Determinants of Foreign Direct Ivestment inflow in South East European Countries - Panel Estimation

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Abstract

The first part of the paper examines the objective of the study. Following, in the second part we continuo with analyses of the importance of FDI to transition economies of (SEEC) South East European Countries. The study examines the trend and characteristics of FDI based on geographical distribution of FDI in the SEECs and compare its amount with Central East European Countries (CEECs).

In the third part, following the theoretical approach of FDI and empirical evidence identified by literature review of FDI determinants, we tried to identify some of the main host country determinants of FDI inflow in SEECs. For this reason, we employed panel data estimation. Using a sample of SEECs and panel data technique under random effect specification the paper research the relationship between FDI, GDP growth, GDP per capita, number of inhabitants, trade openness, inflation, exchange rate, external debt and some technology development proxies.

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1. Introduction

Developing countries can gain potential benefits by attracting international capital flows. This is based on the grounds that Foreign capital through expanding domestic savings, usually at low levels, enable countries to increase their rate of capital accumulation. In turn this lead to speediness of the development processes of the country through increasing long term growth prospects and wealth of the population. Foreign Direct Investments (FDI) as a type of foreign capital inflow can help to finance the increased needs for resources in developing countries and facilitate the transfer of managerial and technological know – how.

Due to the weak relationship of South East European Countries (SEEC) with European Union Countries (EU), SEE Countries are less developed and receive less FDI inflow in comparison to Central European Countries (CEC) and they are lagging well behind them in terms of speediness of transition processes. (Skuflic. L and Botric V, 2006).

Taking into account the importance of FDI in the future economic development of transition economies, the main objective of this study is to examine the determinants of FDI inflow in South East European Transition Economies. In the sample are included South East European Countries: Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Macedonia, Moldova, Romania, Serbia and Montenegro and Slovenia. The study is organized as follow: In this part a short introduction and main objectives of the study are given. Second part proceeds the importance of FDI in transition economies. Also, within this part additionally, a general discussion on the importance of the FDI to transition economies of South East European Countries is presented. In this section some macroeconomic data for these countries are also presented including the overview of trends and characteristics of FDI. In the third part of the study a theoretical framework for identifying the main determinants of FDI and some of the empirical work on these determinants is reviewed. In the fourth section we focus primarily on the panel econometrics model and under random effect specification we estimate the equation presenting the determinants of FDI in SEECs. The section continuous with discussion of the results and conclude with policy implications discussion.

2. The importance of FDI in transition economies. FDI dynamics in SEE countries

Following the transition processes of the SEEC economies from centralist and planned systems to market oriented systems, there has been an increasing interest in Foreign Direct Investment (FDI) in these countries. In line with this a large number of countries went through transition processes paying subsidies to attract FDI. One justification of this is that social returns of FDI exceeds private returns, because of productivity spillovers from FDI to domestic firms. (Haskel. J, Pereira. S, Slaughter.M, 2002).

2.1 The importance of FDI in transition economies

Due to the significance of productivity spillovers that host countries experiences from inward FDI, the determinants of Foreign Direct Investment have been extensively studied. Host countries benefited from knowledge and technology transfer to domestic firms and to the labour force. Also, they benefited from enhanced competition and improved access for exports abroad, notably in the source country, therefore FDI is considered as important catalyst for the economic transformation of the transition economies. (Blomstrom M, Kokko A, 2003). Its importance is moreover seen to be in providing sufficient financial resources for the acquisition of new plants and equipment, and also in the transfer of organizational forms from relatively more technologically advanced economies. (Blomstrom M, Kokko A, 2003).

The importance of FDI also lies in its ability to increase competitiveness in the host country local market, which result in the correction of domestic market failures to reflect the spillover benefits (Blomstrom M, Kokko A, 2003). The entry of new foreign firms into the host country market, raises the demand for domestically produced products in the host country, which leads to entry of other new firms and product varieties in the imperfectly competitive sector, and the reduction in the cost of production. This increase in competitiveness attracts further foreign investors, into the country, raising national income and welfare. This motivates the host country to

subsidize FDI, in competition with other host countries that see the same potential gains. (Blomstrom M, Kokko; 2003)
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2.2 FDI Dynamics in SEEC. General relation of FDI to transition economies of South East European Countries and some comparisons with other economies

The region of South East Europe[2] is comprised of ten ex socialist countries: Albania, Bosnia and Herzegovina, Bulgaria, Macedonia, Moldova, Croatia, Serbia, Montenegro, Romania and Kosova

South East European Countries in comparison with other transition economies of Central East European Countries lagged well behind the former, due to Balkan crisis that the region of SEE has experienced during the past decade. The slow progress of these countries also can be attributed to inconsistent macroeconomic stabilisation policies.

In global context, transition European countries, including SEE have relatively small fraction of FDI of world total amount. However, the situation has been improved over time since their share is increasing constantly compared to other parts of the world, thus reinforcing a successful reintegration of these countries into the world economy.

Table 1 Inward Stock of FDI (in million of US$)

Region	1990	1995	1999	2000	20001	2002	2003	2004
World	207878	341086	1092052	1396539	825925	716128	632599	648146
Developed Countries	172067	218738	849052	1134293	596305	547778	442157	380022
Developed Countries share of world total (%)	82.7	64.12	77.74	81.22	72.19	76.49	69.89	58.63
Developing Countries	35736	117544	232507	253179	217845	155528	166337	233327
Developing countries share of world total (%)	17.19	34.46	21.29	18.12	26.37	21.71	23.22	35.99
Central and Eastern Europe	75	4803	10492	9067	11775	12821	24106	34897
CEE share of world total (%)	0.03	1.4	0.9	0.64	1.42	1.7	3.81	5.38

Source: UNCTAD, 2005 (UNCTAD Handbook of Statistics
http://www.unctad.org/en/docs/tdstat30_enfr.pdf)

From the table 1 it can be seen that the world stock of FDI grew by 32.07% between 1990 and 2004. According to the data that reflect the FDI inflow, table 1 shows that at the beginning of last decade, significant part of FDI inflow, was concentrated in developed countries. This trend decreased constantly over the years which is justified by shifting of FDI stock in Developing Countries. As concern to transition countries of CEE at the start of transition period in 1990 the total inward stock of FDI in these countries was less than 1%. Its level increased significantly in 1995 to 1.4%. After this period, the FDI inward stock in CEE felt gradually until the year of 2000 and then the trend enjoyed a steady rise up to 2004.

Turning to the transition economies of SEE, the general trend of FDI inflow in South East European Countries has been improved, and these countries have received significant level of FDI from the years of 1990 to 2004. In a global scale, the share of SEE countries is not very large, but this share has been rising in the last few years. However, the importance of FDI in the transition economies of SEE can be analysed through the relative indicator of FDI inward stock as a percentage of gross domestic product (GDP) in the relevant country (table 2). This indicator enables us to reveal the potential effect of accumulated FDI on the overall national economic activity (Skuflic L, Botric V, 2006).

Table 2 FDI inward per capita in SEEC and CEC (In %)

FDI inward per capita in SEEC and CEC*											
Years	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**

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[2] The above countries are listed according to EBRD approach

Albania	0.07	0.08	0.10	0.16	0.14	0.12	0.15	0.19	0.20	0.18	0.19
Bosnia	0.00	0.00	0.03	0.00	0.02	0.05	0.09	0.11	0.14	0.17	0.21
Bulgaria	0.04	0.03	0.06	0.10	0.13	0.19	0.18	0.20	0.24	0.26	0.31
Croatia	0.02	0.03	0.05	0.11	0.09	0.13	0.19	0.21	0.30	0.36	0.38
Macedonia	0.01	0.01	0.01	0.02	0.06	0.06	0.11	0.25	0.25	0.22	0.22
Romania	0.01	0.02	0.03	0.07	0.10	0.15	0.18	0.19	0.17	0.22	0.25
Serbia	0.02	0.02	0.02	0.06	0.08	0.13	0.12	0.13	0.10	0.15	0.17
Czech Republic	0.10	0.13	0.14	0.16	0.24	0.30	0.39	0.45	0.52	0.50	0.53
Estonia	0.12	0.15	0.18	0.23	0.33	0.44	0.48	0.53	0.60	0.72	0.87
Hungary	0.17	0.25	0.29	0.39	0.44	0.48	0.49	0.53	0.56	0.59	0.60
Latvia	0.09	0.13	0.17	0.21	0.24	0.25	0.27	0.28	0.30	0.30	0.33
Lithuania	0.05	0.06	0.09	0.11	0.15	0.19	0.21	0.22	0.28	0.27	0.29
Poland	0.04	0.06	0.07	0.09	0.13	0.16	0.21	0.22	0.25	0.26	0.25
Slovenia	0.09	0.09	0.10	0.11	0.13	0.13	0.15	0.13	0.19	0.16	0.15
Slovakia	0.04	0.04	0.06	0.08	0.10	0.11	0.18	0.23	0.35	0.36	0.35

Source: UNCTAD: Handbook of Statistics 2007-
http://stats.unctad.org/Handbook/TableViewer/tableView.aspx?ReportId=153
http://stats.unctad.org/Handbook/TableViewer/tableView.aspx?ReportId=142
*calculations done by the author

As it can be seen from table 3, the SEECs became more attractive for investors during the years after 2000. In the year 2000 the highest inward FDI as a percentage of GDP was recorded in Croatia (0.19), Bulgaria (0.18) and Romania (0.18). The same countries remained the main recipient of FDI in the region, during the coming years. The lowest level of FDI inward stock in 2000 were recorded in Bosnia (0.09), Macedonia (0.11) and Serbia (0.12). After the year of 2000, the situation changed in favour of SEECs. This potential change of trend can be attributed to improvement of macroeconomic stabilization policies and consistent conditions for investment. Another explanation for this can be the successful negotiation between the SEE countries and the EU leading to their eventual membership of the EU, which means that the region, has successfully completed its transitional period leaving behind the devastating consequences of national conflicts.

2.3 FDI trends in SEEC

FDI inflows into SEECs were low during the years of 1980 and 1990, obviously, due to high level of centralization of the economies and state owned companies. At the end of 2000 the cumulative FDI flows in SEEC was 3 614 millions of dollar, which represent 16.57 percent of total FDI in the ten new EU members (table 3). Slow progress in reforms, political instability can be the main reasons for the low levels of FDI inflow in SEECs. However in relation to FDI, the situation improved dramatically since 2000, reaching its pick in 2003. A detailed structure of cumulative FDI inflow in SEEC can be seen from the table 3.

Table 3 Foreign Direct Investment: Inward Flows – Continued – Millions of Dollar

Inward Flows – Flux Entrants									
Years	1980	1990	1995	1999	2000	2001	2002	2003	2004
SEEC	**24**	**71**	**748**	**3694**	**3614**	**4466**	**3790**	**8365**	**10778**
New EU 10 members[3]	**123**	**1050**	**12693**	**20260**	**21810**	**19569**	**23288**	**12067**	**20341**
SEEC share of New EU 1O (%)	**19.51**	**6.76**	**5.89**	**18.23**	**16.57**	**22.82**	**16.27**	**69.32**	**52.98**
Albania	-	-	70	41	143	207	135	178	426
Bosnia and Hercegovina	-	-	0	177	146	119	265	381	497
Bulgaria	-	4	90	819	1002	813	905	2097	2488
Croatia	-	-	114	1472	1087	1564	1126	2042	1076
Macedonia	-	-	9	33	175	442	78	95	151
Romania	-	-	419	1041	1037	1157	1144	2213	5174

[3] In the sample of new 10 EU members are included: Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Slovakia, Slovenia.

Serbia and Montenegro	-	-	45	112	25	165	137	1360	966
Yugoslavia (former)	24	67	-	-	-	-	-	-	-

Sources: UNCTAD 2005 (http://www.unctad.org/en/docs/tdstat30_enfr.pdf

FDI inflows into the SEEC have increased from 24 million dollars in 1980 to 10.778 billions of dollar in 2004. The amount of FDI inflow in SEEC in 1990 represented 6.76% of the total FDI to the new EU 10 member countries. In 1995 the share of SEECs FDI inflow as a percentage of ten new EU members total FDI inflow slightly decreased to 5.89%. In 2000 SEEC – 8 countries attracted approximately 16% of total FDI inflows to the new 10 EU members, and total FDI inflow of SEEC to the new 10 EU member countries increased significantly in 2003 by 69.32 %. FDI in SEEC – 8 is highly concentrated in a few countries: Croatia, Bulgaria, Romania, whereas other SEE countries such as Albania, Bosnia and Herzegovina, Macedonia, and Serbia and Montenegro have received negligible share of total FDI in the region. The explanation behind this pattern is that relatively more developed countries receive more FDI in comparison to least developed countries. However the trend is not in accordance with the traditional hypothesis that relates FDI with cheaper factors, especially price of labour. (Skuflic L, Botric V; 2006).

3. Theoretical framework identifying the main determinants of FDI

John Dunning (1981) proposed comprehensive theoretical framework of FDI flows. From the rich set of literature that provides the theoretical framework of FDI within the international business concept we have chosen an eclectic approach; the ownership, location and internalization (OLI) p aradigm. It is John Dunning who founded the eclectic theory of FDI, via the so called **O-L-I** paradigm (ownership-location-internalization), a theory that even today hasn't lost its actuality and relevance. It represents a combination of the three partial theories of FDI, which focused on the ownership advantages, the location advantages and the internalization advantages.

The ownership advantages or the firm specific advantages take their place among the key determinants of the FDI. In order to overcome the information advantage that domestic enterprises may have over foreign firms, a foreign firm that enters the economy must have some offsetting firm specific advantage (Johnson A, 2006). Examples of these advantages include scale economies, brand name, managerial skill or superior technology (Johnson A, 2006). Thus, the multinational company decides to take advantage of its own advantages, which derives from the economy of the scope, the managerial and the marketing experience, the advanced technologies as a result of the abundant investments in research and development, the variety of its products and the like.

The location advantages represent the motives of the firm to make use of the advantages that a certain country offers, such as lower costs for the work force, natural resources and the like. These advantages determine how attractive different locations are for productions (Johnson, A. 2006). Given ownership specific advantages, Dunning has identified several main determinants of location specific advantages for foreign and indigenous firms. They include factors determining the size and rate of growth of consumers, sales markets, production factors and capabilities, general infrastructure, availability and quality of inputs, policy of governments toward general foreign direct investment, general political, social and economic stability of the country and attitude of local population to foreign firms. Assuming a certain size and distribution of markets, and each firm is a profit maximizing operating in a price taking situation, production will be located where costs are lowest (Dunning 1981). In turn this will depend on the availability and cost of factor inputs, the efficiency at which these inputs are transformed into outputs, and the costs of movement from the point of production to that of marketing. (Dunning 1976).

The internalization advantages, represent. the motives of the firms to expand their business in order to accomplish lower transactional costs. (Johnson A, 2006). If the main MNC doesn't own the foreign branch offices in their entirety, it will encounter huge (transactional) expenses for monitoring the foreign partner or the foreign markets. Internalization advantage determines how the MNE chooses to use its ownership advantage (Johnson A, 2006). These advantages, can be achieved through protecting technology know – how, quality, brands and to leverage information and learning within the firms cross – border network of subsidiaries and the joint ventures (Oxelheim L, Radnoy T and Stonehil A, 2001). In terms of internalization theories (Dunning 1981, Backley and Cason 1975) explain the FDI is a result of the greater efficiency, which is

achieved through coordination of international production which remains in the hands of the firm-investor. The advantages of the internalization come to the force in circumstances when the commercial barriers or the transport costs are high, the risk from inappropriate employment of the specific knowledge in the firm is high, when important information asymmetries between the potential buyers and the sellers exist, and the like. The theories of the internalization are especially relevant for the industries that are based on exploitation of the resources. (Oxelheim L, Radnoy T and Stonehil A, 2001).

3.1 Empirical approach for the main determinants of FDI

The following factors are screened out to investigate the determinants of location of FDI inflow in South East Europe. These determinants may be summarized as three categories such as the factors associated with improving investment environment, macroeconomic factors and Investment cost factors. *The investment environment improving factors* include openness level of economies, government expenditure as a share of GDP, infrastructure level of development measured by number of telephone and internet users per 1000 inhabitants and business environment conditions measured by number of days needed to open a business. *Macroeconomic factors* include growth rate of economy and gross domestic product per capita. *Cost related factors* include exchange rate, lending rate of interest and real tax revenue. They also include cost and the quality of labour.

Theoretical research regarding *the investment environment improving factors,* as concern to openness of the economy, has been focused on the studies about the relationship between FDI and trade as a proxy for the openness degree of the economy. The studies have been focused on the relationship whether these flows are complements or substitutes. (Johnson A, 2006). Theories developed within this framework, vary according to relaxation of immobility assumption. (Johnson A, 2006). The openness of host country's economy may encourage FDI inflows, and relatively closed economy may discourage FDI inflow. If production factors are assumed to be perfectly immobile internationally, then no conclusion can be obtained about the relationship between FDI and Trade. (Johnson A, 2006). It has been found that If capital mobility is present, and the assumption of identical production function is relaxed, then capital movement becomes perfect substitute for trade (Blonigen B, 2005, Dunning 1977). However, (Markunsen 1983) by introducing the reasons for trade which are not based on relative factor endowments, but on the conditions such as external economies of scale and different production technologies, found a complementary relationship between FDI and trade. (Markunsen 1983).

Macroeconomic factors variable include GDP growth and GDP per capita. The hypothesis of FDI lead to economic growth is actually based on the endogenous growth model.(Choong Chee, Yusop Z, Soo Ch, 2004). The theoretical and empirical literature imply that, FDI, as a part of foreign financing has a strong positive growth impact on the recipient economy (Ledyaeva S, Linden M, 2006). Positive effect of FDI on economic growth may be due to technological spillovers, employment effects and productivity improvements. (Zorska A, 2005) In this regard, FDI's contribution to growth come through transferring advanced technology from the industrialized to developing economies. (Ewe - Ghee Lim, 2001). To the extent, where economic growth through FDI is promoted , FDI may have positive impact that is similar to domestic investment, along with alleviating partly balance of payments deficits in the current account. As concern to GDP per capita variable, a higher economic developing level shows the strong purchasing power and good economic performance (Li Xinzhong, 2005). Meantime, this variable also means that the economy with high per capita GDP has high labor productivity and good local infrastructure. Thus, economic development level should have a positive relationship with FDI inflows.

Cost related factor variables include exchange rate, interest rate, real tax revenue and annual average wage (Li Xinzhong, 2005). Exchange rate variable may be a measurement of rate of return on FDI to explain the level of FDI inflows, that is, it determines the value of repatriated profits or remittances (Li Xinzhong, 2005). The theoretical analysis about the relation of FDI with exchange rates shows explicitly that relative FDI inflows are a function of relative real exchange rates, and that exchange rates affect foreign direct investment, and the impact is significant, especially in short run (Yuqing Xing, 2006). Therefore, If one host country devalues its currency

against that than the source country more than the other does, FDI into the former country will be expected to increase relative to other country.[4] .

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3.2 Theoretical Framework for empirical studies in accordance with OLI paradigm

The empirical literature has identified different factors likely to influence the strategy of foreign firms toward foreign operations. These factors include the structure investment portfolios and risk exposures, competitive strengths and weaknesses of MNEs, their bargaining power with governments, their product portfolios, their liquidity position and so on.

Dunning 1988 have argued that the failure of international intermediate product markets is both a necessary and sufficient condition to explain the likelihood of MNEs to engage in foreign operations. This is explained by linear relation of perceived costs of transactional market failures and the likelihood of MNEs to exploit their competitive advantages through international production. (Dunning 1988). Thus having regard this, it seems to suggest that the greater the perceived costs of market failures the higher the likelihood of MNEs for engaging in contractual agreements with foreign firms.

Table 4 presents determinants of FDI inflow that have been analyzed in earlier studies with the intention of identifying variables that can be argued to constitute Location, Ownership and Internalization advantages. The first column list location advantages, while the second and third column list ownership and internalization advantages. The rightmost column presents the expected effect of each determinant on FDI inflow[5].

Table 4 Determinants of FDI used in empirical studies

Location Advantage	Ownership/internalization advantage/other	Expected effect on FDI inflows.
Demand / Profit potential		
GDP/Capita		+
Market size (GDP)		+
Market size growth (GDP growth rate)		+
Population		+
	Rates of return	+
Institutions		
	Cultural Proximity	+
Corruption		-
Country Risk		-
Policies of government		-/+
Privatization		+
Transition Performance		+
Production costs		
Capital		-
Labour		-
Information		-
Infrastructure		+
Agglomeration		+
Transaction cost		
Geographical Distance		-
Non Tarrif Barriers		+
Tarrif Barriers		+
Other		
	Exchange rate	-/+
	Firm size	+
	Natural Resources	+
	Trade Flows.	-/+

Source (Johnson A. 2006)

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[4]The explanation for this is that, given other factors determining FDI, such as market size, growth, labour skills, political and economic stability and regulatory framework constant, MNEs are likely to invest in countries which devalues their currency, in order to benefit from low production cost, since the wealth and production cost effects are positively associated with devaluation.
[5] This is based on a priori theoretical reasoning; There might be other studies that find other results.

However, in order to understand the determinants of FDI in transition economies, it is crucial to specify an empirical model that allows for a combination of traditional and non traditional specific determining factors of FDI.

4. Econometric model about the determinants of FDI inflow in South East European economies

4.1 Methodology and data description

In the case of our sample of countries, we have chosen a combination of traditional and non traditional determinants presented on the literature. In this section we will try to empirically assess the determinants of FDI for the SEECs. The panel data set used in this analysis cover 9 countries[6] and runs for a time period, 2000 – 2005. The database has been built using EBRD source and World Bank Source. All values used in the analysis are expressed in US dollars in real terms. The scope of the model, although being formulated at a relatively aggregated level, is to consider the diverse range of influences on decision making in investing abroad.

Since both cross section and time series are available, we estimate equations, which take the following form

$$y_{it} = u_i + \gamma x_{it} + \varepsilon_{it}$$

where the pair of terms i, t express the transversal and temporal aspects of the per country panel data, y is the dependent variable and x the matrix of explanatory variables, and u_i is parameter specific to each country[7].

In order to assess the influence of the variables described, a foreign investment equation may be build up in the following linear form[8].

$$
\begin{aligned}
(FDI/Y)_{i,t} &= \mu_i + \beta_1 GY_{i,t} + \beta_2 y_{i,t} + \beta_3 G\exp + \beta_4 Open_{i,t} + \beta_5 Inflation + \beta_6 ER_{i,t} + \beta_7 DCPS_{i,t} \\
&+ \beta_8 BD + \beta_9 \operatorname{int} ernet_{i,t} + \beta_{10} lof.of.nom.GDP + \beta_{11} External.debt + \varepsilon_i \, (1)
\end{aligned}
$$

By explaining the expected signs of the variables, we briefly discuss some of the variables introduced in the model. The dependent variable is FDI/Y which denotes the share of FDI to GDP for each country, so obviously Y is real GDP. The first explanatory variable introduced in the model is GY, which denotes real GDP growth and the second one denoted by *y* is GDP per capita. These variables are introduced as indicators to show the level of development, the size of the market, and the growth potential of each country. Investment in capital scare countries is expected to yield higher return indicating an inverse relationship between the levels of GDP and FDI. At the same time, as concern to market seeking FDI, it is expected a positive relationship between the income levels denoted by GDP per capita and the FDI, since driving motives for FDI by investors are presented by their intention for import substitution. We also expect a positive relationship between GDP growth and FDI. Another traditional variable measuring the market size is log of nominal GDP, for which we also expect the positive sign. The role of policy measure is captured by Gexp which denotes government expenditures as a share of GDP.

The ratio of total trade (exports plus imports) to GDP is usually used to indicate the degree of openness of host country' economy. The openness of the economy (trade regime) is captured by the variable named *Open* which is defined as the ratio of trade flow (exports plus imports) over GDP. The empirical studies indicate that, the higher openness is, the more favourable attracting FDI inflow will be, especially for the export oriented FDI inflow. Therefore, the variable of openness is expected to have a positive effect on FDI inflow. However, from some empirical studies it has been indicated that different effects of FDI inflow may take place. For example, high trade barriers cause the market oriented FDI inflow, and make a substitute for imports. As a result of this, the variable of openness may have negative effect on FDI.

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[6] Albania, Bosnia, Bulgaria, Croatia, Macedonia, Moldova, Romania, Serbia and Slovenia
[7] In fact we estimate equation 1 under different assumptions about the structure of our panel data model. The constant is specific to each country only under the fixed and random effects model
[8] The definition and data source of variables is presented on appendix.

The rate of inflation is introduced as explanatory variable in order to gain information about investors yield. The expected effect may vary by the time when the investment is being made. The empirical studies indicate that relatively low average inflation rate means lower macroeconomic risk and therefore a higher capital flow is expected to be attracted. On the other hand, if the investment has happened before the inflation period, it is expected that the growth of product prices, the investor has invested in, should be positively associated with further FDI.

The average exchange rate is introduced as one of the explanatory variables in order to see the effect of exchange rate on FDI. The exchange rate used here is per US dollar national currency. That is the host exchange rate. The host exchange rate may generate a mixed effect on FDI inflows, especially in the case of FDI being able to be a substitute for exporting from home country to host country because of tariff and the competitive price of goods in host country when it is the strength of home currency. This means that the higher host exchange rate means strength of home currency, which is not favorable for exports of home country to host country so as to attract FDI inflows for substitute of exports from home country to host country. On the other hand, the high host exchange rate implies the depreciation of national currency. This will discount remittances and returns on FDI so as to deter FDI inflows potentially.

The non traditional variable, which is introduced in the model, such as domestic credit to private sector (in percent of GDP) reflect the level of development of financial system in the host country. It is expected that this variables to be positively related to FDI attraction.

The variables, time required to start a business expressed in number of days, is introduced in the specified model, in order to capture the effect of business environment of South East European Countries on FDI attraction. The main hypothesis developed here is that the lower the number of days required for starting a business, the better the business environment in the region, thus, the higher the likelihood for attracting FDI.

Two other variable that reflect the level of infrastructure development, is introduced in the model. The variable *internet* is measured as the number of internet users per 1000 inhabitants. The scope of this variables is to assess the role played by the quality and the concentration of infrastructure. A positive relationship between FDI and this variables is expected.

Since, it has been proven that, countries with more FDI in services, and more efficient investment, to be those countries with high share of external debt in GDP (Valerija Botric, Lorena Skuflic, 2005), the variable of external debt as a share of GDP is introduced in the model, in order to capture the efficiency of investment in the region, particularly in service sector. Considering this, it is expected positive impact of external debt as a share of GDP, on net FDI. The positive impact of external debt as a share of GDP, on net FDI, might be due to the increased efficiency of investment, and increased investment in service sector. Through increased investment activity and its efficiency, the growth rate of the economies should also increase.(Botric V, Skuflic L, 2004) The role of the FDI in this context is straightforward. Foreign investment should, almost by definition, positively contribute to the increased investment efficiency, since in addition to capital, they also introduce technology and knowledge transfer. (Lovrinčević, Marić and Mikulić, 2004)

4.2 Econometric Procedures

Equation 2 is being considered under one method, which is random effect. By standard testing procedures, this methods has been proved as the most appropriate one, therefore the random effect method is the only that has been considered for interpreting the estimators. The panel consists of 9 countries, and runs for a time span of 6 years. The total number of observations is 54. Having countries as observation units, a priori we expect to find varied *B* coefficients. The assumption that there are no differences between economies, can not be tested due to the presence of relatively few time periods in the sample.[9] Since we are interested only in average system wide impacts of exogenous variable, and not in obtaining individual country coefficients, slope heterogeneity doesn't matter and the Error Components Model[10] versus Random Coefficients Model is preferred.[11] In order to test for the most appropriate specification, we continuo with

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[9]Using relatively few time periods causes difficulties in the estimation of the random coefficient model (RCM), since it introduces heteroscedasticity (Green, 1997).

[10]Error Components Model (ECM) allows for heterogeneity between cross section units and / or time series, and interdependence between countries.

[11] According to the rule put forward by Pesaran and Smith (1995), the presence of slope heterogeneity precludes dynamic specification of the model. Hence we do not include the lagged dependent variables.

testing[12], starting from the less restricted specification to the more restricted one. The following models are being considered.

Two Way vs. One Way Model

$$(FDI/Y)_{i,t} = \mu_i + \beta_1 GY_{i,t} + \beta_2 y_{i,t} + \beta_3 G\exp + \beta_4 Open_{i,t} + \beta_5 Inflation + \beta_6 ER_{i,t} + \beta_7 DCPS_{i,t}$$
$$+ \beta_8 BD + \beta_9 \text{int } ernet_{i,t} + \beta_{10} \log nomGDP + \beta_{11} External.debt. + \varepsilon_{i,t} + v_t (2)$$

One Way Fixed Effect vs. CLRM

$$(FDI/Y)_{i,t} = \mu_i + \beta_1 GY_{i,t} + \beta_2 y_{i,t} + \beta_3 G\exp + \beta_4 Open_{i,t} + \beta_5 Inflation + \beta_6 ER_{i,t} + \beta_7 DCPS_{i,t}$$
$$+ \beta_8 BD + \beta_9 \text{int } ernet_{i,t} + \beta_{10} \log nomGDP + \beta_{11} External.deb\varepsilon_i + v_t + u_i......(3)$$

One Way Random Effect vs. CLRM

$$(FDI/Y)_{i,t} = \mu_i + \beta_1 GY_{i,t} + \beta_2 y_{i,t} + \beta_3 G\exp + \beta_4 Open_{i,t} + \beta_5 Inflation + \beta_6 ER_{i,t} + \beta_7 DCPS_{i,t}$$
$$+ \beta_8 BD + \beta_9 \text{int } ernet_{i,t} + \beta_{10} \log nomGDP + \beta_{11} External.deb + \varepsilon_{i,t}.......(4)$$

Fixed Effects vs. Random Effects

$$(FDI/Y)_{i,t} = \mu_i + \beta_1 GY_{i,t} + \beta_2 y_{i,t} + \beta_3 G\exp + \beta_4 Open_{i,t} + \beta_5 Inflation + \beta_6 ER_{i,t} + \beta_7 DCPS_{i,t}$$
$$+ \beta_8 BD + \beta_9 \text{int } ernet_{i,t} + \beta_{10} \log nomGDP + \beta_{11} External.deb + \varepsilon_i + u_i.....(5)$$

Having regard the first model, (two way fixed effect, two way vs one way model) we test, whether net FDI as a share of GDP is influenced by time effects or not[13]. By comparing two way against one way effect shown in the appendix (table 5), we conclude that time effects are jointly insignificant, and that both $\chi 2$ and F[14] test are in favor of One-Way Model indicating that there is no time specific effect on net FDI as a share of GDP[15]. This also can be supported by the fact that different countries have different propensity to FDI and different factors influence FDI across them. Having regard equation 3, when testing that all group effects are identical[16] under F test and $\chi 2$ test, we conclude that unobservable time invariant country differences are present and the one way fixed effect model is preferred, versus Classical Linear Regression Model (CLRM, thereafter) (table 6 shown in the appendix). Equation 4, is being considered in order to examine[17] whether, the variance of group specific error term is the overall constant[18]. The fact that test statistics of 3.85 is greater than the critical value of $\chi 2$ (0.05 and df=1)=3.842 one can conclude that the test favours one way random effect. (table 7 shown in the appendix), therefore One – Way Random Effect model is more appropriate than CLRM. The Hausman test[19] is used to choose between fixed and random effects. It tests the H_0 that random effects u_i and regressors are uncorrelated. If random

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[12]Note that there is no standard testing procedure. The literature provides us only with tentative guidelines. Since the more unrestricted the estimator the more assumptions and more complicated the error term, and the more to go wrong. Therefore, the procedure used is from the less restricted to the more restricted model.

[13] Hypothesis H_0 suggest that time effects are 0 (H_0: $\gamma_t = 0$).

[14] F-test for joint period effects.

[15] Based on this previous test that one-way effects model was better specified than two-way effects model, hence, we continue testing whether one-way effects is more appropriate than CLRM. In this term, we test one-way fixed as well as random effects vs. CLRM

[16] $H_0 = \alpha_i = \alpha_0$; tests restrictions that fixed effects are identical.

[17] Since α is the overall OLS constant, this test checks whether random effects are equal to the OLS intercept, i.e. wether they are necessary.

[18] **Breusch and Pagan's LM** statistic test is conducted in order to test the hypothesis H0: $\sigma 2u=0$, where it tests restrictions that ui=α ($\alpha\equiv$CLRM overall constant). This test has $\chi 2$ distribution with 1 d.f.

[19]A test with the Ho that xit and αi are uncorrelated (Hausman, 1978). Hasuman tests whether the fixed effects and random effects coefficients are significantly different, i.e. they don't converge to the same values of $\hat{\beta}$. If this is true, Ho does not hold, i.e. xit and αi are correlated, thus making the random effects coefficients inconsistent and inefficient. Note that the random effects coefficient is consistent and efficient both under Ho and the alternative, while the fixed effect coefficient only under Ho.

effects and regressors are uncorrelated, we then estimate random effects model. Conversely, if they are correlated, then fixed effects model is taken. Since the Hausman statistic is smaller than its critical value, we can not reject Ho, that regressors (x_{it}) and random effects (α_i) are uncorrelated. Consequently, the One-Way RE is favoured, therefore, the random effect should be kept.(table 8 shown on the appendix). Finally, the results obtained from the above testing procedures suggest that One-Way random effects model is that we should take in consideration in further analyses. Therefore, the equation of the final model will be based on the following equation:

$$
\left(FDI/Y\right)_{i,t} = \mu_i + \beta_1 GY_{i,t} + \beta_2 y_{i,t} + \beta_3 G\exp + \beta_4 Open_{i,t} + \beta_5 Inflation + \beta_6 ER_{i,t} + \beta_7 DCPS_{i,t} \\
+ \beta_8 BD + \beta_9 \operatorname{int} ernet_{i,t} + \varepsilon_i + u_i
$$

When we test for autocorrelation, the results shows that our model is robust to autocorelation, and therefore the model does not suffer from serial correlation.[20], meaning that we will get unbiased and consistent estimators which makes the model well specified. To check for normality we plot the residuals (figure 1 shown in the appendix), although this procedure is very sensitive to outliers. The figure 1 shows that the residuals seems to have a bell shaped distribution.[21], implying that there is no problem with non-normality[22]. Testing for Heteroscedasticity, whether residuals have constant mean and variance is difficult in panel data, with short time series. White correction is one solution, but it can be applied only in One-Way FE models not in Random Effect ones. Therefore, in order to test the robustness of the model to heteroscedasticity, we plot the residuals to see whether we can draw a conclusion. The plot of residuals (figure 2 shown in the appendix) appears to suggest that the model has constant mean and variance indicating that the model does not suffer from heteroscedasticity.

4.3 Discussion of the Results
The results obtained from above testing procedures indicate that One Way Random Effect should be taken into consideration, for interpreting the coefficients.

Table 1 Discussion of the Results
One Way Random Effect Model
(FDI/Y)i,t = -9.57 – 0.40GY – 0.001Y + 0.021Gexp + 0.01OP – 0.10inflation + 0.10ER
 t ratio   -0.56   -2.67   - 2.9   + 0.27   +0.353   -4.14*   + 1.069

– 0.022DCPS – 0.063BD + 0.01IU + 1.70LOGNOM + 0.053EX.DEBT   (6)
  - 0.49   - 0.96   +2.47*   + 1.032   +2.771*

Estimated autocorrelation -0.12
            Note.
            *Significant at the conventional level of 5% level of significance

As it seems, from estimated equation 6 some the results obtained from estimation of random effect model, do not coincide with expected signs. Contrary to expectations, market size variable, such as GDP growth has negative impact on net FDI as a share of GDP. This is due to the fact that growth rate of the GDP is greater than the growth rate of the FDI in many SEEC countries. In the model, holding other variables constant, for each percentage increase in GDP growth, the net FDI as a share of GDP decreases by 0.4 percent. This relationship is due to the reasons that the region of South East Europe, during the analysed period was in the process of installing parliamentary democracy, and this result, has been attributed to deficit financing of the democratic process. (Frimpong J.M, Abaye Oteng, 2006). Meaning that the growth is mainly reflecting government

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[20]Estimated autocorrelation coefficient is -0.12 (table 4 shown on the appendix). The condition of no autocorrelation is satisfied, because the p (value) for our small sample is below 0.3 in absolute term.
[21]The figure shows that the distribution of residuals is also skewed. Nevertheless, non-normality is not problematic, for asymptotically the inference is correct and OLS-based estimators will still be unbiased and relatively the most efficient.
[22]When non-normality is a problem we cannot use the standard normality-inducing transformations as a remedy.

sector deficit financing rather than the growth of real sector. Similar result suggesting the negative relationship between FDI and GDP growth has been found by Joseph Mangus Fripong and Oteng Abayie (2006), when analysing bivariate causality between FDI inflows and economic growth in Ghana. In favour of this argument is the example of Macedonia in 2001. Although Macedonian economy in that year registered a negative growth of -4.51, its net FDI as a share of GDP in that country was 12.83%, which is much higher in comparison to previous year, and the rest of the years of analysed period. The results indicate that there is negative relationship between net FDI as a share of GDP and GDP per capita, although the size of the coefficient is not very high. Holding other variables constant, for a unit increase in GDP per capita, net FDI as a share of GDP decreases by 0.001 percent. The negative and significant coefficient of income per capita on net FDI as a share of GDP, supports the absolute income convergence hypothesis among countries, which states that the level of per capita income of the poor countries catch up with one of the rich ones. (Serranito F, Guetat I, 2000). Similar result, that indicate negative relationship between FDI and GDP per capita, has been found by Kabir Hasan, when studying FDI, Information technology and Economic Growth in MENA[23] region. The phenomena of absolute income convergence might be present, due to the reason that our sample consist of countries, some of which are more developed (Romania, Slovenia, Bulgaria) and some others not well developed (Albania, Macedonia, Serbia and Montenegro). The conclusion is supported by Slovenian case. Even though Slovenian GDP per capita is very high, its share of FDI to GDP is very low in comparison to other South East European Countries, due to the reasons that Slovenia is moreover concentrated on investing abroad, rather than attracting FDI from other places. The inflation rate is a key indicator of monetary policies of a country. A lower inflation rate should mean a better climate for investment. The results indicate that the coefficient of inflation, corrected by GDP deflator exhibit negative significance on FDI as a share of GDP. The negative impact of inflation upon FDI might be due to the macroeconomic instabilities that high inflation rates imply in the countries of South East Europe. (Buch and Lipponer 2004). In the model estimated, holding other variables constant, for each percentage increase in inflation, corrected by GDP deflator, the net of FDI as a share of GDP will decrease by 0.106 percent. The findings suggest that infrastructure development, measured by internet users per 1000 inhabitants, has significant positive impact on FDI, once reflecting the dominance of infrastructure, in FDI decisions. The coefficient of 0.017 means that, holding other variables constant, for 100 additional internet users, the net of FDI as a share of GDP will increase by 1.7 percent. The result suggest that improving stocks of infrastructural capital, increase the attractiveness of a country as a platform for multinational investment. An extensive network, apart from the blatant consequences in market growth, also signals the quality level of host country. The positive impact of external debt as a share of GDP, on net FDI, might be due to the increased efficiency of investment, and increased investment in service sector. At the same time, countries with those characteristics – more FDI in services, and more efficient investment, have proven to be those with high share of external debt in GDP. (Valerija Botric and Lorena Skuflic). As the results indicate, holding other variables constant, 10 percent increase in external debt as a share of GDP, net FDI as a share of GDP increases by 0.53 percent.

However, contrary to expectations the results indicate that some of the variables resulted insignificant, and they do not affect FDI decisions. These variables include, openness measured by the ratio of exports plus imports over GDP, government expenditures, exchange rate, domestic credit to private sector as a share of GDP, number of days required to open a business, and log of nominal GDP.

4.4 Conclusion

We have analysed the FDI Determinants in the SEEC – 9, during the period 2000 – 2005. We have used panel data estimation method, and under random effect specification, we tried to determine whether the traditional and less traditional determinants prove to be significant for our sample of countries. The results show that market seeking determinants (GDP growth, GDP per capita, GDP level) give negative significant results under random effect specification. Since this result might be due to the reason that the region of South East Europe, during the analysed period was in the process of installing parliamentary democracy, and this result, has been attributed to deficit financing, undertaken to finance the democratic processes in these countries, it seems, to

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[23] The MENA countries covered in his study include Egypt, Iran, Jordan, Saudi Arabia, Morocco, Tunisia, Turkey and Yemen.

suggest that as soon, as the democratic processes in some of these countries of the region will be fully installed, the positive impact of growth on FDI will be exerted. The robustness of the variable regarding the infrastructure, introduced as a number of internet users per 1000 inhabitants, implies that it is likely that the large scale improvement of physical infrastructure would have been facilitated by economic unions regional and financial aid. Since some of our selected countries (Romania, Slovenia, Bulgaria), are linked to EU, the positive effect of this variable indirectly reflects the crucial effect of Single European Market or other similar programmes of other integrated unions on the pattern of FDI.

On the other hand, the variables openness, domestic credit to private sector as a percentage of GDP, even though excreted positive influence on FDI, they proved to be insignificant for the analysed period. This is due to the fact that compared with the need of the investing firms, this market may be too small. Hence, the investing firms are raising the credit outside of these economies. It can be concluded that as the increasing trade with other economies, and development of financial sector, will contribute to the stronger integration of the SEEC with other economies in the region, the significance of these coefficients might increase, and therefore the impact of trade and financial sector development, significantly might influence positive FDI decisions. The role of government expenditures although has a positive impact on attracting FDI it is not significant. One possible explanation is that the expenditures per se are not a major determinant within SEECs countries framework. These countries have attained a certain level of development and the share of governmental expenditure does not significantly fluctuate. Therefore, the incremental governmental expenditure will have a little effect on the probability of inducing a foreign investor to undertake an investment. In our case, it seems that public expenditures does not affect FDI attractiveness in SEECs countries.

Refferences

Articles

1. Agiomirgianakis, G; Asteriou, D; Papathoma, K. (2004). The Determinants of Foreign Direct Investment: A Panel Data Study for the OECD Countries. *Department of Economics, Discussion Paper Series . No. 03/06.*
2. Blomstrom M, Kokko A, (2003). The Economics of Foreign Direct Investment Incentives, *National Bureau of Economic Research, Working paper 9498.*
3. Cheng, L. K., and Kwan, Y. K (2000). What Are the Determinants of the Location of FDI. The Chinese Experience, *Journal Of International Economics*, 51, pp. 379-400
4. Dahlstrom T and Andreas Johnson (2007). '' Bureaucratic Corruption, MNEs and FDI''. *CESIS electronic working paper series*, paper no 92.
5. Dunning, J,H. (1973) 'The Determinants of International Production', *Oxford Economic Papers*, New Series, Vol 25, No. 3, pp. 289 – 336
6. Dunning, J.H. (1977), Trade, location of economic activity and the MNE: a search for an eclectic approach in B. Ohlin and P.O. Hesselborn (eds.): The International Allocation of Economic Activity, 395-418, London, Macmillan.
7. Dunning, J,H, Alan. M. Rugman. (1985) 'The Influence of Hymer's Dissertation on the Theory of Foreign Direct Investment', *The American Economic Review*. Vol. 75, No. 2, Papers and Proceedings of the Ninety – Seventh Annual Meeting of the American Economic Association, pp. 228 – 232.
8. Dunning J, H, (1988). The Eclectic Paradigm of International Production: A Restatement and Some Possible Extensions, *Journal of International Business Studies.* Vol 19, No 1, pp. 1 – 31.
9. Dunning J, H, (1998).'Location and the Multinational Enterprise: A Neglected Factor, *Journal of International Business.* Vol (29), No 1, pp. 45 – 66.
10. Fripong, M, J; Abaye, O,F (2006) 'Bivariate causality analysis between FDI inflows and economic growth in Ghana. *MPRA Paper* No. 351.
11. Hasan K (2001). 'FDI, Information Technology and Economic Growth in the MENA Region. *Department of Economics and Finance. University of New Orleans,* 10th ERF paper.
12. Johnson A (2006). FDI inflows to the Transition Economies of Eastern Europe: Magnitude and Determinants, *CESIS Electronic Working Paper Series*, Paper No 59.
13. Jorge R. Calderon – Rosell (1985). Towards the theory of Foreign Direct Investment. *Oxford Economic Papers*, *New Series*, Vol 37, No 2, pp 282 – 291.
14. Leonard, K, Cheng; Yum, K, Kwan. (2000). What are the determinants of the location of foreign direct investment? The Chinese Experience. *Journal of International Economics 51, pp 379 – 400*
15. Markusen, J.R. (1983), Factor movements and commodity trade as complements, *Journal of International Economics*, Vol (14), 341-356.

16. Nauro, F, K; Kinoshita Y (2003). Why Does FDI Go Where it Goes. New Evidence from Transition Economies, *IMF Working Paper. WP/03/228.*
17. Oxelheim L, Radnoy T and Stonehil A,(2001). On the Treatment within Finance Specific Factor within OLI Paradigm, *The Research Institute of Industrial Economics, Working Paper No. 554, 2001*
18. Skuflic, L. and Botric, V (2006). Foreign Direct Investment in South East European Countries' *Eastern European Economics*, vol (44), no, pp 72 – 90.
19. Zorska A. (2005). Foreign Direct Investment and Transformation'' Eastern European Economics, vol (43), no. 4, pp 52 - 7

Appendix

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Variable Name	Definition	Country	Source of Data
FDI/Y	Net Foreign Direct Investment as a percentage of GDP, expressed in US dollars.	The Whole Sample	EBRD. http://www.ebrd.com/country/sector/econo/stats/index.htm 25 July, 2007
GY	GDP growth (annual percentage)	The Whole Sample	World Bank http://devdata.worldbank.org/data-query/ 25 July, 2007
Y	GDP per capita	The Whole Sample	EBRD http://www.ebrd.com/country/sector/econo/stats/index.htm 25 July, 2007
Gexp	Government expenditure as a share of GDP	The Whole Sample	EBRD http://www.ebrd.com/country/sector/econo/stats/index.htm 25 July, 2007.
OP	(trade balance over GDP) expressed as a percentage	The Whole Sample	EBRD http://www.ebrd.com/country/sector/econo/stats/index.htm 25 July, 2007
Inflation	Inflation GDP Deflator (Annual %)	The Whole Sample	EBRD http://www.ebrd.com/country/sector/econo/stats/index.htm 25 July, 2007
ER	Exchange Rate (official, annual average) – dollar per National Currency	The Whole Sample	EBRD http://www.ebrd.com/country/sector/econo/stats/index.htm 25 July, 2007
DCPS	Domestic Credit to Private Sector in % of GDP.	The Whole Sample	EBRD http://www.ebrd.com/country/sector/econo/stats/index.htm 25 July, 2007
BD	Time Required to Start a Business (Number of Days)	The Whole Sample	World Bank, http://devdata.worldbank.org/data-query/ 25 July, 2007
IU	Internet Users per 1000 Inhabitants	The Whole Sample	World Bank, http://devdata.worldbank.org/data-query/ 25 July, 2007
Log of Nom	Logarithmic of Nominal GDP.	The Whole Sample	EBRD http://www.ebrd.com/country/sector/econo/stats/index.htm 25 July, 2007
External Debt	External Debt as a share of GDP.	The Whole Sample	EBRD http://www.ebrd.com/country/sector/econo/stats/index.htm 25 July, 2007

```
--> REGRESS;Lhs=FDIGDP;Rhs=ONE,GDPGROWT,GDPCAPI,GOVERNME,OPENTRA,INFLATIO
    ,EXCHANGE,DOMESTIC,NUMBEROF,USERSOFI,LOGOFNOM,EXTERNAL;Panel;Str=INDEX
    ;Fixed;Period=TIME$
Hypothesis Tests                        |
|           Likelihood Ratio Test            |        F Tests          |
|        Chi-squared   d.f.   Prob.      |   F    num. denom. Prob value |
| (2) vs (1)   24.730      8     .00173     3.267    8    45     .00509 |
| (3) vs (1)   40.956     11     .00002     4.333   11    42     .00025 |
| (4) vs (1)   50.985     19     .00009     2.811   19    34     .00420 |
| (4) vs (2)   26.255     11     .00595     1.935   11    34     .06929 |
| (4) vs (3)   10.029      8     .26298      .867    8    34     .55283 |
| (5) vs (4)    6.736      5     .24106      .771    5    29     .57873 |
```

```
| (5) vs (3)   16.765    14    .26893    .754   14    29    .70584 |
+-------------------------------------------------------------------+
```

Table 5 Two Way vs. One Way (Model 5 vs. 4)

Tests	T-statistic*	Prob.	<>	CV-5%	Comparisons and Indications
Likelihood ratio test ~χ^2	6.736[df. 5]	0.24106	<	11.0705	TT<CV → Accept H$_0$. (Favours One-Way Effect)
F test	0.771[df.5;29]	0.10288	<	2.53	TT<CV → Accept H$_0$ (Favours One-Way Effect)
Estd. Autocorrelation of e(i,t) -.128827					

Table 6 - FEM vs. CLRM

Tests	T-statistic*	Prob.	<>	CV-5%	Comparisons and Indications
Likelihood ratio test ~χ^2	10.029[df. 8]	0.26298	<	15.5073	TT<CV → Accept H$_0$. (Favours CLRM)
F test	0.867[df.8;34]	0.55283	<	2.27	TT<CV → Accept H$_0$ (Favours One-Way Effect)

One Way Random Effect vs. Classical Linear Regression Model

```
--> REGRESS;Lhs=FDIGDP;Rhs=ONE,GDPGROWT,GDPCAPI,GOVERNME,OPENTRA,INFLATIO
        ,EXCHANGE,DOMESTIC,NUMBEROF,USERSOFI,LOGOFNOM,EXTERNAL;Panel;Str=INDEX
                        ;Random$
```

```
        | Fit          R-squared        =    .6109964     |
        |              Adjusted R-squared =   .3936121     |
        | Estd. Autocorrelation of e(i,t)    -.128827      |
        +------------------------------------------------+
        +------------------------------------------------+
        | Random Effects Model: v(i,t) = e(i,t) + u(i)    |
        | Estimates:  Var[e]            =   .336342D+01    |
        |             Var[u]            =   .686445D+00    |
        |             Corr[v(i,t),v(i,s)] =  .169498       |
        | Lagrange Multiplier Test vs. Model (3) =   3.85  |
        | ( 1 df, prob value =  .049703)                   |
        | (High values of LM favor FEM/REM over CR model.) |
        | Baltagi-Li form of LM Statistic =        3.85    |
+---------+-------------+---------------+-------+---------+---------
                                                        -+
|Variable | Coefficient | Standard Error |b/St.Er.|P[|Z|>z] | Mean of
                                          X|
+---------+-------------+---------------+-------+---------+---------
                                                        -+
GDPGROWT     -.40400028     .15117226    -2.672   .0075   4.67777778
GDPCAPI      -.00100039     .00034289    -2.918   .0035   3662.35981
GOVERNME      .02172863     .08036613     .270    .7869   40.7314815
OPENTRA       .01258366     .03569692     .353    .7245   22.2733333
INFLATIO     -.10616498     .02561864    -4.144   .0000   11.3348148
EXCHANGE      .01057123     .00988599    1.069    .2849   54.3011111
DOMESTIC     -.02247777     .04509451    -.498    .6182   20.0888889
NUMBEROF     -.06370145     .06608898    -.964    .3351   44.6851852
USERSOFI      .01795931     .00725479    2.476    .0133   122.635370
LOGOFNOM     1.70855750    1.65551754    1.032    .3021   10.0544444
EXTERNAL      .05331649     .01923777    2.771    .0056   61.2462963
 Constant    -9.57671206   16.8350184    -.569    .5695
```

Table 7

Random Effects Model: v (i,t)=e(i,t)+u(i) Estimates	
Var [e]	.336342D+01
Var [u]	.686445D+00
Corr [v (i, t), v (i,s)]	.169498
Langrange Multiplier Test vs Model (3) = 3.85 (.049703) < χ^2 (1 df)= 3.842	

Fixed Effect Model vs. Random Effect Model

```
--> REGRESS;Lhs=FDIGDP;Rhs=ONE,GDPGROWT,GDPCAPI,GOVERNME,OPENTRA,INFLATIO
     ,EXCHANGE,DOMESTIC,NUMBEROF,USERSOFI,LOGOFNOM,EXTERNAL;Panel;Str=INDEX$
```

```
| Random Effects Model: v(i,t) = e(i,t) + u(i)        |
| Estimates:  Var[e]              =   .336342D+01  |
|             Var[u]              =   .686445D+00  |
|             Corr[v(i,t),v(i,s)] =   .169498      |
| Lagrange Multiplier Test vs. Model (3) =    3.85 |
| ( 1 df, prob value =  .049703)                   |
| (High values of LM favor FEM/REM over CR model.) |
| Baltagi-Li form of LM Statistic =          3.85 |
| Fixed vs. Random Effects (Hausman)     =    5.51 |
| (11 df, prob value =  .903733)                   |
| (High (low) values of H favor FEM (REM).)        |
+--------------------------------------------------+
```

Table 8

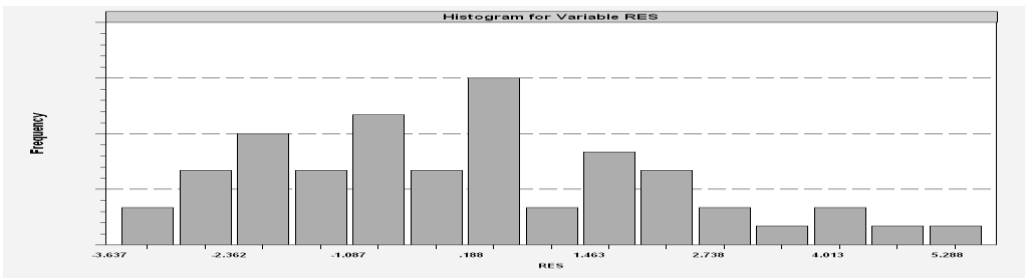| Random Effects Model: v (i,t)=e(i,t)+u(i) Estimates	
Var [e]	.336342D+01
Var [u]	.686445D+00
Corr [v (i, t), v (i,s)]	.169498
Fixed vs Random Effects (Hausman) (3) = 5.51 (.049703) < χ^2 df = 4;1%)=13.27	

Figure 1 – Normality test

Figure 4.2 – Heteroscedasticity Test.