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## **FOREIGN DIRECT INVESTMENT AND EXPORT IN TURKEY: A COINTEGRATION ANALYSIS**

### **Abstract:**

Foreign direct investment has an important role for developing countries. This study aims to investigate the impact of foreign direct investment on export in Turkey over the period of 1992:01-2014:05. The Johansen cointegration, impulse response functions and variance decomposition techniques are used in order to analyse the causal relationship between foreign direct investment and Turkish export. According to obtained findings there is a relationship between these variables in long term. In other words, foreign direct investment and export are cointegrated. Impulse response functions showed that Turkish export reacts positively to shocks in foreign direct investment. Empirical findings suggest that export is affected by foreign direct investment.

### **Keywords:**

Foreign Direct Investment, Turkish Export, Turkish Economy

**JEL Classification:** A10, F00, F21

## INTRODUCTION

Lack of savings is one of the major economic problems in developing countries. This situation makes the foreign capital important to fill savings gap. Foreign capital is mainly divided into two categories which are foreign portfolio investment (FPI) and foreign direct investment (FDI). "FPI includes investments by a resident entity in one country in the equity and debt securities of an enterprise resident in another country which seek primarily capital gains and do not necessarily reflect a significant and lasting interest in the enterprise. The category includes investments in bonds, notes, money market instruments and financial derivatives other than those included under direct investment, or in other words, investments which are both below the ten percent rule and do not involve affiliated enterprises. In addition to securities issued by enterprises, foreigners can also purchase sovereign bonds issued by governments" (UNCTAD, 1999: 4). According to OECD, "FDI is a category of cross-border investment made by a resident in one economy (the direct investor) with the objective of establishing a lasting interest in an enterprise (the direct investment enterprise) that is resident in an economy other than that of the direct investor. The motivation of the direct investor is a strategic long-term relationship with the direct investment enterprise to ensure a significant degree of influence by the direct investor in the management of the direct investment enterprise. The "lasting interest" is evidenced when the direct investor owns at least 10% of the voting power of the direct investment enterprise. Direct investment may also allow the direct investor to gain access to the economy of the direct investment enterprise which it might otherwise be unable to do. The objectives of direct investment are different from those of portfolio investment whereby investors do not generally expect to influence the management of the enterprise" (OECD, 2008: 17).

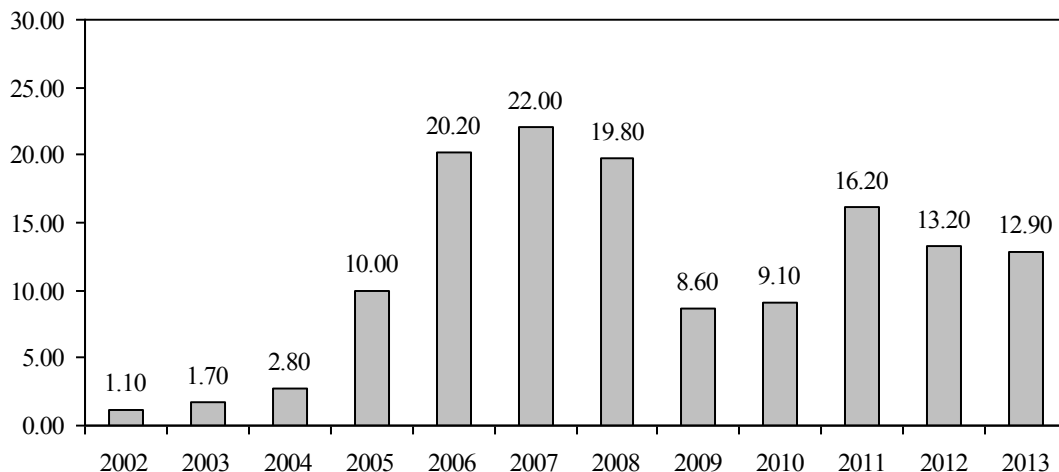
When compared to portfolio investments, the majority of the countries prefer FDI by taking economic returns into consideration. There is a vast literature related to the effects of FDIs on host country. Generally, direct investments enable transfer of capital, technology, management, organizational and marketing skills. For this reason, it is accepted that direct investments have positive effect on such variables as economic growth, employment, efficiency, prices and poverty. Furthermore, domestic enterprises can integrate with global markets more rapidly with this kind of investments.

At the same time, FDI has both direct and indirect effect on the export of host country. Increase in the export of host country as a result of sale of the products manufactured by foreign firms in host country reflects direct effect. Increase in export of host country by domestic firms being positively affected by foreign firms reflects indirect effect. Furthermore, there is not a consensus on the effect of FDI on export. The reason for that is that FDI can negatively affect export by externalizing domestic capital and accordingly domestic products. The objective of this study is to analyze econometrically how FDI has effect on export in Turkey for 2002-2014 periods with the help of monthly data. 2000s has a special place in FDI in Turkey. Even though neoliberal policies have been adopted since the beginning of 1980s in Turkey, not any significant development concerning FDI has been experienced up to 2000s.

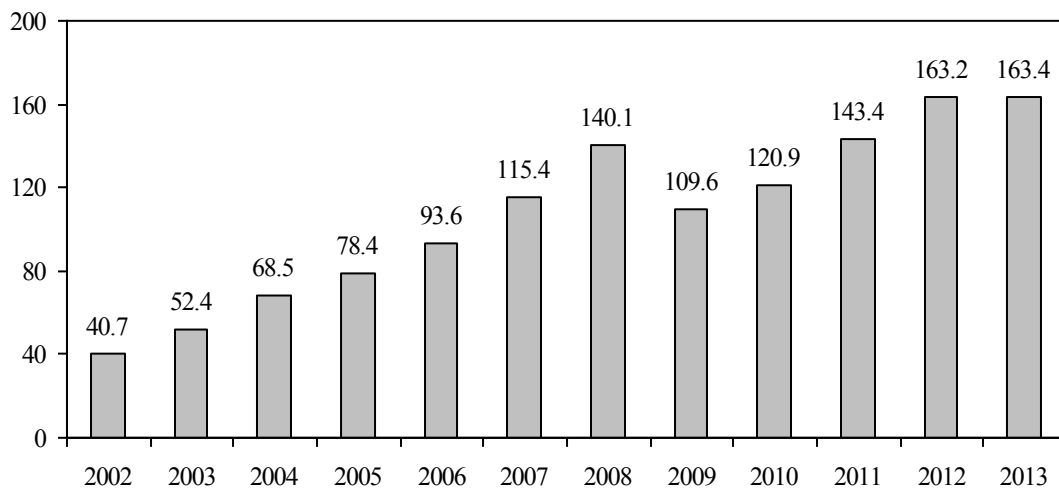
Thanks to economic and political stability, FDI inflows has increased substantially in the 2000s compared to the 1980s and 1990s in Turkey. While the accumulated FDI inflows to Turkey until the year 2002 accrued to only about USD 15 billion, it reached

to USD 138 billion between 2003-2013. FDI inflows to Turkey has had an upward trend especially since 2005, and it reached to USD 22 billion in 2007 as the highest level ever recorded. However, the country got affected by the decline in global FDI flows which due to the economic crisis in 2008, and since 2009 FDI inflows to Turkey has followed a fluctuating course (Republic of Turkey Ministry of Economy, 2013: 9). In this period, services and manufacturing sectors have attracted the highest amount of FDI. Majority of FDI inflows to Turkey from Europe, North America and the Gulf countries (www.invest.gov.tr 14/08/2014). Figure 1 shows the development of foreign direct investment in Turkey.

**Figure 1. FDI Inflows in Turkey, 2002-2013**



Positive developments in domestic and foreign macro equilibrium were reflected on the foreign trade of the country at this time period and the export of Turkey which had been 40 billion dollars in 2002, reached 163 billion dollars in 2013. However, as of the second half of 2007, financial crisis that increases its effect on especially developed countries' markets turned into a global scale crisis by evolving in short span of time with its negative effect on balances of economic units and uncertainty it generates. Weakening of demand in foreign markets to a great extent as a result of the crisis decreased the export of Turkey significantly. Expansionary policies commenced to be applied especially in developed countries to establish economic balances after crisis and positive results of aforementioned policies have been obtained gradually since 2010. The development in export at this period is shown in Figure 2.

**Figure 2. Turkish Export, 2002-2013**

Whether FDI has any contribution on the development of export or not and the quality of incoming direct investments will be assessed in this study. The rest of this paper is organized as follows: Section 2 introduces the selected literature, Section 3 presents data and econometric methodology, followed empirical results in Section 4. Summaries, conclusions and policy implications of the study are given in Section 5.

## LITERATURE REVIEW

A number of empirical studies on the relationship between foreign direct investment and export has been carried out using different estimation approaches. The literature offers inconsistent results on the relationship between foreign direct investment and export. Table 1 summarizes the various studies in this field.

**Table 1. Overview of Previous Studies**

Author	Methodology	Period	Country	Results
Haq (2013)	Ordinary Least Squares (OLS)	1980-2012	Pakistan	FDI has a positive impact on export
Çetin and Seker (2013)	Augmented Granger causality tests	1980-2009	8 developing countries	Toda-Yamamoto test indicates that there is a causal relationship between variables running from FDI to exports for Poland and Mexico, while the direction of causality is from exports to FDI for Pakistan and Turkey. Dolado-Lütkepohl test's findings exhibit that there is a uni-directional causality running from FDI to exports for Poland, while the direction of causality is from exports to FDI for Pakistan and Tayland.
Kuntluru et al. (2012)	Ordinary least squares (OLS)	1998-2005	India	FDI has a negative impact on export performance in pharmaceutical industry
Rutaihwa and Simwela (2012)	Ordinary least squares (OLS)	1989-2009	Tanzania	The contribution of FDI in mining sector have been weakly and exerting negative pressure on Tanzania's export performance
Yilmazer (2010)	Granger causality test	1991-2007	Turkey	There is no causality FDI and export
Wong and Tang (2009)	Granger non-causality approach	1999:3-2006:3	Malaysia	There is a unique long-run causal relationship running from exports to FDI but there is no evidence of long-run causality from FDI inflows to export
Bucevska (2009)	Panel data analysis	1997-2007	EU Candidate Countries	FDI has a positive and significant impact on the export performance of the three EU candidate countries
Wang et al. (2007)	Ordinary least squares (OLS)	1983-2002	China	FDI promotes exports
Pacheco-López (2005)	Granger causality test	1970-2000	Mexico	There is a bi-directional causality between FDI and export
Şen and Karagöz (2005)	Granger causality test	1994:4-2004:4	Turkey	There is no relationship between portfolio investments and export
Sun (2001)	Panel data analysis	1984-1997	China	FDI is an important factor contributing to the rapid growth of exports

## DATA AND METHODOLOGY

Monthly time series data, which covers the period 2002:01-2014:05, are utilised in this study. All the variables are expressed in logarithmic form. The variables used in this study are foreign direct investment (FDI) and export (EXP). These variables come from The Central Bank of Turkey (CBRT). The data and resources were shown at Table 2.

**Table 2. The Data Set**

Variable	Explanation	Resources
FDI	Foreign Direct Investment, \$	CBRT
EXP	Export, \$	CBRT

The following techniques were used for data analysis and evaluation:

- Unit Root Test
- Johansen Cointegration Test
- Impulse Response Function
- Variance Decomposition

## EMPIRICAL RESULTS

All the data series were tested for stationarity to avoid statistically spurious relationships. For this purpose the Augmented Dickey-Fuller unit root test was used and test results are presented in Table 3.

**Table 3. Results of ADF Unit Root Test**

Variables	Level	First Difference	Test Critical Values			Decision	Order of Integration
			1% level	5% level	10% level		
FDI	- 1.977756 (0.2964)	-12.25356 (0.0000)	- 3.476143	- 2.881541	- 2.577514	Nonstationary at level but stationary at first difference	<i>I</i> (1)
EXP	- 2.098577 (0.2457)	-13.88894 (0.0000)	- 3.478911	- 2.882748	- 2.578158	Nonstationary at level but stationary at first difference	<i>I</i> (1)

The unit root test results show that variables are non-stationary at level form but do not contain unit root after first differencing. Before the VAR model is estimated, the optimal lag length was chosen using the information criteria. The statistical output of lag length criteria test is presented in the Table 4.

**Table 4. VAR Model Lag Length Determination Criterion Results**

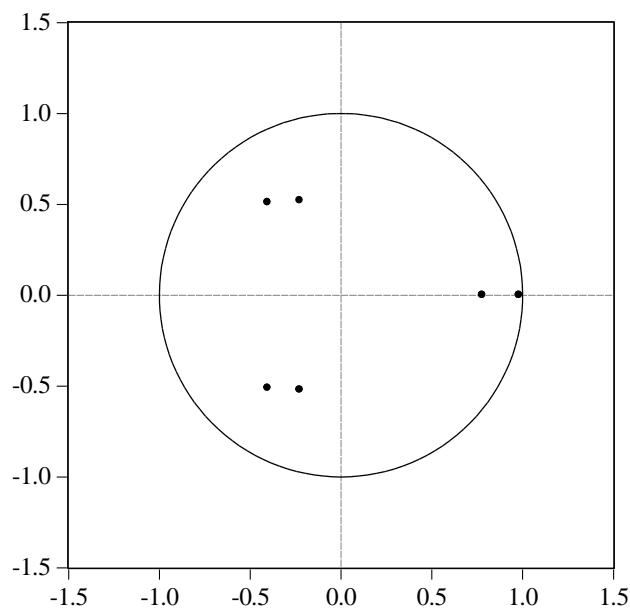
Lag	LogL	LR	FPE	AIC	SC	HQ
0	93.40443	NA	0.000972	-1.260751	-1.219692	-1.244067
1	285.7205	376.6742	7.24e-05	-3.858214	-3.735039	-3.808164
2	305.8572	38.88460	5.79e-05	-4.080789	-3.875497	-3.997372
3	322.0673	30.85508*	4.89e-05	-4.249204	-3.961795*	-4.132420*
4	326.5007	8.316406	4.87e-05*	-4.255181*	-3.885656	-4.105031

\* Shows the lag length selected by the criterion.

For robust estimation of VAR or VECM, optimal lag length is compulsory is capture autoregressive correlation in residuals of the estimated model (Phung-Tran and Trang-Le, 2014) The optimum lag length is 3 according to Schwarz and Hannan-Quinn information criteria.

The stability of the VAR model was tested using AR root graph which shows the inverse roots of the AR polynomial.

**Figure 3. Inverse Roots of AR Characteristic Polynomial**



The points in the graph are the inverse roots of the VAR model. It can be seen in the graph all the points are in the circle, which means the VAR(3) containing FDI and EXP is stationary.

In the next step of this study, Johansen cointegration test was used to determine the long-run relationship between the two variables. Results of the Johansen cointegration tests are reported in Table 5.

**Table 5. Results of Johansen Cointegration Test**

Number of Assumed Cointegration Equalities	Trace Test			Maximum Eigenvalue Test	
	Eigenvalue	Trace Statistic	0.05 Critical Value	Max-Eigen Statistic	0.05 Critical Value
0	0.172736	33.52245	25.87211	27.49654	19.38704
Maximum 1	0.040706	6.025906	12.51798	6.025906	12.51798

Both the Trace and Maximum-Eigenvalue tests indicate one cointegrating at the 5 percent level. Finding a cointegrating vector between FDI and EXP series indicate that there is a long run relationship for Turkey. Existence of a long run relationship between FDI and EXP shows that the behaviors of the variables in the short run may be addressed within the framework of vector error correction model (VECM). Results of the error correction model and Wald test conducted to determine the causal relationship between the variables in the short and long run are presented in Table 6.

**Table 6. Results of Vector Error Correction Model**

Dependent Variable	t test						t test ECT <sub>-1</sub>	Wald test
	$\Delta EXP_{t-1}$	$\Delta EXP_{t-2}$	$\Delta EXP_{t-3}$	$\Delta FDI_{t-1}$	$\Delta FDI_{t-2}$	$\Delta FDI_{t-3}$		
$\Delta EXP$	-0.478854 [-4.84862]	-0.216271 [-2.14444]	0.017845 [0.20719]	-0.096151 [-2.59597]	-0.088997 [-2.83910]	-0.053479 [-2.25000]	-0.174156 [-2.53415]	( $\Delta FDI_{t-1}; ECT_{-1}$ ) $\chi^2(2)=9.578099$

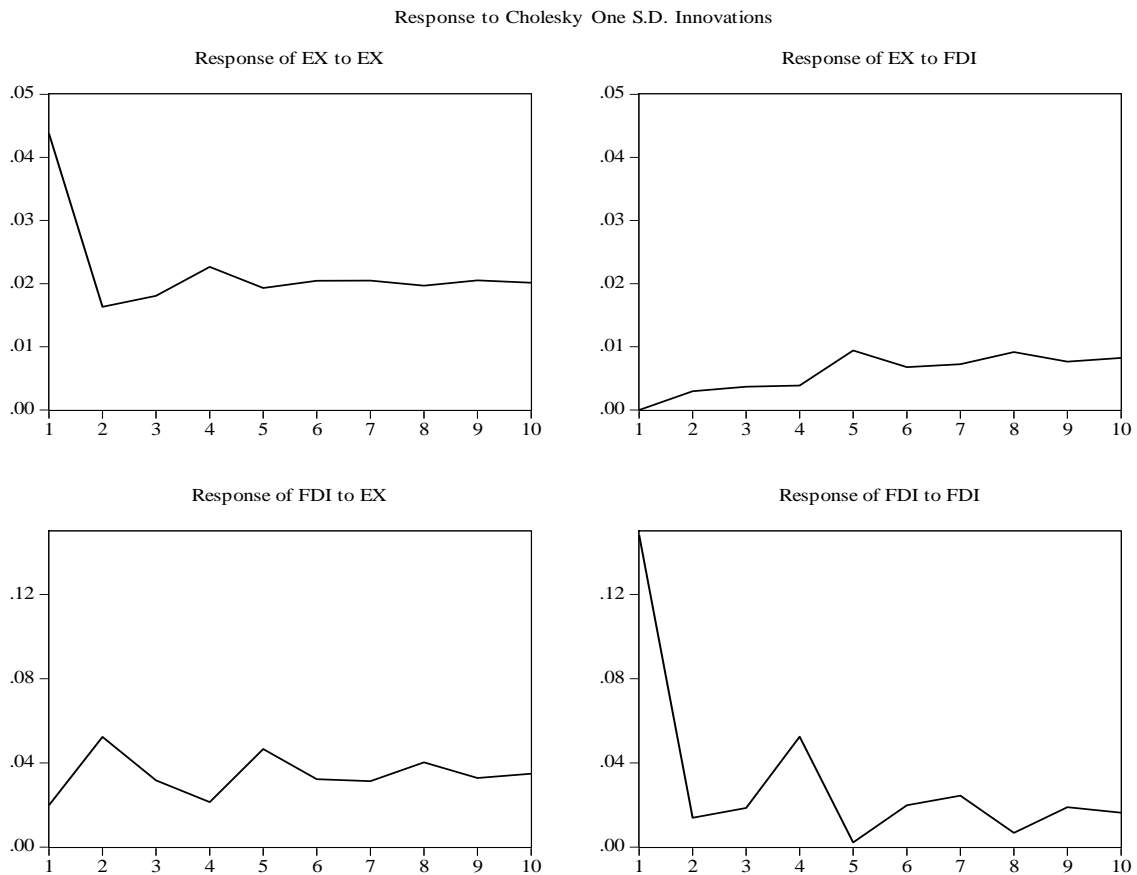
Values in [ ] show t statistics.

While Wald test results confirm that a causality relationship from international oil prices to current account deficit exists in the long run, t test results show that oil prices are not an explanatory variable on the current account deficit in the short run.

Finally, impulse response functions (IRF) are computed to analyse short run dynamics. IRF are used to track the responses of a system's variables to impulses of the system's shocks (Ronayne, 2011. 2). The impulse response function graphically illustrates the expected response of export to the innovation in foreign direct investment and by export itself and also show the response of foreign direct investment to the innovation in export and by foreign direct investment itself. This function enables characterization of the dynamic interactions among variables and allows us to observe the speed of adjustment of variables in the system. Figure 4 plots the response of export to shocks in foreign direct investment and vice versa.



### Figure 4. Impulse-Response Functions



According to impulse response functions, export is influenced by foreign direct investment. Similarly, shocks to the export has a positive impact on foreign direct investment at beginning.

### CONCLUSION

This study aims to determine relationship between foreign direct investment and export for Turkey from the period 2002:01-2014:05. For this purpose unit root test, Johansen cointegration test, vector error correction model and impulse response functions were applied. According to obtained results there is a relationship between these variables in the long run. Impulse response functions showed that a shock to the foreign direct investment has a positive impact on export. Similarly, a shock to the export has a positive impact on foreign direct investment at beginning. This findings indicates that FDI plays an important role for export-led growth in Turkey.

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