Foreign Direct Investment and Gross Domestic Product: An Application on ECO Region (1995-2011)

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Abstract

Theoretical studies reveal that Foreign Direct Investments (FDI) have a positive impact on the growth in GDP of the host-country. This study puts forward whether the relationship between FDI inflow and GDP in the region of Economic Cooperation Organization (ECO) is coherent with the theoretical expectations. In this framework, the causal relationship between FDI inflow to the ECO region and GDP will be analyzed. The data of 1995-2011 periods is used in causality analysis covering ten ECO member countries. Granger Causality Test based on error correction model and Holtz-Eakin, Newey and Rosen Panel Causality Test are applied in analysis. According to the results of the causality tests, a strong positive causality from FDI to GDP and a slightly less positive causality from GDP to FDI in ECO region have been detected. Obtained results of the study comply with the theoretical expectations.

Keywords: Foreign Direct Investment, Economic Growth, GDP, ECO, FDI

JEL Codes: E22, F20, F21, O16

1. Introduction

Enhancing per capita income within a country through increasing current output level constitutes one of the primary objectives of economics. The close relationship between GDP, current output level and per capita income orients economists to elaborate on the problem of how to increase these values more. The main concern in this issue is to ensure an increase in GDP. In other words, an increase in GDP, the market value of all the products and services produced annually within a country, can also be defined as economic growth. What is desirable in an economy is to increase GDP and achieving economic growth consequently.

Domestic sources can be thought as the prior supplier for the capital necessary for increasing economic growth. However, in case of low level of income and absence of enough saving, "foreign investment" is one of the means for closing capital deficit (Yılmazer, 2010:242). Foreign investment is the movement of capital funds from one country to another and realizes in the form of international money, capital markets and direct investments (Kurtaran, 2005:367). Foreign Direct Investment (FDI) is the establishment of a new production line or buying an already established production line in a country different from its origin with the aim of diffusing its production abroad (Seyidoğlu, 1999: 664). The main influence of FDIs in a hosting country is their absolute contribution to national income. Since the foreign capital is used in domestic production, it is added to the GDP. The issue of attention at this point is the fact that whether the all factors used in production is produced by the owners of capital or not. If there are imported production factors, their value should be excluded from the GDP (Karluk, 2009: 691). Type and function of the coming FDI gain importance in this sense.

The importance of FDIs has increased almost in all countries with the globalization process intensified with 1980s due to their positive impact on economic growth. Therefore, its entrance has been promoted. Especially with mid-1990s, FDI has been seen as a means for compensating absence of enough domestic capital. By this way, while the total amount of FDI in 1990 was 207 billion dollar; it reached to 1,524 trillion dollar in 2011 (UNCTAD, 2012: 24).

The relationship between FDI and GDP within the region of Economic Cooperation Organisation (ECO) will be analysed in this study by means of panel causality method. The study composes of four parts except the introduction part. In this scope, the relation between FDI and GDP will be examined within its theoretical framework firstly; in the succeeding part, a summary of the studies related to the issue will be provided. The fourth part will present some basic information regarding the ECO area. Data set, method of study, analysis, and results will be stated in the fifth part. The last part composes of a conclusion and discussion.

2. Relationship between FDI and GDP

The amount of domestic savings, capital stock, use of advanced technology and the amount of investment are widely accepted as the key determinants of economic growth. In case of absence of enough capital stock, low savings, inability of using technological innovations in combination with human capital; it can be argued that there is not a fertile environment for making investments in such an economy. Hence, an increase in output level and economic growth cannot be achieved in such a setting. The countries suffering from low levels of savings and capital are facing with choice between finding foreign debt and to increase FDI inflow. Despite the positive influence of foreign debt in terms of capital inflow, it bears some risks of repayment. Therefore, it is less preferable than FDIs. It is opted, especially when there is not any or enough FDI inflow. In this scope, FDI has been started to be seen as a fundamental source of external financing both in developed countries and countries suffering from low capital in the last 20 years thanks to its positive effects in host country through level of capital, technology and other means. Many developing countries are trying to attract FDI by following outward-oriented industrialization policies in order to increase the growth of economy (Yılmazer, 2010:242). China, Brazil, Russia, Singapore and India can be listed as the primary countries attracting huge amounts of FDI in recent years (Davies, 2010).

Economic growth theories puts forth that FDIs have positive impact on economic growth. Transfer of capital and technology is widely accepted positive effects of FDI. But, there are also others, namely: increasing marginal capital efficiency, efficient distribution of sources, efficiency increase, organizational skills, know-how, skilled labour, brand, easy entrance to markets, etc. (Berthelemy and Demurger, 2000:140; Mencinger, 2003:491; Lyroudi et. al, 2004:198; Athukorala,2003:4). Despite the theoretical consensus on positive effects of FDI on economic growth, there is not any empirical consensus on the effects of FDIs. According to the results derived from some sectoral studies, FDIs have no impact on economic growth. In these studies, any positive externality between domestic and foreign firms could not have been found (Carcovic and Levine, 2002:196). While some macroeconomic studies were not identified any positive relation between FDI and economic growth, some others argued that the positive impact of FDIs on economic growth depends on level of income, human capital, situation of financial system and trade policies in host country (Demirel, 2006:111). Countries, especially the developing ones, see FDIs as a fundamental means for achieving economic growth. The governments of the countries in which positive impacts of FDI on economic growth detected have made regulations such as tax incentives, infrastructure incentives, and exemptions from import duties in order to enhance FDI inflow (Lyroudi et. al, 2004:198). Despite the ambiguity in the results of empirical studies, especially developing countries have making politic regulations aiming to increase FDI inflow in order to ensure or increase economic growth by compensating negative effects of low capital accumulation, low domestic savings, absence of use of new technology.

The theoretical structure of empirical studies about FDI and economic growth is based on the neo-classical growth models or endogenous growth models. According to the groups defending financial liberation within the framework of neo-classical theory, international capital flows ensure economic growth in the long run through enhancing use of sources in the economy and increasing savings and production-oriented investments. According to neo-classical growth models, while FDIs increase level and efficiency of investments; its impact on economic growth is temporary in the middle-run and permanent in the long-run. Economic growth in the long-run can be seen as a function of technological improvements in new endogenous growth models.

Accordingly, FDI increases economic growth of host country through the effects of technology transfer and diffusion (İnsel and Sungur, 2003:4; Nair-Reichert and Weinhold, 2000:3). In contrast to conventional economic growth theories, new economic growth literature pays more attention on technological developments. In this scope, economic growth depends heavily on prevailing technological conditions in the country. It is also argued that economic growth in developing countries is stated in terms of grasping technological developments. Besides, a strong complementary relationship between FDI and human capital has been found; therefore, it is thought that FDIs in relation with the increases in human capital will increase economic growth in a greater ratio (Boresztein et. al, 1998: 118).

The most important impact of FDIs is their net contribution to host country income. FDI's influence over host country's economy can be analyzed by two channels. The first is the contribution of FDIs to the sector of intermediate goods which is also defined as growth effect and the increasing specialization of input producers by this way. The second is the externality effect stemming from R&D activities. Thus, domestic firms can benefit from advanced knowledge of foreign enterprises (Berthelemy and Demurger, 2000:141). FDIs can be evaluated by treating them as a special kind of capital transfer. Accordingly they have two characteristics: Firstly, FDIs may enhance competitiveness of host country by bringing "specialization" and "know-how". Secondly, FDIs directed to industrial sectors may be seen as a transfer of capital between capital sectors of two countries (Karluk, 2009:688). Briefly, positive influences of FDIs on production factors in industrial sectors make a direct impact on economic growth. According to the studies performed, FDIs make contribution to capital accumulation in host country, ensure training and hence specialization of labour force, increase entrepreneurship skills and enable better use of natural sources. What is more, one of the features that differentiate FDIs from other investments is the fact that FDIs have a control power on the management policy and decisions of the business (Moosa, 2002:2).

3. Review of Literature

The relation between FDI and economic growth is frequently studied both theoretically and empirically. There are ongoing studies especially on the economic effects of FDI in developing countries. A consensus has not been developed yet regarding the results of analyses. Summary of some selected studies will be provided below.

Borenszteinet. al (1998), the study aims to measure the effect of FDI on economic growth in 69 developing countries in the period of 1970-79 and by using regression bound to panel data. According to the results, it has been seen that FDIs is a means of technology transfer contributing a lot to the economic growth. However, FDIs have positive effect on economic growth, when advanced technology is accompanied by capital and human capital at a certain level.

Nair-Reichert et. al (2000), they tested the causality between FDI and economic growth in 24 developing countries within the period of 1971-1995 by using fixed effects and random effects panel data estimation method. In consequence of econometric analysis, they founded that the effect of FDI on economic growth varies across developing countries. Despite the differences among countries, the results show that the effect of FDI on economic growth is higher in open economies.

Carcovic and Levine (2002), they examined the relation between FDI and economic growth in 72 countries within the period of 1960-1995 by using new statistical techniques and two new databases. Firstly, they formed a panel data set linked to World Bank data set and basing on the averages of seven five-year periods between 1960 and 1995. Besides, the results were verified by using the FDI data received from IMF database. Methodologically, Generalized Method of Moments (GMM) was used. According to the results of empirical applications, it has been seen that FDI do not have an effect on economic growth solely.

Chowdhury and Mavrotas (2003), they used an innovative econometric method in order to defined the direction of the causality between FDI and economic growth in Chile, Malaysia and Thailand. They applied Augmented Dickey Fuller (ADF) unit root test and Toda-Yamamoto causality test to the time-series data belonging to 1969-2000 period. According to results of empirical analyses, while the GDP is the cause of FDI in Chile, there is two-way causality between FDI and GDP in Malaysia and Thailand.

Lyroudiet. al (2004), they examined the effect of FDIs on economic growth of transition economies. To this aim, they focus on Eastern European and Balkan countries in the period of 1995-1998. According to the results of the study, FDIs do not have any significant effect on the economic growth of transition economies.

Roy and Berg (2006), they considered whether FDI inflow have a contribution on the growth of the U.S. economy in their study covering the period of 1970-2001. In order to define two-way relation between FDI and economic growth, they used time-series data and simultaneous equation model. As a result, they saw that FDIs have a positive and significant effect on the growth of the U.S. economy.

Değer and Emsen (2006), they examined the relationship between FDI and economic growth in 27 transition economies in the period of 1990-2002 by making a distinction of Central Eastern Europe and Central Western Asian country through panel data regression analyses. According to results estimated, they observed that FDIs have positive effects on transition economies.

Erçakar and Yılgör (2008), they analyzed the long-term relation between FDI and economic growth in 19 selected countries by using the data of 1980-2005 period through panel unit root test and panel co-integration test. While the results of panel unit root test show that FDI and GDP do not have a unit root, the results of panel co-integration test verify a long-term relation between FDI and GDP.

Yılmazer (2010), he analysed the effect of FDI on economic growth in Turkey within the period of 1991:1-2007:3 in terms of quarterly data by means of Granger causality test. GDP, export and import data was used in relation to economic growth. At the end of analysis, a strong causality between FDI and economic growth was not detected. Besides, it has been found that FDIs pursue import and export weakly.

Ekinci (2011), he looked at whether a long-term relation between FDIs and economic growth in Turkey in the period of 1980-2010 exists or not by applying Granger causality test. As a consequence, a two way relationship between FDIs and economic growth was found, but it has not been observed any relation between FDIs and employment.

4. FDI and GDP in ECO Region

ECO is an international organization established in 1985 in order to support regional economic integration. Turkey, Iran and Pakistan are founding members of the ECO. With the participation of new members in 1992, number of member states reached ten. New members of ECO are as follow: Azerbaijan, Kazakhstan, Kirghizstan, Uzbekistan, Turkmenistan, Tajikistan and Afghanistan. Member states of ECO area are aiming to make cooperation in various fields. Founding a free trade area is one the main objectives of ECO (Kızıltan and Sandalcılar, 2011:102). ECO region is a market whose population is around 400 million.

GDP and FDI data belonging to ECO region exists in Table 1. The table shows that as the amount of GDP increased in the ECO, the amount of FDI entering area has increased. The table also demonstrates that the share of ECO region from the global amount of FDI increased by years. The rationality behind the entrance of FDI in to the area differs in terms host country. In recent years, FDI entering to Turkey has a limited capacity of creating new employment opportunities and targeting sub-service sectors (finance, communication, transportation, etc.) (Saray, 2011:399). One of the features of the entering FDIs is the fact that they happens mostly in the form of partial or wholesale privatization of the existing facilities rather than fresh investments. FDIs in Kazakhstan and Turkmenistan mostly concentrate on energy sector (Gövdere and Kaleli, 2008). Petroleum and natural gas play a vital role in economic growth of such countries.

Table 1: GDP and FDI Values of ECO Region

Years	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Total GDP (Billion Dolar)	455	477	485	497	479	490	425	499	594	744	907	1049	1296	1493	1357	1582	1806
Total FDI (Billion Dolar)	2,82	3,17	4,31	4,01	3,58	3,12	8,15	9,98	10,75	15,64	20,00	33,46	38,33	44,02	33,19	31,93	41,11
Share in World Cumulative FDI	0,82	0,81	0,88	0,57	0,33	0,22	0,98	1,59	1,83	2,10	2,04	2,29	1,94	2,46	2,77	2,44	2,70
FDI/GDP	0,62	0,67	0,89	0,81	0,75	0,64	1,92	2,00	1,81	2,10	2,21	3,19	2,96	2,95	2,45	2,02	2,28

Source: UNCTADstat Database

Graph 1 shows the graphics of FDI and GDP values in ECO region in the period of 1995-2011. It can be concluded from the graph that time-way of variables show a similar nature in many panels.

Graph 1: Graph of GDP and FDI in ECO Region
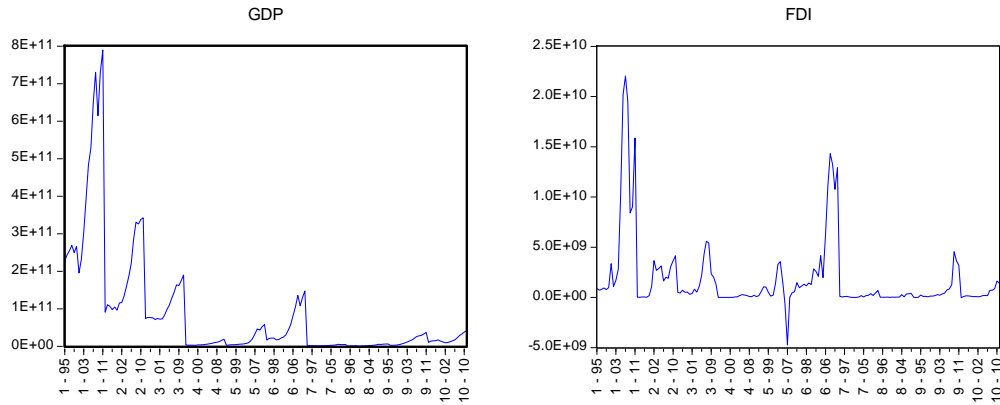
5. Econometric Analysis

The study analyzes the relationship between GDP and FDI in ECO region. The effect of FDI on economic growth will be estimated in the analysis by using the model below.

$$GDP = \alpha + \beta FDI \tag{1}$$

The data of 1995-2011 period will be used in the empirical analysis. Gross national product symbolizing economic growth and direct foreign investment will be defined in terms of the variables of GDP and as FDI respectively. While the GDP values are received from IMF World Economic Outlook Database (2012); FDI values are reached from UNCTADstat (2012) in terms of USA dollars.

Panel data method will be used in analyses. Panel data can be defined as the combination of observations made in a certain time on the cross-section of economic units such as country, firms and household. Values belonging to any year lie in section; values of economic variables varying in time composes time dimension of panel (Baltagi, 2005:11).

$$y_{it} = \alpha + X'_{it} + u_{it} \qquad i = 1, \dots, N \quad t = 1, \dots, T \tag{2}$$

Main equation used in panel data analysis is as the equation numbered 2. In this equation, i=1,...N, shows the data belonging N number of countries, firms or household lie in the cross-section of the model. The analysis covers horizontal-sequence data of ten different countries. t=1,..T, symbolizes time and it is used for defining time series part of the model. Time series examined covers the period of 1995-2011. u_{it} is the error term which is independent for all times and units. It is assumed that the error term is diffused in the form of $u_{it} \approx IID(0, \sigma^2)$. However, whether the variables include unit-root or not will be tested as in the test of time series analysis in panel data analysis. Hence, regression estimations derived from series including unit-root series are not reliable and may lead to false or misleading estimations. The panel unit tests have been used in literature frequently are the tests deriving from the studies of Levin, Lin & Chu (2002) and Im, Pesaran& Shin (2003). Stationary of data will be analyzed with the help of the equation below.

$$\Delta y_{it} = \alpha \, y_{it-1} + \sum_{j=1}^{p_i} \beta_{ij} \Delta y_{it-1} + x'_{it} \delta + \varepsilon_{it} \tag{3}$$

Unit-root test results belonging to GDP and FDI variable are presented in Table 2 and Table 3. Table 2 shows the results of two different root-tests (LLC Unit Root Test and IPS Unit Root Test). According to results, GDP variable includes unit root at level; when the first difference is taken, it is understood that it becomes stationary at 1 % confidence level. A similar situation is also applicable for FDI variable. FDI variable include unit root at level. When the first difference is taken, it is tested that it becomes stationary at 1 % confidence level. Both series are integrated at the level of I(1).

Table 2: Unit Root Test Results for GDP Variable

Tests		Level	First Difference	Result
Levin, Lin & Chu Panel Unit Root Test	Constant & No Trend	9,119 [1]	-4,617 [3] *	I (1)
	Constant & Trend	-0,918 [3]	-6,659 [2] *	I (1)
	No Constant & No Trend	10,168 [1]	-3,801 [2] *	I (1)
Im, Pesaren &Shin Panel Unit Root Test	Constant & No Trend	9,743 [1]	-3,097 [3] *	I (1)
	Constant & Trend	2,363 [3]	-4,384 [2] *	I (1)

Note: (*) symbol shows that coefficients are statistically significant at % 1 level. Lags for tests are selected automatically by based on Schwarz information criterion.

Table 3: Unit Root Test Results for FDI Variable

Tests		Level	First Difference	Result
Levin, Lin & Chu Panel Unit Root Test	Constant & No Trend	3,292 [3]	-4,819 [3] *	I (1)
	Constant & Trend	3,679 [3]	-2,461 [2] *	I (1)
	No Constant & No Trend	0,298 [3]	-8,264 [3] *	I (1)
Im, Pesaren &Shin Panel Unit Root Test	Constant & No Trend	3,974 [3]	-4,220 [3] *	I (1)
	Constant & Trend	2,673 [3]	-3,907 [2] *	I (1)

Note: (*) symbol shows that coefficients are statistically significant at % 1 level. Lags for tests are selected automatically by based on Schwarz information criterion.

The long-term relationship between the variables stationary at the same level is analyzed with co-integration tests. Co-integration test is a process in which long-term balance relation among series is examined. Engle and Granger (1987) state that linear combination of two or more unstationary variables may be stationary. The existence of co-integration is tested by applying Engle-Granger and Johansen-Jeselius maximum likelihood methods to variables in time series analysis. Co-integration test developed by Pedroni (1999, 2004), which is the one that is used most frequently in the literature, will be used in co-integration test of panel data series. In Pedroni co-integration test, the existence of the long-term relation between y and x variables in equation numbered 4 will be tested by looking at stationary of the e_{it} residual in the equation. Co-integration test results performed are presented in Table 4 and Table 5.

$$y_{it} = \alpha_i + \delta_i t + \beta_{1i} X_{2it} + \beta_{2i} X_{2it} + \cdots + \beta_{Mi} X_{MIt} + e_{it} \qquad (4)$$

GDP and FDI variables used in analysis are exposed to Pedroni co-integration test separately as independent variables and in-group and among-groups statistics are calculated. Meaningful statistical estimations derived from Panel v (Variance ratio), Panel ρ (Phillips–Perron Type ρ), Panel PP (Phillips–Perron Type t) and Panel ADF (Dickey–Fuller Type t) are used for in-group statistics; and Group ρ- (Phillips–Perron Type ρ), Group PP - (Phillips–Perron Type t) and Group ADF (Dickey–Fuller Type t) are used in among-group statistics verify the co-integration relation between the mentioned variables. In other words, it is concluded that there is a long-term relationship between GDP and FDI in ECO region.

Table 4: Results of Panel Co-integration Test

Dependent Variables		GDP			FDI		
Pedroni Panel Cointegration Statistics		Constant& No Trend	Constant& Trend	No Constant& No Trend	Constant& No Trend	Constant& Trend	No Constant& No Trend
In-group Statistics	**Panel v**	2,275 **	0,722	-0,137	3,697*	-0,771	5,343*
	Panel ρ	-3,123*	-2,381*	-2,232**	-2,216**	-0,667	-3,289*
	Panel PP	-14,391*	-10,816*	-5,998*	-2,188**	-3,723*	-2,965*
	Panel ADF	-11,882*	-11,257*	-5,095*	-6,549**	-2,957*	-5,114*
Among-group Statistics	**Grup ρ**	1,608	2,745	0,990	-0,760	1,095	-0,642
	Grup PP	-1,235***	0,608	-6,289*	-1,964**	-2,699*	-2,276**
	Grup ADF	-0,239	-1,881**	-2,995*	-3,201*	-2,402*	-2,503*

Note: Lag lenghts are determined according to Schwarz Information Criterion. (*), (**) and (***) symbols show that coefficients are statistically significant at %1, %5 and %10 levels respectively ..

Two different methods are used in the analysis in order to estimate causality relationship between variables. One of these methods is generalised Granger Causality Test formed by adding an error correction term (ECT) into Granger Causality Test; the other method is the Panel Causality Test developed by Holtz-Eakin, Newey and Rosen. Granger Causality Test added ECT is estimated through the equation below.

$$\Delta y_t = \beta_0 + \sum_{i=1}^{I} \beta_1 \Delta y_{t-i} + \sum_{j=1}^{L} \beta_2 \Delta x_{t-j} + \beta_3 \lambda_{t-1} + \varepsilon_t \qquad (5)$$

$$\Delta x_t = \gamma_0 + \sum_{i=1}^{M} \gamma_1 \Delta y_{t-i} + \sum_{j=1}^{N} \gamma_2 \Delta x_{t-j} + \gamma_3 \delta_{t-1} + \omega_t \qquad (6)$$

In these equations; I, L, M and N stand for optimal lag length; ε_t and ω_t show error terms without any serial correlation. λ and δ symbolizes the first lagged value of error terms which were derived from long-termed co-integration relation and which were showing the dimension of previous unbalancedness. Hereby, it is possible to reach long-term and short-term causality between y and x values. While β_1, β_2, γ_1 and γ_2 co-efficient in the equations numbered 5 and 6 define the short-term causality relation between variables in the model, β_3 ve γ_3 show the long-term causality. For the stability of the model, β_3 ve γ_3 co-efficient (co-efficient of error correction terms) should be negative. Thus, the system will incline to balance in the long-run after an outward shock (Şimşek and Kadılar, 2010:133).

Panel data causality results are estimated separately for panel OLS, fixed effects and random effects models, and presented in Table 5 and Table 6. Accordingly, the existence of long-run and short-run causality is realized the causality from FDI to GDP in the first analysis testing. According to estimations made in all of the models (panel OLS, fixed effects and random effects) in the short-run, FDI is the cause of GDP at 10 %, 5% and 5% confidence level respectively. In the long-run, according to fixed effects and random effects models, a strong meaningful causality is observed at the levels of 10% and 1% respectively.

Causality from GDP to FDI is tested in the second analysis; the analysis puts forth the existence of causality in the short and long terms in contrast to fixed effects model. While the causality test is meaningful at the level of 1 % in the short-run, it is meaningful at the level of 5 % in the long-run. It is estimated that there is short-run causality at the level of 1 % in other models.

Table 5: Granger Causality Error Correction Results [GDP=f(FDI)]

Panel OLS		Fixed Effects		Random Effects	
F-Test	**ECT**	**F-Test**	**ECT**	**F-Test**	**ECT**
2,324***	-1,971	2,396**	-0,421***	2,942**	0,111*
R^2 :0,28	F-Stat:4,649	R^2 :0,69	F-Stat:8,041	R^2 :0,32	F-Stat:5,883
DW:2,222	Prob:0,000	DW:2,177	Prob:0,00	DW:2,275	Prob:0,000

Note: ECT; Error Correction Term (*), (**) and (***) symbols show
that coefficients are statistically significant at %1, %5 and %10 levels
respectively.

Table 6: Granger Causality Error Correction Results [FDI=f(GDP)]

Panel OLS		Fixed Effects		Random Effects	
F-Test	**ECT**	**F-Test**	**ECT**	**F-Test**	**ECT**
13,155*	0,102	11,738*	0,417**	11,546*	0,039
R^2 :0,53	F-Stat:13,635	R^2 :0,63	F-Stat:9,644	R^2 :0,53	F-Stat:13,635
DW:2,175	Prob:0,000	DW:2,259	Prob:0,00	DW:2,178	Prob:0,000

Note: ECT; Error Correction Term (*), (**) and (***) symbols show that
coefficients are statistically significant at %1, %5 and %10 levels
respectively.

One of causality method used in this analysis is Holtz-Eakin, Neweyve Rosen panel causality test developed in 1988. Holtz-Eakin, Newey and Rosen adjusted causality test in the meaning of Granger by taking the difference of variables in order to purge them from fixed effects. They also suggested the use of instrumental variable set including difference and levels of variables (Öztürk et. al, 2011:63-64). For dual dynamic panel model,

$$y_{it} = \beta_0 + \sum_{j=1}^{n} \beta_j y_{it-j} + \sum_{j=1}^{n} \alpha_j x_{it-j} + f_i + \varepsilon_{it} \tag{7}$$

the relation between the variables of y_{it} and x_{it} is tested in the equation numbered (7). Hereby, f_i defines fixed effects; n defines the lag length; ε_{it} defines random error terms. The aim is to identify causality and its direction by testing whether or not y_{it} ve x_{it} variables are equal to zero as a group. The differenced model can be shown as below.

$$y_{it} - y_{it-1} = \sum_{j=1}^{n} \beta_j (y_{it-j} - y_{it-j-1}) + \sum_{j=1}^{n} \alpha_j (x_{it-j} - x_{it-j-1}) + (\varepsilon_{it} - \varepsilon_{it-1}) \tag{8}$$

The results reached from the equation numbered (8) are presented in Table 7. Accordingly, the argument putting forth that FDI is not a cause of GDP has been rejected at 1 % confidence level. In other words, FDI is a cause of GDP in ECO region. Similarly, the argument putting forth that GDP is not a cause of FDI has been rejected at 1 % confidence level. In that case, according to the results of Holtz-Eakin, Newey and Rosen panel causality test, there is a bi-directional causality relationship between GDP and FDI.

Table 7: Results of Holtz-Eakin, Newey and Rosen Panel Causality Test

Dependent Variables	Lag Lenght	Wald x^2 Test	F Test
GDP	4	13,668*	13,342*
FDI	4	61,361*	15,341*

Note: (*) symbol shows that coefficients are statistically significant at % 1 level.

6. Conclusion

The results reached at the end of this study aiming to analyse the effect of FDI inflow on GDP growth in ECO region show that FDI inflow has an utmost importance for the region. The data for 1995-2011 were used in the study. Granger Causality Test based on error correction model and Holtz-Eakin, Newey and Rosen Panel Causality Test are applied to variables. The results of the two causality tests notify a strong positive relation from FDI inflow to GDP. Any strong causality relation from GDP to FDI inflow is not observed. The results of the study coincide with the results of the previous similar studies (Değer and Emsen, 2006; Tandırcıoğlu and Özen, 2003).

The effect of FDI inflow on the economic growth achieved in process cannot be denied in the countries gained their independence after 1990s (primarily Azerbaijan, Kazakhstan, Turkmenistan and Uzbekistan). Especially the amount of FDI entering to energy sector has played a significant role in overcoming insufficiency of sources and in increasing employment. Besides, the problems stemming from the absence of a legal framework regulating FDI inflow has been overcome in due course. With the formulation of legal framework related to FDI inflow, the amount of FDI entering to these countries has increased. One of the positive influences of FDI inflow to ECO region is the acceleration of the transition of these countries into open market economies. That is, entrance of FDI or multi-national corporations has facilitated integration of ECO region countries into international system and enhanced their competitiveness at the global level.

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