# THE IMPACTS OF INWARD AND OUTWARD FDI ON INCOME INEQUALITY IN TURKEY AND SELECTED TURKIC REPUBLICS

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**Abstract**

*This study investigates the effects of inward and outward FDI on income inequality in Turkey, Azerbaijan, Georgia, Kazakhstan, Kyrgyzstan, Turkmenistan and Uzbekistan. The methodology covers panel cointegration techniques and balanced panel regressions. The conclusion is that inward and outward FDI have averagely a negative impact on income inequality in the long-run period but on the other hand the short-run effect of inward and outward FDI on income inequality is positive. The conclusion is robust to using different methods for estimation, sample selection and controlling for potential outliers.*

**Keywords**: *Balanced Panel Regressions; FDI; Income Inequality; Turkic Republics; Turkey*

**Jel Classification**s: *F21, D31, C23*

## I. INTRODUCTION

It is known that Foreign Direct Investment (FDI) is a long-term investment contribution of a specific country to another country. Two countries can have joint ventures, management and technology transfer with the assistance of FDI. FDI is categorized into two terms which are "Inward FDI" and "Outward FDI".

FDI is thought to have positive impacts on productivity and macroeconomic growth (Figini and Görg, 2011; Balcioglu, 2016). The value for global FDI was $1,35 trillion in 2012. FDI inflows to developing countries are much more flexible than flows to developed countries with a value of $703 billion in 2012 accounting for a 52 percent of global FDI. The outflows from developing countries were $426 billion (31 percent of the world total) (World Investment Report, 2013). Table 1 and Table 2 below indicate FDI flows in and out by region starting from 2010 and ending at 2012 with billion of dollars and in percentages respectively.

**Table 1: FDI Flows by Region for the Period 2010-2012 (Billions of Dollars)**

| Region | FDI Inflows | | | FDI Outflows | | |
|---|---|---|---|---|---|---|
| | 2010 | 2011 | 2012 | 2010 | 2011 | 2012 |
| **World** | **1,409** | **1,652** | **1,351** | **1,505** | **1,678** | **1,391** |
| Developed Economies | 696 | 820 | 561 | 1,030 | 1,183 | 909 |
| Developing Economies | 637 | 735 | 703 | 413 | 422 | 426 |
| Africa | 44 | 48 | 50 | 9 | 5 | 14 |
| Asia | 401 | 436 | 407 | 284 | 311 | 308 |
| East and South-East Asia | 313 | 343 | 326 | 254 | 271 | 275 |
| South Asia | 29 | 44 | 34 | 16 | 13 | 9 |
| West Asia | 59 | 49 | 47 | 13 | 26 | 24 |
| Latin America & the Caribbean | 190 | 249 | 244 | 119 | 105 | 103 |
| Ocenia | 3 | 2 | 2 | 1 | 1 | 1 |
| Transition Economies | 75 | 96 | 87 | 62 | 73 | 55 |
| **Structurally Weak, Vulnerable and Small Economies** | **45** | **56** | **60** | **12** | **10** | **10** |
| Least Developed Countries | 19 | 21 | 26 | 3 | 3 | 5 |
| Landlocked Developing Countries | 27 | 34 | 35 | 9,3 | 5,5 | 3,1 |
| Small Island Developing States | 4,7 | 5,6 | 6,2 | 0,3 | 1,8 | 1,8 |

**Source:** World Investment Report, 2013

From Table 2, it can be seen that transition economies have more FDI inflows and outflows than the regions: Africa, South Asia, West Asia and Ocenia. In the future coming years, there could be good expectations about the increase of the FDI inflows and FDI outflows related with those countries.

**Table 2: FDI Flows by Region for the Period 2010-2012 (in Percentage)**

| Region | FDI Inflows | | | FDI Outflows | | |
|---|---|---|---|---|---|---|
| | 2010 | 2011 | 2012 | 2010 | 2011 | 2012 |
| **Percentage Share in World FDI Flows** | | | | | | |
| Developed Economies | 49,4 | 49,7 | 41,5 | 68,4 | 70,5 | 65,4 |
| Developing Economies | 45,2 | 44,5 | 52 | 27,5 | 25,2 | 30,6 |
| Africa | 3,1 | 2,9 | 3,7 | 0,6 | 0,3 | 1 |
| Asia | 28,4 | 26,4 | 30,1 | 18,9 | 18,5 | 22,2 |
| East and South-East Asia | 22,2 | 20,8 | 24,1 | 16,9 | 16,2 | 19,8 |
| South Asia | 2 | 2,7 | 2,5 | 1,1 | 0,8 | 0,7 |
| West Asia | 4,2 | 3 | 3,5 | 0,9 | 1,6 | 1,7 |
| Latin America & the Caribbean | 13,5 | 15,1 | 18,1 | 7,9 | 6,3 | 7,4 |
| Ocenia | 0,2 | 0,1 | 0,2 | 0 | 0,1 | 0 |
| Transition Economies | 5,3 | 5,8 | 6,5 | 4,1 | 4,3 | 4 |
| **Structurally Weak, Vulnerable and Small Economies** | **3,2** | **3,4** | **4,4** | **0,8** | **0,6** | **0,7** |
| Least Developed Countries | 1,3 | 1,3 | 1,9 | 0,2 | 0,2 | 0,4 |
| Landlocked Developing Countries | 1,9 | 2,1 | 2,6 | 0,6 | 0,3 | 0,2 |
| Small Island Developing States | 0,3 | 0,3 | 0,5 | 0 | 0,1 | 0,1 |

**Source:** World Investment Report, 2013

In this study, the specific countries other than Turkey have transition economies and they are trying to recover from the negative impacts of the collapse of the Soviet Union in 1991. Turkic Republics have underdeveloped economies based on export of raw materials in exchange for assistance from Russia. With the collapse of the Soviet Union, it had been almost impossible for them to export their products (Gouliev, 1997; Vand derleeuw, 1997). These countries also struggle with low income level, high level of unemployment and low utilization level of industrial capacity. Therefore, after 1991, Turkic Republics have started a slow transition process which is called "from plan to market economy" through economic reforms and privatization (Melo et al., 1997; Aslund, 2001). In the case of Turkey, it can be said that it has an emerging market economy (IMF, 2011) and according to CIA the country is one of the world's newly industrialized countries.

The effects of FDI are discussed through the literature with the main focus on inward and outward FDI; not the casual links between them and the inequality. For example: the paper by Nunnenkamp et al. (2008) explaines a general equilibrium analysis of the medium and long-run effect of FDI inflows on income distribution and poverty in Bolivia. The study shows that FDI increases income disparities between the regions of rural and urban.

Chintrakarn et al. (2012) point out that the inequality effects of inward FDI are variable across USA states. Feenstra and Hanson (1997); Lipsey (2002) mention about North-South models in order to see the effects of inward and outward FDI within the North American Free Trade (NAFTA). Becker et al. (2005) discusses that outward FDI by German firms is attracted by host countries with highly skilled labors. Arndt (1997) and Marin (2004) discuss that the allocation of labor-intensive production through outward FDI could improve the competitiveness and productivity of the parent firm.

The aim of this paper is to find out the effects of inward and outward FDI on income inequality in Turkey, Azerbaijan, Georgia, Kazakhstan, Kyrgyzstan, Turkmenistan and Uzbekistan for the period of 1992-2012. The study is most probably the first attempt to investigate the impacts of inward and outward FDI on income inequality in Turkey and selected Turkic Republics that assess the casual links between inward and outward FDI and inequality.

This paper is structured in this way: Section two deals with the methodology with theoretical background. Section three explains data and analysis while section four presents conclusions.

## II. METHODOLOGY WITH THEORETICAL BACKGROUND

In this section, the correlation between FDI (inward and outward) and income inequality in Turkey, Azerbaijan, Georgia, Kazakhstan, Kyrgyzstan, Turkmenistan and Uzbekistan is investigated by the model used by Chintrakarn et al. (2012).

The model for inward FDI is:

$$II_{it}=a_i+\mu_i t+b^{IFDI}(IFDI/GDP)_{it}+e^{IFDI}_{it} \quad (1)$$

where

$II_{it}$: income inequality over time periods t=1,...,T and countries i=1,...,N

$(IFDI/GDP)_{it}$: ratio of INWARD FDI to GDP in percentage values over time periods t=1,...,T and countries i=1,...,N

$b^{IFDI}$: measure the long-run effect of inward FDI on inequality

$a_i$: country -specific fixed effects

$\mu_i$: country-specific deterministic time trends

The model for outward FDI is:

$$II_{it}=a_i+\mu_i t+b^{OFDI}(OFDI/GDP)_{it}+e^{OFDI}_{it} \quad (2)$$

where

$(OFDI/GDP)_{it}$: ratio of OUTWARD FDI to GDP in percentage values over time periods t=1,...,T and countries i=1,...,N

$B^{OFDI}$: measures the long-run effect of outward FDI on inequality

All the other definitions for the variables are as defined above.

Equation (1) and (2) assume that i-there is a long-run relationship between income inequality and inward FDI-to-GDP ratio and ii-there is a long-run relationship between income inequality and outward FDI-to-GDP ratio respectively. Whenever the data are applied, the expectation is to see non-stationary behavior with the individual time series for inward FDI/GDP, outward FDI/GDP and income inequality. Then the expectation is to see two cointegrating relationships; one between $II_{it}$ and $(IFDI/GDP)_{it}$ and the other one between $II_{it}$ and $(IFDI/GDP)_{it}$.

The advantage of cointegration analysis is to have a stationary error term ($e_{it}$) showing that relevant non-stationary variables are not omitted. It is known that an important indication of getting cointegration is that no relevant non-stationary variables in the cointegrating vector are omitted. Therefore cointegration estimators are robust to the omission of variables that are not part of the cointegrating relationship. This justifies reduced form models as written in equation (1) and (2).

Equations (1) and (2) assume that inequality is endogenous as well. This assumptions show that changes in inward and outward FDI cause changes in income inequality. Long-run Granger causality in at least one direction is also implied with the existence of cointegration. It is said that causality could run from income inequality to inward and outward FDI. The required empirical work starts with examining the unit-root properties of the variables, testing if the variables are cointegrated or not, dealing with the potential endogeneity problem and looking for the direction of causality. The final empirical work deals with the potential cross-country heterogeneity between FDI and inequality.

## III. PRESENTATION OF DATA AND ANALYSIS

In this section, FDI stocks /GDP is accepted as the main measure of FDI like in the studies of Chintrakarn et al. (2012) and Figini and Görg (2011). The reason under it is that; stocks may capture long-run effects more effectively than annual FDI flows. FDI flows /GDP are also used to investigate the robustness of the findings. World Development Indicators Online is used to gather the data on the percentage ratios of net FDI inflows and outflows to GDP and UNCTAD's FDI database is used to collect data for the percentage ratios of inward and outward FDI stocks to GDP. The estimated household income inequality (EHII) data set developed by the University of Texas Inequality Project (UTIP) is considered. The main advantage of this EHII data set is to be fully comparable across space and time. The EHII index is forecasted by using the information from the Deninger-Squire data set combined with UTIP-UNIDO set and is in GINI format. Mainly, the EHII index is constructed (Galbraith and Kum, 2005) by making regression on the Deninger-Squire Gini indices on the UTIP_UNIDO Theil inequality measures and using the forecasted values as estimated Gini coefficients. Aggregate measures of inequality have benefits of capturing overall inequality as the EHII Gini. Therefore interpolatrion and extrapolation are done for the missing values of the UTIP_UNIDO data using the growth rate of EHII Gini coefficients. It is known that panel cointegration methods can be implemented with shorter data sets when compared with their time-series counterparts and Table 3 presents the information about the countries with means for $EHII_{it}$, $(IFDI/GDP)_{it}$ and $(OFDI/GDP)_{it}$. Data for $EHII_{it}$, $(IFDI/GDP)_{it}$ and $(OFDI/GDP)_{it}$ are available for the period of 1992-2012 (21 years) which shows a balanced panel of 147 total observations for 7 countries.

**Table 3: Countries with Means for the Considered Variables**

| Country | Mean of $EHII_{it}$ | Mean of $(IFDI/GDP)_{it}$ | Mean of $(OFDI/GDP)_{it}$ |
|---|---|---|---|
| Turkey | 46,43 | 8,84 | 7,21 |
| Azerbaijan | 48,24 | 6,47 | 5,84 |
| Georgia | 52,36 | 5,78 | 4,93 |
| Kazakhstan | 49.41 | 6,31 | 5,71 |
| Kyrgyzstan | 54,21 | 4,61 | 4,05 |
| Turkmenistan | 51,78 | 5,82 | 5,05 |
| Uzbekistan | 54,73 | 4,57 | 4,13 |

In this part, the long-run effects of inward and outward FDI on inequality are also investigated. Panel cointegration techniques are used in order to control for omitted-variable and endogeneity bias. After finding the unit-root and cointegration properties of the given variables, the long-run relationship between $EHII_{it}$ and $(IFDI/GDP)_{it}$ and between $EHII_{it}$ and $(OFDI/GDP)_{it}$ is considered and then the robustness of the results. Then the direction of causality between the three variables and the degree of heterogeneity are examined.

**Panel Unit-Root and Cointegration**

Table 4 presents the results of the panel unit-root tests.

**Table 4: Panel Unit-Root Tests**

| Variables | Deterministic Terms | LLC Statistics | B Statistics | IPS Statistics |
|---|---|---|---|---|
| $EHII_{it}$ | c,t | 1,61 | 0,21 | -0,04 |
| $(IFDI/GDP)_{it}$ | c,t | 12,28 | 4,86 | 5,76 |
| $(OFDI/GDP)_{it}$ | c,t | 16,35 | 2,24 | 7,98 |

**Note:**

c,t shows that different intercepts and time trends for each country are considered and for adjusting autocorrelation, three lags are selected.

LLC stands for the test recommended by Levin et al. (2002), B denotes the test of Breitung (2000) and IPS shows the test done by Im. Et al. (2003). Augmented Dickey-Fuller type t-statistics are considered. While IPS test allows the autoregressive parameter for varying across countries, LLC and B tests restrict the first-order autoregressive parameter to be same for all countries.

Larson et al. (2001) which is based on Johansen's (1988) is considered. Larson et al. (2001) accepts all the variables as potentially endogenous therefore it prevents the normalization problems occurred in residual-based cointegration tests and enables the determination of the number of cointegrating vectors.

Larson et al. (2001) contains the Johansen vector-error-correction model for each country separately:

$$\Delta y_{it}=\Pi_i y_{it-1}+\sum_{i=1}^{k_i} \acute{\Gamma}_{ik}\Delta y_{it-k} +D_{it}\gamma_i+\varepsilon_{it} \quad (3)$$

where

$y_{it}$ is a n*1 vector of endogenous variables; n is the number of variables

$\Pi_i$ is the long-run matrix of order n*n

$D_{it}$ indicates deterministic terms (constants and time trends)

$k_i$ is the lag order

The null hypothesis accepts the condition where all of the N countries in the panel have a common cointegrating rank. The alternative hypothesis is that all the cross-sections have a higher rank. In order to test the null hypothesis against alternative hypothesis, a panel cointegration rank trace-test statistic is calculated by using the mean of the individual trace statistics:

$$\overline{LR}_{NT}[H(r)/H(n)]=(1/N)\sum_{i=1}^{N} LR_{iT}[H(r)/H(n)] \quad (4)$$

where n rows show error-correction coefficients and r columns represents the cointegrating vectors.
The standardized form is:

$$\overline{\Psi}_{LR}[H(r)/H(n)]=[\sqrt{N}(LR_{NT}[H(r)/H(n)]-E(Z_k)]/\sqrt{Var(Z_k)}\rightarrow N(0,1) \quad (5)$$

where

$E(Z_k)$ is the mean of asymptotic trace statistic

$Var(Z_k)$ is the variance of the asymptotic statistic

They are tabulated by Breitung (2005) for the model considered in this study.

The Fisher statistic proposed by Madalla and Wu (1999) is also calculated:

N

$$\lambda=-2\Sigma_{i} \log(n_i) \quad (6)$$

where

$n_i$ is the n value of the trace statistic for country i. It is calculated from response surface estimates in the study of MacKinnon et al. (1999). The distribution of Fisher statistic is $\chi^2$ with N*2 degrees of freedom. Table 5 presents the results of the tests mentioned above.

**Table 5: Decision of the Number of Cointegrating Vectors**

| | Cointegrating Rank | | |
|---|---|---|---|
| | r=0 | r=1 | r=2 |
| Panel Trace Statistics | 8,25* | 3,12* | -0,13 |
| Fisher Statistics | 86,04* | 37,59 | 13,24 |

**Note:*** shows rejection of the null hypothesis. The null hypothesis is the number of cointegration vectors that is less than or equal to r for the 1% level. Schwarz criterion decides the number of lags with max of two lags. The panel trace statistic is asymptotically normally distributed. The trace statistic diverges to positive infinity under the alternative hypothesis. The idea is to be able to reject the null hypothesis by using the right tail of the normal distribution. The distribution of Fisher statistic is $\chi^2$ with N*2 degrees of freedom.

Table 6 indicates the results that show there is no cointegration between $(OFDI/GDP)_{it}$ and $(IFDI/GDP)_{it}$. $EHII_{it}$ and $(IFDI/GDP)_{it}$ and $EHII_{it}$ and $(OFDI/GDP)_{it}$ form cointegration relationships as mentioned in equations (1) and (2).

In order to test for the cointegrating vectors, the study of Pedroni (1999) is used and the results are presented in Table 6.

**Table 6: Pedroni (1999)'s Test Results for Cointegration**

| | Between $EHII_{it}$ and $(IFDI/GDP)_{it}$ | Between $EHII_{it}$ and $(OFDI/GDP)_{it}$ | Between $(OFDI/GDP)_{it}$ and $(IFDI/GDP)_{it}$ |
|---|---|---|---|
| Panel PP t-statistic | -4,21* | -3,87* | -1,12 |
| Panel ADF t-statistic | -4,13* | -3,81* | -0,68 |
| Group PP t-statistic | -5,64* | -5,02* | -0,41 |
| Group ADF t-statistic | -5,73* | -5,93* | 0,38 |

**Note**: *shows a rejection of the null hypothesis of no cointegration at the 1% significance level. Schwarz criterion is used in order to decide the number of lags and the maximum number of lags which is accepted to be 3 lags.

**Long-run Relationships**

The dynamic OLS estimator is used in order to estimate the long-run impacts of inward and outward FDI on income inequality. It is easy to control for the potential endogeneity of inward and outward FDI with this estimator because it creates unbiased and asymptotically efficient estimates even with endogenous regressors.

The study by Kao and Chiang (2000) indicate the pooled within-dimension DOLS models for equations (1) and (2) which can be written as follows:

$$EHII_{it}=a_i+\delta_i t+b^{IFDI}(IFDI/GDP)_{it}+\Sigma_{j=-k}^{k}\varphi_{ij}^{IFDI}\Delta(IFDI/GDP)_{it-j}+\varepsilon^{IFDI}_{it} \quad (7)$$

$$EHII_{it}=a_i+\delta_i t+b^{OFDI}(OFDI/GDP)_{it}+\Sigma_{j=-k}^{k}\varphi_{ij}^{OFDI}\Delta(OFDI/GDP)_{it-j}+\varepsilon^{OFDI}_{it} \quad (8)$$

where

$\varphi ij^{IFDI}$ and $\varphi ij^{OFDI}$ are coefficients of lead and lag differences. The coefficients look for possible serial correlation and endogeneity of the regressors.

The pooled DOLS models are estimated by generalized least squares (GLS) with cross-section weights to investigate for cross-sectional heteroskedasticity as mentioned in the study of Arnold and Roelands (2010). White cross-section method is used in order to calculate the standard errors.

From the obtained results, which are presented in Table 7, it is understood that the coefficient of $(IFDI/GDP)_{it}$ is considerably significant and negative. The meaning is that FDI reduces income inequality in the considered countries in the long-run. The estimated coefficient on outward FDI is also negative and statistically significant.

**Table 7: Long-run Effects of $(IFDI/GDP)_{it}$ and $(OFDI/GDP)_{it}$ on $EHII_{it}$**

| | $(IFDI/GDP)_{it}$ | $(OFDI/GDP)_{it}$ | No of Countries |
|---|---|---|---|
| Within-dimension DOLS estimator Kao and Chiang (2000) | -0,223*(-4,38) | -0,142*(-3,52) | 7 |
| DOLS mean group estimator Pedroni (2001) | -0,148*(-3,78) | -0,329*(-3,41) | 7 |
| 2-step system estimator Breitung (2005) | -0,157*(-5,46) | -0,141*(-5,47) | 7 |

**Note**:* shows significance level at 1 %. t-statistics are presented in the parenthesis. The DOLS regressions are estimated with one lag and one lead with max of two lags based on Johansen-based Breitung (2005)

**Robustness**

The robustness of the negative effect of (inward and outward) FDI on income inequality is examined by several sensitivity tests suggested by Pedroni (2001) and Breitung (2005). The results are shown in Table 7.

**Outliers**

It should be understood whether the negative coefficients on $(IFDI/GDP)_{it}$ and $(OFDI/GDP)_{it}$ are not related with outliers since the number of countries is small. The DOLS regressions are re-estimated with the exclusion of one country at a time from the sample. The estimated coefficients and their t-statistics show that the negative inequality effects are not the result of individual outliers.

**Long-run Causality and Short-run Dynamics**

It is known that causality may run from inward and outward FDI to inequality and from inequality to inward and outward FDI. The residuals from the individual DOLS long-run relations are considered in order to test the direction of long-run causality and to find the short-run dynamics. The equations are as follows:

$$ec_{it}^{IFDI}=EHII_{it}-[est.a_i+est.\delta_i t+est.b_i^{IFDI}\,(IFDI/GDP)_{it}] \quad (9)$$

where est. stands for estimated

$$ec_{it}^{OFDI}=EHII_{it}-[est.a_i+est.\delta_i t+est.b_i^{OFDI}\,(OFDI/GDP)_{it}] \quad (10)$$

The error correction terms in the three-equation VECM model are:

$$\Delta EHII_{it}=c_{1i}+\alpha_1^{IFDI}ec_{it-1}^{IFDI}+\alpha_1^{OFDI}ec_{it-1}^{OFDI}+\sum_{j=1}^{k}b_{11j}\Delta EHII_{it-j}+\sum_{j=1}^{k}b_{12j}\Delta(IFDI/GDP)_{it-j}+\sum_{j=1}^{k}b_{13j}\Delta(OFDI/GDP)_{it-j}+\xi_{1it} \quad (11)$$

$$\Delta(IFDI/GDP)_{it}=c_{2i}+\alpha_2^{IFDI}ec_{it-1}^{IFDI}+\alpha_2^{OFDI}ec_{it-1}^{OFDI}+\sum_{j=1}^{k}b_{21j}\Delta EHII_{it-j}+\sum_{j=1}^{k}b_{22j}\Delta(IFDI/GDP)_{it-j}+\sum_{j=1}^{k}b_{23j}\Delta(OFDI/GDP)_{it-j}+\xi_{2it} \quad (12)$$

$$\Delta(OFDI/GDP)_{it}=c_{3i}+\alpha_3^{IFDI}ec_{it-1}^{IFDI}+\alpha_3^{OFDI}ec_{it-1}^{OFDI}+\sum_{j=1}^{k}b_{31j}\Delta EHII_{it-j}+\sum_{j=1}^{k}b_{32j}\Delta(IFDI/GDP)_{it-j}+\sum_{j=1}^{k}b_{33j}\Delta(OFDI/GDP)_{it-j}+\xi_{3it} \quad (13)$$

where

$c_i$ is the fixed effect,

$ec_{it}^{IFDI}$, $ec_{it}^{OFDI}$ stand for errors or deviations from the equilibrium points,

$\alpha_i^{IFDI}$ is the adjustment coefficient that determines how sensitive are $EHII_{it}$ and $(IFDI/GDP)_{it}$, $EHII_{it}$ and $(OFDI/GDP)_{it}$ to deviations from the equilibriim points.

Granger theory mentions that at least one of these four adjustment coefficients must be non-zero if a long-run relationship is considered between variables.

Test for weak exogeneity is done according to the study of Herzer (2008). The test for weak exogeneity is started by first eliminating the insignificant short-dynamics according to the lowest t-values. The second step is the decision on the significance of the error-correction terms. All the variables in the VECM including the error-correction terms are stationary therefore it is a good fit to use the conventional t-tests.

Table 8 presents the results obtained from VECM.

**Table 8: VECM to Test Long-run Causality and Short-run Dynamics**

| Independent Variables | Dependent Variable $\Delta EHII_{it}$ | Dependent Variable $\Delta(IFDI/GDP)_{it}$ | Dependent Variable $\Delta(OFDI/GDP)_{it}$ |
|---|---|---|---|
| $ec_{it-1}^{IFDI}$ | -0,541* (-4,85) | 0,413* (2,54) | - |
| $ec_{it-1}^{OFDI}$ | -0,189* (-3,28) | - | 0,207*(2,98) |
| $\Delta EHII_{it-1}$ | - | - | - |
| $\Delta EHII_{it-2}$ | - | - | - |
| $\Delta(IFDI/GDP)_{it-1}$ | - | - | - |
| $\Delta(IFDI/GDP)_{it-2}$ | 0,120*(2,41) | - | - |
| $\Delta(OFDI/GDP)_{it-1}$ | 0,114*(4,47) | - | 0,186*(5,89) |
| $\Delta(OFDI/GDP)_{it-2}$ | - | - | - |
| No of Countries | 7 | 7 | 7 |

**Note:** * shows significance level at 1%. t-statistics are indicated in the parantheses. General-to-specific procedure with max of two lags decides the number of lags. The models are estimated by cross-section weighted GLS using White cross-section standard errors.

From Table 8, it can be concluded that inward and outward FDI have a positive causal effect on income inequality in the short-run and have a negative causal effect on income inequality in the long-run. These obtained results of the panel cointegration analysis do not definitely contradict the results of partial equilibrium studies for the short-term adjustment problems. In this study the long-term dimension is also considered.

**Individual Country Impacts**

The findings that are already obtained do not indicate that FDI has a negative long-run effect in each individual country. Table 9 shows the individual DOLS estimates of the coefficients for $(IFDI/GDP)_{it}$ and $(OFDI/GDP)_{it}$. The sample size of the study is small but there are studies that have cointegration analysis for individual countries with smaller time samples like (Irvin and Izurieta, 2000).

**Table 9: DOLS estimates for Individual Countries**

| | $(IFDI/GDP)_{it}$ | t-statistics | $(OFDI/GDP)_{it}$ | t-statistics | No of observations (no of years) |
|---|---|---|---|---|---|
| Turkey | -0,524* | -3,148 | -0,569* | -3,470 | 21 |
| Azerbaijan | -0,458** | -2,354 | -0,412** | -2,697 | 21 |
| Georgia | -0,689** | -2,783 | -0,743** | -2,813 | 21 |
| Kazakhstan | 1,245** | 2,578 | 1,147** | 2,314 | 21 |
| Kyrgyzstan | -0,987* | -3,124 | -0,897* | - 2,345 | 21 |
| Turkmenistan | 1,101* | 2,475 | 0,241* | 3,874 | 21 |
| Uzbekistan | 0,974** | 2,187 | 0,873* | 2,897 | 21 |

**Note**:*,** indicate significance level at 1% and 5% respectively

From Table 9, it is easily seen that the effects of inward and outward FDI on income inequality for Turkey, Azerbaijan and Georgia are individually negative where as the effects of inward and outward FDI on income inequality for Kazakhstan, Turkmenistan, Uzbekistan are individually positive.

## IV. CONCLUSIONS

The study makes the panel cointegration analysis for the correlation between FDI and income inequality for a sample of 7 countries for the period of 1992-2012 (21 years).

The findings for the considered sample can be summarized as followings:

i- inward and outward FDI have averagely a negative impact on income inequality in the long-run period
ii- the short-run effect of inward and outward FDI on income inequality is positive
iii- long-run causality runs in both directions
iv- significant differences in the long-run effects of FDI on income inequality for individual countries
v- inward and outward FDI have a negative causal effect on income inequality in the long-run period
vi- inward and outward FDI have a positive causal effect on income inequality in the long-run period

From this study, it is important to understand that policymakers of the countries should consider the effect of inward and outward FDI on income inequality for the short-run and long-run period while they focus on productivity and growth-promoting with the involvement of technology. The different effects of FDI on income inequality for individual countries could be investigated in more detailed ways but this study contributes to literature on the distributional effects of FDI especially for the countries having transition economies.

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