EFFECT OF FOREIGN DIRECT INVESTMENTS ON ECONOMIC GROWTH: AN EMPIRICAL ANALYSIS

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─**Abstract** ─
In this study effects of foreign direct investments (FDI) on economic growth were analysed by bounds testing approach (ARDL) developed by Pesaran et al. (2001) in the sample of Turkey by using the data of 1991:Q4-2013:Q1 periods. The series of goods and services exports which was thought to effect the growth were also included in the analysis. At the analysis result it was found that series were cointegrated. According to the empirical findings, the effect of foreign direct investments and exports on economic growth were observed as statistically significant and positive in accordance with our theoretical expectations. However, the effect of foreign direct investments is considerably at low level. In short term analysis coefficient of error correction term was found statistically significant and negative. Therefore, deviations occurred among variables converge to equilibrium level.

Key Words: *Foreign Direct Investment, Economic Growth, Export.*
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1-Introduction

Capital accumulation which is a restricted production factor is an important determiner in providing sustainable growth for developing countries. Foreign direct investments and free foreign trade are important instruments for the countries having insufficient capital accumulation in providing this. Economic growth differences of countries can be satisfied by transferring technologies between foreign direct investments and countries (Javornik, 2004). Because the foreign direct investment attracting country also transfers technology, qualified labour, institutional and administrative experience as well (Zhu and Tan, 2000). Technology transfer via foreign direct investment and expansion of it in production process contribute to economic growth (Grossman and Helpman, 1991).

Contributions of foreign direct investments to the national economy can be analysed in two groups. Foreign direct investments help to compensate the lack of domestic savings financing the investments (Yaprakli, 1998) and stimulate the economic growth via export channel (Sun, 1998). Also thanks to the foreign direct investments, with the increase in domestic competitive environment research and development (R&D) expenses increase, some positive externalities such as ensuring financial and commercial openness occur (Özcan and Arı, 2010).Foreign direct invested country becomes safe and investable in international market and goods produced in the country are provided to be recognized in foreign market. Competition increases with the foreign direct investments coming with new technologies and unproductive domestic companies become productive with the help of technology and human capital investments (Blomström and Wolff, 1989). Contributions of American companies in technological development of Far East countries such as Japan and Taiwan can be regarded in this context.

It is difficult for countries to sustain their economic growth in long term just depending on foreign direct investments. The most important point here is to provide the information and technology transfers coming with foreign direct investments to be internalized, developed and made them available in production process by domestic companies (Göçer, 2013).

Besides the contributions of foreign direct investments on economic growth, it is also claimed that they have negative effects. Foreign direct investments in the form of company combination and purchase (especially in the case of privatization of public institutions) may cause unemployment as a result of overemployed workers layoffs (Vergil and Ayaş, 2009; Peker and Göçer, 2010). Also the foreign direct investments providing their intermediate and final consumption goods from their affiliated companies abroad may increase the import, therefore the account deficit of the host country (Yalta, 2011). In the event of reduction in profit transfers and profit incomes of investing companies, moving the factory may cause high amount of capital output and reduction in employment (Mencinger, 2008).

Along with the globalization process today when economic integrations and mobility of investments have increased and open economy policies are implemented, the effects of foreign direct investments, exports and foreign trade on many macro-economic variables such as, especially economic growth of countries, employment, current account deficit, etc. have often been analysed. The general belief in literature is that foreign direct investments would contribute positively to factor prices (especially wages), factor efficiency, information and technology transfers, foreign trade balance and economic growth (Değer and Emsen, 2006).

While there is no consensus about the effect of FDI on economic growth, the view that this effect may change from one country to another and according to the developmental level, but it may generally be positive outweighs when the studies in literature are analysed. The leading studies claiming that the effect of FDI on economic growth is positive are; Papaioannou (2004), Varamini and Kalash (2010), Kottaridi and Stengos (2010), Ray (2012),Wang and Wong (2009), Değer and Emsen (2006), Li and Liu (2005), Chowdhury and Mavrotas (2005), Asheghian (2004), Zaman et al. (2012). We can represent as an example for the leading studies claiming that FDI have no effect or indirect effect on economic growth Katırcıoğlu (2009), Aslanoğlu (2002), Alıcı and Ucal (2003), Lyroudi et al. (2004).

2. Method and Empirical Findings

In our study covering the period 1991:Q4–2013:Q1 a total three variables and quarterly data were used. In the letter symbols for the variables, y shows real Gross Domestic Product, dyy shows foreign direct investments and x shows good and services exports. Variables were included in the analysis as percentage change. Variables were obtained from Central Bank of the Republic of Turkey (CBRT) website (http://evds.tcmb.gov.tr/).

In this study in order to investigate the effect of FDI on economic growth the bounds testing approach developed by Pesaran et al. (2001) was used. The series of goods and services exports which was thought to effect the growth were also included in the analysis. This approach is considered to be more useful when compared to the cointegration methods developed by Engle-Granger (1987), Johansen (1988) and Johansen-Juselius (1990). In these related methods the analysed series should have unit roots at level and they should be integrated at the same level when their difference are taken. Therefore, if one or a part of series is stationary at the level, cointegration relationship cannot be searched. However, there is no such restriction in bounds testing approach. Although the stationary levels of the series is different, the presence of cointegration relationship can be tested. Nonetheless, another advantage of the bounds testing approach is that estimation of model is possible with the data containing few observations (Narayan and Narayan, 2004:25).

Before starting the analysis, some tests and procedures about the variables in the study were carried out. First of all, stationary degrees of series were investigated by Augmented Dickey Fuller test and unit root test was carried out.

2.1. Unit Root Test

In order to be stationary of a time series, its average and variance mustn't change over time and its covariance between the two periods must depend just on the distance between the two periods, but not the period that this covariance is calculated (Gujarati, 1999). Since we see spurious regression problem in the models estimated by non-stationary time series (Granger and Newbold, 1974), the

results do not reflect the real relationship. In this case t and F testing results lose their validity. Therefore, it is only possible for the regression analysis performed with non-stationary time series to be significant and reflect the real relationships when there is a cointegration relationship between these time series (Gujarati, 1999).

In this study stationary degrees of variables were firstly analysed by using Dickey Fuller Test (1979). According to Table 1 presenting ADF test results, all variables are non-stationary at level in 5 % significance level. While FDI series is stationary at level, growth and exports series become stationary when their differences are taken at the first degree.

Table 1: ADF Unit Root Test Results

Variables	ADF Test		ADF Test		ADF Test	Critical Values		
						%1	%5	%10
y	-3.13[4]	*dyy*	-11.57[0]	*x*	-2.12[9]	-4.07	-3.46	-3.15
Δy	-7.92[3]	*Δdyy*	-8.34[3]	*Δx*	-3.00[7]	-3.51	-2.89	-2.58

Note: Δ symbol shows that the first differences of variables were taken. The values in [ ], shows the optimal lag length determined according to Akaike information criterion (AIC) for ADF test.

2.2. Cointegration Test

Level values of many variables are non-stationary. If there is a cointegration relationship between series, in other words series move together in long term, a spurious regression problem will not be faced in the analysis to be carried out by level values (Pesaran et al. 2001; Gujarati, 1999). However, dynamic behaviours of variables moving together in long term show some deviations from the equilibrium relationship (Enders, 1996).This is a basic characteristics of cointegrated variables and plays a determining role on short term dynamics. The dynamic model appearing along with this process is called as error correction model (Enders, 1995). In order to implement the bounds testing approach an unrestricted error correction model (UECM) is firstly set up. The adapted form of this model to our study is as follows:

$$\Delta y_{t} = \alpha_0 + \sum_{i=1}^{m} \alpha_{1i} \Delta y_{t-i} + \sum_{i=0}^{m} \alpha_{2i} \Delta dyy_{t-i} + \sum_{i=0}^{m} \alpha_{3i} \Delta x_{t-i} + \alpha_4 y_{t-1}$$

$$+ \alpha_5 dyy_{t-1} + \alpha_6 x_{t-1} + u_t \tag{1}$$

where m stands the optimum lag length, Δ stands for the difference operator, u_t stands for the error term and others with the abbreviated letters stand for the meanings in variable definitions. Optimum lag length in this study was determined by means of Akaike information criterion (AIC). According to Kamas and Joyce (1993), there must not be autocorrelation between the error terms of the model in the optimum lag length, so that the test would give reliable results. When successive dependency problem occurs in the minimum lag length of AIC, a higher AIC value of lag length is taken as the optimum lag length. The maximum lag length was taken as eight, the optimum lag length for the bounds testing was determined as five and it was observed that there is no autocorrelation in this lag length.

After determining the lag length, the process to test the cointegration relationship between variables started. The cointegration relationship between variables in the bounds testing approach is carried out via testing the null ($H_0 : \alpha_4 = \alpha_5 = \alpha_6 = 0$) hypothesis. Acceptance or rejection of the null hypothesis is determined by F test. The calculated F statistics value is compared to the upper and lower critical table values in Pesaran et al. (2001). In the first case, if the calculated F statistics value is lower than the lower critical value, it is decided that there is no cointegration relationship between the series. In the second case, if the calculated F statistics value is between the lower and upper critical value, a precise interpretation cannot be made, in other words we are ambivalent. In this case alternative cointegration methods should be tried. Finally, if the calculated F statistics value is more than table upper critical value, it is decided that there is a cointegration relationship between the series. According to this, in order to test the H_0 hypotesis, calculated F statistical value is compared to the critical values obtained from Pesaran et al. (2001) in Table 2. These critical values are given for one independent variable and 1% of significance.

Table 2: Bounds Testing Results

	k	F stat.	Lower Limit	Upper limit

Constant Model	2	3.49	2.17	3.19
Constant and Trend Model	2	3.44	2.63	3.35

Note: k, stands for the number of independent variable. Critical values are taken from Table CI(ii) and CI(iii) in Pesaran et al. (2001:300).

In Table 2 the calculated F statistics can be seen as higher than upper critical value. In this case, H_0 hypothesis is rejected and it is found that there is a cointegration relationship between the variables. Thus, because the cointegration relationship is determined, estimation process of the autoregressive distributed lag (ARDL) models started in order to investigate the long and short term relationships between the variables.

2.3. Long Term Analysis

ARDL model which is set up to analyse the long term relationship is formulated as follows:

$$y_t = \alpha_0 + \sum_{i=1}^{m} \alpha_{1i} y_{t-i} + \sum_{i=0}^{n} \alpha_{2i} dyy_{t-i} + \sum_{i=0}^{r} \alpha_{3i} x_{t-i} + u_t \tag{2}$$

where *m,n* and *r* are lag lengths and they are determined by using AIC. This transaction was carried out with the method that Kamas and Joyce (1993) proposed in their causality analyses so as to determine lag length. According to this, first of all, regression of the dependent variable was made according to its own regressive values, and the lag length of without autocorrelation model, which gives the lowest AIC value, was found. Then, by keeping the identified lag length of dependent variable stationary, regression models were formed with all possible regressions of the first independent variable, and by taking AIC value into consideration, regression number of this independent variable was identified. Optimum regression number was obtained by repeating similar transactions for other variables. According to this, a long term ARDL(5.2.3) model was determined for the constant and constant and trend models.

Diagnostic testing results of the model show that the estimation is successful. Breusch-Godfrey autocorrelation test, White heteroscedasticity test, Jarque-Bera normality test and Ramsey rest test statistics are at acceptable level.

In Table 3 the estimation results of the long term ARDL models and the long term coefficients calculated depending on these results are presented. According to Table 3, coefficients of FDI and exports variables are statistically significant and interpretable and it affected the economic growth positively in accordance with our theoretical expectations in both models. A 100% of increase in FDI and exports increases the economic growth with the rate of 2% and 12% in order. This result is interpreted as an important proof that FDI and exports have effects on economic growth. However, the effect of FDI on growth is too low in both models.

Table 3: Estimation Results and Coefficients of Long Term ARDL Model

Variables	Constant Model ARDL (5.2.3)		Constant and Trend Model ARDL (5.2.3)	
	Coefficient	t-statistics	Coefficient	t-statistics
dyy	0.0272	1.4244***	0.0254	1.3877***
x	0.1205	1.8819**	0.1201	1.8745**
C	2.1283	1.6784**	1.3837	0.6345
Diagnostic Tests				
R^2=0.73	$\chi^2_{BGAB}(2)=0.39(0.67)$		R^2=0.73	$\chi^2_{BGAB}(2)=0.37(0.69)$
$\overline{R}^2$=0.69	$\chi^2_{WDV}=1.08(0.38)$		$\overline{R}^2$=0.68	$\chi^2_{WDV}=1.11(0.36)$
F.ist.=15.87(0,00)	$\chi^2_{JBN}=0.86(0.64)$		F.ist.=14.49(0,00)	$\chi^2_{JBN}=0.51(0.77)$
DW=1.84	$\chi^2_{RRMKH}(2)=2.43(0.01)$		DW=1.84	$\chi^2_{RRMKH}(2)=2.41(0.01)$

Note: $\chi^2_{BGAB,}$ $\chi^2_{WDV,}$ χ^2_{JBN} and χ^2_{RRMKH} Breusch-Godfrey autocorrelation, White heteroscedasticity, Jarque-Bera normality test and Ramsey rest test statistics in order. The values in parentheses shows prob. values. ** and *** show 5% and 10% significance levels in order.

2.4. Short Term Analysis

Short term relationship between variables was again investigated by means of ARDL Error Correction Model based on bounds testing approach. According to this, adapted version of the model to our study is formulated as:

$$\Delta y_t = \alpha_0 + \alpha_1 ec_{t-1} + \sum_{i=1}^{m} \alpha_{2i}\Delta y_{t-i} + \sum_{i=0}^{n} \alpha_{3i}\Delta yy_{t-i} + \sum_{i=0}^{r} \alpha_{4i}\Delta x_{t-i} + u_t \qquad (3)$$

where, ec_{t-1} is error correction terms and it stands for one term lagged series of error terms series which is obtained from long term relationship. This coefficient for this variable points out how many of the deviations in short period will improve after one term. If the sign of this coefficient is negative, deviations occurring in the series will converge to the long term balance value; if it is positive, it will diverge from the long term balance value.

In this model, while the lag lengths of the variables are determined, the process in determining the long term ARDL model is repeated. For short term bounds testing ARDL(4.1.2) models were determined for the constant and constant and trend models.

Estimation results of ARDL(4.1.2) models are presented in Table 4. Diagnosis test results of the model show that estimation is successful. Breusch-Godfrey autocorrelation test, White heteroscedasticity test, Jarque-Bera normality test and Ramsey rest test statistics are at acceptable level.

Table 4: Error Correction Terms and Diagnostic Tests of Short Term ARDL(4.1.2) Models

Models	Error Correction Term Coefficient	t-statistics	
Constant	-0.4037	-3.9283*	
Constant and Trend	-0.4061	-3.9576*	
	Diagnostic Tests		
R^2=0.54	$\chi^2_{BGAB}(2)$=0.36(0.72)	R^2=0.54	$\chi^2_{BGAB}(2)$=0.31(0.73)
$\overline{R}^2$=0.48	χ^2_{WDV}=1.23(0.28)	$\overline{R}^2$=0.48	χ^2_{WDV}=1.30(0.24)
DW=1.84	χ^2_{JBN}=0.86(0.64)	DW=1.84	χ^2_{JBN}=0.51(0.77)
F=8.45(0,00)	$\chi^2_{RRMKH}(1)$=2.48(0.01)	F=8.49(0,00)	$\chi^2_{RRMKH}(1)$=2.45(0.01)

Note: $\chi^2_{BGAB},$ $\chi^2_{WDV},$ χ^2_{JBN} and χ^2_{RRMKH} Breusch-Godfrey autocorrelation, White heteroscedasticity, Jarque-Bera normality test and Ramsey rest test statistics in order. The values in parentheses shows prob. values. * show 1% significance level.

As can be seen in Table 4, coefficient of error correction term in both models is statistically significant and negative as expected. Therefore, the error correction term of the model works. In other words, the deviations in short term moving together with the series in long term disappear and series converge to long term balance value again.

3. Result and Policy Implications

In this study effect of FDI on economic growth in Turkish economy was investigated with ARDL bounds testing approach by using the data of 1991:Q4-2013:Q1 periods. Exports series which is thought to affect the growth was also included to the model. It was found that there was a cointegration relationship between the series. Long and short term relationships between series were analysed with ARDL method based on the bounds testing. At the analysis results, it was found that FDI and exports affected the economic growth at the statistically significant level and positively. However, the effects of FDI on the growth is highly low. The effect of exports is higher than FDI. In short term analysis it was found that error correction mechanism of the model works, in other words the deviations in short term moving together with the series in long term disappeared and series converged to long term balance relationship.

As a result, it was observed that FDI and exports in Turkey affected the economic growth positively in accordance with our expectations. A 100% of increase in FDI and exports increases the economic growth with the rate of 2% and 12% in order. Implementation of stimulations, foreign exchange policies and legal regulations stimulating the exports and decreasing the dependency on intermediate input imports by the decision makers will provide the sustainable growth. The effect of FDI on the economic growth is very low as opposed to our expectations. Unstable and low amount of FDI to Turkey and being most of the FDI the privatization of public institutions rather than establishing a new factory can be the reason for this. In order to reach high and sustainable growth rate like Asian countries (China, India), Turkey should attract more FDI. In order to attract FDI it would be appropriate to provide economic and political stability, to implement the necessary investment stimulations and legal and structural regulations and to present the country necessarily. In fact, credit rating of Turkey in November, 2012 rose to the investment-grade for the first time thanks to the strong economic program carried on since 2011.

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