

# The Contribution Of FDI Flows To Domestic Investment: An Econometric Analysis Of Developing Countries

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## ABSTRACT

Foreign direct investment flows may affect domestic investment in different dimensions. The interests related to the impact of FDI on domestic investment focus on whether FDI is a complement or a substitute for domestic investment. The aim of this paper is to research for the effects of FDI on domestic investment for Turkey, Brazil, Russia, South Africa and Mexico by using time series analyses. For this purpose, we utilize GMM (Generalized Method of Moments) methodology. The sample period is 1990:1-2012:3 for Turkey and Mexico; 1995:1-2012:3 for Brazil; 1995:1-2012:2 for Russia and 1990:1-2011:4 for South Africa. The empirical results put forth an evidence of crowding out effect for Turkey and South Africa. On the other hand, it is found that FDI creates crowding in effects for Russia. One other finding of the study is statistically insignificant coefficients for Brazil and Mexico.

**Key Words:** Foreign Direct Investment, Domestic Investment, Developing Countries, Time Series Analysis, GMM.

**JEL Classification:** F21, F23, O11, C22, G11

## Doğrudan Yabancı Sermaye Yatırımlarının Yurtiçi Yatırımlara Etkisi: Gelişmekte Olan Ülkeler İçin Ekonometrik Bir Analiz

### ÖZ

Doğrudan yabancı sermaye yatırımları yurtiçi yatırımları çeşitli şekillerde etkileyebilmektedir. Bu türdeki sermaye akımlarının yurtiçi yatırımlar üzerindeki etkisine yönelik ilgi, DYSY'nin etkisinin tamamlayıcı mı yoksa ikame edici mi olduğu üzerine odaklanmıştır. Çalışmanın amacı zaman serileri analizini kullanarak Türkiye, Brezilya, Rusya, Güney Afrika ve Meksika için doğrudan yabancı yatırımların yurtiçi yatırımlar üzerindeki etkilerini araştırmaktır. Bu amaç için GMM yöntemi kullanılmıştır. Örneklem dönemi Türkiye ve Meksika için 1990:1-2012:3, Brezilya için 1995:1-2012:3, Rusya için 1995:1-2012:2 ve Güney Afrika için 1990:1-2011:4 olarak belirlenmiştir. Analiz sonuçları Türkiye ve Güney Afrika için dışlama etkisinin geçerli olduğunu göstermektedir. Diğer taraftan Rusya için doğrudan yabancı yatırımların artırma etkisi yaratığı bulunmuştur. Çalışmanın diğer bir bulgusu, Brezilya ve Meksika için istatistiksel olarak anlamsız katsayı tahminlerinin elde edilmesidir.

**Anahtar Kelimeler:** Doğrudan Yabancı Sermaye Yatırımları, Yurtiçi Yatırımlar, Gelişmekte Olan Ülkeler, Zaman Serileri Analizi, GMM.

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## I. INTRODUCTION

The key problem for developing economies is the resource requirements in excess of domestic savings. At that point foreign capital is accepted as an

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important way to overcome this shortcoming. Foreign capital flows include both financial investments that are made via instruments of capital and money markets, and foreign direct investments (FDI) that have physical characteristics (Seyidođlu, 2003: 451). Foreign direct investments can be defined as investments that are made by foreign firms in domestic lands through purchasing a firm or providing founding capital for a newly established firm or increasing the capital of an existing company (Karluk, 2003: 486). IMF defines this kind of foreign capital as "an incorporated or unincorporated enterprise in which a foreign investor owns 10 percent or more of the ordinary shares or voting power of an incorporated enterprise or the equivalent of an unincorporated enterprise". Direct investment enterprises comprise those entities that are subsidiaries (a nonresident investor owns more than 50 percent), associates (an investor owns 50 percent or less) and branches (wholly or jointly owned unincorporated enterprises) either directly or indirectly owned by the direct investor (IMF, 2013: 86).

The major determinants of FDI are liberalization policies, new economic integrations, trade acts, tariff liberalization and new information technology that declines the communication and management costs. FDI creates significant economic effects by providing access to new markets, cheap production, new technology, alternative products, labor and management skills and financing opportunities. FDI also plays a major role in the internationalization of the business (Göçer et al, 2012: 94).

The impacts of FDI on investment may be positive or negative. These effects arise from its complementarity and substitution attributes. If FDI produces substitute goods, it may crowd out especially inefficient domestic firms; on the other hand if FDI produces complementary goods or if FDI uses inputs from domestic market, it may crowd in domestic investment. Effects of FDI on domestic investment depend on whether FDI and the domestic firms are in the same industry or not. If FDI comes to a sector in which domestic activities are intensive, domestic firms may have difficulties in surviving against the competition of foreign firms and may be driven out of the sector. If FDI goes to a sector which includes less domestic firms, it may crowd in the domestic firms in this sector (Göçer et al., 2012: 95).

Although it is conventionally thought that increases in direct investment would affect domestic investment in the same direction via its positive externalities, significant amount of empirical studies presume that the effect of direct investment on domestic investment may be negative and question the potential relationship between the two variables. Empirical results could not submit precise results regarding the impact of FDI on domestic investment. Because the results of empirical analysis vary from country to country/ region to region, due to the differences in national/regional policies, response of domestic enterprises, the type of FDI inflow in the recipient country and the econometric methodology used (De Mello, 1999; Eregha, 2011: 4).

The aim of this study is to empirically analyze the crowding in/ out effects of FDI on domestic investment in selected developing countries. Since our

empirical investigation focuses on developing economies that need foreign resources- especially FDI which is more preferable sort of foreign capital depending on its less speculative, less volatile and long term property- to finance their economic development; and since investment is accepted as a fundamental determinant of economic growth, the link between FDI and investment have to be considered. The findings from this investigation will provide guidance for the decision makers about the contribution of FDI. If the direct investment is found to crowd out domestic investment, then this result would lead us to question the contribution of direct investment for the host country and to consider what to do to increase the economic benefits from FDI. The sample of the study is selected as Brazil, Russia, South Africa, Turkey and Mexico. The countries other than Turkey are top prospective host economies for 2012–2014 periods according to the UNCTAD survey that is based on 174 validated company responses.<sup>1</sup>

The next part of the study is organized as follows. The second part of the study explains the theoretical channels through which the crowding out/ in effects of FDI on domestic investment occur. The third part conveys the previous empirical studies related to the subject. The fourth and the ensuing part provide information followingly about the data set, methodology and the empirical results. And finally the last part of the study includes the conclusions and suggestions.

## **II. THE EFFECTS OF FDI ON DOMESTIC INVESTMENT**

FDI can influence the host countries' economy in various ways. The main reason for the effort of the host countries to attract foreign direct investments is to be able to reach new financing resources for their economic development. The key role of investment in economic growth and development is well known. So, in assessing the contribution of FDI on economic development, an important point to focus on is the effect of FDI on domestic investment.

The effect of FDI on domestic investment may be complementary or substituent. If there is substitution effect (crowding out effect), foreign firms replace the locals and if there is complementarity effect (crowding in effect), foreign firms support local firms to develop and to become effective. When it is considered that total investment volume of a country consists of foreign and domestic investment; it can be said that in case of crowding out effect, rate of increase in total investment is smaller than the rate of increase in foreign investment. And in case of crowding in effect, rate of increase in total investment exceeds the rate of increase in foreign investment (Titarenko, 2005: 3; Özağ et al, 2004: 66; Agosin and Machado, 2005: 151). The impact of FDI on domestic investment varies from country to country depending on national policies, the sort of FDI and the strength of the domestic entrepreneur in the host country (Titarenko, 2005: 3; Agosin and Machado, 2005: 151). These two opposite impacts of FDI on investment will be summarized in the following subheadings.

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<sup>1</sup> Information about the results of the UNCTAD survey is represented in Table 1.

### **A. Complementarity Effect**

The channels through which the complementarity effects of FDI on domestic investment arise can be listed as follows:

- The contribution of FDI on capital formation varies depending on the sector that the FDI goes. If the sector that FDI goes is different from the sectoral distribution of the existing capital stock, the impact of FDI on domestic investment may be complementary (Agosin and Mayer, 2000: 4). In other words, FDI in undeveloped sectors, where there is not domestic competition, may lead total capital stock to increase (Açıklalın, 2009: 2). This is because domestic firms in undeveloped sectors do not have the basic information about the production process (Agosin ve Machado, 2005: 151). Furthermore the investments that are planned to be carried out in undeveloped sector of developing economies are so costly. Especially financial and technological necessities for the sectors that require high technology are much higher than the domestic capacity (Titarenko, 2005: 3).
- Foreign investors may contribute to the domestic firms by their financial resources (Apergis et al, 2006: 386).
- FDI may create positive externalities through their new technology, machine and equipment, developed organizational methods, managerial skills, advanced marketing techniques and opportunities to reach international markets (Açıklalın, 2009: 2).
- FDI may provide the infrastructure (transportation, telecommunications, etc.) that is necessary for domestic capital formation but can not be done through their own means. And this factor increases the profitability of the domestic investors (Çinko, 2009: 124; Apergis et al, 2006: 386).
- The impact of FDI on domestic investment depends on the reason of their coming. If the aim is to overcome the trade barriers of the host economy, the domestic investment will not increase. But if it is purposed to provide comperative advantage, FDI may create positive effects with its forward and backward linkage effects (Mahmood and Chaudhary, 2012: 1500).
- FDI may impress domestic investment positively by creating demand for goods and inputs and so by increasing the income of both domestic firms and factor owners (Bilgili et al, 2007: 131; Mahmood and Chaudhary, 2012; 1500).
- FDI may cause the other firms in the same sector to gain more competetive property (Agosin and Machado, 2005: 152).

### **B. Substitution Effect**

The effect of FDI on domestic investment may be substitutive. These negative effects arise through the channels outlined below:

- FDI that operates in an intensively competetive sector may create disincentive effects for domestic investment and causes capital stock to decrease (Açıklalın, 2009: 2). This effect is also valid for the cases in which domestic firms have already reached the technology that will be brought by multinational companies (Titarenko, 2005: 3). If a multinational company

that has a significant superiority in comparison with domestic firms invests in a competitive sector, it takes away the investment opportunities from domestic entrepreneurs (Agosin and Mayer, 2000: 3).

- The foreign firms that are known with their superior technology are more advantageous in getting some opportunities in comparison with domestic firms. And so they force domestic firms to go out the market (Agosin and Mayer, 2000). Foreign investments prevent the development of infant industries that can not abide the long and costly learning process (Özağ et al., 2004: 66).
- FDI disrupt the balance of payments because it causes imports to increase and terms of trade to worsen. This situation leads an increase in the price of capital goods and a decrease in domestic investment (Apergis et al., 2006: 387).
- Furthermore, multinational firms' capacity of employing qualified labor is more than domestic firms due to their production scale and specialization. And this is a significant cost for domestic firms in entering the market (Özağ et al., 66).
- If foreign firms use the scarce physical and financial resources in the recipient country or if the foreign firms obstruct the investment opportunities of domestic firms, domestic investment may decrease (Çinko, 2009: 124). Domestic firms in countries with undeveloped financial markets can not get positive externalities from FDI (Mahmood and Chaudhary, 2012: 1500). Multinational firms may cause interest rates to increase by borrowing from domestic financial markets and consequently may induce domestic investment to decrease (Agosin and Machado, 2005: 153).
- FDI crowds out domestic firms by causing wages and inputs that are domestically supplied to increase (Apergis et al., 2006: 387).
- If foreign firms use modern production technologies while the local ones have primitive and traditional production structures, integrity of the economy deteriorates resulting in a dual structure and this situation leads to unfair competition (Şimşek and Behdioğlu, 2006: 53).
- FDI may drive out local firms through competition by increasing competition and lowering prices (Mahmood and Chaudhary, 2012: 1501).
- Another reason for crowding out is the different treatment given to foreign investors compared to domestic investors. The discretionary incentives given to foreign investors (including tax-holidays, free land, tax exemptions on imported machinery and intermediate inputs, access to loan guarantees and many other benefits) do not allow domestic firms to compete favorably with their counterparts (Mayanja, 2012: 17).

### **III. LITERATURE REVIEW**

There have been many studies related to the effects of FDI on domestic investment in the literature. Some of these studies are summarized below:

Agosin and Mayer (2000) empirically evaluate the effects of FDI on domestic investment for a sample of 30 economies (12 African, 8 Asian and 12

Latin American countries). The sample period involves panel data for 1970-1996 eras. The study concludes that for Asian countries crowding in effects and for Latin American countries crowding out effects are valid. Analyses are repeated for sub periods of 1976-1985 and 1986-1996 and it is identified that the achieved results does not change under different sub period definitions.

Backer and Sleuwaegen (2003), in the context of occupational choice models, conclude that FDI declines the power of local entrepreneurs but increases the domestic investments through networking chain and learning effects.

Agrawal (2000) analyzes the effects of FDI on domestic investment for five South Asian economies (India, Pakistan, Bangladesh, Sri Lanka and Nepal) by using panel data for the 1965-1996 periods. The empirical results that are achieved from fixed effects methodology indicate that FDI is complement for domestic investments.

Hecht et al. (2004) investigate the topic with a panel data set of 64 countries that covers the 1976-1997 periods. The results from OLS and two stage OLS analyses point to crowding in effects of FDI.

Titarenko (2005) evaluates the subject for Latvia. Analyses are realized with quarterly time series for 1995-2004 periods. The paper follows the approach of Agosin and Mayer (2000). Results from empirical analysis present a crowding out effect of FDI on domestic investment for Latvia.

Agosin and Machado (2005), analyze the relationship between FDI and domestic investment with panel data for 12 countries regarding 1971-2000 period. They utilize GMM methodology and detect that FDI causes crowding out effects in Latin American countries while the effect is neutral for Asian and African countries.

Apergis et al. (2006) investigate the dynamic relationship between FDI inflows and domestic investment for a panel of 30 countries by means of panel cointegration and causality techniques. The sample period is 1992-2002. The results of the bivariate case support the complementarity between FDI and domestic investment while the results of the multivariate case point out crowding out effects of FDI.

Düzgün (2008) analyzes the effects of FDI on investment for Turkey by the use of quarterly time series for the 1991:4- 2004:4 periods. The paper follows Engle -Granger cointegration and Granger causality methodologies. Empirical results indicate a cointegration relationship between the variables and a unidirectional causality from domestic investment to FDI.

Açıkalin (2009) empirically analyzes the relation between FDI and fixed capital investment for Turkish economy. The sample period covers 1970-2007 eras and empirical investigations are actualized by Johansen cointegration method, Granger causality analysis and impulse response functions. It is determined that there is no cointegration relationship between variables and the causality runs from domestic investment to FDI. Results from impulse response functions indicate that an increase in domestic investment causes an increase in FDI.

Eregha (2011) explores the relationship for 10 ECOWAS<sup>2</sup> countries. The paper analyzes the 1970-2008 period by bivariate and multivariate panel cointegration techniques. Empirical results indicate a long run cointegration relationship between variables and call attention to crowding out effects of FDI on domestic investment in ECOWAS countries. Furthermore, panel causality tests point out bidirectional causality between FDI and domestic investment.

Sunny and Sawant (2012) research the potential crowding in/ out effects of FDI for China and India. The approach of Agosin and Mayer (2000) is followed in the empirical analyses that are performed with annual data for 1980-2010 periods. The results support a crowding in effect for India and a crowding out effect for China. Johansen cointegration analysis results support the presence of cointegration relationship between FDI and domestic investment for the Indian economy. According to the Granger causality results there is a unidirectional causality from domestic investment to FDI.

Mahmood and Chaudhary (2012) explore the relationship between FDI and domestic investment for Pakistan by ARDL cointegration technique and error correction models. The analyses involve 1972-2010 period. Empirical results indicate that the variables are cointegrated and FDI affects domestic investment positively both in the long run and in the short run. Another empirical study for Pakistan economy is realized by Shah et al. (2012). The paper analyzes the 1990-2010 periods and utilizes OLS methodology. The results indicate that FDI creates complementary effects on domestic investment.

Göçer et al. (2012) explore the impact of FDI on domestic investment for 35 developing countries with panel data related to 1992-2010 periods. The empirical results that are obtained through GMM methodology represent a positive impact from FDI to domestic investment.

Mayanja (2012) investigates the effect of FDI on domestic investment for 30 Sub-Saharan African countries by system GMM methodology and with panel data regarding 1990-2008 eras. Empirical findings support crowding out effects.

#### **IV. DATA SET AND VARIABLES**

In this paper, impact of FDI on domestic investment is investigated for Turkey, Brazil, Russia, South Africa and Mexico through time series analyses. The time interval determined for each country is different due to the availability of data. The analyses are performed with quarterly series. The sample period is 1990:1-2012:3 for Turkey and Mexico; 1995:1-2012:3 for Brazil; 1995:1-2012:2 for Russia and 1990:1-2011:4 for South Africa. The variables used in empirical analysis are symbolized with F, I and GR. F is the ratio of FDI (which is the sum of FDI in abroad and FDI in recipient country) to GDP. But only in Mexico F is taken as the ratio of FDI in recipient country to GDP.

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<sup>2</sup> The Economic Community of West African States

**Table 2. Unit Root Test Results**

Country	Variable	ADF	PP	NG-PERRON				Decision
				$MZ_a$	$MZ_t$	MSB	MPT	
Turkey	F	Level -1.660(3) <sup>a</sup> 1.Difference -5.186*(2) <sup>a</sup>	Level -8.157*(3) <sup>b</sup>	Level -51.821*(6) <sup>b</sup>	Level -5.077*(6) <sup>b</sup>	Level 0.098*(6) <sup>b</sup>	Level 1.826*(6) <sup>b</sup>	I(0)
	I	Level -0.543(8) <sup>a</sup> 1.Difference -3.273*(7) <sup>a</sup>	Level -2.410(8) <sup>c</sup> 1.Difference -12.368*(8) <sup>a</sup>	Level -15.277(5) <sup>b</sup> 1.Difference -29.361*(8) <sup>b</sup>	Level -2.755(5) <sup>b</sup> 1.Difference -3.831*(8) <sup>b</sup>	Level 0.180(5) <sup>b</sup> 1.Difference 0.131*(8) <sup>b</sup>	Level 6.016(5) <sup>b</sup> 1.Difference 3.104*(8) <sup>b</sup>	I(1)
	GR	Level -8.209*(0) <sup>b</sup>	Level -8.157*(3) <sup>b</sup>	Level -36.667*(3) <sup>b</sup>	Level -4.261*(3) <sup>b</sup>	Level 0.116*(3) <sup>b</sup>	Level 2.601*(3) <sup>b</sup>	I(0)
Brazil	F	Level -2.566(1) <sup>c</sup> 1.Difference -8.595*(2) <sup>a</sup>	Level -4.500*(0) <sup>c</sup>	Level -20.853**(0) <sup>b</sup>	Level -3.213**(0) <sup>b</sup>	Level 0.154**(0) <sup>b</sup>	Level 4.466**(0) <sup>b</sup>	I(0)
	I	Level -8.073*(0) <sup>c</sup>	Level -8.071*(2) <sup>c</sup>	Level -30.278*(2) <sup>b</sup>	Level -3.887*(2) <sup>b</sup>	Level 0.128*(2) <sup>b</sup>	Level 3.033*(2) <sup>b</sup>	I(0)
	GR	Level -3.449(4) <sup>b</sup> 1.Difference -7.537*(4) <sup>a</sup>	Level -8.415*(6) <sup>a</sup>	Level -25.498*(6) <sup>c</sup>	Level -3.381*(6) <sup>c</sup>	Level 0.133*(6) <sup>c</sup>	Level 1.574*(6) <sup>c</sup>	I(0)
Russia	F	Level -9.779*(0) <sup>b</sup>	Level -9.847*(3) <sup>b</sup>	Level -29.528*(3) <sup>b</sup>	Level -3.796*(3) <sup>b</sup>	Level 0.129*(3) <sup>b</sup>	Level 3.353*(3) <sup>b</sup>	I(0)
	I	Level -2.992(3) <sup>b</sup> 1.Difference -13.219*(0) <sup>a</sup>	Level -2.890(4) <sup>c</sup> 1.Difference -13.439*(2) <sup>a</sup>	Level -13.181**(4) <sup>c</sup>	Level -2.529**(4) <sup>c</sup>	Level 0.192**(4) <sup>c</sup>	Level 2.008**(4) <sup>c</sup>	I(1)
	GR	Level -7.124*(0) <sup>b</sup>	Level -7.124*(0) <sup>b</sup>	Level -33.388*(0) <sup>b</sup>	Level -4.086*(0) <sup>b</sup>	Level 0.122*(0) <sup>b</sup>	Level 2.730*(0) <sup>b</sup>	I(0)
South Africa	F	Level -8.692*(0) <sup>a</sup>	Level -8.737*(4) <sup>a</sup>	Level -44.207*(3) <sup>b</sup>	Level -4.700*(3) <sup>b</sup>	Level 0.106*(3) <sup>b</sup>	Level 2.067*(3) <sup>b</sup>	I(0)
	I	Level -2.449(1) <sup>b</sup> 1.Difference -5.599*(0) <sup>a</sup>	Level -2.815(4) <sup>b</sup> 1.Difference -5.599*(0) <sup>a</sup>	Level -3.166(4) <sup>b</sup> 1.Difference -22.727**(0) <sup>b</sup>	Level -1.244(4) <sup>b</sup> 1.Difference -3.362**(0) <sup>b</sup>	Level 0.393(4) <sup>b</sup> 1.Difference 0.148*(0) <sup>b</sup>	Level 28.467(4) <sup>b</sup> 1.Difference 4.065**(0) <sup>b</sup>	I(1)
	GR	Level -7.819*(0) <sup>b</sup>	Level -7.741*(3) <sup>b</sup>	Level -35.952*(3) <sup>b</sup>	Level -4.178*(3) <sup>b</sup>	Level 0.116*(3) <sup>b</sup>	Level 2.876*(3) <sup>b</sup>	I(0)
Mexico	F	Level -3.113**(2) <sup>c</sup>	Level -7.324*(5) <sup>c</sup>	Level -46.009*(5) <sup>b</sup>	Level -4.771*(5) <sup>b</sup>	Level 0.104*(5) <sup>b</sup>	Level 2.113*(5) <sup>b</sup>	I(0)
	I	Level -4.174*(9) <sup>b</sup>	Level -2.624(1) <sup>c</sup> 1.Difference -8.610*(4) <sup>a</sup>	Level -13.184(1) <sup>b</sup> 1.Difference -38.690*(4) <sup>b</sup>	Level -2.546(1) <sup>b</sup> 1.Difference -4.375*(4) <sup>b</sup>	Level 0.193(1) <sup>b</sup> 1.Difference 0.113*(4) <sup>b</sup>	Level 7.036(1) <sup>b</sup> 1.Difference 2.482*(4) <sup>b</sup>	I(1)
	GR	Level -4.967*(8) <sup>b</sup>	Level -7.551*(1) <sup>a</sup>	Level -39.947*(0) <sup>b</sup>	Level -4.321*(0) <sup>b</sup>	Level 0.108*(0) <sup>b</sup>	Level 3.070*(0) <sup>b</sup>	I(0)

**Note:** The numbers in parantheses "(.)" are the lag lengths that are determined by AIC in ADF test. Bartlett Kernell estimation method is used in PP and NG-Perron tests, bandwidth is determined as Newey-West. a: denotes that regression does not involve constant term or trend; b: denotes regression involves both constant term and trend; c: denotes regression involves constant term. \*, \*\*, indicates 1% and 5% significance level.



I is the proportion of domestic investment to GDP. GR is the growth rate of reel GDP. All the variables are expressed in U.S. dollars. Data used in this study is obtained from IMF (IFS- International Financial Statistics) and OECD. After the series are deseasonalized, 3 unit root tests, namely Augmented Dickey-Fuller (ADF), Phillips-Perron (PP) and Ng-Perron are performed. The results of the unit root tests are submitted in Table 2.

**V. EMPIRICAL RESULTS**

The study utilizes GMM methodology in order to analyze the impact of FDI on domestic investment for Turkey, Brazil, Russia, Mexico and South Africa. Analyses are performed separately for each country. The instrumental variables of the models are lagged values of the variables. The investment model for each of the five countries is as shown below:

$$I_t = \alpha + \beta_1 F_t + \beta_2 F_{t-1} + \beta_3 F_{t-2} + \beta_4 F_{t-3} + \beta_5 F_{t-4} + \beta_6 I_{t-1} + \beta_7 I_{t-2} + \beta_8 I_{t-3} + \beta_9 I_{t-4} + \beta_{10} GR_{t-1} + \beta_{11} GR_{t-2} + \beta_{12} GR_{t-3} + \beta_{13} GR_{t-4} + \varepsilon_t \tag{1}$$

where *I* = investment/GDP ratio, *F* = FDI/GDP ratio, *GR* = growth of reel GDP, the  $\alpha$  is a constant and  $\varepsilon$  is a serially uncorrelated random error. The model, which has been developed by Agosin and Mayer (2000), has current and lagged values of the growth rate and FDI as explanatory variables of domestic investment.

After estimating this investment model for each country and removing all statistically insignificant variables, we reach the results that are represented in Table 3.<sup>3</sup> AR(1) is included into the models in order to eliminate the autocorrelation problem.

**Table 3. GMM Estimation Results**

	<b>Turkey</b>	<b>Brazil</b>	<b>Russia</b>	<b>South Africa</b>	<b>Mexico</b>
<b>Constant</b>	10.276 (6.427)*	-1.190 (-1.225)	1.121 (2.872)*	-0.389 (-1.806)***	0.581 (1.258)
<b>F</b>	0.359 (2.816)*	-0.367 (-3.539)*	0.291 (5.858)*	0.086 (3.892)*	0.506 (2.637)**
<b>F(-1)</b>		0.407 (3.382)*		-0.047 (-3.569)*	-0.637 (-3.285)*
<b>F(-2)</b>		-0.308 (-3.645)*	0.117 (2.332)**		0.403 (1.941)***
<b>F(-3)</b>	-0.181 (-2.593)**	0.144 (2.343)**		-0.032 (-2.864)*	-0.356 (-2.061)**
<b>F(-4)</b>			0.132 (2.593)**	0.041 (3.144)*	0.336 (4.238)*

<sup>3</sup> Following Titarenko (2005: 6), we removed statistically insignificant variables in forming the final form of the investment model.

<b>I(-1)</b>		1.343 (16.114)*	1.282 (18.345)*	2.134 (23.036)*	1.764 (17.287)*
<b>I(-2)</b>		-0.929 (-7.594)*	-0.666 (-4.452)*	-1.501 (-6.774)*	-0.945 (-7.655)*
<b>I(-3)</b>		0.771 (5.272)*	0.701 (4.299)*	0.559 (2.618)**	
<b>I(-4)</b>	0.451 (7.414)*	-0.093 (-1.178)	-0.385 (-6.235)*	-0.165 (-1.917)***	0.139 (3.334)*
<b>GR(-1)</b>	0.009 (2.070)**		0.029 (7.541)*	-0.009 (-3.777)*	0.014 (2.483)**
<b>GR(-2)</b>	0.016 (2.415)**	-0.013 (-3.272)*			0.055 (4.039)*
<b>GR(-3)</b>	0.061 (9.442)*	0.031 (3.938)*	0.009 (2.486)**	0.004 (1.247)	-0.073 (-5.239)*
<b>GR(-4)</b>				-0.009 (-2.072)**	0.024 (6.261)*
<b>AR(1)</b>	0.865 (24.841)*	-0.717 (-12.006)*	-0.838 (-16.304)*	-0.604 (-5.452)*	-0.867 (-12.685)*
<b>R<sup>2</sup></b>	0.808	0.711	0.636	0.952	0.586

**Note:** The values in parenthesis are t-statistics. \*, \*\*, \*\*\* indicates respectively 1% significance level, 5% significance level and 10% significance level.

In order to determine whether FDI crowds out or crowds in domestic investment in the long run, we used the coefficient developed by Agosin and Mayer (2000: 9) and laterly used by Titarenko (2006) and Sunny and Swant (2012). The relevant coefficient is shown below:

$$\hat{\beta}_{LT} = \frac{\sum_{j=1}^5 \hat{\beta}_j}{1 - \sum_{j=6}^9 \hat{\beta}_j} \quad (2)$$

The criteria used to determine the CO/CI effect is the value and significance of coefficient  $\hat{\beta}_{LT}$ . The significance of  $\hat{\beta}_{LT}$  is tested through Wald Test. There are three possibilities (Agosin and Machado, 2005: 156):

1) The case in which it is not possible to reject the hypothesis ( $\hat{\beta}_{LT} = 1$ ) with a Wald test. This means that in the long run an increase in FDI adds one to one to total investment and there are no macroeconomic externalities stemming from FDI.

2) The case in which the null hypothesis ( $\hat{\beta}_{LT} = 1$ ) is rejected and  $\hat{\beta}_{LT} > 1$ . This is means that there is a crowding in (CI) effect in the long run. More precisely, FDI adds more than one to one to total investment. In other words, FDI creates positive macroeconomic externalities in long term.

3) The case in which the null hypothesis ( $\hat{\beta}_{LT} = 1$ ) is rejected and  $\hat{\beta}_{LT} < 1$ . This means that there is long-run crowding out (CO) effect. More precisely, FDI adds less than one to one to total investment and has negative long-term externalities on investment. In other words, there is displacement of domestic investment by FDI.

The Wald test results of  $\hat{\beta}_{LT}$  coefficients for regression models of each country are shown in Table 4. The coefficient values are less than 1 for Turkey and South Africa what is the evidence of a long-term CO effect of FDI on investment. Thus, one additional dolar of FDI leads to less than a dolar increase in total investment. On the other hand, empirical results indicate a CI effect for Russia.  $\hat{\beta}_{LT}$  coefficient is not statistically significant for Brazil and Mexico. This means that an increase in FDI adds one to one to total investment in the long run.

**Table 4.** Wald Test of  $\hat{\beta}_{LT}$  Coefficients for Five Countries

Countries	$\hat{\beta}_{LT}$	$\chi^2$ Test Statistic Value	Long-term Effect
Turkey	0.265	12.040*	CO
Brazil	1.349	0.170	N <sup>a</sup>
Russia	8.057	6.253**	CI
South Africa	-1.856	9.276*	CO
Mexico	6.127	1.216	N <sup>a</sup>

\*, \*\*; indicates respectively significantly different from one at the 1% level and 5% level. N<sup>a</sup>; not significantly different from one.

## VI. CONCLUSION

There are different opinions about the effects of FDI on domestic investment in economics literature. Some researchers advocate the crowding out effects of FDI while others argue that FDI creates crowding in effects. In the case of a crowding out effect, FDI displaces domestic investment. However in the existence of crowding in effect, FDI stimulates domestic firms to invest more or supports their development. The main purpose of this study is to analyze the validity of these effects in selected developing countries.

To this end, the impact of FDI on investment is empirically investigated for Turkey, Brazil, Russia, South Africa and Mexico. Analyses are performed with quarterly time series from 1990s to the present. The selected time interval varies from country to country because of the availability of the data. The investment models are estimated with GMM methodology. The coefficients that are obtained from the estimated investment models are tested with Wald test in order to identify the crowding out/ in effects of FDI. Evidences from empirical analyses indicate that crowding in effect of FDI on domestic investment exhibites in only Russia and FDI crowds out domestic investment in Turkey and South

Africa. However, there is no significant crowding in or crowding out effect for Brazil and Mexico.

Based on these empirical results, it can be said that national investment policies should be rearranged to increase the contribution of FDI to domestic investment. FDI\_inflows\_towards\_the\_less\_developed\_industrial\_sectors should be encouraged by new incentives. In this way, foreign investors may contribute these sectors via their new technologies and new products. These incentives can stimulate the activity of domestic firms and enable FDI to crowd in domestic investment.

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**Table 1: TNCs' Top Prospective Host Economies for 2012–2014<sup>4</sup>**

	Country		Country		Country
1	China(1)	8	Germany (8)	14	Poland (6)
2	USA (2)	<b>8</b>	<b>Russian Fed. (5)</b>	<b>14</b>	<b>South Africa (-)</b>
3	India(3)	8	Thailand (12)	17	Korea (-)
4	Indonesia (6)	11	Vietnam (11)	17	Sweden (-)
<b>5</b>	<b>Brazil (4)</b>	<b>12</b>	<b>Mexico (10)</b>	19	France (19)
6	Australia (8)	13	Japan (-)	19	Italy (-)
6	England (13)	14	Holland (-)	19	Malaysia (19)

**Resource:** WIR (2012: 22) (<http://www.unctad-docs.org/files/UNCTAD-WIR2012-Full-en.pdf>)

<sup>4</sup> The source of the table is an UNCTAD survey which is based on 174 validated company responses. The rows shown in blue are developing countries and others are developed economies.