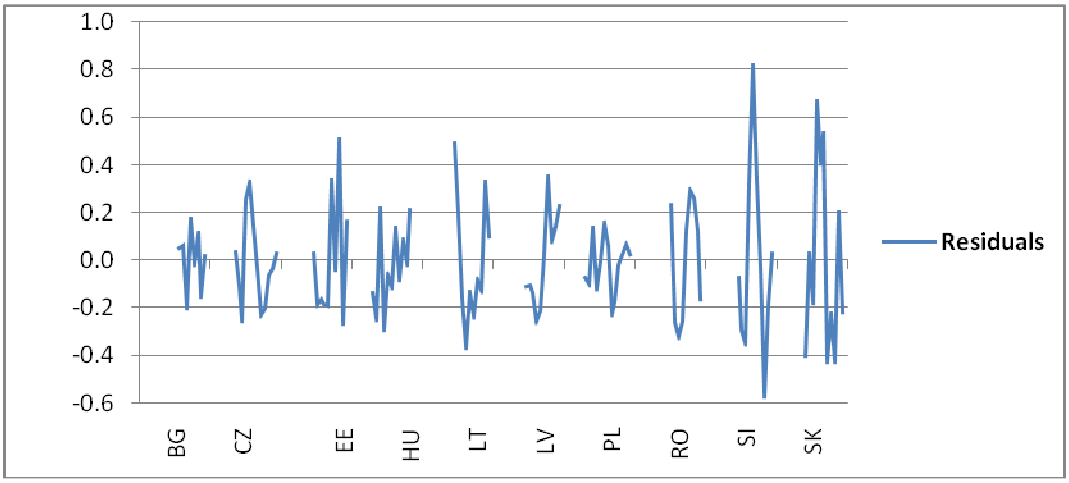
unreliable conclusions. OLS estimator is therefore no longer BLUE (Best Linear Unbiased Estimator).

One way of testing for heteroskedasticity is observing the residuals. Table 4.4 presents residuals for each country in the following initial equation:

$$FDI_{it} = \alpha_i + \mu_t + \beta_1 R\_D_{it} + \beta_2 P\_SEC_{it} + \beta_3 TRA_{it} + \beta_4 RAIL_{it} + \beta_5 L\_C_{it} + \beta_6 GDP_{it} + u_{it} \quad (4.3)$$

The estimation contains double fixed effects and six variables. The whole output will not be presented because it has to be adjusted for the problems that it contains to become meaningful to analyse. The difference in the residuals in table 4.4 is most evident if we compare two extreme values of Bulgaria and Slovakia. Residuals of Bulgarian observations are concentrated between -0.2 and 0.2 while the error terms from the estimation for Slovenia stretch from -0.6 to 0.8. There is a strong motive to suspect heteroskedasticity and therefore to test for it more precisely.

Table 4.4 Graph of the residuals for each country



To test for heteroskedasticity White's test is set up. White's test analyses if the residuals can be explained by independent variables. A relationship is estimated between squared residuals as a dependant variable and all six variables, squared variables and a cross-product of all variables:

$$u_{it}^2 = \beta_0 + \beta_i x'_{it} + \mu_i x'^2_{it} + v_i z'_{it} + \gamma_{it}, \quad (4.4)$$

where z'_{it} is a cross-product of all the variables in all the time periods, u_{it} is the error term for the regression (4.1) and γ_{it} is the error term for the White's test.

Apendix 3 shows the whole output of the White's test. Meanwhile, we only need to look at the F-value of the regression. F-test has a null hypothesis that all the coefficients in the regression are equal to zero. Therefore low p-values allow us to make a conclusion that at least one of the parameters is significantly unequal to zero. In this particular case it means that at least one independent variable affects squared residuals and therefore causes heteroskedasticity. The test is computed with cross-section fixed effects to test if the heteroskedasticity is eliminated by using fixed effects model. This method contains omitted variables that are specific for countries and therefore could in theory explain the different variances. Furthermore because of the reasons explained below the model will be re-specified the model and will only include cross-section fixed effect dummy α_i.

Table 4.5 shows a shorter version of the test results. The test with cross-section fixed effects has an F-value of 1.665 and a p-value of 0.036 that is significant at 5% level. Thus the conclusion is that this estimation suffers from heteroskedasticity and is going to specify standard errors incorrectly.

In case of heteroskedasticity WLS (weighted least squares) is a more efficient estimator. It weights each observation by the inverse of the error variance and in this way minimises the residuals (Verbeek, 2008, p. 92). The practical problem of WLS is that we have to assume the variance of error terms. In this case error variance is unknown and EGLS (Estimated General Least Squares) is going to be used instead where the known weights of WLS are replaced by the estimates. EGLS will likely be more efficient than OLS in small samples but it will always outperform it in large ones (Verbeek, 2008, p. 93).

The decision of using EGLS is a result of the specific characteristics of the selected data and is based on the heteroskedasticity test. The EGLS however does not allow for double fixed effects estimation which is the initial method. The White's test with cross-section fixed effects indicated that the model is heteroskedastic why the panel regression analysis will be limited to cross-section dummy variables.

Period fixed-effects contain omitted variables that affect all the individuals similarly but vary over time. Leaving them out might reduce the value of R-squared and give fault significance to variables that possibly are correlated with the omitted variables. It can as well introduce autocorrelation into the estimation or increase a degree of it because the time variant effects are no longer included in the dummy variables. This possibility is considered and tested in the following estimations.

Table 4.5 White's Test

Dependent Variable: RESID^2 Method: Panel Least Squares Sample (adjusted): 1995 2007 Cross-sections included: 10 Total panel (unbalanced) observations: 104 Effects Specification: Cross-section fixed (dummy variables)			
R^2	0.472118	Mean dependent var	0.068229
Adjusted R^2	0.188481	S.D. dependent var	0.117555
S.E. of regression	0.105899	Akaike info criterion	-1.380823
Sum squared resid	0.751377	Schwarz criterion	-0.44003
Log likelihood	108.8028	F-statistic	1.664511
Durbin-Watson stat	2.704527	Prob(F-statistic)	0.035908

4.3.4 Normality

Another important assumption that needs to be fulfilled to be able to rely on inference in the estimations is the normality of error terms. The t-statistics for the parameters are based on the assumption that the error terms are distributed normally with a mean of zero and a constant variance σ^2 ($u_{it} \sim N(0, \sigma^2)$). The assumption is derived from central limit theorem which proves that OLS estimators in large samples will be close to the real coefficients in the population. Larger number of observations decrease variance and therefore concentrates the OLS estimators around their actual means (Stock and Watson, 2007, p. 133). Verifying the normal distribution in the sample will make the inference more reliable and the coefficients more likely representing the true population values. Normality is commonly tested with a Jarque-Bera test that bases the conclusions on the skewness and kurtosis of the error term distribution. The null hypothesis of the test assumes normality and has a Chi-squared distribution (Verbeek, 2008, p. 195). So far the exact model has not been estimated and therefore we cannot make any conclusions about the normality of the error terms. This assumption will therefore be commented later on when the outputs of the panel estimation are presented.

4.3.5 Outputs with six explanatory variables

Based on the previous discussion a cross-section fixed effects panel regression is estimated with cross-section weights. For simplicity the estimation is called model A. Table 4.6a presents the output of the following regression:

$$FDI_{it} = \alpha_i + \beta_1 R\_D_{it} + \beta_2 P\_SEC_{it} + \beta_3 TRA_{it} + \beta_4 RAIL_{it} + \beta_5 L\_C_{it} + \beta_6 GDP_{it} + u_{it}$$

(4.5, model A)

The estimation has a value of R^2=0.746. The adjusted value is slightly lower (0.703) which is expected because of the large number of explanatory variables. It is however an extreme difference to the unwheighted statistics that only has an R^2 value of 0.141. The difference can possibly be explained by a large amount of heteroskedastic variables why EGLS alters variances significantly for many explanatory variables.

The output shows a number of significant variables at 5% significance level. Research and development expenditures, trade and infrastructure affect FDI positively as expected while labour costs affect the FDI positively opposed to what was expected. Coefficient of private sector share has a positive sign as well and has a p-value of 0.051 so right above the significance level of 5%. GDP has a highly unexpected negative sign however is insignificant. The regressor also has a large standard error that increases the critical values of the t-statistics and therefore makes it more difficult to reject the null hypothesis of the coefficient being equal to 0. The results will be interpreted more extensively further on when further modifications are completed.

An issue that has to be solved is the country individual effects. EGLS output of model A shows that cross-section dummies are insignificant. However looking at cross-section fixed effects for each country in table 4.6b the range of different effects seems to be big and it even covers 0 with some countries having a negative intercept. A value of 0.185 for Bulgaria indicates for example the country's FDI level that is not explained by the independent variables in the model. Thus with all the explanatory variables equal to 0 a logarithmic three-year average of differenced logged values of FDI inflows would be 0.185 (cross-section fixed effects are time invariant and therefore do not indicate growth). A negative sign of a dummy variable means that if all explaining variables had a value of 0 the countries would be outward investors. Although the individual effects are insignificant there is a suspicious detail of standard error of the intercept being so high.

To test if the cross-section dummies are important for the model EGLS is applied with cross-section weights but without cross-section fixed effects. This situation is shown in table 4.6a, model B that is represented by the following equation:

$$FDI_{it} = \beta_1 R\_D_{it} + \beta_2 P\_SEC_{it} + \beta_3 TRA_{it} + \beta_4 RAIL_{it} + \beta_5 L\_C_{it} + \beta_6 GDP_{it} + u_{it}$$

(4.6, model B)

In model B, R^2 decreases to 0.297, only one variable proves to be significant at 5% significance level and Durbin-Watson statistics decrease. Another thing that happened is the standard errors that increased powerfully, three of them becoming larger than the regressor itself. This shows that cross-section fixed effects explain many changes in FDI. Removing individual effects from the regression does no longer tell us that certain countries always receive higher/lower levels of FDI inflows. Without the individual effect the value scope of the variables expands and can no longer explain the flows of FDI. This is an important conclusion because it shows the need of exploring the omitted variables and analysing the reasons for the differences between countries with altered methods. The individual dummy variables are also consistent with the theory. It is unlikely that all the countries would have the same level of FDI when independent variables are equal to 0. Thus model A seems to represent reality better and is going to be the initial model for further discussion.

Table 4.6a Outputs with six explanatory variables

Dependent variable: FDI
Cross-sections included: 10

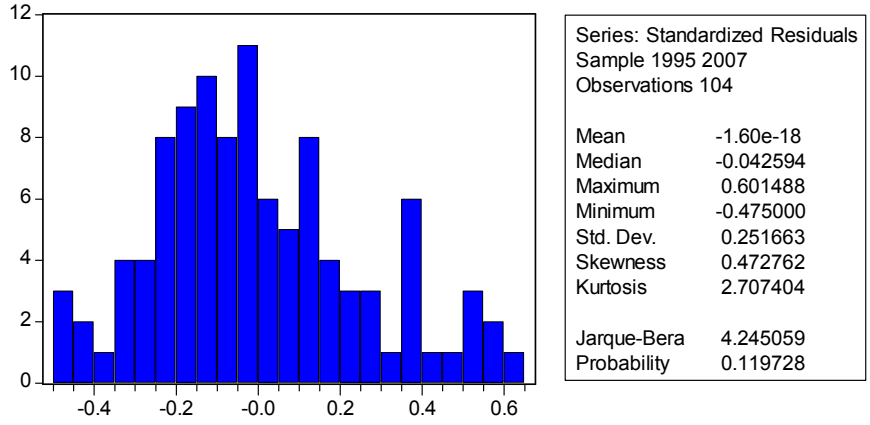
Explanatory variable	Model A	Model B	Model C
C	0.031 (0.075)		0.030 (0.101)
R_D	1.846 (0.484)***	0.524 (0.420)	1.953 (0.532)***
P_SEC	1.186 (0.600)*	0.585 (0.650)	0.393 (1.013)
TRA	1.201 (0.359)***	0.825 (0.436)*	1.529 (0.451)***
RAIL	0.909 (0.382)**	0.046 (0.395)	0.756 (0.561)
L_C	1.276 (0.256)***	1.144 (0.285)***	1.352 (0.411)***
GDP	-1.487 (1.539)	0.740 (0.757)	-1.715 (2.246)
AR(1)			0.174 (0.107)
Sample (adjusted)	1995 2007	1995 2007	1996 2007
No of observations	104	104	94
R^2	0.746	0.297	0.688
Adjusted R^2	0.703	0.261	0.623
Durbin-Watson stat.	1.6832	1.405	2.0729
F-statistics	1.7242	8.2808	10.6106
Probability (F-stat.)	0.0000	0.0000	0.0000

Notes:
Model A: Panel EGLS (Cross-section weights), cross-section fixed effects;
Model B: Panel EGLS (cross-section weights), no fixed effects;
Model C: Panel EGLS (cross-section weights), cross-section fixed effects, autoregressive term of first order AR(1);
Standard error appears in the parenthesis;
(***) indicates significance at 1% level; (**) at 5% level; (*) at 10% level

Table 4.6b Cross-section fixed effects (Model A)

Country	Effect
Bulgaria	0.185
Czech Republic	-0.101
Estonia	-0.100
Hungary	-0.198
Lithuania	-0.050
Latvia	-0.064
Poland	0.088
Romania	0.050
Slovenia	0.046
Slovakia	0.182

Table 4.6c Normality test, model A



4.3.6 Autocorrelation

Durbin-Watson statistics indicate possible autocorrelation in the estimation in table 4.6a, model A. A model without any autocorrelation would normally have values close to 2. Model A has a somewhat lower value of Durbin-Watson statistics d=1.683. To find out the probability of autocorrelation with d=1.683 we can check the Durbin Watson statistics for 6 independent variables and 104 observations (that are approximated to 100 observations). The test has null hypothesis of no autocorrelation. At 5% significance level the lower critical value is dL=1.550 and the upper one is dU=1.803 (Durbin-Watson statistics, p. 6). The value in the model A is in the middle of the two critical values (dL < d=1.683 < dU). This means that we can neither accept nor reject null hypothesis and can therefore not make any conclusions about the autocorrelation.

To test for autocorrelation in a different way, a slightly altered model is estimated. Table 4.6a shows model C with function:

$$FDI_{it} = \alpha_i + \beta_1 R\_D_{it} + \beta_2 P\_SEC_{it} + \beta_3 TRA_{it} + \beta_4 RAIL_{it} + \beta_5 L\_C_{it} + \beta_6 GDP_{it} + u_{it}$$

(4.7, model C)

Thus it is so far the same as the equation 4.5 in model A. However model C additionally assumes autoregression function with a lag of first degree AR(1) which assumes autocorrelated error terms:

$$u_{it} = \rho_1 u_{i(t-1)} + \varepsilon_{it}, \quad (4.8)$$

where u_{it} is the error term in (4.1) and thus also (4.5) and ε_{it} is the error term in (4.8).

The coefficient of AR(1) in model C estimates ρ that is the first-order serial correlation coefficient. In table 4.6a it is observable that ρ is estimated to 0.174. The correlation is not significant at 10% significance level even though it raises DW statistics to 2.073. Concluding these two tests there is no significant autocorrelation in the model. It is slightly surprising because the model has omitted period-fixed effects. This could possibly have caused autocorrelation because it represents time variant effects that are invariant individually.

Thus model A seems to represent the reality best and is going to be discussed later on from the perspective of the economic theory. Before moving on we have to consider normality of the error terms in the model A and make sure that the model is not based on incorrect assumptions. Table 4.6c shows a histogram of the residuals. The test computed Jarque-Bera statistics to 4.245 with a probability of 0.120. Although the probability is not extremely high it still does not allow rejecting the null hypothesis at 10% significance level. Therefore the residuals have normal distribution and the inference is reliable

4.3.7 Output with five explanatory variables

The discussion above has explained the reasoning of keeping the cross-section fixed effects. The other variable that is highly insignificant is real GDP, a measure of market size. The coefficient of GDP had an unexpected negative sign which means that higher GDP reduces inflows of FDI. This could depend on several reasons. Firstly, negative sign does not necessarily mean that GDP growth would make the foreign direct investors leave the country's economy and by no means says that a country can attract more FDI by reducing GDP. It is more likely that the countries with lowest incomes would attract most FDI because of other reasons. In fact, the correlogram in table 4.3 shows that GDP is correlated in the initial data with labour costs at 0.947 which is close to perfect multicollinearity. This means

that in this sample countries with low GDP have lower production costs in form of low wages and therefore receive more FDI. Another reason to the unexpected sign is possible multicollinearity. GDP is correlated both with labour costs and goods transported by rail. Indeed, GDP has a large standard error that is an indicator of multicollinearity. Excluding GDP from the model would therefore allow analysing L_C and RAIL variables independently and hopefully make the estimation more efficient.

To make sure that the decision to take away GDP instead of labour costs was right we want to make sure that the theory of labour costs affecting FDI is consistent. As was mentioned in the theoretical discussion in part 3, FDI could as well affect labour costs. For this purpose a Granger causality test with 1, 2 and 3 lags in table 4.7 is performed. None of the null hypothesis can be rejected thus it cannot be stated that L_C affects FDI inflows or the opposite. However, the probability that L_C causes FDI is bigger with 2 and 3 lags. In fact, it gets even bigger with more lags. The output is however not presented here as it gets less reliable because of the decreased number of observations. This conclusion is slightly surprising because labour costs significantly affect FDI inflows in the outputs of table 4.6a and 4.8a. This can partly depend on the correlations in the data that can make labour costs seem significant when it is actually another variable that stands for the effect on the FDI.

However, it is also important to understand that Granger causality test simply checks for whether there is a relationship between past values of L_C and the past values of FDI inflows (Stock and Watson, 2007, p. 547). This is different firstly because labour costs are considered separately and thus the correlation is not present in a one-variable model. Secondly, the model considers lagged values and therefore can give a slightly different picture. It is especially likely if we remember that the series are transformed to three-year averages of the differentiated values. These transformed values consider medium-term effects and thus a lagged value of them can analyse the relationship in a too long-term perspective. The only conclusion of the test that we can make is that there is no evidence that FDI affects labour costs in this paper and therefore it is justifiable to leave labour costs as an independent variable. The GDP variable besides the insignificance in table 4.6a is additionally correlation with RAIL and would thus require further adjustments.

Table 4.7 Pairwise Granger Causality Tests

Sample: 1990 2008

Null Hypothesis:	Obs	F-Statistic	Prob.
1 Lag			
FDI does not Granger Cause L_C	97	1.47024	0.22835
L_C does not Granger Cause FDI		0.18155	0.67102
2 Lags			
FDI does not Granger Cause L_C	87	0.09864	0.90618
L_C does not Granger Cause FDI		1.72399	0.18475
3 Lags			
FDI does not Granger Cause L_C	77	0.48526	0.69361
L_C does not Granger Cause FDI		2.06421	0.11280

The new EGLS with five variables is estimated with individual effects:

$$FDI_{it} = \alpha_i + \beta_1 R\_D_{it} + \beta_2 P\_SEC_{it} + \beta_3 TRA_{it} + \beta_4 RAIL_{it} + \beta_5 L\_C_{it} + u_{it} \quad (4.9)$$

In table 4.8a it is observable that the estimation has an R^2 value of 0.683 (a decrease). None of the coefficients change the sign however their significance changes slightly. Private sector share is more significant and has a p-value of 0.0260. R&D expenditures, trade and labour costs are significantly positive at the significance level of 1%. Variable of goods transported by rail is still positive and only significant at 10% significance level (p=0.075). The change in the significance in RAIL is not unexpected because of high positive correlation between GDP and RAIL. Cross-section fixed effects are continuously insignificant, have a high standard error and are negative for some of the selected countries. Table 4.8b shows however that the differences between countries are almost unchanged.

Finally, normality of the error term distribution in the output of five variables will be considered. Table 4.8c shows Jarque-Bera normality test of the residuals. The null hypothesis is normality of the error terms distribution and it has a probability of 0.206. We can therefore not reject null hypothesis and are able to suppose that the normality assumption is fulfilled.

Table 4.8a Output with five explanatory variables

Dependent Variable: FDI
Cross-sections included: 10

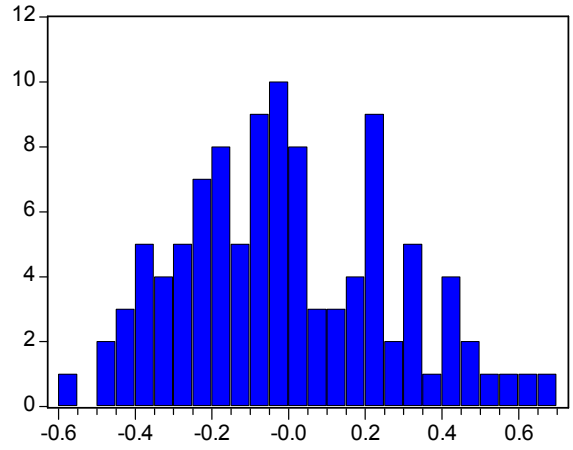
Explanatory variable	
C	-0.038 (0.034)
R_D	1.626 (0.420)***
P_SEC	1.334 (0.589)**
TRA	1.137 (0.379)***
RAIL	0.682 (0.378)*
L_C	1.270 (0.260)***
Sample (adjusted):	1995 2007
No of observations:	104
R^2	0.683
Adjusted R^2	0.633
Durbin-Watson stat	1.6708
F-statistic	13.6746
Prob(F-statistic)	0.0000

Note: Method: Panel EGLS (cross-section weights), cross-section fixed effects;
Standard error appears in the parenthesis;
(***) indicates significance at 1% level; (**) at 5% level; (*) at 10% level

Table 4.8b Cross-section fixed effects

Country	Effect
Bulgaria	0.173
Czech Republic	-0.075
Estonia	-0.105
Hungary	-0.173
Lithuania	-0.050
Latvia	-0.085
Poland	0.079
Romania	0.050
Slovenia	0.059
Slovakia	0.160

Table 4.8c Normality test



Series: Standardized Residuals
Sample 1995 2007
Observations 104

Mean	-0.005396
Median	-0.037828
Maximum	0.653254
Minimum	-0.560069
Std. Dev.	0.271589
Skewness	0.331086
Kurtosis	2.459961
Jarque-Bera	3.163830
Probability	0.205581

4.4 Discussion

We have so far analysed FDI determinants in CEEC-10 in different stages and have modified the empirical method. This discussion sums up and studies the results from the theoretical point of view.

Unfortunately, results for variables of Corruption Index and Consumer Price Index were not produced because the variable transformation did not remove non-stationarity. This influenced the choice of six final variables for the regression. However, there was a problem of high initial correlation between some variables. GDP is correlated by 0.947 with labour costs and by 0.859 with goods transported by rail. These correlations are likely in reality because of the following reasons. GDP is a measure of the overall economic output produced in a country. On the other hand labour costs consist mainly of taxes and earnings. In the "sweatshop" argument by Golub (1995) it was disputed that low wages reflect low productivity. Higher wages mean higher productivity and therefore higher GDP. Thus the two measures partly capture the same process.

Choosing the determinants it was hoped that the measures would reflect different aspects of the host economy that are important for foreign direct investors. One of the aspects could have been GDP as a measure of market size more that the one of productivity. A possible explanation for the extremely high correlation between the variables is a flexible labour market that responds to productivity changes fast. Transformation of the variable reduced correlation to 0.123 but the output in table 4.6a still showed high standard error of GDP which is a sign of multicollinearity. On the other hand, there could be other more technical reason for high correlation of the two variables. To be able to analyse and compare the statistics labour costs were adjusted to real prices. Data on GDP was also in real terms and was transformed with the same values of GDP deflator. This similar alteration might have exaggerated correlation between the two variables. Another problem with the data was the missing data for labour costs that reduced number of observations and could therefore have captured effects that do not exist in a longer term.

GDP in the original data also has a correlation of 0.859 with goods transported by rail. In this situation however the explanation is less obvious. Most likely the countries invest more resources in infrastructure when the economy is booming. Developing countries such as CEEC-10 have a weak economic buffer and economic recessions challenge basic sectors of the economy such as healthcare, education, labour markets. In this situation infrastructure loses its priority and decreases together with GDP. The correlation is high and it makes it

difficult to analyse changes in one variable only. It is observable in table 4.8a that when GDP variable is removed and RAIL becomes less significant.

These two facts made it difficult to observe changes in FDI when solely GDP is changed. The coefficient of GDP was insignificant because of high standard error and therefore the variable was removed. Conclusions if the market size matters for FDI could therefore not be made. Because of correlation we are not able to separate the effects on FDI from the GDP, L_C and RAIL. The hypothesis of larger markets affecting FDI inflows positively has to be tested with altered methods, with more observations and hopefully less correlation.

Another pair of variables that were highly correlated in the initial data is the labour costs and FDI (corr(L_C,FDI)=0.834). The relationship could theoretically be explained by two facts. First of all, labour cost is a crucial determinant for resource-seeking FDI. This type of vertical investment seeks cheap labour force to produce less advanced intermediate goods. Thus labour costs and FDI inflows should have a reversed causality. On the other hand, FDI inflows bring new technology and positive externalities discussed in part 1. Moreover, the size of positive spillovers is positively dependent on the differences between the source and the host country (Rodriguez-Clare, 1996). This would possibly imply that the positive externalities are significant in CEEC-10 because of their past as plan economies with low productivity levels. This would also suggest that FDI inflows would increase productivity and therefore wages. The important question here is which effect has a stronger impact on CEEC-10 economies. According to Granger causality test in table 4.7 there is no significant relationship between the FDI and L_C despite the direction of the causality we choose. Thus we have no evidence in this sample that FDI affects labour costs in CEEC-10.

To sum up the problem of high correlations and multicollinearity it is necessary to say that the conclusions made in the following paragraphs are less robust. The parameters depend on the selected variables and are difficult to observe independently. This problem is partly solved by the variable transformation and the exclusion of the GDP variable. However to be able to make more reliable conclusions one could choose different data or a longer period of time. The later is however only possible in the future when the countries have existed longer.

Despite the problems we are able to make some conclusions about the determinants of FDI inflows that explain differences in CEEC-10. R&D expenditures have a coefficient equal to 1.846 in case of six variables and 1.626 in case of five variables. In reality it means that the three-year average growth of FDI inflows is approximately between 1.6 and 1.8% when the three-year average increase in R&D expenditures is one percent. The result is expected

because human capital and high level of technology are expected to attract market-seeking FDI. Horizontal integration requires labour force and technology that can handle the whole production.

Trade is an approximate measure of openness in the estimation. High level of openness attracts resource-seeking FDI because of reduced transport costs and higher export efficiency of intermediate goods. Increase of trade share in GDP (%) indeed affects FDI inflows positively. Three years' average increase of trade by one percent affects FDI inflows upwards by 1.2 % in the six-variable model and by 1.1% in the five-variable model.

Private sector had a positive coefficient of 1.19 in the six-variable model with a p-value of 0.051 thus nearly significant at the significance level of 5%. The model where GDP was removed estimated the coefficient to significant 1.33. Private sector has been a cause of FDI in CEEC-10. However this panel regression estimates whether higher private sector share in GDP has itself affected FDI flows. It therefore indicates that market-seeking FDI is attracted by high private sector where there is a possibility of gaining a higher market share. The result confirms therefore previous research of European Commission (Enlargement Papers, 2001) which has estimated that historical FDI was mainly market-seeking.

Finally, goods transported by rail is found to be positively significant in the six-variable model with a coefficient of 0.91 with a p-value of 0.0193. However the model without GDP estimates a coefficient to 0.68 with a p-value of 0.0747 and only finds the variable RAIL significant at a significance level of 10%. This obviously could be affected by high correlation between GDP and RAIL which affects the estimated parameter. In both cases FDI responds to changes in infrastructure is inelastic. An increase in goods transported by rail by one percent increases FDI inflows by 0.7% to 0.9%. Nevertheless a cautious conclusion of infrastructure being a positive determinant of FDI can be made. This variable most likely reveals resource-seeking FDI because good infrastructure brings down the production costs and makes the production in a foreign host country worthy.

The unexpected sign of labour costs in the model was already discussed. Resource-seeking FDI would decrease level of investment when labour costs increase. In this model though the three years' average increase of labour costs by one percent affects FDI inflows upwards by 1.3%. As reasoned before the result might depend on the high correlation between labour costs and GDP. Increase in productivity increases FDI which is consistent with the theory. In other words, higher wages are worth to pay if the increase of productivity is the reason. Other problems such as a short period of time for available data and the transformation of the initial data in local currencies to USD in real term might have

influenced the results as well. Thus the conclusions on labour costs although explicable are still uncertain and need further investigation.

Dummy variables for individual effects conclude that without the explanatory variables five countries (CZ, EE, HU, LT, LV) would be outward investors. Thus there should be other variables explaining the division between inward and outward investors among CEEC-10. This leaves the question of determinants of FDI inflows to region open for further researches.

Finally we expected to make some assumptions about the motives of FDI in the 10 Central and Eastern European Countries. Analysing the significant variables does not give a clear-cut picture of the nature of FDI. Positive causality between R&D expenditures, private sector share and FDI inflows points at market-seeking investments. The positive effect of higher labour costs on FDI could also indicate market-seeking intensions. The foreign investors do not necessarily try to lower production costs, they want quality and self-sufficiently of the labour force as well. However, higher share of trade in GDP and better infrastructure lower production costs and attract resource-seeking FDI which is also the case of this paper.

Although the results are ambiguous they are still rather expected. On the one hand, it is difficult to group the determinants into strict groups. The grouping depends on certain companies, their location and the sector of investment. On the other hand, the results still provide interesting conclusions because they confirm CEEC-10 as transition economies. It is likely that some sectors of the economy in these countries have moved to highly technological, human capital rich products while others specialise on providing MNCs with cheap intermediate goods. Another explanation for different specialisation strategies is the entry to EU market. It is likely that some investors from the third country invest into CEEC-10 in order to enter the domestic EU market. It would be interesting to test if the peripheral location of these Central and Eastern European countries was an important factor for the outsider investors (see Ireland in Gorg and Ruane, 2000). In contrast, it is possible that the EU investors enter CEEC-10 markets to reduce production costs while the trade barriers in the Union are low.

5. CONCLUSIONS

In order to explain the differences in FDI inflow levels to 10 Central and Eastern European countries a cross-section fixed effect panel regression was estimated. The data and specification appeared to have flaws that partly were difficult to adjust because of relatively few observations. The transformation of the series done to remove the non-stationarity reduced the number of observations additionally. The conclusions of the thesis are therefore cautious and this paper is an encouragement to improved further studies on FDI flows to Central and Eastern Europe.

The transformed relationship between variables estimate how much a three-year average growth rate of one percent in independent variable affects a three-year average growth rate in FDI inflows. The six variables (GDP, RAIL, TRA, L_C, R_D and P_SEC) that were tested in the final model have generally proved the expected processes. In general, the results can be interpreted as guidelines for economic growth in the transition economies of CEEC-10. Since the positive externalities of FDI should be exceptionally dominating in this region the variables bring insight into what the country policy makers should prioritise. The countries of Central and Eastern Europe that have high R&D expenditures, high share of private sector, high share of trade in GDP and a well-functioning infrastructure attract higher levels of foreign direct investment. As panel regression analyses changes over time as well, this means that countries received higher FDI inflows when the values of the significant explanatory variables were increasing.

The variable of labour costs does not provide us with clear-cut results. We can make a hypothesis that the labour costs represent productivity because of high correlation with GDP and hence FDI is positively affected by higher productivity in the host country. This unexpected effect of labour costs is however present in several earlier researches which confirm the complex nature of labour costs. The conclusions made on the effect of GDP and labour costs on FDI inflows are thus restricted and are in need of being improved by further research with more observations and a less correlated data.

An interesting result of the panel regression is the country fixed-effects that for some countries obtained a negative sign. Although insignificant, they suggest that five countries in the region would be “net outward investors” if the explanatory variables were equal to zero. This means that with the explanatory variables in this thesis these countries would receive lower levels of FDI than the “net inward investors”. This does not necessarily need to be negative because it depends on the outside investments that are done. In the case of

productive direct investments from local individuals and companies, the "net outward investing" countries could be compensated the loss in wealth from inward FDI by increase in wealth of the outward investing companies. However, this is a separate research subject that would have to be studied carefully.

The second question of the paper was to find out the motives of FDI in the region. The results over significant variables indicate both market- and resource-seeking strategies in the 10 Central and Eastern European Countries. This gives a reason of concluding that the economies are not fully specialised to provide particular types of products. The selected countries are in transition between attracting FDI by cheap production costs and by offering skilled labour for producing goods for the inside market. It is as well likely that enterprises have different motives of FDI in CEEC-10 depending on their location. The EU investors are expected to exploit relatively cheap production costs in the countries while outsider investors are more likely to try to reach domestic EU market through these peripheral countries. This division and the role of the specialisation in general could also be a continuation of this paper.

Appendix 1:

10 Central and Eastern European Countries

BG- Bulgaria
CZ- Czech Republic
EE- Estonia
HU- Hungary
LT- Lithuania
LV- Latvia
PL- Poland
RO- Romania
SI- Slovenia
SK- Slovakia

Appendix 2:
FDI

	BG	CZ	EE	HU	LT	LV	PL	RO	SI	SK
1990	4000	120000	0	311000	0	0	89000	10	95003	24100
1991	55900	511000	0	1462141	0	0	291000	40000	102691	82000
1992	41500	983000	82272	1479165	10000	29405	678000	77000	111000	100000
1993	40000	654278	162225	2349715	30175	45123	1715000	94000	112600	198834
1994	105400	878232	214427	1144084	31305	214453	1875000	341000	116900	269878
1995	90400	2567565	201489	4804151	72558	179618	3659000	419000	150400	236133
1996	109000	1435279	150222	3288936	152400	381694	4498000	263000	173300	350826
1997	504800	1286493	266224	4154801	354503	521053	4908000	1215000	334500	173745
1998	537317	3700169	580524	3343001	925525	356900	6365000	2031000	215700	562132
1999	818788	6312597	305183	3307673	486458	347600	7270000	1041000	106600	354307
2000	1001504	4987079	387310	2770479	378875	412500	9343000	1037000	135800	2052481
2001	812942	5640707	542494	3943892	445825	132000	5714000	1157000	503400	3078340
2002	904660	8496609	284523	3012852	712452	253600	4131000	1144000	1659500	4104199
2003	2096789	2021276	918991	2177247	179180	303500	4589000	1844000	301500	559265
2004	2662210	4977795	965817	4520638	773154	636900	12716000	6517000	831400	3037419
2005	4312400	11601979	2935059	7626150	1031819	713500	10309000	6482160	540400	2411132
2006	7507400	5521762	1787234	19696551	1840186	1664200	19876000	11393430	649332	4166967
2007	8974150	9293735	2686600	37230951	2017037	2247200	22959000	9492000	1482773	3363351
2008*	7527996	8775942	1610285	5327720	1484433	1165916	13521391	10881406	1484198	2792060

Notes: The data is in thousands USD, current prices.

Sources: World Bank's WDI online, FDI net inflows in thousands USD (current prices);
*Values for 2008 are from FDIstat, FDI net inflows in thousands USD (Current prices);
Underlined values are from EBRD , Selected Economic Indicators – Macroeconomic; FDI, net in thousands USD (current prices).

Appendix 3:
White's test

Dependent Variable: RESID^2
Method: Panel Least Squares
Sample (adjusted): 1995 2007
Cross-sections included: 10
Total panel (unbalanced) observations: 104

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.212653	0.10466	2.031844	0.0461
R_D	-1.512692	0.876975	-1.724898	0.0892
R_D^2	-0.976717	4.255397	-0.229524	0.8192
P_SEC	0.628735	1.817656	0.345904	0.7305
P_SEC^2	-9.70856	9.81782	-0.988871	0.3263
TRA	-0.466989	1.147658	-0.406906	0.6854
TRA^2	-3.49054	3.817524	-0.914347	0.3638
RAIL	-0.877586	1.198052	-0.732511	0.4664
RAIL^2	-6.406816	3.683926	-1.739127	0.0866
GDP	-0.956261	4.04874	-0.236187	0.8140
GDP^2	-39.77408	47.02647	-0.845781	0.4007
L_C	-1.118653	0.798838	-1.400351	0.1660
L_C^2	-0.169094	1.946043	-0.086891	0.9310
R_D*P_SEC	13.30728	10.40731	1.278647	0.2054
R_D*TRA	-1.090255	6.729655	-0.162008	0.8718
R_D*RAIL	2.087998	6.180599	0.337831	0.7365
R_D*GDP	15.04961	20.01413	0.751949	0.4547
R_D*L_C	6.199621	4.903277	1.264383	0.2105
P_SEC*TRA	2.028434	12.62341	0.160688	0.8728
P_SEC*RAIL	21.69938	13.55957	1.6003	0.1142
P_SEC*GDP	-1.850295	37.1113	-0.049858	0.9604
P_SEC*L_C	8.41512	9.247346	0.910004	0.3661
TRA*RAIL	-6.139816	7.572193	-0.810837	0.4203
TRA*GDP	9.466937	21.55579	0.439183	0.6619
TRA*L_C	2.733163	4.106099	0.665635	0.5079
RAIL*GDP	30.34212	24.70174	1.228339	0.2236
RAIL*L_C	-11.1137	5.816352	-1.910767	0.0603
GDP*L_C	21.93702	16.55288	1.325269	0.1896

Effects Specification: Cross-section fixed (dummy variables)

R-squared	0.472118	Mean dependent var	0.068229
Adjusted R-squared	0.188481	S.D. dependent var	0.117555
S.E. of regression	0.105899	Akaike info criterion	-1.380823
Sum squared resid	0.751377	Schwarz criterion	-0.44003
Log likelihood	108.8028	F-statistic	1.664511
Durbin-Watson stat	2.704527	Prob(F-statistic)	0.035908

References:

Alfaro, Laura; Rodriguez-Clare, Andres (2004), "Multinationals and Linkages: An Empirical Investigation", *Economia,* Vol 4, p. 113-169.

Alfaro, Laura; Kalemli-Ozcan, Sebnem; Sayek, Selin (2009), "FDI, Productivity and Financial Development", *The World Economy,* Vol. 32, P. 111.

Alquacil, Maite; Cuadros, Ana; Orts, Vincente (2008), "EU Enlargement and inward FDI", *Rewiew of Development Economics,* Vol 12, p.594-604.

Asiedu, Elizabeth (2006), "Foreign Direct Investment in Africa: The Role of Natural Resources, Market Size, Government Policy, Institutions and Political Instability", *World Economy,* Vol. 29, p.63-77.

Azzimonti, Marina; Sarte, Pierre-Daniel G. (2007), "Barriers to Foreign Direct Investment Under Political Instability", *Economic Quarterly-Federal Reserve Bank of Richmond,* Vol 93, p. 287-315.

Barrell, Ray; Holland, Dawn (2000), "Foreign Direct Investment and Enterprise Restructuring in Central Europe", *Economics of Transition,* Vol. 8, p. 477-504.

Basar, Mehmet; Tosunoglu, Sebnem (2006), "EU Integration Process: Will Turkey Overcome the FDI Obstacles?", *Managing Global Transitions,* Vol 4, p. 115-128.

Basu, Bharati; Yao, Jianfeng (2009), "Foreign Direct Investment and Skill Formation in China", International Economic Journal, Vol. 23, No.2, p. 163-179.

Bellak, Christian; Leibrecht, Markus; Riedl, Alexandra (2008), "Labour costs and FDI flows into Central and Eastern European Countries: A survey of the literature and empirical evidence", *Structural Change and Economic Dynamics,* Vol. 19, p. 17-37.

Bhardwaj, Arjun; Dietz, Joerg; Beamish, Paul W. (2007), "Host Country Cultural Influences on Foreign Direct Investment", *Management International Review,* Vol. 47, No. 1, p. 29-50.

Birsan, Maria; Buiga, Anuta (2009), "FDI Determinant: Case of Romania", *Transition Studies Review,* Vol. 15, No. 4, p.726-736.

Blomström, Magnus; Kokko, Ari (1997), "Regional Integration and Foreign Direct Investment", *Working Paper Series in Economics and Finance,* no.172.

Blomström, Magnus; Kokko, Ari (1998), "Multinational Corporations and Spillovers", *Journal of Economic Surveys,* Vol 12, p.247-277.

Blomström, Magnus; Sjöholm, Fredrik (1999), "Technology Transfer and Spillovers: Does Local Participation with Multinationals Matter?", *European Economic Review*, Vol 43, p.915-923.

Blonigen, Bruce A. (2005), "A Review of the Empirical Literature on FDI Determinants", *Atlantic Economic Journal*, Vol. 33, No. 4, p.383-403.

Botrić, Valerija; Škuflić, Lorena (2006), "Main Determinants of Foreign Direct Investment in the Southeast European Countries", *Transition Studies Review,* Vol 13, p. 359-377.

Chowdhury, Abdur; Mavrotas, George (2006), "FDI and Growth: What Causes What?", *The World Economy,* Vol 29, No 1, p. 9-19.

Demekas, Dimitri G.; Horváth, Balász; Ribakova,Elina; Wu, Yi (2007), "Foreign Direct Investment in European Transition Economies – the Role of Policies", *Journal of comparative Economics,* Vol 35, No 2, p.369-386.

Dewenter, Kathryn L. (1995), "Do Exchange Rate Changes Drive Foreign Direct Investment?", *Journal of Business,* Vol 68, No.3, p. 405-433.

Dunning, John H.; Narula, Rajneesh (1996), "The investment development path revisited", in *Foreign Direct Investment and Governments: catalysts for economic restructuring,* London, Routledge.

Durbin-Watson Statistics, http://www.nd.edu/~wevans1/econ30331/Durbin_Watson_tables.pdf, (available 2010-01-04).

EBRD (European Bank for Reconstruction and Development), (2009 a), Structural Change Indicators http://www.ebrd.com/country/sector/econo/stats/index.htm (available 2009-12-29).

EBRD (European Bank for Reconstruction and Development), (2009 b), Selected Economic Indicators-Macroeconomic http://www.ebrd.com/country/sector/econo/stats/index.htm (available 2009-12-29).

Enlargement Papers (2001), Directorate General for Economic and Financial Affairs, *The Economic Impact of Enlargement,* Enlargement Papers, No. 4 http://ec.europa.eu/economy_finance/publications/publication1583_en.pdf (available 2009-12-29).

ESD, Estonian Statistics Department, Main National Accounts Indicators, www.stat.ee (Statistical database: Economy- National Accounts- GDP) (available 2009-12-29).

Faeth, Isabel (2009), "Determinants of Foreign Direct Investment- a Tale of Nine Theoretical Models", *Journal of Economic Surveys,* Vol. 23, No. 1, p. 165-196.

FDI Database a, *Definitions and Sources,* http://www.unctad.org/Templates/Page.asp?intItemID=3198&lang=1 (available 2009-12-29).

FDI Database b, *Search by Country/Economy,* http://www.unctad.org/Templates/Page.asp?intItemID=3198&lang=1 (available 2009-12-29).

FDIstat, *FDI flows and stocks,* http://stats.unctad.org/fdi/ (available 2009-12-29).

Golub, Stephen (1995), "Productivity and labor costs in newly industrializing countries", *FRBSF Weekly Letter,* Vol 95, p. 1-4.

Gorg, Holger; Ruane, Frances (2000), "European integration and peripherality: Lessons from the Irish experience", *The World Economy,* Vol 23, p. 405-421.

Khamfula, Yohane (2007), "Foreign Direct Investment and Economic Growth in EP and IS Countries: The Role of Corruption", *The World Economy,* Vol 30, p.1843.

Lahiri, Sajal (2009), "Foreign Direct Investment: An Overview of Issues", *International Review of Economics & Finance*, Vol 18, No 1, p.1.

de Mello, Luiz R Jr (1999), " Foreign direct investment-led growth: Evidence from time series and panel data", *Oxford Economic Papers,* Vol 51, p. 133-151.

Mukherjee, Arijit, Sinha, Uday Bhanu (2007), "Welfare-reducing domestic cost reduction", *Review of International Economic,* Vol. 15, No. 2, p. 294–301-

Mukherjee, Arijit; Suetrong, Kullapat (2009), "Privatization, strategic foreign direct investment and host-country welfare", European Economic Review, Vol 53, p. 775.

OECD, http://stats.oecd.org, Real Output & Total Labour Costs (available 2009-12-29).

Razin, Assaf; Sadka, Efraim; Yuen, Chi-Wa (1999), "An Information-Based Model of Foreign Direct Investment: The Gains from Trade Revisited", *International Tax and Public Finance,* Vol 6, p. 579-596.

Rodriguez-Clare, Andres (1996), "Multinationals, linkages, and economic development", *the American Economic Review,* Vol 86, p. 852-874.

Sayek, Selin (2009), "Foreign Direct Investment and Inflation", *Southern Economic Journal,* Vol. 76, No. 2, p. 419-443.

Shang-Jin, Wei (2000), "How Taxing is Corruption on International Investors?", *Review of economics and Statistics,* Vol. 82, No. 1, p. 1-11.

Stock, James H.; Watson, Mark W. (2007), "Introduction to Econometrics", Pearson Education, Inc., 2nd ed.

Verbeek, Marno (2008), "A Guide to Modern Econometrics", John Wiley & Sons Ltd, Southern Gate, Chichester, 3rd ed.

Transparency International, Corruption Perceptions Indexes, http://www.transparency.org/policy_research/surveys_indices/cpi/2009 (availabe 2010-01-04).