

The Effects of Various Regional and Global Integration Indices on Foreign Direct Investment (Case Study: OPEC Countries)

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Abstract

Economic integration at global and regional level is one of the most important consequences of mutual relationships of countries. Given that capital is the stimulant of economic growth and development and developing countries are often faced with lack of capital, they are trying to compensate this with foreign borrowing but regarding crises resulted from it foreign direct investment is being used as its substitute. The main objective of this paper is to study the effect of economic integration and globalization on FDI attraction. In order to achieve the above goal foreign direct investment equation for Asian countries is estimated by Stata software using panel data during 2001-2011 based on theoretical literature of gravity model and using of econometric methods. Our results, as we expected reveal that there is a positive relation between economic integration and foreign investment. Comparison of results in different cases shows that co-integration has more impacts on FDI for OPEC Countries under globalization conditions. In globalization cases, integration is the best choice for attracting of FDI in OPEC.

JEL Classification: F13, F23

Key Words Economic Integration, Foreign Direct Investment, Gravity Model, OPEC Countries.

1- Introduction

While capital is considered as the stimulant of economic growth and development and developing countries are usually faced with lack of capital, paying attention to factors that attract capital is the most important need of policy makers. Given that Foreign Direct Investment is one of the main methods to achieve capital, technology and possibility of durability in these countries, resorting to commercial-regional arrangements and economical integrations is one of the ways to confront with sudden impacts of entering in to globalization processes which maintains economy of many developing countries versus the global competition. Also competitive benefit is reinforced through this in various markets and is led to increasing of investment in the region. It enhances economical welfare through increasing of commercial transactions' volume and provides the premise of economic growth and development. Increasing development of international economic organizations and regional economic unions, merging of financial markets, creating of monetary unions, liberalization and easier transaction of goods and services, capital transfer and merging of large productive enterprises that are the globalized manifestations of economy affect extending of international business flows and Foreign Direct Investment.

Najjarzade and Shaghghi (2005) have studied regional convergence and its impact on Foreign Direct Investment in MENA Islamic Countries (Egypt, Iran, Saudi Arabia, Morocco, Tunisia, Turkey and Yemen). They have exploited the Gravity Model in this study relying on performed researches especially studies of Heliman and Krugman (1985) and finally use the generalized model to examine the impact of regional integration on Foreign Direct Investment. Obtained results reveal that gross domestic product of host and guest countries as the demonstrating index of economic size of countries has a positive impact on Foreign Direct Investment. Population variable of host and guest countries has negative impact on mutual flows of Foreign Direct Investment. Also variable of distance has a negative impact on investment attraction in MENA member countries.

Taheri (2004) studies effects of three unions of ECO, D8 and EU on Iran's business flow in a research entitled "effects of creating of economic convergence between Iran and economic blocks, applying of Gravity Model". He has used panel data method with Gravity Model in order to identify main and explaining variables. In this study thirty one (31) major commercial parties of Iran have been considered for the time period 1991-2000. First, three gravity models in the framework of panel data are studied that explain commercial relation of Iran and contracting countries. Results show that variable of open is significant with 90% possibility but its intensity is 85% and its sign is as expected. Variable of Linder has the essential significance and considerable importance in all models. Result of Linder theory is that whatever the demand structure of two countries has more similarity, business among them will have more intensity.

Karimi (2004) has performed a study entitled "globalization of economic integration and the most appropriate commercial-regional arrangements for Iran's economy (opportunities and challenges)" in order to examine the process of economic globalization and commercial-regional arrangements and clarifying of their relation by means of the Gravity Model and estimation method of panel data.

In this survey the existent integrations of ECO and D8 are first studied in which Iran has membership and then various convergences are introduced for Iran by means of economic variables and indexes such as economy size, market size, economic similarity and economic structure so that the most appropriate commercial-regional arrangements will be determined in a way to increase Iran's commercial potential. Finally, parallelism of two categories of

globalization and commercial-regional arrangements is studied through the Gravity Model and its application in OECD economic integration. The model has been estimated by panel data method and includes the time period 1992-1998. Obtained experimental results of sixteen (16) generalized Gravity Models show that ECO economic integration has been able to affect mutual business flows' volume to some extent and this integration doesn't show an appropriate activity from itself with regard to D8 integration and couldn't affect Iran's mutual business flows.

Di Mauro (2001) has studied economic integration among the European Union and eastern and western European countries (CEEC) and its effects on the volume of Foreign Direct Investment among the countries in his article. He estimates the gravity equation by means of data of thirty two (32) member countries in the Union during a sixth-year time period (1992-1997) and for nine manufacturing and service production sectors through GLS method and applying of time constant effects method. Results of this study demonstrate that coefficients of variables related to manufacturing production sector (like machineries sector) are significant and have a positive sign on Foreign Direct Investment among the countries as expected, while variables of administrative services sector have negative sign. Second, variables of "economic space" and "similarity level among the countries" have positive impact on attracting of foreign capitals too. Also, variables of "difference in partial factors' inventory" and "distance between the entered FDI among CEEC and EU countries" have negative effect on the volume based on the expectation theory.

Dude et al (2003) have studied the impact of four different groups of explanatory variables to determine the place of FDI in a research entitled "institutions, integration and determining of Foreign Direct Investment' s place" by using of the Gravity Model for sixty three (63) host countries and eighteen (18) guest countries (including OECD countries) in year 1996. Results of the research show a strong relation among institutional variables in the host country and FDI of the guest countries. Moreover, business integration among the countries has a positive impact on determining of Foreign Direct Investment's (FDI) place of the host countries. However, effects of integration on attraction of Foreign Direct Investment (FDI) comparing with the effect of institutional factors of the host country are at a lower level. Also, applied explanatory variables in Gravity Models of business like gross domestic product, gross domestic product per capita and distance between host and guest countries have significant and positive impact on the entered FDI in to the guest countries.

Tayebi and Hartemni (2006) have studied the effect of regional integrations on mutual flow of Foreign Direct Investment (FDI) in an article entitled "effect of business integrations on Foreign Direct Investment flow in the European Union and southwest of Asia" by applying of the Gravity Model and panel data model in the time period 1992-2003. The intended gravity model has been estimated through ordinary least squares method and by means of fixed effect model in panel data. Results reveal that gross domestic product in both the source and destination countries of Foreign Direct Investment has positive and significant effects on Foreign Direct Investment flow. This implies that economic conditions of the members in the European Union and Union of Southwestern Asia play a major role in enhancement of foreign investment. Generally, findings of this study show that regional integration in the west of Asia has considerable effect on the Foreign Direct Investment flow in member countries and their partners. The strong point of this study lies in introduction of virtual variables of economic integrations especially the variable of integration has been calculated in different ways and has been used in estimation of the model. Also applied theoretical bases and principles in this article have a high validity. However, effect of economic integrations on Foreign Direct

Investment has just been considered in this study, while it is possible to study a reverse effect too and that is the effect of Foreign Direct Investment on formation of economic integrations which has not been considered in this study.

The main objective of this survey is to study the effect of economic integration and globalization on the attracted amount of Foreign Direct Investment. To do this Foreign Direct Investment's equation in one groups of the OPEC countries has been estimated by stata software and panel data during the period 2001-2011 based on theoretical literature of the gravity model and applying of econometrics method. Thus structure of this survey is classified as the following. After introduction in section 1, research literature including theory of economic integration and theory of Foreign Direct Investment and research background will be represented in section 2. Then an appropriate model is explained in order to study the effect of integration on Foreign Direct Investment flow based on theoretical principles and experimental evidences in section 3. At last this model is estimated for OPEC countries in section 4 and conclusions are stated in section 5.

2- Research Literature and Background

Theoretical Principles of the Gravity Model

Gravity model was used for the first time by Tin Bergen (1962) for analysis of international business flows. Then Linnemann (1966), Aitken (1973) and Bluet and Systemans (1968) expanded it (Mays, 1978). Mays has performed a research about models which study effects of economic integration on business and recalls gravity models as a principal tool that could explain mutual business flows. These are not complicated and could explain mutual business flows with explanatory variables of both contracting countries simultaneously.

However, critics and users of this model believe that it is simple and such simplicity is its main strong point, because it deals with a limited number of variables and this is led to more easiness of calculation and more controllability of data issue (Deardoff, 1984). Mays (1987), Harris and Matyas (1998) believe that although gravity models lack strong theoretical bases but they have played a good role in experimental studies especially in the field of predicting of business flows and are useful for political analyses. According to them, the main flaws in previous studies are related to the nature of applied data and explicit and implicate limitations of data application, because cross-sectional data method or time series have been used to explain business flows that traverse conclusions would be obtained because as it was pointed out there are a number of deleted variables in such estimations or some of them are not considered practically. As a result, heterogeneity among the countries is not considered. In order to remove this problem, group data estimation method is applied that in addition to considering of heterogeneity among the countries, it has a higher efficiency and explanatory power.

It appears that population variable of a country is used as a criterion to estimate size of that country and since countries with more population have tendency for self-sufficiency, relying on internal markets has been increased because of improving of the market size. Therefore they become more introvert and decrease their commercial volume by reduction of imports. Thus the expected sign should be negative, but as Bergostrand (1986) points out there is an opposition in this argument, so that more population gives rise to saving resulted from the scale and this issue is more appeared in exports (Karimi, 2004). Hence, sign of population variable will be uncertain.

Davoodi and Shahmoradi(2005) extract the especial Gravity Model by the Helpman and krugman researche:

$$\begin{aligned}
 C &= \alpha_1 Y^{\beta_1} \\
 X &= \alpha_2 Y^{\beta_2} \\
 M &= \alpha_3 Y^{\beta_3} \\
 Y &= C(Y) + X(Y) - M(Y) \quad (1)
 \end{aligned}$$

With differential of the first three models, we have:

$$\begin{aligned}
 \frac{dC}{dY} &= \beta_1 \frac{C}{Y} = \beta_1 c \quad , \quad c = \frac{C}{Y} \\
 \frac{dX}{dY} &= \beta_2 \frac{X}{Y} = \beta_2 x \quad , \quad x = \frac{X}{Y} \\
 \frac{dM}{dY} &= \beta_3 \frac{M}{Y} = \beta_3 m \quad , \quad m = \frac{M}{Y} \quad (2)
 \end{aligned}$$

The first three models of (1) used in the fourth model of (1) and differentiated:

$$\begin{aligned}
 dY &= \beta_1 c dY + \beta_2 x dY - \beta_3 m dY \\
 \beta_1 c + \beta_2 x - \beta_3 m &= 1 \\
 \beta_1 C + \beta_2 X - \beta_3 M &= Y \quad (3)
 \end{aligned}$$

With the redifferentiating of (3) we have;

$$\beta_1 \frac{dC}{C} \cdot \frac{C}{Y} + \beta_2 \frac{dX}{X} \cdot \frac{X}{Y} - \beta_3 \frac{dM}{M} \cdot \frac{M}{Y} = \frac{dY}{Y} \quad (4)$$

The ratio of $\frac{M}{Y}$, $\frac{X}{Y}$, $\frac{C}{Y}$ are average propensity of Import, Export and consume object we respectively, that are constant and will move toward an especial amount. With this have:

$$\beta_1 c \frac{dC}{C} + \beta_2 x \frac{dX}{X} - \beta_3 m \frac{dM}{M} - \frac{dY}{dY} = 0 \quad (5)$$

That the wholly form is:

$$Y = AC^{\beta_1 c} X^{\beta_2 x} M^{-\beta_3 m} \quad (6)$$

At totally the accountability equation between two countries i&j is :

$$Y_j = AC_j^{\beta_1 c_j} X_j^{\beta_2 x_j} M_j^{-\beta_3 m_j} \quad (7)$$

$$Y_k = C_k^{\beta_1 c_k} X_k^{\beta_2 x_k} M_k^{-\beta_3 m_k}$$

By multiplying the two above equation, the mutual export of i&j countries is:

$$X_{jk}^{\beta_2 x_j} X_{kj}^{\beta_2 x_k} = \frac{1}{C_j^{\beta_1 c_j} C_k^{\beta_2 c_k}} Y_j Y_k M_j^{-\beta_3 m_j} M_k^{\beta_3 m_k} \quad (8)$$

The effect of protectionism and transporting cost will add with these two equations;

$$M_j = \frac{X_j}{(1+t_j)(1+d_{jk})} \quad (9)$$

$$M_k = \frac{X_k}{(1+t_k)(1+d_{jk})} \quad (10)$$

With using these two equations in (8) will show that the mutual export of i&j countries depended to their GDPs, Distances, Tariffs and Consumes.

Helpman and krugman (1985) have explained a gravity model to analyze effects of regional integration on the amount of mutual FDI among the countries with such inference and substituting of Foreign Direct Investment instead of commercial transactions among countries.

3- Experimental Model of Research

Much part of data and statistical information are adopted from the world development indicators' report (WDI, 2009) that has been received through the World Bank's website. In order to calculate geographical distance among the countries, time and date website (www.time.com and date.com) has been used. Statistics related to Foreign Direct Investment are obtained from national business and development conference report through unctad website. PC-TASS CD has been applied for data related to countries' mutual export and import.

Generalized gravity model has been used in order to study the effects of economic integration on mutual Foreign Direct Investment of OPEC Countries that is represented as below:

$$LnFDijt = \alpha + \beta_1 \ln Y_j + \beta_2 \ln POP_j + \beta_3 \ln Dist_{ij} + \beta_4 \ln DI_{ij} \tag{9}$$

FDI_{ijt}: FDI's inventory, Y_j: income of j countries, POP_j: population of country of j, Dist_{tij}: distance between i and j countries.

DI_{ij} shows integration index between countries i and j.

We have used the following index in order to study the effect of integration on attracting of Foreign Direct Investment which has been obtained according to studies of Ivan et al (2006).

$$DI_i = \sqrt{DO_i DTC_i} \tag{10}$$

Since integration process is started from openness of economies and its effects' range and limit depends on the structure and size of the existent relations among these economies, the obtained integration index from these two variables is an appropriate index for studying of this relation. It is obtained during the following stages and X_{ij} shows mutual export and Y_i and Y_j show gross domestic product in the host and guest country.

$$DTC_i = \frac{\sum_{j \in N} \alpha_{ij} \beta_{ij}}{\sqrt{\sum_{j \in N} (\alpha_{ij})^2} \sqrt{\sum_{j \in N} (\beta_{ij})^2}} \tag{11}$$

Amounts of (B_{ij}, α_{ij}) in the above formula are obtained from relations

$$B_{ij} = \frac{Y_j}{\sum_{k \in N/i} Y_k}, \alpha_{ij} = \frac{X_j}{\sum_{k \in N} X_{ij}} \text{ respectively.}$$

Another formula that is used in integration index is the degree of openness that is obtained during the stages below.

$$DO_i = \sum_{j \in N} DO_{ij} = \frac{\sum_{j \in N} X_{ij}}{\hat{Y}_i} \tag{12}$$

Gross domestic product and mutual export are used in this formula that \hat{Y}_i is calculated through two formulae of ($\hat{Y}_i = Y_i - a_i Y_i, a_i = Y_i / \sum_{j \in N} Y_j$). Also globalization index has been

used in this article given that applied tools in regionalism and regional and economic integration are similar to tools of the globalization process and the fact that countries establish commercial integrations with other countries for taking part in the world business organization and gain experience for economy globalization. It is calculated according to the following formula. Then after calculation, globalization index is used instead of economic integration in the clarified formula of the above gravity model.

$$DGI = \sum_{i \in N} a_i DI_i \quad (13)$$

$$\ln FDI_{ijt} = \alpha + \beta_1 \ln Y_j + \beta_2 \ln POP_j + \beta_3 \ln Dist_{ij} + \beta_4 \ln DGI \quad (14)$$

4- Results of the Estimated Model

In order to estimate the gravity model for Foreign Direct Investment, member OPEC Countries are considered. The above model has been adopted from Najjarzade and Shaghghi' research (2007). The authors have applied the total proportion of FDI of the host country to its imports amount from the destination country of investment to calculate mutual FDI volume.

$$FDI_{ijt} = (M_{jit} / M_{jt}) FDI_{jt} \quad (15)$$

FDI_{ijt} is Foreign Direct Investment from country i in the country j in year t, FDI_{jt} is Foreign Direct Investment volume of country j in year t, M_{jit} is volume of the country's imports from country i in year t and M_{jt} is total imports of the country j in year t. It is necessary to determine estimation type of panel data before estimating of the model. Limer F test is used to choose the synthetic method or panel data in model estimation and as it is shown in table (1), amount of statistic Limer F is obtained equal to zero which demonstrates that the null hypothesis (data is in the synthetic form) is rejected on behalf of the opposite hypothesis, i.e. existence of capability in panel data method.

4-1 Results Obtained From Model's Estimation in OPEC Block

In order to analyze hypotheses regarding the effect of variables of economic integration, gross domestic product, population, geographical distance and economic liberalization of Asian countries on attracting of Foreign Direct Investment, the model has been explained in six states for OPEC countries' group.

According to the estimated results in the period 2001-2011 for each variable:

- Variable of gross domestic product per capita: since it is obvious from theoretical issues, coefficient of income per capita must be positive. As table 1 shows coefficient of variable of gross domestic product per capita is positive for each of the six models. It means that gross domestic product per capita for the first model has positive effect on attracting of Foreign Direct Investment. It shows that this variable is one of the effective factors on attracting of Foreign Direct Investment. By entering of variable of convergence in to the model (second model) the estimated coefficient for gross domestic product per capita has been increased from 1.22 to 1.48, thus by considering of this variable, role of gross domestic product becomes more considerable in attracting of Foreign Direct Investment.
- Variable of population of the country: real effect of population on commerce is uncertain and sign of its coefficient is not specified in commercial flow equation. Effect of population on attracting of Foreign Direct Investment is reverse in estimations of this research. It means that increasing of population in all six models is resulted in reduction of attracting of Foreign Direct Investment. One of the reasons of this reverse

effect could be savings resulted from scale of production in increasing output conditions, so the need for foreign import and business will be reduced in such conditions. Variable of population in the first model, i.e. existence of openness degree has a higher estimated coefficient. Therefore, population has a higher impact on reduction of Foreign Direct Investment attraction if economic openness degree exists.

- Variable of distance between two countries: one of the most important reasons for the negative effect of this variable on business volume is the cost of transportation. In other words, the farther the countries from each other, the less they do business with each other. About the obtained coefficient of determination we can say that it is increased when the model is estimated with variable of economic integration than those estimated by variables of economic liberalization and convergence.

Table (1) the Result of Estimated Model in OPEC Block (6 forms)

Independed Variables	FDI model with DO variable	FDI model with DTC variable	FDI model with DI variable	FDI model with DGO variable	FDI model with DGTC variable	FDI model with DGI variable
C	-8/57 z=-1/19 p=(0/23)	-4/53 z=-0/54 p=(0/58)	-8/53 z=-1/2 p=(0/23)	-18/55 z=-1/02 p=(0/3)	-4/53 z=-0/54 p=(0/58)	-19/62 z=-1/3 p=(0/19)
Ingdpj	1/3 z=5/4 p=(0/00)	1/01 z=2/66 p=(0/00)	1/22 z=5/1 p=(0/00)	1/48 z=5/13 p=(0/00)	1/01 z=2/66 p=(0/00)	1/38 z=4/82 p=(0/00)
Inpopj	-0/04 z= -0/22 p=(0/82)	-0/1 z= -0/39 p=(0/69)	-0/05 z= -0/22 p=(0/82)	-0/11 z= -0/41 p=(0/68)	-0/1 z= -0/39 p=(0/69)	-0/11 z= -0/43 p=(0/66)
InDistij	0/12 z=0/62 p=(0/53)	0/28 z=1/24 p=(0/21)	0/12 z=0/63 p=(0/53)	0/27 z=1/2 p=(0/22)	0/28 z=1/24 p=(0/21)	0/27 z=1/22 p=(0/22)
InDo _{ij}	1/72 7 p=(0/00)					
InDTC _{ij}		10/67 1/68 p=(0/09)				
InDI _{ij}			3/49 7/12 p=(0/00)			
InDGO _{ij}				2/1 0/84		

				p=(0/04)		
lnDGTCij					10/52 1/68 p=(0/09)	
lnDGLij						14/57 2/17 p=(0/03)
R ²	0/42	0/21	0/43	0/21	0/21	0/42
χ^2	105/97 p=(0/00)	96/65 p=(0/00)	106/08 p=(0/00)	96/97 p=(0/00)	96/65 p=(0/00)	105/97 p=(0/00)
F _{leamer}	29/99 p=(0/00)	32/2 p=(0/00)	29/64 p=(0/00)	30/14 p=(0/00)	32/20 p=(0/00)	30/69 p=(0/00)
H _{hausman}	30/70 p=(0/00)	20/24 p=(0/00)	72/97 p=(0/00)	11/77 p=(0/00)	20/24 p=(0/00)	0/69 p=(0/87)
χ^2_{LR}	101/41 p=(0/00)	40/95 p=(0/00)	103/66 p=(0/00)	38/19 p=(0/00)	40/95 p=(0/00)	39/05 p=(0/00)

Only DGTC variable is on the significance level 90% among the variables of liberalization and other variables have a very high and reliable significant level. This issue shows the importance of existence of liberalization variables in the model related to attracting of Foreign Direct Investment in this scope. The highest obtained coefficient belongs to variable DGLij and is equal to 10.67. So, effect of globalization variable in this geographical region has been higher by far than other variables of liberalization in attracting of Foreign Direct Investment.

To put it differently, we can say that economic integration index in countries of OPEC block clarifies changes of foreign investment better than other indexes because of R².

Estimation of Coefficients in Globalization State

As mentioned earlier, coefficients related to each of the above variables have been estimated in the globalization state too. Globalization is a consistent and dynamic process that affects all economic sectors. There are different definitions for this term and the most important characteristic of all of these definitions especially in relation to this thesis is removing of commercial and economical boundaries and enhancing of international transactions.

The world is passing from nations' dispute in business relations to the new stage of total transactions and public participation in economic activities. Globalization is a comprehensive and dynamic movement that includes all economic aspects or affects them. It creates a competitive environment while internationalize markets in which just powerful and efficient economic units would survive. Thus, governments resort to regionalism and formation of regional arrangements to maintain their economy against

the global problems through this and make investment enhancement and growth possible in the region (Azarbayejani, 2003).

5- Conclusion and Recommendations

Variables of gross domestic product per capita and economic liberalization are the most effective variables on attracting of Foreign Direct Investment. This shows the importance of paying attention to increasing of production power and competitive power of the country in the scope of international commerce. Given to the positive impact of variables of liberalization, Asian countries should look for more liberalization in their internal economy and provide the essential ground for more enjoyment of foreign investment by removing of the existent barriers.

The main purpose of this section is to evaluate the effect of economic and global integration on the attraction level of Foreign Direct Investment. To do this end equation of Foreign Direct Investment for Asian countries has been estimated to obtain the above purpose based on the current theoretical literature and by using of econometrics method. Results show a positive and significant relation among them and imply the point that various integrations and merges are led to increasing of motivation at foreign investment level in the member countries. Obtained results for Asian countries in the time period 2001-2011 reveal positive and significant effect of integration and globalization on Foreign Direct Investment in these countries. Gross domestic product of countries is the most effective factor on developing of commercial relations among the countries. In other words, extending of size and economic capacities of countries pave the way to enhance commercial relations among them and negative sign of distance demonstrates a barrier in facilitation of mutual Foreign Direct Investment flows. Negative sign of population is related to savings resulted from scale on the volume of mutual investment flow of the above countries.

One of the effective common characteristics between economic integrations and globalization is establishment of competitive space that is created among the converged countries and is resulted in durability of economies which have higher economical power and competition. This competition is more severe in the discussion of globalization and has much importance, while it has a lower intensity in a region because of fewer partners. Since joining to the global village is inevitable, integration could be a criterion for weaker economies to examine their economic power, business capability and competitive advantage for a wider scale like the global economy and provide the ground for their presence in global markets.

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