How Does FDI and Economic Growth Affect Each Other? The OECD Case

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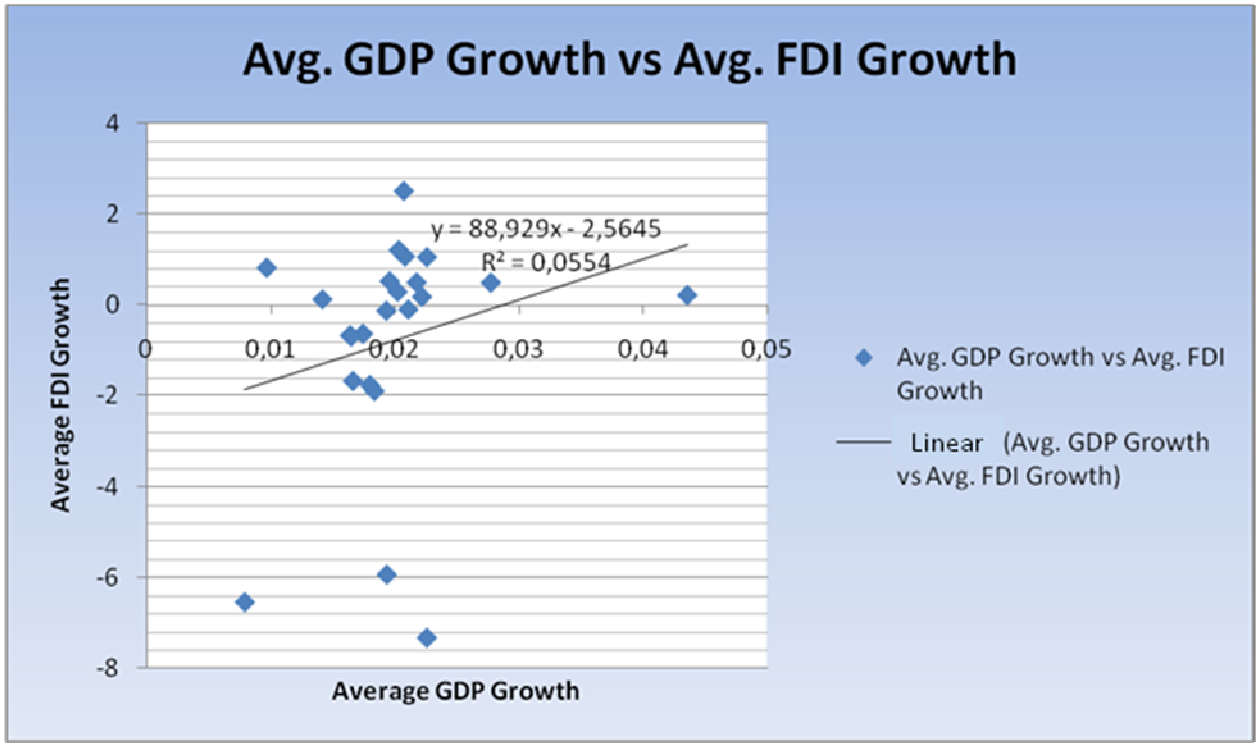
Abstract

This paper tests the endogenous relationship between FDI and economic growth using a panel dataset for 23 OECD countries for the period 1975-2004. Following the literature, we treat economic growth and FDI as endogenous variables, and estimate a two-equation simultaneous equation system with the generalized methods of moments (GMM) for the OECD case. We find that FDI and growth are important determinants of for each other. We also find that export growth rate is statistically significant determinant of FDI and economic growth. Our results indicate that there is an endogenous relationship between FDI and economic growth.

Introduction

What kind of relationship does exist between FDI and GDP growth? This is one of the interesting questions in modern times as capital movement is almost completely free to move between countries. World Bank statistics show that FDI worldwide grew 23.4 percent per annum on average between 1970-2006 and reached 1.4 trillion dollars in 2006. The huge growth of capital movement liberalization next to free trade movement indicates that there is some positive relationship between FDI and economic growth. The following graph indicates this positive relationship in one dimension: FDI growth versus GDP growth.

Figure 1: Average GDP Growth versus Average FDI Growth in OECD



The figure scatter plots average growth rate of GDP against average growth rate of FDI of OECD countries in the period 1975-2004. The figure exhibits that there is a positive relationship between average GDP growth and average FDI growth, though the latter has large variations across countries.

On possible question that one may ask on the relation between FDI and economic growth is how FDI affects economic growth? There is contradicting evidence on this issue, though most of them support the idea that FDI has a positive impact on economic growth. On the theoretical grounds, FDI may affect growth positively because FDI, which moves in general from capital-rich countries to capital-scarce economies, lower rental rate of capital and increase production via enhancing labor productivity and introducing new technology embedded in the capital. On the other hand, FDI may affect growth negatively, as it may deteriorate competition and may corrupt the development path of the country in its own interests. Most empirical works nonetheless seem to have found a positive impact of FDI on economic growth. For example, Papanek (1973), Balasubramanyam *et al.* (1996), Borensztein *et al.* (1998), Balasubramanyam *et al.* (1999), Berthelemy and Demurger

(2000), Obwona (2001), Reisen and Soto(2001), Zhang and Ram(2002), Massoud (2003), Bengoa and Sanchez–Robles (2003), Basu *et al*. (2003), Saha (2005), Li and Liu (2005), Hansen and Rand (2006), Hyun (2006), Johnson (2006), Güner and Yılmaz (2007), Basu and Guariglia (2007) found empirically that FDI enhances economic growth. On the contrary, Fry (1993) and Bornschier *et al*. (1978) found that FDI may deteriorate growth as it may distort the development part of FDI receiving economy. Interestingly, some other studies like Alfaro *et al*. (2002), Carkovic and Levine (2002), Durham (2004), and Herzer *et al*. (2008) found that there is no direct relationship between FDI and economic growth. In Annex A, we provide a more detailed review of the literature and their main findings.

The alternative question that one may ask due to figure 1 is whether economic growth has any impact on determining FDI or not? On theoretical grounds, it also has contradicting explanations. On the one hand, the higher the growth rates in a country, the higher the growth in demand, which implies greater profitability opportunities for inflowing capital. Hence, capital must prefer higher growing countries. On the other hand, lower growing economies may imply more profitability opportunities for capital, given that these economies are capital-scarce and labor abundant (if they are capital abundant and have low growth rates, it does not have any incentive for capital to move in such economies). Empirical research on the issue has mixed results. On the one hand, works by Chowdhury and Mavrotas (2006), Saha (2005) and Choe (2003) found that higher growth rates attract more FDI (=countries having higher growth rates attract more FDI). On the other hand, studies like Hansen and Rand (2006), Hsiao and Hsiao (2004) and Mencinger (2003) argue that high-growing countries do attract much FDI.

This study works out the above-discussed two fundamental questions in a simultaneous equation system for the case of OECD. The simultaneous equation setup allows us to treat FDI and economic growth variables endogenously. Heuristically speaking, our approach is rare in the literature; most empirical studies use either single equation estimation techniques or (Granger-) causality tests to determine the direction of causality. Our simultaneous equation model allows us to estimate the determinants of FDI and economic growth for OECD countries by using panel data. Moreover, following Saha (2005) and Li and Liu (2005), we use Generalized Methods of Moments (GMM) estimation technique in a panel dataset.

The organization of paper is as follows. Section 2 portrays an illustrative framework. We show that FDI determines economic growth and that economic growth is a determinant of FDI. Section 3 first describes the data and its limitations and next discusses the simultaneous equation system. Section 4 presents the findings of the model and its implications. The last section provides some concluding remarks.

An Illustrative Framework[1]

Let us assume an open economy that capital may freely move between borders. Let us further assume that domestic and foreign capital are perfect substitutes for factor of production; hence each pay the same rate of return, r, the world interest rate. Suppose that capital per person k^* that exists in a domestic country at a particular time has two possible ownerships: domestic residents and foreigners. Suppose also that k is capital per person that belongs to domestic residents. Hence, $k^* - k$ represents *total* foreign investments in

[1] This section is based on chapter 3 of Barro and Sala-i-Martin (2005).

the domestic country. For matter of illustration, we assume that $k^* - k > 0$, without loss of generality. In another interpretation, $k^* - k$ represents net claims by foreigners on the domestic economy. We assume that the model is single-good economy. The only function of openness in this model is the free movement of capital. We continue to assume that labor is immobile. The budget constraint for the representative household is

$$\dot{k} = w + (r - n) \cdot k - c \qquad (1)$$

Where k is capital per person owned by domestic residents, w is the real wage rate, r is the world's real rate of interest, n is the population growth rate, c is the consumption, and a dot on top of a variable indicates a time derivative of the variable.

Suppose that utility function of the representative consumer is defined as

$$U(c) = \int_0^{\infty} e^{-\rho t} u(c) L dt \qquad (2)$$

Where $U(c)$ is the overall utility, ρ is the subjective rate of discount, $u(c)$ is the momentary felicity function, L is the labor which grows at rate n. We assume that momentary utility is defined as $u(\mathrm{c}) = \dfrac{\mathrm{c}^{1-\theta} - 1}{1 - \theta}$, where θ is the elasticity of marginal utility.

The representative household's optimization problem implies constructing an optimal control problem, which yields:

$$\frac{\dot{\mathrm{c}}}{\mathrm{c}} = \frac{1}{\theta}(r - \rho) \qquad (3)$$

Suppose that the production technology is represented by

$$\mathrm{Y} = F(K^*, N) \qquad (4)$$

Where Y output, K^* is total physical stock available in the domestic economy, and N is labor stock. The optimization conditions for the representative firm entail equality between the marginal products and the factor prices:

$$f'(k^*) = r \qquad (5a)$$

$$f(k^*) - k^* f'(k^*) = w \qquad (5b)$$

If we substitute for w from equation (5b) into equation (1) and use equation (5a), the change in assets per capita can be determined as

$$\dot{\mathrm{k}} = f(k^*) - r(k^* - k) - nk - c \qquad (6)$$

Note from equation (6) that it would become the standard equation of motion of Ramsey if the economy were closed, $k^* - k = 0$. The difference between equation (6) and the macroeconomic budget constraint of Ramsey model is that the domestic economy is incurring rental cost for the total foreign capital that came in until time t. By definition, it must be true that $k^* - k = \int_0^t FDIdt$, where FDI is the physical capital inflow from abroad at time t. If we take time derivative of this identity, we obtain that $\dot{k}^* - \dot{k} = FDI$. Hence, we may alternatively express equation (6) as follows:

$$\dot{k}^* = f(k^*) - r(k^* - k) - nk - c + FDI \qquad (7)$$

Given that $y = f(k^*)$, the growth rate of output g is $g_y = \frac{\dot{y}}{y} = \frac{f'(k^*)k^*}{f(k^*)}\frac{\dot{k}^*}{k^*}$. Hence, the growth rate of domestic economy is positively supported by FDI, that is,

$$g_y = \frac{f'(k^*)k^*}{f(k^*)}\left[\frac{f(k^*)}{k^*} - r\frac{(k^* - k)}{k^*}r - n\frac{k}{k^*} - \frac{c}{k^*} + \frac{FDI}{k^*}\right] \qquad (8)$$

Hence, $g_y = h(FDI, Z)$, with $h_{FDI}(\cdot) > 0$ and Z represents vector of all variables that determine growth rate.

Since we have not modeled the foreign (lending) economy next to the domestic (borrowing) economy, we may directly exploit the literature on FDI on the determinants of FDI. As we know from our literature survey above, *ex ante* differences between domestic and world interest rates, the size of the economy, the growth rate of economy, export growth rate of economy all contribute to determination of FDI. Hence, we may argue that the following FDI function is capable of capturing FDI behavior:

$$FDI = f(g_y, M) \qquad (8)$$

where M represents vector of variables next to the growth rate of domestic economy that contributes to the determination of FDI.

Data, Method and its limitations

Data

FDI inflows data have been retrieved from World Development Indicators Online Database. Raw FDI data were in current US$. Per capita FDI data were formed by using populations of countries, which were collected from Penn World Table Database. Lastly, FDI per capita growth rates were calculated from these per capita FDI data. A similar procedure was applied for determining export growth rates. Firstly, exports of goods and services data were collected from WDI Online Database. Next, per capita exports values calculated by using population data from Penn World Table and finally growth rates of export per capita were found. Growth rates of per capita GDP values were directly retrieved from WDI Online Database.

Our data set consists of 23 OECD countries and covers time period of 1975–2004. We included Australia, Austria, Canada, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Japan, Mexico, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, Turkey, United Kingdom, and USA in our data set. We dropped Belgium and Luxembourg from the data set as their FDI data are not trustable. Consequently our sample size consists of 690 observations and also it is a balanced panel data set.

Simultaneous Equation System

The empirical method that is used to predict more than one equation systems is called simultaneous equation system approach. A simultaneous equation system consists of a number of *structural equations* involving several *endogenous variables* whose values are determined within the specified system. Their values also depend on several *exogenous variables* whose values are specified outside the system, and also on lagged values of variables, known as *predetermined variables.* To avoid confusion, exogenous variables are also considered predetermined. Structural equations can be behavioral, technical, identities or equilibrium conditions. If each of the endogenous variables is solved in terms of the exogenous and predetermined variables, we obtain a system of *reduced form equations.* These equations will not contain any endogenous variables but will depend on the stochastic terms of all the equations. A good example to simultaneous equation system is demand and supply equations; price and quantity are jointly determined in this system.

Although the implications of simultaneity for econometric estimation were recognized long time ago, e.g., Working (1926), the first major contribution to the area of estimating simultaneous equation system has been made by Trygve Haavelmo (1943). According to Haavelmo (1943), if one assumes that the economic variables considered satisfy, simultaneously, several stochastic relations; it is usually not a satisfactory method to try to determine each of the equations separately from the data, without regard to the restrictions which the other equations might impose upon the same variables. That this is so is almost self-evident, for in order to prescribe a meaningful method of fitting an equation to the data, it is necessary to define the stochastic properties of all the variables involved. Otherwise, we shall not know the meaning of the statistical results obtained. Furthermore, the stochastic properties ascribed to the variables in one of the equations should, naturally, not contradict those that are implied by the other equations.

If the simultaneity is ignored and ordinary least squares applied, the estimates will be biased and inconsistent. Consequently, forecasts will be biased and inconsistent. In addition, tests of hypotheses will no longer be valid (Ramanathan, 1998).

Our illustrative framework suggests that FDI contributes positively to the growth rate of FDI receiving economy, and that positive growth rate stimulates positively FDI inflows. That means there is bi-directional causality relationship between variables. Hence, we need to consider the determination of FDI and growth rate together as it is not possible to construct one-equation regression models.

Econometric Analysis

In this part of the paper, we present our results out of simultaneous equation systems analysis. In this work, our simultaneous equation system is composed of two equations:

$$g_{FDI,it} = \beta_0 + \beta_1 g_{Y,it} + \beta_2 g_{X,it} + \beta_3 g_{FDI,it}(-1) + u_{it} \quad (9a)$$

$$g_{Y,it} = \alpha_0 + \alpha_1 g_{FDI,it} + \alpha_2 g_{X,it} + \alpha_3 g_{Y,it}(-1) + v_{it} \quad (9b)$$

In (9a), $g_{FDI,it}$ is the growth rate of foreign direct investment of the i'th country at time t, $g_{Y,it}$ is the growth rate of GDP, $g_{X,it}$ is the growth rate of exports and $g_{FDI,it}(-1)$ is one year lagged value of FDI growth rate. In (9b), $g_{Y,it}$ is one year lagged value of GDP growth rate.

Growth rate of exports is the annual percentage change of goods and services exports. GDP growth rate is stated as annual percentage change in GDP. Lastly, FDI growth rate is the growth rate of foreign direct investment inflows to countries.

Before starting to an econometric analysis, unit root tests of related series must be made in order to beware of “artificial regression” problem. Because if there is a unit root problem in any series, which is used in the model, there will be no stationary in this series. Consequently, estimation results will not be economically meaningful.

There are different approaches to unit root tests. Our results with these different approaches are shown in Annex B. Unit root test results prove that our series are stationary series and they do not involve unit root problems. Hence, we can estimate our model by using these series. The following table shows the estimation results of our simultaneous equation system which was estimated by the different econometric methods.

Table 1: Estimation Results of the Simultaneous Equation System

Dependent Variables		*Independent Variables*							
		Constant	gy	gFDI	gx	gFDI(-1)	gFDI(-2)	gy(-1)	gy(-2)
1	gFDI	-137.668* (-1.92)	15.917 (0.75)	-	4.367 (0.55)	-	-	-	-
2		-323.153 (-1.58)	17.202 (0.27)	-	27.849 (0.82)	-	-	-	-
3		-404.177** (-1.99)	88.391 (1.43)	-	16.463 (0.48)	-	-	-	-
4		-244.410*** (-6.21)	18.773*** (2.61)	-	18.944*** (4.14)	-	-	-	-
5		-245.333*** (-5.99)	21.626*** (3.10)	-	19.044*** (4.16)	-0.008 (-1.60)	-	-	-
6		-220.755*** (-5.03)	15.520** (2.00)	-	17.295*** (3.62)	-0.007 (-1.37)	0.008* (1.95)	-	-
1	gY	1.260*** (10.46)	-	5.230 (0.75)	0.121*** (8.97)	-	-	-	-
2		1.226*** (4.62)	-	0.0001 (0.52)	0.142*** (3.59)	-	-	-	-
3		1.239*** (4.69)	-	0.0002 (0.76)	0.142*** (3.59)	-	-	-	-
4		1.167*** (5.90)	-	0.0002* (1.80)	0.155*** (5.02)	-	-	-	-
5		0.523*** (2.86)	-	0.0006*** (3.38)	0.127*** (4.36)	-	-	0.417*** (11.46)	-
6		0.247 (1.23)	-	0.0008*** (4.39)	0.157*** (4.98)	-	-	0.360*** (10.26)	0.114*** (4.06)

t values in parenthesis: *** %1 level, ** %5 level, * %10 level

For matter of clarity, let us suppose that "the first equation" refers to the equation that tries to identify the determinants of FDI and that "the second equation" refers to the equation that tries to identify the determinants of GDP growth. The first model uses Ordinary Least Squares (OLS) estimation method, to identify the first and second equations. t-statistics of $g_{Y,it}$ and $g_{X,it}$ in the first equation are insignificant for 1%, 5%, and 10% levels of significance.

In the second equation, t-statistic of $g_{FDI,it}$ is insignificant at all levels, while $g_{X,it}$ is significant at 1% level. Our test results indicate us that OLS regressions do not produce statistically reliable/significant results.

In the second model, Two Stage Least Squares Method (TSLS) was used to estimate the system. The results indicate that t-statistics of $g_{Y,it}$ and $g_{X,it}$ in the first equation are insignificant. Moreover, t-statistics of $g_{FDI,it}$ in the second equation is insignificant. Again, $g_{X,it}$ is statistically significant for the 1% level of significance.

In the third model, Three Stage Least Squares (3SLS) estimation technique was used in order to estimate the system. $g_{Y,it}$ and $g_{X,it}$ in the first equation, are statistically insignificant. Also, in the second equation, $g_{FDI,it}$ is statistically insignificant, too. However, t-statistics of $g_{X,it}$ is statistically significant for the 1% level of significance.

In the fourth model, which was estimated by GMM technique, although coefficients of all the variables are statistically significant at the 1% level of significance and signs are positive as expected for the first equation, and also $g_{X,it}$ is statistically significant for 1% level of significance in the second equation; t-statistics of $g_{FDI,it}$ is only significant for the level of 10%.

Fifth model is the model which consists of one year lags of $g_{FDI,it}$ and $g_{Y,it}$. It is estimated by GMM method, because model includes one year lagged values of dependent variables and this means that our model behaves as an autoregressive model. As it can be seen from the table, in the first equation only coefficient of one year lagged $g_{FDI,it}$ is insignificant. $g_{Y,it}$ and $g_{X,it}$ are significant for the 1% level of significance. However in the second equation, all the coefficients are statistically significant at the level of 1% and also signs of coefficients are as expected.

Sixth model consists both one-year and two-year lagged values of $g_{FDI,it}$ and $g_{Y,it}$, respectively. According to the estimation results of this model, only $g_{X,it}$ shows significance at the 1% level for the first equation. $g_{Y,it}$ is statistically significant for 5% level and two-year lagged value of $g_{FDI,it}$ is significant at the 10% level. However, in this

equation, one-year lagged value of $g_{FDI,it}$ is statistically insignificant. In the second equation, all the independent variables are statistically significant at the level of 1%.

As a result, from the table above, it can easily be seen that, best model for our system is certainly Model 5.

In model 5, coefficients of the variables show that FDI and economic growth are important determinants of each other. Also, it is obvious from the results that export growth rate is statistically significant determinant of FDI and economic growth. On the other hand, although both FDI and economic growth affect each other in a positive way, the effect of economic growth on FDI is larger than the effect of FDI on economic growth in OECD countries.

Our findings are mainly consistent with the literature, though there are some counter findings. Our finding that FDI inflows affect economic growth positively is also found by Güner and Yılmaz (2007), Hyun (2006), Li and Liu (2005), Saha (2005), Hsiao and Hsiao (2004), Bengoa and Sanchez-Robles (2003), Mencinger (2003), Massoud (2003), Zhang and Ram (2002), Reisen and Soto (2001), Obwona (2001), Berthelemy and Demurger (2000), Balasubramanyam, Salisu and Sapsfort (1999), Borensztein, Gregerio and Lee (1998), Balasubramanyam, Salisu and Sapsford (1996) and Papanek (1973). Contradicting evidence is given by Bornschier, Chase-Dunn and Rubinson (1978) and Durham (2004). The former study argues that FDI has especially negative impact on the growth rate of developing countries. The latter study asserts that current value of FDI does not have any positive impact on the growth rate. Johnson (2006) on the other hand argues that FDI has positive impact on developing countries but not on developed countries. As our study focuses on OECD countries, which are developed by and large, our results contradicts with this result.

Concluding Remarks

It is well known from the wide literature of economic growth that FDI is a major engine of economic growth. However, what is less understood is the two-way relationship between FDI and growth. In other words, there is an endogeneity between FDI and growth, and if this endogeneity is ignored econometric estimations will produce wrong and misleading results.

In this paper, the endogenous relationship between foreign direct investment and economic growth was examined for 23 OECD countries and 1975 – 2004 period of time. For this purpose a simultaneous equation system was established and an econometric estimation procedure was applied. Our empirical results suggest that FDI positively affects economic growth rate and also economic growth rate positively affects FDI inflows. Our results indicate that economic growth stimulates growth rate of FDI inflows more than that the growth rate of FDI stimulates economic growth.

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Annex A

Table 1: Literature Review

Author	Sample Size and Time Period	Econometric Method and Tests	Empirical Evidences
Basu & Guariglia (2007)	119 developing countries 1970 – 1999	Generalized Methods of Moments (GMM)	FDI enhances both educational inequalities and economic growth in developing countries. However, it reduces the share of agriculture sector in GDP.
Güner & Yılmaz (2007)	104 countries 1993 – 2004	Ordinary Least Squares (OLS)	FDI affects economic growth in a positive way and it provides some advantages on capital accumulation.
Johnson (2006)	90 developed and developing countries 1980 – 2002	OLS	FDI inflows accelerate economic growth in developing countries. But it is not valid for developed countries.
Chowdhury &Mavrotas (2006)	3 countries 1969 – 2000	Toda – Yamamoto Causality Test	In Chile, GDP growth is the Granger Cause of FDI but reverse is not true. In Malaysia and Thailand FDI and economic growth are Granger causes of each other.
Hyun (2006)	59 developing countries 1984 – 1995	OLS	FDI has positive effect on economic growth but lagged FDI values have no positive effects on current economic growth.
Hansen & Rand (2006)	31 developing countries 1970 – 2000	Unit Root Tests, Panel Cointegration Test and VAR Analysis	There is a strong causality from FDI through GDP growth.
Li & Liu (2005)	21 developed countries and 63 developing	Unit Root Tests, Durbin – Wu – Hausman Test, OLS	Endogenous relationship between FDI and economic growth has accelerated since the middle of 1980s. Also, relationships between FDI, human capital and technological differences effect economic

	countries 1970 – 1999		growth in developing countries indirectly.
Saha *(2005)*	20 Latin America countries and Caribbean countries 1990 – 2001	3 Stage of Least Squares	FDI and economic growth are important determinants of each other in Latin America and Caribbean. There is an endogenous relationship between FDI and economic growth.
Durham *(2004)*	80 countries 1979 – 1998	Extreme Bound Analysis (Sensitivity Analysis)	There is no direct positive effect of current and lagged values of FDI and portfolio investment on economic growth.
Hsiao & Hsiao *(2004)*	8 countries 1986 – 2004	Granger Causality Test and VAR Analysis, Unit Root Tests GMM method	There is one – way causality from FDI through GDP growth and exports. FDI and exports make positive contribution to economic growth.
Hermes & Lensink *(2003)*	67 less developed countries 1970 – 1995	OLS	Financial development level of a FDI attracting country is an important pre-condition in order to provide positive affect of FDI on economic growth.
Basu, Chakraborty & Reagle *(2003)*	23 developing countries 1978 – 1996	Unit Root Tests and Panel Cointegration Test	There is a steady state relationship between FDI and GDP growth in the long – run.
Bengoa & Sanchez – Robles *(2003)*	18 Latin America countries 1970 – 1999	Hausman Test OLS	Economic freedom is an important determinant of FDI inflows. Also FDI affects economic growth positively.
Mencinger *(2003)*	8 EU countries 1994 – 2001	Granger Causality Test	FDI affects economic growth but economic growth doesn't affect FDI.
Massoud	51 developing	OLS	FDI accelerates economic growth in both time periods (1989 – 1996

(2003)	countries 1989 – 1996 1989 - 2000		and 1989 – 2000)
Choe *(2003)*	80 countries 1971 – 1995	Granger Causality Test	FDI is Granger cause of economic growth and economic growth is Granger cause of FDI. However economic growth affects FDI growth more.
Zhang & Ram *(2002)*	85 countries 1990 – 1997	OLS	There is a positive relationship between FDI and economic growth in 1990s.
Carkovic & Levine *(2002)*	72 developed and developing countries 1960 – 1995	OLS and GMM	FDI alone has no statistically significant affect on economic growth.
Alfaro, Chanda, Kalemli-Ozcan & Sayek *(2002)*	*1. sample*: 20 OECD countries and 51 non-OECD countries 1975 – 1995 *2. sample*: 20 OECD countries and 29 non-OECD countries 1980 – 1995	OLS	FDI alone has an ambiguous affect on economic growth. However, the countries which have developed financial markets can benefit from FDI.
Zhang *(2001)*	11 East Asia and Latin America countries	Granger Causality Test	It's more possible FDI to affect economic growth in export promoting countries than import substituting countries.

	1957 – 1997 (different time periods among these years)		
Duttaray (2001)	66 developing countries 1970 – 1996	Granger Causality Test, Non-Stationarity Test	In less than %50 of selected countries, FDI affects economic growth.
Reisen & Soto (2001)	44 countries 1986 – 1997	GMM	FDI and portfolio investments affect economic growth positively.
Obwona (2001)	Uganda 1975 – 1991	2 Stage Least Squares	FDI has a positive effect on economic growth in Uganda.
Berthelemy & Demurger (2000)	24 Chinese provinces 1985 – 1996	GMM	FDI plays an important role in the economic growth of Chinese provinces.
De Mello (1999)	32 OECD and non-OECD countries 1970 – 1990	Augmented Dickey-Fuller Test, Panel Cointegration Test, OLS	There is an inverse relationship between the difference of technologically leader countries and their followers, and effect of FDI on economic growth.
Nair – Reichert & Weinhold (1999)	24 developing countries 1971 – 1995	MFR model (mixed fixed and random model) Causality Test	Although there is heterogeneity between countries, the affect of FDI on future economic growth rates is more in more open countries.
Balasubramanyam, Salisu & Sapsford (1999)	46 countries 1970 – 1985	OLS	FDI – labor force relations play an important role in the growth process.
Borensztein, Gregorio & Lee	69 developing countries	SUR Method	FDI is an important tool for technology transfer. Also, it makes more contributions to economic growth than domestic investment.

(1998)	1979 – 1989		
Balasubramanyam, Salisu & Sapsfort *(1996)*	46 developing countries 1970 – 1985	OLS	In export promoting countries affect of FDI on economic growth is more than import – substituting countries.
Fry *(1993)*	16 developing countries 1975 – 1991 (different time periods according to different countries)	OLS	In 11 developing countries, FDI affects economic growth negatively. But in Pacific Basin countries FDI affects economic growth positively. The reason of these different evidences is that, in Pacific Basin countries economic distortions are less.
Bornschier, Chase-Dunn & Rubinson *(1978)*	76 less developed countries 1960 – 1975	OLS	FDI has negative impact on economic growth in developing countries. Also, this impact increases as income level increases.
Papanek *(1973)*	*1. Sample:* 34 countries 1950s *2. Sample:* 51 countries 1960s	OLS	Savings and FDI flows affect one third of economic growth; foreign aids have more impact than other determinants on economic growth. There is no obvious relationship between FDI and foreign aids. Also, economic growth is not correlated with export, education, per capita income and country size.

Source: Constructed by authors

Annex B

Table 2: Unit Root Test Results for *FDIg*

Method	Statistics	Probability
Levin, Lin&Chu (Null Hypothesis: Unit Root)	-5.64182	0.0000
Im, Pesaran and Shin W-stat (Null Hypothesis: Unit Root)	-9.05500	0.0000
ADF - Fisher Chi-square (Null Hypothesis: Unit Root)	179.043	0.0000
PP - Fisher Chi-square (Null Hypothesis: Unit Root)	366.293	0.0000
Hadri Z-stat (Null Hypothesis: No Unit Root)	-0.18945	0.5751

Table 3: Unit Root Test Results for *Yg*

Method	Statistics	Probability
Levin, Lin&Chu (Null Hypothesis: Unit Root)	-4.83151	0.0000
Im, Pesaran and Shin W-stat (Null Hypothesis: Unit Root)	-9.57166	0.0000
ADF - Fisher Chi-square (Null Hypothesis: Unit Root)	179.632	0.0000
PP - Fisher Chi-square (Null Hypothesis: Unit Root)	262.024	0.0000
Hadri Z-stat (Null Hypothesis: No Unit Root)	0.43079	0.3333

Table 4: Unit Root Test Results for *Xg*

Method	Statistics	Probability
Levin, Lin&Chu (Null Hypothesis: Unit Root)	-7.34907	0.0000
Im, Pesaran and Shin W-stat (Null Hypothesis: Unit Root)	-11.8374	0.0000
ADF - Fisher Chi-square (Null Hypothesis: Unit Root)	226.190	0.0000
PP - Fisher Chi-square (Null Hypothesis: Unit Root)	349.215	0.0000
Hadri Z-stat (Null Hypothesis: No Unit Root)	-0.18645	0.5740