

How Do Foreign Direct Investment and Growth Interact in Turkey?

Erkan ILGUN^{*}, Karl-Josef KOCH^{**}, Mehmet ORHAN^{***}

Abstract

This paper empirically investigates the relation between growth and Foreign Direct Investment (FDI) in Turkey. There are mixed conclusions about the impact of FDI on growth and the literature includes many studies where FDI has negative, positive and no significant effects on growth. Turkey serves like an open lab for such empirical studies since the country has experienced high and persistent levels of inflation for about thirty years as well as several economic crises in the last decade after which the inflation is taken under control and high growth rates are attained. Furthermore, Turkey has managed to start receiving considerable FDI recently. We establish a VAR Model with 5 variables to examine the FDI-Growth relation and consequently the impulse-response analysis are carried out to see the impact of shocks on the variables entering the VAR equations. We also included the variance decomposition to work out the sources of variance in both growth and FDI. Our model provides empirical support to bi-directional causality between FDI and growth.

Keywords: Growth, FDI, VAR Models, Granger Causality, Impulse-Response Functions, Variance Decomposition.

JEL Classification Codes: C22, F43, O16.

* Department of Management, International Burch University, Sarajevo, Bosnia and Herzegovina, e-mail: erkan-ilguen@web.de

** Department of Economics, Siegen University, Germany, e-mail: koch@vwl.wiwi.uni-siegen.de

*** Corresponding author, Department of Economics, Fatih University, Istanbul, Turkey, e-mail: morhan@fatih.edu.tr.

1. Introduction

The relation between Foreign Direct Investment (FDI) and growth has been the focus of substantial research leading to massive empirical studies with a special point of interest forwarded to the direction of causality between the two. FDI as an important source of capital integrated to the domestic investment is associated with more job opportunities in the home country. Besides, it enhances the profiting possibilities of Multinational Companies (MNC) thereby helping both sides attain advantages. As endogenous models suggest FDI stimulates growth by diffusing technology to the recipient country. There is a huge gap of capital stock and technology between developed and undeveloped countries and FDI appears as a suitable means to fill the gap.

Globalisation advancing in the last decades especially with the improvement of the information technology and communication help so much in flows of factors of production over the globe. This process is better for all since all capital, technology and labor will be used more efficiently as long as the borders of the countries are open. MNCs make use of more and better information to decide on which country of the globe to invest. International investment does not necessarily flow from developed to developing countries. Less advanced sectors in developed countries constitute very profitable opportunities to the MNC situated at the frontier of Research and Development (R&D). Many MNCs find huge markets and profit opportunities in the slightly less advanced sectors of the developed countries. Besides, MNCs specialized in certain high-tech products that are originated in developing countries find opportunities to invest at the developing countries.

In order to advance growth, developing countries must have well-educated labor force and capital stock using high-technology. Regarding the qualified labor force, many developing countries are rich in population but they must provide education at all levels. Coming to the capital stock, they have to save more but this is not likely since the share of consumption in disposable income is much larger than saving because the majority of the population has to satisfy their basic needs in order to survive. On the other hand, the gap in technology between developing and developed countries is much more difficult to eliminate since developing countries cannot afford the too expensive R&D activities. The key solution to help developing countries remove their shortcomings in capital stock and technology simultaneously is to attract international investment, especially FDI. Romer (1993) claims that FDI is the quickest and most reliable way of getting rid of the gap¹. Romer (1986) and Sala-i-Martin (1996) claim that FDI brings technology to the target country as well.

This paper has the intention of exploring the FDI-growth relation in Turkey empirically. Research about the the FDI-growth relation in Turkey is surprisingly

¹ Romer (1993) mentions the gap of the idea which he defines in "A nation that lacks physical objects like factories and roads suffers from an object gap. A nation that lacks the knowledge used to create value in a modern economy suffers from an idea gap."

limited to the best of our knowledge. Turkey appears in the list of countries in some published papers but there are only a few papers focusing uniquely on Turkey one of which is a conference paper by Alici and Ucal (2003). The paper is now obsolete since it examines the causal link among exports, FDI and output over 1987-2002 when larger volumes of FDI were not attracted to the Turkish economy.

The main contribution of our paper is the search for the relation between FDI and growth in Turkey with more recent data and a short list of proper variables. The other contribution is the use of VAR framework which is more appropriate than others. We start with the Introduction in Section 1 followed by the Literature Survey in Section 2. Section 3 explains the methodology and data where Section 4 is devoted to empirical findings. Finally, Section 5 underlines the concluding remarks.

2. Literature Review

Research on the relation between FDI and growth is concentrated over a few aspects of the association. Some studies explore the existence of the relation as well as different features of it whereas much more focus on the direction of causality. These studies comprise of different variables of interest and conclude in various results. Roy and van der Berg (2006) claim that the lack of sufficient data is the main reason behind the mixed results. Since multinational firms are investing abroad for about two decades we do not have enough data to make reliable econometric analysis. Studies differ in their econometric methodology as well. One might think that the relation between FDI and growth is obvious but Choe (2003), for instance, fails to provide empirical evidence to the relation between FDI and economic growth in the framework of a VAR model with a sample of 80 countries over 1971-1995.

Still, almost all studies support positive association. Coming to the direction of causality; both routes are reasonable. Since the FDI flowing to a country will lead to further growth of the country, it is reasonable to think that causality runs from FDI to growth. On the other hand, if the country is growing rapidly, foreign investors will be more motivated to invest to take the share from the growing output. Among numerous papers, Chenery and Strout (1966), and Krueger (1987) claim that FDI leads to economic growth. Bende-Nabende et al (2003) used Johansen cointegration methodology and the corresponding vector error correction on a selection of East Asian countries to conclude in both negative and positive long-run relationship between FDI and growth. Furthermore, they reported significant spillover effects of less developed countries. Shan (2002) used the VAR together with variance decomposition and impulse response function analysis to examine the relation between FDI and several economic variables in China with quarterly data over 1986-1:1998-4. He reported the two-way-causality between FDI and output. Borensztein et al (1998) has published one of the pioneering papers in this topic. They tested the effect of FDI on economic growth with data from 69

developing countries in the framework of seemingly unrelated regression (SUR) estimation of panel data. Their main finding is that the effect of FDI to growth in the receiving country depends on the level of human capital in the home country.

Besides de Mello (1999) investigates the impact of FDI on output and total factor productivity using both time series and panel data over OECD and non-OECD countries. He concludes that the influence of FDI on growth depends on the degree of complementarity and substitution between FDI and domestic investment. In another empirical study, Balasubramanyam et al (1996) provides empirical leverage to the hypothesis of Bhagwati who states that the volume of incoming FDI varies according to whether a country is following export promoting or export substituting strategy. Chowdury and Mavrotas (2006) examine the causal relationship between FDI and growth to figure out the direction of causality for Chili, Malaysia and Thailand over 1969-2000. They conclude that it is GDP that causes FDI in the case of Chile and not vice versa, while for both Malaysia and Thailand, there is a strong evidence of a bi-directional causality.

Roy and van den Berg (2006) select USA as the FDI receiving country. They establish a simultaneous equation system (SEM) which concludes in the bi-directional relation between FDI and growth. Hansen and Rand (2005) analyse the Granger causality between FDI and growth for 31 developing countries over 31 years and they somehow empirically prove that FDI causes growth. Furthermore, Choe (2003), Chakraborty (2004), and Blomstrom et al (1996) all argue that economic growth promotes FDI. Choe, for instance, use data on 80 countries for the period 1971–95 and detect the two-way causation between FDI and growth where the causality is more apparent from growth to FDI. Bengoa et al (2003) analyses the panel data for a sample of 18 Latin American countries over 1970-1999 to conclude that FDI is positively correlated to economic growth in the host countries. But, Carkovic and Levine (2005) perform dynamic panel data estimation and does not find consistent results to support “FDI promotes growth”. Durham (2004) uses panel data on 80 countries over 1979–98 and fails to identify a positive relationship between FDI and economic growth. He suggests that the effects of FDI are contingent on the ‘absorptive capability’ of host countries.

It is not only the capital flowing with FDI, it is the know-how, technology, and the experience in organizing production at the same time. See Balasubramanyam et al (1996) and de Mello (1999) for details. FDI motivates growth through two channels according to de Mello (1997): Technological upgrading and knowledge transfers and the extent of FDI’s growth-enhancing depends on degree of complementarity and substitution between FDI and domestic investment.

Coming to the research focusing on FDI-Growth relation in Turkey, papers concentrating solely on Turkey is only a few. Kalyoncu and Ozturk (2007) examine the impact of FDI on Turkey and Pakistan over 1975-2004. They use the Engle-Granger cointegration and Granger causality tests and conclude that there is a bi-directional causality between two variables in Turkey. Yilmazel (2010) published a

more recent paper in Turkish where she examined the relation among FDI, exports, imports and growth with the help of quarterly data over 1991Q1-2007Q3. Her main conclusion is that there is no strong causality between FDI and growth justified. Besides, Katircioglu (2009) uses the bounds test for cointegration to work out the long-run equilibrium relation between FDI and growth in Turkey when FDI is the dependent variable. Mucuk and Demirsel (2009) conclude the long run relation between FDI and growth where they strangely argue that there maybe some disadvantages of FDI to growth possible. In a similar study, Demirel (2006) in his masters thesis follows the different estimation method of 3 SLS to figure out the determinants of FDI where he comes up with GDP, inflation, and investment (both public and private). On the other hand, the determinants of growth are reported as FDI and exports.

3. FDI in Turkey

Turkey had put many restrictions in front of international trade and investment in order to devote herself to state-controlled enterprises before 1980s. The economy could not produce due to inefficiencies in the public sector and Turkey had to go through a row of reforms. Turkey's commercial policy changed from the import substitution regime to the export-supporting growth strategy in early 1980s. The export oriented policy was introduced with several radical reforms as for example the liberalisation of the foreign exchange market, and encouragement of the FDI around Turkey in order to use the comparative advantages in international trade.

The government at that time noticed the increasing impact of globalisation on economies and Turkey had removed trade barriers in her economy for the purpose of using the advantages of the foreign resources. To accelerate the development of the economy the priority was given to international investments. There had to be a great increase in welfare in order to attain the living standards of the EU countries. FDI is the best alternative source of foreign capital for Turkey that would contribute to production as a complement of national savings. In contrast to portfolio investments, FDI is the more stable external capital resource and has the greater lasting effect once integrated to the domestic economy.

In 2002, the Turkish economy entered a new growth regime with election of the Justice and Development Party (AKP) who achieved to win two consecutive elections for the first time in the country's political history of the past fifteen years. In addition to full EU membership the present government has two main purposes in the agenda: Economic development and expansion and deepening of democratic principles. The financial sector that is blamed to cause the two last crises in the economy (November / December, 2000 and February, 2001) is taken under control with regulations and some institutions are founded to audit financial institutions regularly.

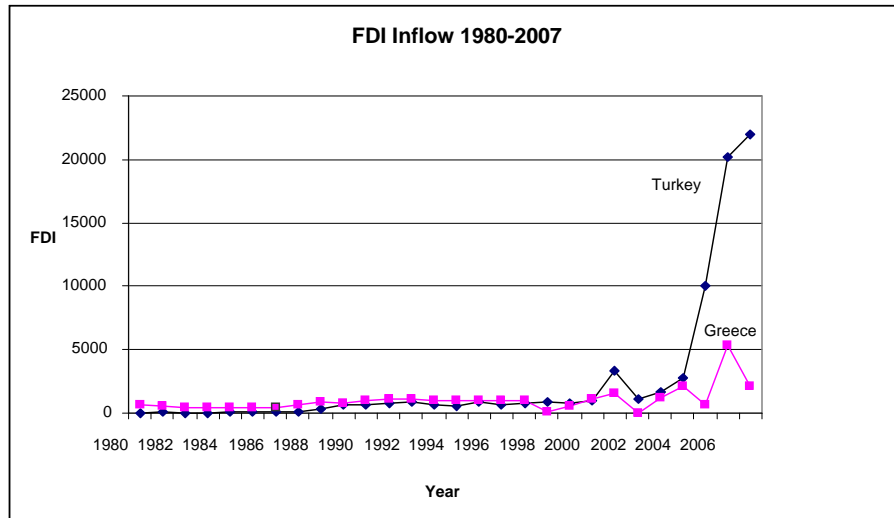


Figure 1. FDI flows to Turkey and Greece between 1980-2007 (June)

Source: Data from UNCTAD-Stat.

The main purpose of the program is the stabilisation of the macroeconomy with high growth rate and low unemployment. This program is to be achieved with a dynamic private sector and a smaller, but more effective public sector. On the way to be a member of the European Union (EU), Turkey is making necessary arrangements and plans to be a global competitor at least for some sectors. The country has a young population but FDI is inevitable to fill the gap in capital stock. Beside the geostrategic position of Turkey among three continents, the government makes legal and structural arrangements to provide incentives for foreign investors. These efforts were effective and Turkey managed to jump the FDI she has been receiving especially after 2002 mostly in terms of privatisation. We have plotted FDI received by Turkey in Figure 1. We have included the FDI inflow to Greece for a comparison of a similar country.

In spite of heights and depths, the progress in the relations between Turkey and the EU has been perceived as a positive signal at the international markets. Political stability, low inflation rate and other factors contributed knowingly to these optimistic developments. In 2005-2006, the average annual FDI is much higher compared to 1990-2004. The services sector attracted the majority of the FDI, including banking and telecommunication.

4. Methodology and Data

There are basically two lines of research to highlight the relation between growth and FDI. Some studies solve the simultaneous equation models where FDI and growth are the two components of the equations while the others follow more

time series oriented techniques of cointegration and VAR estimation. The problem of endogeneity is common to both lines of research. More recent studies prefer the time series techniques.

Sims (1982) had objected to the specification of the population regression functions on the basis of endogeneity. One standard assumption of the Gauss-Markov Theorem is the exogeneity of the covariates which brings the inconsistency of the OLS estimators of partial regression coefficients when violated. Sims argued that it is not possible to identify the variables as totally endogenous or exogenous and suggested to use the Vector Autoregression (VAR) Models. In a typical VAR model, all variables are assumed endogenous and they may appear on both right and left sides of the regression equation with lags. All variables must prove to be stationary in order to appear in the VAR model. These models became very popular especially in various topics of finance and applied econometrics.

Yet it is not easy to decide the direction of causality between FDI and growth. There are empirical studies addressed in the Introduction that claim both directions of causality. This fact of causality brings the problem of endogeneity to the forefront. That is why we prefer the VAR framework in our empirical analysis. We follow the standard notation of VAR for each of the K variables as:

$$Y_{it} = \sum_{k=1}^K \sum_{s=1}^M \beta_{iks} Y_{k(t-s)} + \varepsilon_{it} \quad (1)$$

where M is the number of lags for each of the variables. We follow Yao (and others like Borenzstein etc.) and assume the Cobb-Douglas production function of:

$$Y = AL^\alpha K^\beta e^\varepsilon \quad (2)$$

where Y is output, L is labor and K is capital. These constitute the two main inputs to production. ε is the error term to capture randomness. Here we charge all factors that influence production else than L and K to A . In standard literature of growth A represents technology or knowledge. But we deviate from the standard literature and use A as a catch-all variable that constitutes main factors that have impact on output including the FDI.

We split K into investment and FDI, and add the labor force as the other factor to determine growth. We add the Balance of Payments (BoP) to reflect both imports and exports. Putting all these together leads to the following variables of the VAR regression model: Growth, FDI, Labor, Investment, and BoP where Growth is annual growth rate of GDP, FDI is the annual net inflow of FDI, Labor is the total labor force, Investment is the logarithm of annual gross fixed investment and BoP is the balance of payments. Our data sources are the Turkish Statistical Institute and State Planning Organisation of Turkey.

5. Empirical Findings

We use annual data over 1980-2004. The stationarity of all variables must be tested in a typical VAR Model. We use the Augmented Dickey Fuller test to decide whether there exists a unit root in the series or not. Surprisingly all variables proved to be stationary. The greatest of all p-values to reject the null of nonstationarity is around 3%. The only exception is investment which has a p-value close to 20%. We left it without taking the first difference to attain stationarity since we want to make use of the advantage of working with levels. Besides, 20% of exact Type 1 Error probability is manageable. Table 1 lists the results of Augmented Dickey-Fuller stationarity test for all variables.

We feed EVIEWS with the levels of the variables to get the estimates of the VAR Model. The lag lengths are all set equal to 2 in order to save more degrees of freedom. All estimation results are presented in Table 2. We first concentrate on the VAR equation attempting to explain the GROWTH, the left-most column. We face the problem of insignificance of some coefficients which is due to the typical characteristic of the VAR models, most probably because of high multicollinearity. But still, FDI has positive sign for both lags and similarly, GROWTH has positive signs for both lags in the FDI equation as well.

Of all the VAR equations the one explaining LABOR and INVESTMENT have the two greatest Coefficients of Determinations, 0.991 and 0.999, respectively. VAR estimation for LABOR reports the highest number of significant coefficients.

Table 1. Stationarity test results of variables.

Variable	t-stat.	Prob.
GROWTH	-6.35	0.0001
FDI	-3.93	0.0328
LABOR	-4.36	0.0107
INVESTMENT	-2.24	0.1985
BOP	-3.90	0.0074

We use STATA to decide on the causality between FDI and GROWTH. STATA uses a version of the Wald statistic to perform the causality test. All coefficients of FDI in the VAR equation of GROWTH are set to zero for the Null. In the GROWTH equation the null of "No Granger causality" is rejected with the p-val of 11.4%, similarly the same null is rejected for GROWTH in the FDI equation with the p-value of 7%. Therefore, we conclude that there is a two-directional causality between GROWTH and FDI. Furthermore, LABOR and INVESTMENT are proven to be Granger causing GROWTH with p-values 0.2% and 8.9%, respectively which is expected and reasonable.

Table 2. VAR Estimation Results (Standard errors in () & t-statistics in []).

	GROWTH	FDI	LABOR	INVESTMENT	BOP
GROWTH(-1)	0.091380 (0.38208) [0.23916]	6.644814 (48.7456) [0.13632]	5901.526 (26406.2) [0.22349]	-0.003318 (0.01141) [-0.29082]	0.026395 (0.27633) [0.09552]
GROWTH(-2)	0.278438 (0.31210) [0.89214]	4.610383 (39.8176) [0.11579]	106733.8 (21569.7) [4.94831]	0.011531 (0.00932) [1.23716]	-0.343694 (0.22572) [-1.52264]
FDI(-1)	0.005942 (0.00429) [1.38654]	0.262196 (0.54672) [0.47958]	1180.624 (296.166) [3.98636]	0.000138 (0.00013) [1.08146]	-0.000625 (0.00310) [-0.20152]
FDI(-2)	0.001393 (0.00294) [0.47455]	-0.065158 (0.37461) [-0.17394]	-38.64108 (202.932) [-0.19041]	3.91E-06 (8.8E-05) [0.04464]	-0.000330 (0.00212) [-0.15549]
LABOR(-1)	9.12E-06 (4.4E-06) [2.07614]	4.21E-05 (0.00056) [0.07508]	0.568971 (0.30370) [1.87346]	2.29E-07 (1.3E-07) [1.74541]	-6.94E-06 (3.2E-06) [-2.18236]
LABOR(-2)	-8.69E-06 (6.9E-06) [-1.25131]	-0.000422 (0.00089) [-0.47629]	-1.630915 (0.48016) [-3.39663]	-9.78E-08 (2.1E-07) [-0.47144]	3.97E-06 (5.0E-06) [0.78975]
INVESTMENT(-1)	-6.227671 (9.15648) [-0.68014]	-849.6985 (1168.17) [-0.72738]	1932790. (632814.) [3.05428]	1.581013 (0.27344) [5.78200]	11.92365 (6.62223) [1.80055]
INVESTMENT(-2)	4.886441 (7.94182) [0.61528]	1243.125 (1013.21) [1.22692]	-733333.1 (548868.) [-1.33608]	-0.692203 (0.23716) [-2.91867]	-10.20612 (5.74375) [-1.77691]
BOP(-1)	-0.622881 (0.89840) [-0.69333]	-125.5359 (114.616) [-1.09527]	-197874.6 (62089.1) [-3.18695]	-0.016665 (0.02683) [-0.62118]	0.518707 (0.64975) [0.79832]
BOP(-2)	0.639799 (0.52960) [1.20808]	40.33985 (67.5659) [0.59704]	173389.9 (36601.4) [4.73725]	0.012838 (0.01582) [0.81176]	-0.595013 (0.38302) [-1.55346]
C	5.237852 (70.4853) [0.07431]	4077.253 (8992.42) [0.45341]	27157661 (4871316) [5.57502]	-1.423338 (2.10488) [-0.67621]	37.44175 (50.9770) [0.73448]
R-squared	0.526558	0.753057	0.991353	0.999265	0.609333
Adj. R-squared	0.132023	0.547271	0.984147	0.998653	0.283777
Sum sq. Resids	230.6691	3754437.	1.10E+12	0.205706	120.6537
S.E. equation	4.384338	559.3476	303006.2	0.130928	3.170879
F-statistic	1.334631	3.659415	137.5720	1631.790	1.871668
Akaike AIC	6.099889	15.79735	28.38683	-0.922402	5.451829
Schwarz SC	6.642951	16.34042	28.92989	-0.379339	5.994891
Mean dependent	4.347826	843.1739	21793273	13.16097	-2.387696
S.D. dependent	4.705980	831.3089	2406529.	3.567085	3.746756

Concerning the FDI equation, the two variables Granger causing are GROWTH and Balance of Payments with p-values of 7% and 0.2%. The other variables' causing FDI are rejected highly significantly. The last row in each equation is allocated to all variables' Granger causing the dependent variable together. This is just like the F-test to check the overall significance. The null of all variables together not Granger causing the dependent variables is always rejected.

We go one step forward to focus on the impulse response analysis and report the responses of just GROWTH and FDI to a one standard deviation shock in other variables, namely LABOR, BOP, and INV, although we have calculated these for all variables. The impulse response analysis are carried out with EViews. We include the plots belonging to the responses of all variables in Figure 2. If there is a shock to the economy from the FDI then GROWTH responds to this shock positively in the following 5 periods and the magnitude of the response is smaller compared to the responses of the following 5 periods.

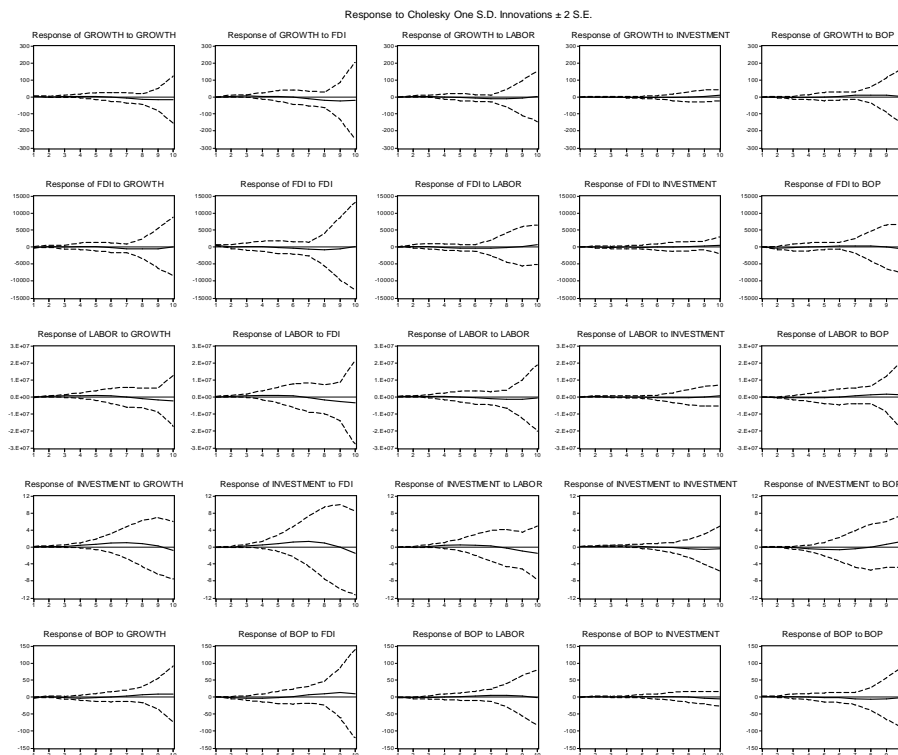


Figure 2. Impulse Response behaviors of variables.

The response of GROWTH to shocks from LABOR is positive in the first four periods and then it becomes negative. Besides, response of GROWTH to investment is small as indicated by the 4th diagram in the top row. Indeed, this is a concern and is interesting since response to domestic investment is less than the FDI. This maybe due to the introduction of know-how and technology as well as the training of personnel with the inflow of FDI. The response of FDI to growth is altering between negative and positive. The magnitude of the response changes as well. We did not report the responses of LABOR, BOP and INVESTMENT in the table to save space but can provide them to the interested reader.

Shan (2002) states that if the response of Variable 1 to a shock in Variable 2 is stronger and longer than other variables than one can deduce that Variable 2 causes Variable 1. We apply the same inference and notice that the response of GROWTH to FDI is both longer and stronger than that of any other variable which supports the claim of "FDI causes growth", as an extra evidence in addition to the causality test we presented in Table 3.

Table 3. Granger causality Test results.

Equation	Excluded	chi2	df	Prob>chi2
GROWTH	FDI	4.342	2	0.114
	LABOR	12.019	2	0.002
	BOP	1.301	2	0.522
	INV	4.836	2	0.089
	ALL	26.952	8	0.001
FDI	GROWTH	5.326	2	0.070
	LABOR	0.645	2	0.724
	BOP	12.148	2	0.002
	INV	0.069	2	0.966
	ALL	57.253	8	0.000
LABOR	GROWTH	10.943	2	0.004
	FDI	6.738	2	0.034
	BOP	11.551	2	0.003
	INV	0.894	2	0.639
	ALL	27.892	8	0.000
BOP	GROWTH	6.173	2	0.046
	FDI	0.639	2	0.727
	LABOR	2.037	2	0.361
	INV	11.533	2	0.003
	ALL	41.863	8	0.000
INV	GROWTH	2.540	2	0.281
	FDI	3.096	2	0.213
	LABOR	4.249	2	0.119
	BOP	1.962	2	0.375
	ALL	13.610	8	0.093

Table 4. Impulse-Response behavior of variables to the shock of one standard deviation

Response of GROWTH:					
Period	GROWTH	FDI	LABOR	INVESTMENT	BOP
1	4.384338 (0.64644)	0.000000 (0.00000)	0.000000 (0.00000)	0.000000 (0.00000)	0.000000 (0.00000)
2	-1.136304 (1.79924)	4.004201 (2.17144)	2.930057 (1.89789)	-0.354493 (1.11886)	-1.369740 (1.98590)
3	3.792427 (3.10210)	5.895480 (4.42644)	2.604753 (3.31273)	0.871751 (1.80412)	-4.810645 (3.94037)
4	4.305357 (5.77676)	4.153264 (8.89434)	1.457633 (7.00200)	-2.337436 (2.78663)	-2.248885 (7.84536)
5	2.288780 (9.70448)	3.880262 (15.9069)	-1.686998 (10.1564)	-3.220183 (2.92320)	1.191218 (12.1076)
6	0.585669 (13.7704)	-0.991086 (20.8968)	-5.902544 (10.0849)	-2.866209 (5.55781)	4.122216 (12.7115)
7	-5.921371 (15.0812)	-10.09118 (20.8841)	-8.775390 (9.97838)	-2.935797 (10.1159)	8.516062 (11.0875)
8	-13.01757 (14.7486)	-18.60557 (21.7669)	-9.651723 (25.6361)	-0.327060 (14.8896)	11.19815 (23.3487)
9	-16.71961 (32.6808)	-23.85859 (55.0640)	-6.624405 (51.2471)	4.315556 (17.3453)	9.914662 (51.5110)
10	-15.49559 (69.4245)	-20.45328 (110.718)	2.105022 (74.6787)	9.444208 (16.6119)	3.222727 (81.8842)
Response of FDI:					
Period	GROWTH	FDI	LABOR	INVESTMENT	BOP
1	-121.0296 (115.259)	546.0967 (80.5176)	0.000000 (0.00000)	0.000000 (0.00000)	0.000000 (0.00000)
2	148.0069 (196.737)	80.62180 (261.290)	165.7468 (241.094)	-31.53065 (149.461)	-276.0585 (255.311)
3	-70.02434 (303.486)	88.58205 (533.409)	172.6520 (392.877)	-151.9810 (141.823)	-123.1434 (485.939)
4	177.2921 (488.367)	139.2585 (744.289)	-91.85882 (492.230)	-71.26575 (191.994)	14.20908 (577.487)
5	83.90684 (658.290)	-86.05387 (963.764)	-270.6010 (437.928)	-114.6701 (299.446)	236.7710 (547.910)
6	-243.7562 (674.752)	-337.5273 (885.529)	-342.6588 (514.777)	-61.67224 (481.413)	354.3604 (480.579)
7	-442.7550 (638.361)	-656.4748 (976.722)	-321.5237 (1195.63)	68.15221 (665.619)	342.9166 (1086.47)
8	-579.7896 (1491.58)	-828.9425 (2425.71)	-138.3528 (2156.32)	194.1285 (689.133)	273.3006 (2169.82)
9	-456.1165 (2955.64)	-565.3008 (4625.58)	206.9735 (2918.13)	385.2836 (636.239)	-9.669107 (3223.15)
10	39.26451 (4367.69)	157.7235 (6498.60)	693.9637 (2908.42)	520.5159 (1258.33)	-531.4184 (3598.61)

We finally analyse the variance decompositions of the variables that are reported in Table 5. Again we do not report the variance decomposition for all variables in order to save space and suggest to provide them to the more interested readers. Table 4 reveals that the variance decomposition of GROWTH displays that FDI is the considerable variance source of GROWTH whereas the contribution of INV to the variance of GROWTH is very limited. On the other hand, BOP has the slightly larger variance contributed to GROWTH. The variance analysis are somewhat different for the FDI. GROWTH, LABOR, and BOP have similar contributions to the variance whereas INV is significantly low.

Table 5. Variance Decomposition of variables.

Var. Dec. of GROWTH:	S.E.	GROWTH	FDI	LABOR	INVESTMENT	BOP
1	4.384338	100.0000	0.000000	0.000000	0.000000	.000000
2	6.865444	43.52159	34.01688	18.21440	0.266611	3.980513
3	11.26768	27.48580	40.00482	2.10610	0.697552	19.70573
4	13.24356	30.46445	38.79306	9.974608	3.620017	17.14786
5	14.50246	27.89574	39.50921	.671207	7.949164	4.97468
6	16.48316	21.72061	30.94600	0.30981	9.177199	7.84638
7	23.80628	16.59960	32.80355	3.32435	5.920339	21.35216
8	36.06972	20.25585	40.89683	7.32049	2.587178	8.93965
9	48.06880	23.50372	47.66318	11.65176	2.262773	4.91857
10	55.43527	25.48567	49.45045	0.905029	4.603766	11.55509
Var. Dec. of FDI:	S.E.	GROWTH	FDI	LABOR	INVESTMENT	BOP
1	559.3476	4.681871	95.31813	0.000000	0.000000	0.000000
2	667.7950	8.196924	68.33084	6.160334	0.222936	7.08897
3	725.7903	7.870130	59.33659	0.87392	4.573595	7.34577
4	768.9705	12.32677	56.13941	11.11399	4.933271	5.48656
5	864.9832	10.68309	45.35796	18.57049	5.656330	9.73213
6	1080.892	11.92710	38.79829	21.94237	3.947857	3.38439
7	1421.595	16.59529	43.75456	7.80050	2.512138	19.33751
8	1782.065	21.14570	49.48102	11.93032	2.785307	14.65766
9	1973.509	22.58375	48.55169	10.82784	6.082515	1.95420
10	2226.226	17.77854	38.65628	18.22611	10.24670	15.09237

6. Conclusions

Our analysis suggest the following remarks to the forefront:

1. Causality between FDI and GROWTH run in both directions. The Wald Test we presented in Table 3 reveals that "FDI leads to GROWTH" and "GROWTH leads to FDI". This finding is parallel to the conclusion of Ozturk and Kalyoncu (2007) and is reasonable since capital is the main input to production and FDI increases the capital. FDI helps increase output by many other ways. On the other hand, if the output of a country is increasing then foreign investors will be more motivated to invest in that country and that is why GROWTH causes FDI.

2. Our VAR estimation results reported positive coefficients for both lags of FDI in the GROWTH equation and the results are similar for GROWTH in the FDI equation. These two results together suggest that the association between GROWTH and FDI is positive.

3. The impulse response analysis suggest that the response of GROWTH to a one standard deviation shock in FDI is positive for five consecutive periods.

4. Our variance decomposition analysis revealed that the main source of variance to GROWTH is FDI followed by LABOR and BOP. Besides, the main variance source of FDI are GROWTH, LABOR and BOP whereas INV contributes the least to the variance of FDI.

The main shortcoming of our paper is the size of our data set. Gathering data belonging to variables in our agenda confined the number of observations. Replicating our analysis with more observations will definitely shed more light to the questions we posed in the paper. Furthermore, one can add the cointegration analysis and the vector error correction mechanism to focus on the long run relation among the variables and what might happen if there are deviations from the long run behaviors. These are the possible directions of further research extending the study of our paper.

References

Alici, A.A. and M.S. Ucal, (2003) "Foreign Direct Investment, Exports and Output Growth of Turkey: Causality Analysis", European Trade Study Group (ETSG) Fifth Annual Conference, Madrid, September 2003.

Balasubramanyam, V.N., M. Salisu, and D. Sapsford, (1996) "Foreign Direct Investment and Growth in EP and IS Countries", *The Economic Journal*, 434, 92-105.

Bende-Nabende, A., J.L. Ford, B. Santoso, and S. Sen, (2003) "The Interaction between FDI, Output and The Spillover Variables: Co-integration and VAR Analyses for APEC, 1965–1999", *Applied Economics Letters*, 10, 165-172.

Bengoa, M. and B. Sanchez-Robles. (2003) "Foreign Direct Investment, Economic Freedom and Growth: New evidence from Latin America" *European Journal of Political Economy*, 19, 529-545.

Borensztein, E., J.D. Gregoriou, and J-W. Lee, (1998) "How Does Foreign Direct Investment Affect Economic Growth?", *Journal of International Economics*, 45, 115-135.

Carkovic, M. and R. Levine (2005) "Does Foreign Direct Investment Accelerate Economic Growth" in *Does Foreign Direct Investment Promote Development* edited by T.H. Moran, E.M. Graham and M. Blomstrom, Peterson Institute of Economic Development.

Chakraborty, C. and P. Basu, (2002) "Foreign Direct Investment and Growth in India: A Cointegration Approach", *Applied Economics*, 34, 1061-1073.

Chenery, H. and W. Strout, (1966) "Foreign Assistance and Economic Development", *American Economic Review*, 66, 679-733.

Choe, J.I., (2003) "Do Foreign Direct Investment and Gross Domestic Investment Promote Economic Growth?", *Review of Development Economics*, 7, 44-57.

- Chowdhury, A. and G. Mavrotas (2006) "FDI and Growth: What Causes What?" *The World Economy*, 29, 9–19.
- De Mello, L.R. (1999) "Foreign Direct Investment-Led Growth: Evidence from Time Series and Panel Data", *Oxford Economic Papers*, 51, 133-151.
- Demirel, O. (2006) "Doğrudan Yabancı Yatırımlar, Ekonomik Büyüme Etkileri ve Türkiye Uygulaması", Yüksek Lisans Tezi, Süleyman Demirel Üniversitesi, Sosyal Bilimler Enstitüsü, İktisat Anabilim Dalı.
- Durham, J. B. (2004). "Absorptive Capacity and The Effects of Foreign Direct Investment and Equity Foreign Portfolio Investment on Economic Growth", *European Economic Review*, 48, 285–306.
- Hansen, H. and J. Rand, (2005) "On the Causal Links between FDI and Growth in Developing Countries", WIDER Research Paper No: 2005/31.
- Katircioglu, S, (2009) "Foreign Direct Investment and Economic Growth in Turkey An Empirical Investigation by the Bounds Test for Co-integration and Causality Tests", Working Paper.
- Krueger, A.O. (1987) "Debt, Capital Flows and, LDC Growth", *American Economic Review*, 13, 159-164.
- Liu, X., P. Burridge, and P.J.N. Sinclair, (2002) "Relationships between Economic Growth, Foreign Direct Investment and Trade: Evidence from China", *Applied Economics*, 34, 1433-1440.
- Mucuk, M, and M. T. Demirel (2009). "Foreign Direct Investment and Economic Performance In Turkey", *Selçuk Ün. Sosyal Bilimler Enstitüsü Dergisi*, 21.
- Ozturk, I, and H. Kalyoncu, (2007) "Foreign Direct Investment and Growth: An Empirical Investigation Based on Cross-Country Comparison", *Economia Internazionale*, 60, 75-82.
- Roy, A.G., and H.F.Van der Berg, (2006) "Foreign Direct Investment and Economic Growth: A Time-Series Approach", *Global Economy Journal*, 6, No 1, Article 7.
- Shan, J. (2002) "A VAR Approach to The Economics of FDI in China", *Applied Economics*, 34, 885-893.
- Romer, P. (1986) "Increasing Returns and Long-Run Growth", *Journal of Political Economy*, 94, 1002–37.
- Sims, C.A. (1980) "Macroeconomics and Reality" *Econometrica*, 48, 1-48.
- Yao, S. (2006) "On Economic Growth, FDI and Exports in China", *Applied Economics*, 38, 339-351.
- Yilmazel, M. (2010) "Doğrudan Yabancı Yatırımlar, Dış Ticaret ve Ekonomik Büyüme İlişkisi: Türkiye Üzerine Bir Deneme", *Celal Bayar Ün. Sosyal Bilimler Dergisi*, 8, 241-260.
- Sala-i-Martin, X. X. (1996) "The Classical Approach to Convergence Analysis", *Economic Journal*, 106, 1019–1036.