The impact of Foreign Direct Investment on Trade Flows in Europe and the Union of Armenia

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Abstract

Foreign investment and other tools of supplying foreign financial resources in developing countries are increasing day by day as one of the development leverages. This plays a basic role in reinforcing competitive power of these countries. Using financial facilities of banks and international financial institutions and supranational foreign investment services provide the possibility to increase capital resources and equipments of a country for growth and development in addition to provide technological needs and one part of financial needs of investors and internal economic activists. It is noteworthy that utilizing international financial and credit facilities in the investee country doesn't show economic weakness of that country; rather it is the absorption degree of such foreign facilities as a sign of political and economical stability in the country, because foreign investors and monetary and financial firms which offer credit facilities always intend to offer their facilities to countries that are relieved about return of base and inferior of capital at date of maturity while ensuring economical and political stability. According to estimation results trade variable has a positive and totally significant impact on mutual relations of foreign direct investment in member countries of the European Unionso that inward FDI is increased about 3.58 by one percent increase of mutual trade among members.

JLE Classification: F02, F11.

Key words: Foreign direct investment, trade flows, Union Europe, Armenia.
1- Introduction

Foreign direct investment has had a considerable growth in developing countries during the two recent decades that is accompanied by severe competition of these countries to attract more foreign direct investment, so using investment incentives has been developed and limitations of foreign investment have been decreased. Also this competition increases number of mutual investment treaties and regional investment agreements across the world. The most important rules of these treaties and agreements are related to gradual reduction or omission of regulations and limitations regarding inward FDI and activity of foreign firms and discriminatory behavior with them in comparison with internal firms. On the other side, current process of the global economy integration changes host countries' behavior towards foreign direct investment. Now developing countries don't view the issue of foreign direct investment with suspicion and effective policies to attract more foreign direct investments have replaced foreign investment limitations in such countries. Moreover, the World Trade Organization doesn't oblige its members to liberalize their investment system but prevents them to execute regulations that are inconsistent with accepted principles in this organization for foreign investors. Besides, foreign direct investment (commercial presence) in service scope is one of the methods to offer services that is subjected to rules of general agreement on trade in services in the World Trade Organization. For this reason foreign direct investment is still regarded as the best method of attracting technology, technical knowledge and modern management techniques in the field of production and economy and becomes important increasingly.

2- literature and Research history

2-1 Theoretical principles of foreign direct investment

From the viewpoint of international monetary fund foreign direct investment is conducted to obtain stable benefits in a country except the investor's hometown. The investor's purpose from such investment is to have an effective role in managing the related firm. UNCTAD\(^1\) defines foreign direct investment as an investment which guarantees long-term relations and reflects continuous interest and control of a real or legal personality residing in a country in a company outside of the investor's hometown. In Palgrave encyclopedia foreign direct investment has been defined as ownership of properties by the investor outside of his hometown. This type of investment has a high stability and if stagnation is occurred in the host country, it couldn't be extracted easily from the country; rather it helps the country to dominate the crisis. Foreign direct investment necessitates high risk and the obtained income by it is not guaranteed. Also foreign direct investment has a long period and these features distinct it from foreign indirect investment. Buying securities and stock of companies in stock trading and certificate of deposit in banks are different types of foreign indirect investment. Low risk, high income, short period of investment and higher power of liquidity are characteristics of such investments.

\(^1\) United Nation Conference on Trade and Development
1- Ever-increasing importance of foreign direct investment

Foreign direct investment as an effective factor on globalization is one of the features of the modern global economy. Ever-increasing flow of foreign direct investment that is accompanied by increased investment of foreign portfolio shows the role of supranational firms in economy of both developed and developing countries. Liberalization of foreign direct investment system especially by developing countries and economies which had restricted foreign direct investment in the past doubled flow of foreign capitals across the world in the 1990’s along with other important actions to attract more foreign capitals by various countries.

2- Forms of foreign direct investment

Foreign direct investment is usually conducted in two forms:

A) Green field FDI or investment in modern manufacturing equipments
B) Cross-Border Mergers and Acquisitions (M&As)

Cross-Border Mergers and Acquisitions (M&As) have had an increasing trend in recent years. This type of investment was increased 28% in 2004 than in 2003 and reached 381 billion dollars. Although this type of investment is mostly conducted among the firms in America and Europe but this phenomenon is occurred in some developing countries and economies especially among public firms that become privatized. However, statistics indicate developing countries have more intention to attract foreign direct investment in the form of green field FDI. Number of foreign green field FDI projects was increased from 9300 in 2003 to 9800 in 2004 and developing countries and economies attracted more projects than developed countries. However developing countries' share is different from the whole attracted green field FDI projects and its focus has been towards some developing countries like China and India. Eleven developing countries attracted more than 100 green field FDI projects in 2004 alone. China and India had a better performance in terms of attracting foreign direct investment through Cross-Border Mergers and Acquisitions (M&As) than other developing countries in 2004 so that relatively half of the whole number of such investments in developing countries was allocated to these two countries. Recent liberalization acts in India and China after their membership in the World Trade Organization as well as their high economic growth are the most critical success factors of these countries in this regard. Moreover, 60% of the whole green field FDI projects in the world were in service sector in 2004 [1].

2-8- Background research

Kong et al (2004) conducted an article entitled "trade, foreign direct investment or obtaining a favorable state for multinational companies". They believed that entering optimal state of multinational companies to foreign markets is a function of market size, fixed expenses of FDI, tariffs and costs of transportation. Results reveal why large countries attract investment more probably while middle-sized countries might primarily make relation through trade. Also they show how these results are different from intensity of competition in the host country. FDI, tariffs and costs of transportation are highly important.

Kubny, Molders and Nanon Camp (2008) conducted a study entitled "regional integration and foreign direct investment in emerging markets". They stated regional integration is a tool to
improve attraction of member countries for foreign direct investment. But regional integration agreements are proposed well for general investment integration. Case study of this article has been conducted in African and Latin American countries. Results illustrate special factors related to countries are more important than regional integration as fluctuation in FDI. Second heavy regional weight of countries like Brazil, China, India and South Africa has had a slight role in improving regional integration while attracting foreign investment.

Martinez and Bengoa (2010) analyzed net impacts of integration as a scale for changes in trade obstacles on decreasing boundary impacts among European countries in his article entitled "impacts of integration and trade obstacles: has European economic integration been led to foreign direct investment?" Data in market were collected for goods among 18 European countries during the period 1995-2006 in this study. Using gravity model through 23 sectors creates an economic integration index based on intention of the host country. Applied variables in this article are: FDI (mutual foreign direct investment), ΣGDP (sum of gross domestic product in host countries), 2(ΔGDP) (square difference between gross domestic product of model countries and host countries), INT1, INT2 and INT3 illustrate integration between labor force skill and gross domestic product. ΔSK is the difference between skillful labor force of host and mother countries. INT1 is integrated relationship index between difference of skillful labor force and gross domestic product of European countries. INT2 is relationship between difference of skillful labor force in two countries and sum of gross domestic product of European countries. INT1 and INT2 are non-zero numbers if mother countries have comparative advantage in skillful labor force; otherwise they would be equal to zero. INT3 is the negative impact between difference of skillful labor force of two countries and sum of gross domestic product of European countries that is non-zero if the host country has comparative advantage in labor force. Otherwise this would be equal to zero. Results of this study suggest that impacts of integration since 1995 have been led to reduction of FDI attraction in member countries up to 50%. Unbelievingly economic integration of European countries has had no impact on allocation of foreign investment resources in this study. Moreover foreign investment model is implemented by horizontal motivations or allocation of knowledge-oriented capital which shows characteristics of American economy. Results of the above studies indicate positive impact of market size on mutual trade and negative impact of distance on volume of mutual trade transactions. A dummy variable has been used in most cases to consider integration.

In an article entitled "direct impact of foreign investment in developing countries" Veker (2011) shows for the first time that important economic discussions rely implicitly on role of multinational companies and foreign direct investment. However, data was studied in 111 developing countries in the period 1980-2008 using panel data to close this gap in research. Experimental results reveal there is no reason to believe activity of responsible multinational companies. Other effective structural variables on conditions of using trade for future studies will be investigated in the present survey too.

1- Model

The template form is provided as follows:

\[ FDI_{it} = f(GDP_{it}, Exch_{it}, SFDI_{it}, Free_{it}, Trade(f(FDI, Open_{...}), u_{it}) \]  

(1)
\[
\text{trade} = f(GDP_n, \text{Exch}_n, \text{Open}_n, FDI(f(\text{trade}, SFDI_n, \text{Interest}_n, \ldots)), e_i)
\]  
(2)

So that the error components model and \( t \) represents the time index and \( i \) is a symbol of the Union. Each of the models also considers the convergence of economic variables will be examined.

Convergence of variables applied in this study to investigate the expression patterns of trade flows and foreign direct investment among member countries of an economic integration increases the. Achieve a high degree of economic integration can also be indicative of actual trade and foreign investment in developing countries and their potential to explain the global higher scales.

First it is essential to test stationary of all applied variables in estimations, because non-stationary of variables either about time-series data or panel data would be led to spurious regression. But it is not possible to use Dickey-Fuller Test and Augmented Dickey-Fuller Test (ADF) to do stationary test about panel data unlike what is common about time-series data, rather it is necessary to test collective stationary of variables. Obtained results of studying variables' stationary that are members of Organization of Economic Cooperation and Development using Levin, Lin and Chu test (LLC) indicate stationary of all model variables. Hypothesis \( H_0 \) in this test illustrates non-stationary of variables and hypothesis \( H_1 \) illustrates stationary of variables.

4-1- Estimating the gravity model to study interactive relationship between trade and FDI among members of the European Union

Although Armenia has not still joined to the European Union but it is regarded as a member country of this union in this section due to its attempts for association and coordination and its similarity with countries of the European Union. Also the European Union and Armenia are considered as the statistical sample in this section. Estimation results related to gravity models of FDI and trade are represented in the framework of two separate equations of foreign direct investment and trade.

A- Gravity model of the European Union's foreign direct investment

Variables of income convergence, interest rate convergence and technology convergence are added in this model to the gravity model of foreign direct investment that was proposed in chapter three, section 3-1-3 to study impact of Europe's economic integration on attraction level of foreign direct investment by members more precisely. Convergence variables show square difference of the intended variable between two business partners.

Foreign direct investment model has been proposed based on the above-mentioned issues in section 3-1-3. Simultaneous estimation method is used here because trade and FDI are simultaneous, otherwise incompatible estimation would be obtained.

Estimated equations are as below:

\[
\text{Trade} = F(h_{\text{tech}}, h_{\text{interestrate}}, h_{\text{income}}, \text{intresti, openki, empi, laborforcei, xrat, popi, gdpi, distij})
\]

\[
\text{Fdij} = F(\text{trade, h_{interestrate}, h_{income}, h_{tech}, distij, gdpi, gdpj, popi, xrat, laborforcei, empi, openki, intresti, free internationally})
\]

Explanatory variables of the model are gross domestic product of the host country and country of origin (\( GDP_{it} \) and \( GDP_{jt} \)), real foreign exchange rate of the host country (\( \text{Exch}_n \)), economic
freedom degree of the host country ($\text{Fre}_{it}$), volume of foreign investment accumulation in the host country of foreign direct investment ($\text{SFDI}_{it}$), long-term banking interest rate of the host country ($\text{Interest}_{it}$), geographical distance of two investment partner countries ($\text{DIS}$) with three variables of income per capita convergence ($\text{h}_{\text{income}}$), interest rate convergence ($\text{h}_{\text{interest}}$) and technology convergence ($\text{h}_{\text{tech}}$). Instrumental variables which haven't been regarded directly in investment model as independent variables are trade and foreign direct investment with a time lag and openness degree of the host country's economy ($\text{Open}_{it}$).

Instrumental variables of the survey are as below:

$h_{\text{tech}}$, $h_{\text{interest}}$, $h_{\text{income}}$, $\text{openki}$, $\text{empi}$, $\text{xrat}$, $\text{gdpj}$, $\text{distij}$, $\text{tread}$, $\text{gdpi}$

First rank condition should be studied to recognize the model before using simultaneous estimation method to estimate this equation. If number of endogenous variables in an equation is $g_2$ and number of exogenous variables that are instrumental variables but haven't been inserted directly in the model as independent variable is $k_2$, rank condition exists when $k_2 \geq g_2$. There is only one endogenous variable in the above investment equation. Number of instrumental variables is equal to eleven among which eight variables are inserted in the model as explanatory variables and there are only three instrumental variables outside of the investment model in this equation. In other words $K_2=3$ and since $k_2 \geq g_2$ ($3 \geq 1$) the above foreign direct investment equation is over identified and it could be estimated through 2SLS method in the framework of panel data.

Now it is necessary to investigate about the sufficient condition that is rank condition. This condition is stated as below:

One equation would be identified in a model having $M$ equations or $M$ endogenous variables if and only if it is possible to obtain at least one non-zero determinant with degree $(M-1)(M-1)$ from coefficients of variables outside of the related but observed variable in other equations of the model. As $M-1=1$ in the proposed equations system in this survey this condition is satisfied automatically.

Also it is necessary to evaluate stationary of variables applied to estimate panel data. Results of unit root test by LLC and Hadri methods are reported in table 4-1. (Explanations in this regard are represented in appendix 2.) According to these results hypothesis $H_0$ regarding unit root of variables or their non-stationary is rejected at significance level 5%.

Gravity model of foreign direct investment was estimated by explaining panel data through Swamy-Arora method that has more reliable results than other methods2 and using instrumental variables to estimate simultaneous equations. Table 4-2 shows results of estimating this equation. The following results were obtained based on the conducted estimation3:

First, results are represented with Baltagi method in the European Union:

Table 1: gravity model of foreign direct investment in the European Union by Baltagi method

\[\text{http://www.ijhcs.com/index.php/ijhcs/index}\]

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2 Swamy-Arora method has corrector of degree of freedom that improves performance of this method in small samples.

3 Numbers in parentheses are related to statistic $t$ and test significance level of coefficients.
Then estimation with Nosa method in the European Union is represented:
Impact of variables on foreign direct investment is explained in the following. Distance has a negative and insignificant impact on foreign direct investment. Interest rate, gross domestic product of the guest country and income convergence and technology convergence are not effective on foreign direct investment. Interest rate convergence shows a positive and significant impact on foreign direct investment. Gross domestic product has a positive and significant impact on foreign direct investment. Labor force has a negative impact on investment.

Table 2: Gravity model of foreign direct investment in the European Union by Nosa method

| Variable       | Coef.  | Std. Err. | z   | P>|z| | [95% Conf. Interval] |
|----------------|--------|-----------|-----|-----|----------------------|
| fdiij          | 9407.05| 2159.785  | 4.36| 0.000| 5173.95 - 13640.15  |
| distij         | -3421.75| 5088.06  | -0.67| 0.501| -65468.06 - 65468.06 |
| gdpj           | 0.009436| 0.009498 | 0.20| 0.838| -0.516676 - 0.121648 |
| gdpj           | 0.009208| 0.001304 | 2.23| 0.026| -0.30484 - 0.313539  |
| xrat           | 92271.19| 24220.44 | 2.07| 0.037| -23579.24 - 177028.57 |
| laborforceij   | -2872.03| 1331.13 | -2.11| 0.035| -6513.33 - 6513.33  |
| empi           | -802.5607| 938.1766| -0.86| 0.392| -2641.333 - 1036.232 |
| openki         | 7.52e+08| 2.6e+08  | 2.72| 0.007| -1.29e+09 - 2.10e+08 |
| hincome        | -1.51e+07| 3.86e-06| -3.95| 0.000| -5.4e+07 - 5.4e+07  |
| hinkome        | 703.5085| 258.5362 | 2.72| 0.007| 196.7863 - 1210.231 |
| httech         | 333097   | 1.87881  | 0.18| 0.859| -3.349304 - 4.015498 |
| cons           | 8.89e+10| 2.99e+10 | 2.97| 0.003| 3.0e+10 - 1.48e+11  |

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Instrumented: fdiij
Instruments: distij gdpj gdpj xrat laborforceij empi openki hincome hinkome httech tared
It is the same as Baltagi state in terms of significance and sign of coefficients. Coefficients related to gross domestic product of country of origin and country of destination of foreign direct investment (GDP$_{it}$ and GDP$_{jt}$) have a positive sign in the equation that are significant statistically at significance level 5%. This issue shows market size of two partner countries is one of the effective factors on foreign direct investment level. Higher level of demand and income in countries increases attraction capability of foreign direct investment. One percent increase in gross domestic product of country of origin in the European Union enhances inward FDI to the *country of destination* 0.001% although this increase is not significant. Therefore, one percent increase in gross domestic product of the host country would increase inward FDI in this country equal to 0.002%. It shows that foreign investors’ motivation to attract FDI is enhanced by development of internal demand for products and services and extending markets in country of destination of investment.

Economic degree of freedom of the host country of foreign direct investment has a positive impact on FDI attraction. Volume of existing foreign capitals accumulation in country of destination of investment has a positive and totally significant impact on attracting foreign direct investment. Greater volume of FDI attraction in previous periods shows security and economic environment of a country is suitable for investment. Foreign investors ensure status of the host country is suitable for investment by observing high volume of the current foreign capitals and will have more motivation to conduct foreign investment in that country. Thus equation of foreign direct investment of the European Union in paired state (origin-destination) shows inward FDI is increased one percent by one percent increase in the volume of foreign capitals of the host country in previous period.

Long-term banking interest rate of the host country in the European Union has been led to FDI increase. This positive relation might be due to the fact that long-term interest rate is regarded as the profit rate or final return rate of capital. Hence, capitals would be directed to the host country by increased interest rate in that country.

Foreign exchange rate of the host country (a foreign currency unit versus home currency) is one of the variables that decreases foreign direct investment attraction in this country and doesn't have the necessary significance level. Geographical distance between country of origin and host country of investment has a negative impact on FDI attraction. Whatever distance between two countries is lower, cost of communication and transportation is less and thus FDI would be more economical. Of course they obtained coefficient for this variable in the European Union is not significant and shows distance is not an important variable for foreign investment decision-making among members of this union.

Finally, trade variable (trade$_{ijt}$) has a positive and totally significant impact on mutual relations of investment in this union. It is notable that using trade as sum of countries' export and import would be led to double calculation because communications in gravity model are regarded in paired state (origin-destination) and export of country i from country j is synonymous with import of country j from country i. For this reason volume of industrial imports of these countries has been used in this model instead of trade volume of member countries. In other words, trade$_{ijt}$ shows import level of country i from country j at time t. The obtained positive coefficient for this
variable indicates trade and foreign direct investment in member countries of the European Union have complementary relation with each other and increased volume of trade in this union hasn't decreased foreign direct investment among members; rather mutual foreign direct investment has been increased 2.93% among them by one percent increase of trade.

Sign of obtained coefficients for convergence variables illustrate income per capita convergence has a reverse and indirect relationship with foreign direct investment attraction in members of the European Union, i.e. similarity in demand and income structure of member countries decreases volume of mutual foreign direct investment in this union. Technology convergence (square difference related to expenses of research and development in two partner countries) hasn't had a significant relationship with inward FDI. The relationship between variable $h_{\text{interest}}$ and dependent variable of FDI is positive. This shows negative relationship between interest rate convergences of partner companies with foreign direct investment. The lower the difference in long-term banking interest rate of countries, the more converged the interest rate and whatever this difference is higher $h_{\text{interest}}$ would become a larger number that increases mutual foreign direct investment.

This model was estimated using Baltagi method as well as Nosa's order $^4$. Because of similarity of the obtained results from these two methods with common two-stage least square method results of estimating this model using the above methods are illustrated summarily in tables 4-3 and 4-4.

**B) Estimating trade equation of the European Union**

Results are analyzed in this section using Nosa method:

Table 3: Estimating trade equation of the European Union using Nosa method

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$^4$ Nosa order and Baltagi method and their difference with Swamy-Arora method are explained in the appendix.
Then results are represented using Baltagi method in the European Union:

Table 4: estimating trade equation of the European Union using Baltagi method

| Variable  | Coef.   | Std. Err. | z      | P>|z|   | [95% Conf. Interval] |
|-----------|---------|-----------|--------|-------|---------------------|
| ta| -0.00721 | 0.00112 | 4.66   | 0.000 | -0.00840 to 0.00022 |
| distij | -0.00036 | 0.00001 | 3.23   | 0.001 | -0.00004 to 0.00001 |
| gdpj | 2.85     | 0.34     | 7.70   | 0.000 | 2.17 to 3.51 |
| xrat | 1.52     | 0.22     | 6.85   | 0.000 | 1.09 to 1.94 |
| laborforce | 1.31 | 0.19 | 6.97   | 0.000 | 1.04 to 1.57 |
| empi | 1.86     | 0.27     | 6.89   | 0.000 | 1.33 to 2.40 |
| openki | 2.85 | 0.34 | 6.52   | 0.000 | 2.17 to 3.51 |
| hhincome | 1.31 | 0.19 | 6.97   | 0.000 | 1.04 to 1.57 |
| hinterestrate | 1.31 | 0.19 | 6.97   | 0.000 | 1.04 to 1.57 |
| htech | 1.31     | 0.19     | 6.97   | 0.000 | 1.04 to 1.57 |
| cons | 2.85     | 0.34     | 6.85   | 0.000 | 2.17 to 3.51 |

Instrumented: ta, distij, gdpj, xrat, laborforce, empi, openki, hhincome, hinterestrate, htech, fdij

Wald chi2(11) = 168.11
Prob > chi2 = 0.0000
Mutual trade model of the European Union’s members is represented based on the proposed gravity model in chapter 3, section 3-1-3 and by considering income per capita convergence and technology convergence variables similar to foreign direct investment equation as below:

\[
\text{Trade}_{ijt} = f(\text{GDP}_{it}, \text{GDP}_{jt}, \text{Open}_{it}, \text{DIS}_{ij}, \text{Exch}_{it}, \text{hIncome}, \text{hTech}, \text{FDI} (f(\text{Trade}_{ij(t-l)}, \text{FDI}_{ij(t-l)}, \text{hInterest}, \text{SFDI}_{it}, \ldots ) \text{DUM})
\]

Rank condition was studied before estimating the model and obtaining impact of convergence variables and the above model was recognized, because simultaneous equations method was applied to estimate the model using two-stage least square method in panel data. There is an endogenous variable in this model that is mutual foreign direct investment of the union members. Exogenous variables of the model are gross domestic product of country of origin and the host country of investment or in other words economic power of business partner countries, openness degree of economy of the importer country, geographical distance between two business partners, income per capita convergence variable, interest rate of the importer country, technology convergence variable and dummy variable of September 11, 2001. Exogenous variables outside the trade model which were only used as instrumental variables included trade lag, foreign direct investment with one time lag, accumulation volume of foreign investment in the host country and interest rate convergence variable. Therefore, rank condition is true in this model and trade equation is over-identified. All variables of this model are stationary. (Stationary of variables was studied)

Trade equation was estimated based on results of table --- given that variables GDP\textsubscript{i} and GDP\textsubscript{j} which indicate gross domestic product of the importer country (or investment level) and the exporter country (or origin of investment) respectively have a significant impact on mutual trade of the European Union's members at significance level 5%. They are the most appropriate variables that determine economic size of countries.

Variable Open\textsubscript{it} indicates openness degree of economy of the importer country (FDI level). Positive impact of this variable on increased trade is consistent with theoretical expectations and the obtained coefficient is significant at significance level 5%.

Changes of foreign exchange rate have had a positive and significant impact on developed trade among members in this equation. Coefficient of geographical distant variable (Dis\textsubscript{ij}) is negative and significant statistically and shows distance has an important and declining role in trade among members of the European Union.

Ultimately volume of mutual foreign direct investment among partner countries is one of the effective factors on mutual trade so that one percent increase in mutual FDI would be led to 0.07% increase in trade volume. This coefficient has a high level of significance. Objective of this thesis is to study the relationship between foreign direct investment and trade and the obtained positive coefficient reveals there is complementary relation between the above variables. To put it differently, FDI attraction doesn't decrease trade volume of member countries in the European Union rather it has been effective to increase it.

This issue shows manufacturing power of the host country of investment has been enhanced by more attraction of foreign capitals and at last it would be possible to develop export in this country.
Income per capita convergence and technology convergence variables in this model have had a negative impact on trade. This illustrates existence of a positive relationship between economic convergence and trade increase in member countries of the European Union, because whatever countries become more converged convergence variables become smaller and trade is increased and becomes large given to the negative sign of obtained coefficients. So, similar structure of demand and income in business partner countries that are members of the European Union will increase volume of international transactions among them. This is totally consistent with Linder's theory. Linder believed similar economic structure of countries creates trade among them so that mutual trade increases 0.00003 % by one percent increase in income per capita convergence and trade would be decreased 0.00003% by one percent increase in divergence or income per capita difference among partners. Accordingly convergence of business partner countries at technology level (significance level 10%) would increase trade among them. In other words, one percent convergence in this variable increases trade equal to 0.00003%.

1- Results

Gravity models of trade and foreign direct investment in the present survey were estimated using random effects method in panel data environment. Panel data method was used because cross-sectional and combined estimations of gravity model are biased estimations since heterogeneity among each pair of countries is not considered as single units. Results of F-test in all intended models reveal hypothesis $H_0$ regarding equality of single impacts could not be accepted. Thus panel data method is more efficient for model estimation. Since trade and foreign direct investment models were estimated simultaneously there was an indigenous variable as an explanatory variable in the model beside the dependent variable and there was a relationship between this indigenous explanatory variable and error term of the model. Hence, random effects' status is occurred in models under study that is consistent with obtained results of Husman test. Because of this, random effects method was selected in this survey to estimate models. Rank condition to recognize the model was studied before estimating each model and the following general results were obtained after estimating the models:

1- Estimating all models show gross domestic product of countries is the most important effective factor on attraction level of foreign direct investment and developed trade among countries. In other words, developing economic capacities of countries would enhance investment and trade relations among them.

2- Interest rate of the host country of investment increases FDI motivation in paired state (origin-destination) of the European Union. Thus it could be stated higher interest rate in this bloc shows more return on capital and higher rate of return for foreign investors.

3- Economic degree of freedom in the European Union and member countries in Organization of Economic Cooperation and Development has a positive impact on FDI attraction among members. This issue indicates whatever economic freedom in countries is more, foreign investors' motivation for FDI would be enhanced. Also economic degree of openness has a positive and significant impact on developed trade in most states under study. As vertical FDI is created due to comparative advantages openness economy of countries not only increases trade among member countries of an economic integration
but it decreases cost of activities of multinational companies in member countries by
decreased trade limitations and increases vertical FDI.

4- Foreign exchange rate has a positive impact on FDI. Increasing of foreign exchange rate
means decreased value of money in the country that receives investment. Cost of
establishment of plants and employment of internal labor force would be cheaper if value
for money in the host country of investment is decreased for investors and thus FDI
would increase. Increased foreign exchange rate in the European Union would enhance
trade and FDI.
References


