

## **Effect Of Foreign Direct Investments On Domestic Investments Of Developing Countries: A Dynamic Panel Data Analysis**

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### **Abstract**

Foreign direct investments are regarded as a significant source of investment in developing countries. However, foreign direct investments may affect domestic investments in different aspects. They can enforce the domestic firms to crowd out of the sector, or crowd in them.

In this study; the effects of foreign direct investments for developing countries was examined by means of panel unit root tests and dynamic panel data analysis, within using belonging 35 countries 1992-2010 period data. As an empirical results obtained from the analysis; foreign direct investments increases domestic investments and has got crowding in effects in developing countries. In these countries, \$1 of foreign direct investment (FDI) causes \$2.64 increasing in total investment.

**Keywords:** Foreign Direct Investment, Crowding in-Crowding out Effects, Developing Countries.

Jel Codes: E22, F21, G11, P33.

### **1. INTRODUCTION**

FDI is an investment involving a long-term relationship that control of a resident entity in one economy is reflecting a lasting interest and in that enterprise resident in an economy other than that of the foreign direct investor (OECD, 1992). FDI refers to the net inflows of investment to acquire a lasting management interest, 10 percent or more of voting stock, in an enterprise operating in an economy other than the investor (World Bank, 1999). These kind investments involve setting up the factory; purchase domestic firm (including privatization), joint venture with a local firm, licensing agreements and purchases of real estate.

FDI have significant effects for economies. It can provide a country access to new markets, cheap production, new technology, alternative products, labor and management skills and financing (Sun, 1996; Barelli and Pain, 1997; Sun, 1998; Jayaraman, 1998; Borensztein, Gregoria and Lee, 1998 and Javorcik, 2004).

FDI has come to play a major role in the internationalization of business lately. FDI reached this volume owing to liberalization policies, new economic integrations, trade acts, tariff liberalization, thanks to new information technology decline the communication and remote management costs. FDI flows have increased from \$54 billion in the 1980's to \$1244 billion in 2010. FDI firms exported \$6 trillion, which about thirty percent of global exports, created

added value \$7 trillion and supply \$33 trillion income to employee in 2010 (UNCTAD-WIR, 2011).

FDI may have some different effects on host country economies. It may cause crowding out or crowding in of domestic firms from sector. Purpose of this study is to analysis this effect on developing countries economy. These effects will be analyzed via panel unit root tests and dynamic panel data analysis method using 35 developing country's 1992-2010 period data.

## 2. THEORETICAL FRAMEWORK

FDI can affect investments of domestic firms via its own investment activities in various ways. Some of the positive and negative effects of FDI on domestic investment are regarded. Impact of FDI on domestic investments may determine according to its complementarity and substitution features. While FDI producing substitute goods, it may crowding out especially inefficient domestic firms; on the other hand FDI will crowding in domestic investment that producing complementary goods or it will uses raw material from domestic market (Buffie, 1993).

If there are FDI's crowds out effects on the domestic investments; one unit FDI increases will lead to increase of total investment in the host country smaller than one unit. On the other hand, if FDI has got crowds in effects on the domestic investment, one unit FDI increases will lead to more than one unit increase of total investment in the host country. If the effect is neutral, a unit FDI increases causes a unit increases on total investment (Misun and Tomsik, 2002).

Crowding out effects of FDI may takes place when foreign and domestic firms are in the same industry. When FDI has come to a sector which included intensive domestic activities, the firms that will compete and domestic firms cannot stand this competition, and will be crowded out of sector. If the FDI goes towards the indigenous sectors, which there is less investment in this sector, through increase the volume of trading and market in this sector, it will be crowding in the domestic firms in this sector (De Mello, 1999).

### 2.1. Mathematical Framework of Crowding In and Crowding Out Effects

For analysis this effects of FDI may beginning with a simple equation where investment in a country is the sum of domestic investment ( $I^d$ ) and FDI: 13

$$I = I^d + FDI \quad (1)$$

From the point of view of the recipient country, FDI can be considered to be an exogenous variable (because it depends on conditions in the world economy, Transnational Corporations (TNCs) strategies, etc.).

Domestic investment is depending on the domestic revenue (GDP). The model simply maybe arranged as follows:

$$I^d = \alpha + \beta_1 GDP \quad (2)$$

By replacing (2) in (1), a model for total investment was obtained:

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13 UNCTAD-WIR, (1999) has been followed here and the model has been extended by the authors.

$$I = \alpha + \beta_1 GDP + FDI \quad (3)$$

The model of equation (3) assumes that FDI has no macroeconomic externalities on domestic investment and that, therefore, one dollar of FDI becomes one dollar of investment. Since the purpose of the exercise is to verify whether these externalities exist and, if they do, whether they are positive or negative, a more general formulation is used:

$$I = \alpha + \beta_1 GDP + \beta_2 FDI \quad (4)$$

An empirical finding that  $\beta_2 > 1$  is evidence for crowding in while  $\beta_2 < 1$  is evidence for crowding out. While investors are investing not only current year, but also look at the past years' economic growth rate. So investments dynamic process can expand as follows:

$$I_{i,t} = \alpha_i + \sum_{j=0}^p \beta_j F_{i,t-j} + \sum_{j=1}^p \gamma_j I_{i,t-j} + \sum_{j=0}^p \delta_j G_{i,t-j} + \varepsilon_{i,t} \quad (5)$$

Where I = investment; F = FDI; G = growth of GDP;  $\alpha$  is the fixed country effects and  $\varepsilon$  is a serially uncorrelated random error.

That long-term crowding in and crowding out will be tested with this the relevant coefficient is:

$$\hat{\beta}_{LT} = \frac{\sum_{j=0}^p \beta_j}{1 - \sum_{j=1}^p \gamma_j} \quad (6)$$

The criterion used to determine crowding in or crowding out is the value and significance of  $\hat{\beta}_{LT}$ . Wald test constraints: If  $\hat{\beta}_{LT} = 1$ , means that foreign direct investment caused neither crowding in effect nor crowding out effect on domestic investment, that is neutral (N) effect.

An increase of one unit FDI will make a total investment also increased one unit; If  $\hat{\beta}_{LT} > 1$ , means that FDI caused crowding-in effect on domestic investment, that a unit of FDI can bring more than one unit of total investment; If  $\hat{\beta}_{LT} < 1$ , means that foreign direct investment caused crowding-out effect on domestic investment, that a unit of increase in FDI to the total increase in investment is less than one unit of.

### 3. SITUATION IN DEVELOPING COUNTRIES

Global foreign direct investment (FDI) flows realized to \$1.24 trillion in 2010. UNCTAD estimates that global FDI will recover to its pre-crisis level in 2011, increasing to \$1.4–1.6 trillion. Some of the poorest regions continued to see declines in FDI flows. Flows to Africa, least developed countries, landlocked developing countries and small island developing states all declined, as flows to South Asia. At the same time, major emerging regions, such as East and South-East Asia and Latin America experienced strong growth in FDI inflows (UNCTAD-WIR, 2011).

International production is expanding, with foreign sales, employment and assets of TNCs all increasing. TNCs' production worldwide generated value-added of approximately \$16 trillion in 2010, about a quarter of global GDP. Foreign affiliates of TNCs accounted for more than

10 per cent of global GDP and one-third of world exports. Table 1 shows the distribution of FDI in the economies.

**Table 1:** Distribution of the FDI in Economies (Billion \$)

	World	Developing Economies	Share of Developing Economies	Transition Economies	Share of Transition Economies	Developed Economies	Share of Developed Economies
1980	54	7	14	0	0	47	86
1990	207	35	17	0	0	173	83
2000	1.403	258	18	7	1	1.138	81
2005	983	332	34	31	3	619	63
2006	1.462	429	29	55	4	978	67
2007	1.971	573	29	91	5	1.307	66
2008	1.744	658	38	121	7	965	55
2009	1.185	511	43	72	6	603	51
2010	1.244	574	46	68	5	602	48

Source: UNCTAD-STAD.

According to Table 1, while FDI in developing countries increasing, decreasing in developed countries. For the first time, developing and transition economies together attracted more than half of global FDI flows. Outward FDI from those economies also reached record highs, with most of their investment directed towards other countries in the South. In contrast, FDI inflows to developed countries continued to decline. The distribution of FDI among for 2010 year top 20 developing countries is shown in Table 2.

**Table 2:** Distribution of the FDI in Top Eleven Developing Countries (Million \$)

	YEAR	1980	1990	2000	2006	2007	2008	2009	2010
1	China	57	3.487	40.175	72.715	83.521	108.312	95.000	105.735
2	Brazil	1.910	989	32.779	18.822	34.585	45.058	25.949	48.438
3	Singapore	1.236	5.575	16.484	29.348	37.033	8.588	15.279	38.638
4	Saudi Arabia	-3.192	312	183	17.140	22.821	38.151	32.100	28.105
5	India	79	237	3.588	20.328	25.350	42.546	35.649	24.640
6	Mexico	2.099	2.633	18.110	20.052	29.734	26.295	15.334	18.679
7	Chile	213	661	4.860	7.298	12.534	15.150	12.874	15.095
8	Indonesia	180	1.092	-4.495	4.914	6.928	9.318	4.877	13.304
9	Angola	37	-335	2.174	9.064	9.796	16.581	11.672	9.942
10	Malaysia	934	2.611	3.788	6.060	8.595	7.172	1.430	9.103
11	<b>Turkey</b>	<b>18</b>	<b>684</b>	<b>982</b>	<b>20.185</b>	<b>22.047</b>	<b>19.504</b>	<b>8.411</b>	<b>9.071</b>

Source: UNCTAD-STAD.

#### 4. LITERATURE

There have been many studies for of FDI effects on domestic investment in the economics literature. In these studies reached different conclusions. Summary of these studies are given in order of date of construction.

Lubitz (1966), studied relating to Canada and found a big effect FDI to domestic investment that: \$1 of FDI led to \$3 of capital formation in host country. Similarly Van Loo, (1977), studied again on Canada with 1948-1966 periods data and found that: \$1 of FDI led to \$1.4 of capital formation in host.

Borensztein, et al, (1998), studied of the impact of FDI on domestic investment, utilizing data on FDI flows from developed countries to 69 developing countries on a yearly basis from 1970 to 1989, has found, that FDI has stimulated domestic investments; one dollar net inflow of FDI increases total investment in the host economy between 1.5 and 2.3 times the increase in the flow of FDI.

Chudnovsky, Lopez and Porta (1996), found crowding out effect in the case of Latin America, where the development of domestic subcontractors was part and parcel of the privatization agreement with foreign investors. Intel built a large microprocessor plant in Costa Rica and contributed to domestic capital formation. This investment as such didn't displace local entrepreneurs, because they hadn't got exist, even potentially. Intel affiliate gave rise to investments by about 40 local suppliers. But there were some complaints by local business people that Intel's investment crowds them out of the labor market by absorbing skilled programmers.

Jomo (1997), studied for Indonesia, Malaysia, and Thailand, which relied heavily on FDI and TNCs have invested in new industries of the economies of those countries mainly microelectronics-related toys and other consumer goods for export markets, initially many of the FDIs where with few linkages to the rest of the economy, domestic suppliers of services and inputs have emerged in time, and FDI crowding in a lot of firms in this industries.

UNCTAD-WIR (1999), including an econometric study for FDIs' effects on domestic investments. This study covers 39 developing countries' 1970-1996 period data by means of panel data analysis. The results with respect to the effects of FDI on investment by individual countries show that neutral effects dominate while the number of crowding in and crowding out cases were equal: the former were found in 19 countries and the latter in 10 countries each. As regards regional patterns, out of the 12 Latin American countries included in the test, none was in the group with crowding-in effects and none of the 12 Asian countries was in the crowding-out group: while neutral and crowding in effects prevailed in Asia, neutral and crowding out effects prevailed in Latin America.

Agosin and Mayer (2000), studied for Asia, Africa and Latin America country via panel data analysis and found that: while there were complementary relationship between investments in Asia and Africa countries, there were substitution relationship in Latin American countries.

Driffield and Hughes (2003), found of FDIs complementarity and creation on the heap economy features'. According to Backer and Sleuwaegen (2003), in the context of occupational choice models, FDI declining the power of local entrepreneurs. But, FDI increases the domestic investments through networking, chain and learning effects.

Agosin and Machado (2005), studied of the impact of FDI on domestic investment via econometric methods and found FDI hadn't got a positive effect on domestic investment. Apergis, Katrakilidis and Tabakis (2006), with panel study involving 30 countries found that: FDI had got complementary relationship between domestic investment in the single-variable model, whereas, in the context of a multivariate model was obtained from the substitutional relationship. Lin and Chuang (2007), tested this effects for Taiwan economy, found that FDI have got important effects on domestic investments. According to them, FDI crowding out to little domestic firms and crowding in the big domestic firms.

Ang (2009), studied of the impact of FDI on domestic investment for Malaysia through VAR analysis using 1960-2003 periods data and found that: \$1 FDI increase the domestic investments \$1.25. Therefore, FDI involves crowding in effects in Malaysian economy.

Gan and Gao (2010), studied of the impact of FDI on domestic investment for China via panel data analysis methods using 1992-2007 periods data and found that: \$1 FDI increase the domestic investment in central region \$4.08 and \$5.88 in Shanxi region. So, FDI have got crowding in effects in China economy.

## 5. EMPIRICAL ANALYSIS

### 5.1. Data Set

A balanced panel of 665 annual observations from 35 developing countries over the period 1992-2010 was used in this study. The sample of countries represents all major regions in the world as FDI attracting in 2010. It includes 11 countries from Latin America and Caribbean, 11 from Asia and the Pacific, 10 from Africa and 3 from economies in transition. Investment, Gross Domestic Product (GDP) and Foreign Direct Investment (FDI) are these studies' variables. Data set was obtained from World Bank, UNCTAD and IMF. All data currency is US dollar. I = investment to GDP ratio; F = FDI to GDP ratio; G = growth of Real GDP.

### 5.2. Method

For this study data set included in the dynamic processes, dynamic panel data analysis method was used. Dynamic panel data analysis method is taken into consideration dynamic structure between the dependent and independent variables (Baltagi, 1995). In addition to use of panel data in estimating ensures control for missing or unobserved variables and relationships allow identification of country-specific effects (Arellano-Bond, 1991; Matyas and Sevestre, 1996). The dynamic panel allows dynamic effects to be introduced into the model and allows feedback from current or past shocks (Hsiao, 1986). This approach requires that  $N > T$  (Hahn, 1997) and  $N$  and  $T$  must be very big (Hsiao, 2003: 75). Simple equation of dynamic panel data is:

$$y_{it} = \delta y_{i,t-1} + \beta x_{it} + \mu_i + u_{it} \quad (7)$$

for  $i=1,2,\dots,N$ ; and  $t=1,2,\dots,T$ .  $\delta$  is a scalar,  $x_{it}$  is  $k \times 1$ ,  $\mu_i$  denotes the  $i$ -th individuals effect and  $u_{it}$  is the remainder disturbance.

In this study, along dynamic panel data estimation methods the technique Generalized Method of Moments (GMM) was used. GMM procedures are more efficient than other estimators Arellano and Bond (1991). The resulting GMM estimator is asymptotically efficient (Baltagi, 1995). GMM estimators use all possible lagged values of dependent and independent variables as instrumental variable (Arellano and Bond 1991). Sargan test is used to determine if instrumental variables of the GMM are suitable (Greene, 2003).

The Sargan test is a test of the validity of instrumental variables. The Sargan test based on the Arellano and Bond (1991) instrument set for the first differenced equations exhibits a zero rejection frequency under both the null hypothesis and alternative hypothesis (Bowsher, 2002). The Sargan test is based on the observation that the residuals should be uncorrelated with the set of exogenous variables if the instruments are truly exogenous. It is a test of the over identifying restrictions. Hypotheses are:

H0: Instrumental variables are exogenous (Moment conditions are valid).

H1: Instrumental variables aren't exogenous (Moment conditions are invalid).

The hypothesis tested with the Sargan-J statistic. This statistic will be asymptotically chi-squared ( $\chi^2$ ) with  $m-k$  degrees of freedom.  $m$  is instrumental variables number and  $k$  is number of the parameter. If the obtained test statistic probability value greater than 0.05, null hypotheses will accepted. Therefore, instrumental variables are uncorrelated to residuals, and

therefore they are acceptable, instruments are healthy. If the obtained test statistic probability value smaller than 0.05, H0 will be rejected and instrumental variables are unacceptable.

### 5.3. Panel Unit Root Test

Panel unit root testing is accepted more strong for only the time dimension of time series unit root tests. Since it covers the data of both time and cross-sectional size (Im, Pesaran and Shin, 1997; Maddala and Wu, 1999; Taylor and Sarno, 1998; Levin and Lin, 1992; Hadri, 2000; Choi, 2001; Levin, Lin and Chu, 2002; Breuer and Wallace, 2002; Carrion-i-Silvestre, 2005; Pesaran, 2006; Beyaert and Camacho, 2008). At the same time, the addition of cross-sectional size of the analysis, increased variability in the data.

The first problem encountered in the panel unit root tests are whether or not independent of each cross-section. Panel unit root tests are divided into first generation and second generation tests. While Breitung (2000), Hadri (2000) and Levin, Lin and Chu (2002) based on the assumption of a homogeneous model; Im, Pesaran and Shin (2003), Maddala and Wu (1999), Choi (2001) based on the assumption of a heterogeneous model.

In this study; Im, Pesaran and Shin (2003) (IPS) test will be used since the countries aren't homogeneous. IPS test is based on this model:

$$\Delta Y_{it} = \delta_i Y_{i,t-1} + \sum_{j=1}^{p_j} \beta_{ij} \Delta Y_{i,t-j} + \gamma X_{it} + \varepsilon_{it} \quad (8)$$

for  $i=1,2,\dots,N$ ; and  $t=1,2,\dots,T$ .  $\delta_i$  is a error correction model. If  $|\delta_i| < 1$  (or unit root test probability value  $< 0.05$ ) serial is trend stationary, or else it has got unit root and not stationary.

**Table3: IPS Unit Root Test**

Variable	Level Value	Prob Value
<i>I</i>	-6.011	0.0000
<i>F</i>	-3.511	0.0002
<i>G</i>	-11.396	0.0000

**Note:** In panel unit root tests Schwarz criterion is used and length was 1 taken.

According to the Table 3, all series are stationary in level values. So this means analyzes to be performed in this series is reliable.

### 5.4. Dynamic Panel Data Analysis

Dynamic data analysis made with using model (5) via GMM and the results of obtained are presented in Table 4.

**Table 4: Results of Dynamic Data Analysis**

Variables	Coefficients	t-Statistics
<i>I(-1)</i>	0.97	414.05
<i>I(-2)</i>	-0.06	-28.68
<i>I(-3)</i>	0.26	86.35
<i>F</i>	0.44	57.62
<i>F(-1)</i>	0.51	34.14
<i>F(-2)</i>	-1.07	-294.95
<i>F(-3)</i>	0.57	65.55
<i>G</i>	0.36	619.67
<i>G(-1)</i>	-0.31	-234.85

$G(-2)$	-0.03	-38.16
$G(-3)$	-0.001	-1.21
$R^2=0.87$	J-Statistic=26.91	Instrument Rank=35

White Period method was used to correct the standard errors. Sargan test was used to determine whether the instruments are suitable or not by using J-statistic and instrument rank. In this way found the p-value=0.208. This result is bigger than 0.05. Thus decided to instruments are suitable and analysis results are reliable.

Long-term investment coefficient calculated using equation (6) and found it 2.64. This result shows; in developing country, \$1of FDI creates \$2.64 in total investments. As result of FDI increases domestic investment and it has got crowding in effect in the developing country. This is a very high degree. Countries, which wishing to increase their domestic investments, should utilize from this source.

## 6. CONCLUSIONS

There are different opinions about the effects of FDI on domestic investment in economics literature. Some economics believe that, FDI reduces domestic investment and it has got crowding out effects. Other claim FDI increases domestic investment and it has got crowding in effects. The main purpose of this study is to analyze these effects in developing countries.

For this purpose, using data from 1992-2010 for 35 developing countries a dynamic panel data analysis was performed. As an empirical results obtained from the analysis; FDI increases domestic investment and has got crowding in effects in developing countries. \$1of dollar FDI leads to an increase \$2.64 total investment in these countries. This value is very high; FDI for the emerging countries shows how important it is. Therefore, countries, which wishing to increase their domestic investments, absolutely should utilize from this source.

As a result, if a country wants to accelerate its developing pace; it tries to attract more FDI its country. The same time governments should take necessary measures for foreign investments attributes and qualities.

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