

# **DYNAMIC LINKAGES BETWEEN FOREIGN DIRECT INVESTMENT, PUBLIC INVESTMENT AND PRIVATE DOMESTIC INVESTMENT: EVIDENCE FROM PAKISTAN**

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## **Abstract:**

*This paper explores the effect of FDI on private investment that whether FDI crowd-in or crowd-out the private domestic investment in Pakistan. For measuring this relationship annual time series data from 1977 to 2011 is used through an autoregressive distributed lags (ARDL) model. The outcome is evident that FDI has significant positive impact on private domestic investment; indicating a crowding in effect. The error correction term shows a significant strong convergence 73% toward equilibrium. These results emphasize to create such an investment friendly environment which attracts foreign investment and promotes investment opportunities for private domestic investors.*

**Keywords:** Public Investment (PI), Private Domestic Investment (PDI), Foreign direct investment (FDI), crowding In-Out, Pakistan.

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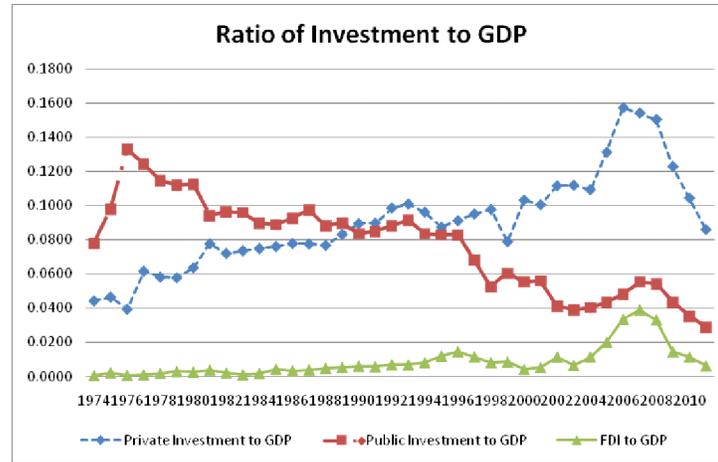
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### **Introduction:**

Foreign Direct Investment is deemed to be a significant determinant of economic development, especially in developing countries. There are several channels through which FDI stimulate the growth, not only of the recipient country, but also for the investor, it helps in capital accumulation, human resource development, technological transfers, introduces new managerial skills, improve the product quality of the domestically produced goods and services, and many more [Campos and Kinoshita (2002), De Mello (1999), Duasa (2007), Pradhan (2009), Dabour (2000), Lean and Bee Wah (2011), Atique et. al. (2004), Arshad and Shujaat (2011)]. In addition to the direct effect there are some indirect benefits usually called “collateral benefit” as to attract the foreign investment governments have to create a peaceful environment, good governance, political stability, better infrastructure system and strong financial market among others.

Following the international trend Pakistani government also adopted the liberalization policies, trying to attract FDI, figure 1 is showing the invest to GDP ratio, this graph depicts that for the last few years there is a decline in all kind of investment public, private and foreign direct. Another important thing is the trend of different investment here PI showing a continues declining trend, PDI was rising till 2006 and after that it has a declining trend while foreign direct investment is also following the PDI and as in 2006 PDI reduced foreign investment also started declining, this trend is indicating a positive relationship between private domestic and foreign direct investment. Despite having this important relationship, there is no such major study in Pakistan, as per our knowledge. Mostly case studies in Pakistan are concerned with the growth effects of FDI and determinants of FDI [Azam and Lukman (2010), Anjum and Nishat(2004), Rehman et al. (2011), Mughal and Akram (2011), Arshad and Shujaat (2011)].



The objective of this study is to examine the dynamic relationship among FDI, PDI and PI, more specifically we want to investigate whether FDI and PDI are complements or substitute. This is an important issue for developing countries like Pakistan, other features of this study are; an annual time series data set is used from 1977 to 2011. Additionally, the stationarity of the data set is checked through a unit root test, and ultimately, an autoregressive distributed lags (ARDL) bound testing approach of co-integration is used to know the long and the short run relationships.

Remainder of the study contains, section 2 presents review of earlier studies. Section 3 discusses the data and econometric model, section 4 demonstrates empirical outcomes and finally conclusion is drawn in section 5.

#### **Review of Literature:**

Empirical literature regarding the impact of FDI on economic growth and domestic investment is divided, no certain conclusion can be drawn, many studies found a positive growth and domestic investment effect while others found a negative effect.

The inconclusiveness has made it a country specific issue in recent past Zeshan et. al. (2004) estimated the effect of FDI on economic development in Pakistan through a co-integration analysis for the period from 1970 to 2001 they concluded that growth impact of FDI is greater under export promotion regime in contrast to import substitution regime and also supported the Bhagwati hypothesis. Another study conducted by Arshad and Shujaat (2011) investigated the relationship between sectoral FDI and sectoral yield in the case of Pakistan through a panel co-integration and causality analysis while the entire economy is divided into three sectors i.e. primary, manufacturing and services. The study consist of 1981 to 2008 data set and the results is evident that FDI has positive impact on output in the long run and there is long run causality running from GDP to FDI while in the short run there is a two way causality between GDP and FDI. The sectoral results vary from sector to sector mainly FDI causes services and primary sector growth on the other hand growth in manufacturing sector causes FDI in manufacturing sector.

Arshad (2012) analyzed the effect of FDI on export, import and GDP growth in Pakistan through a restricted VECM model over the period 1965 to 2005. He concluded that there is no long run connection among FDI and GDP on the basis of co-integration equation, while the causality analysis show that FDI do not granger cause the GDP but GDP causes the FDI. Arshad (2007) examined the growth effect of FDI and financial liberalization in the case of Pakistan using an ARDL bound testing model based on data from 1976 to 2005. This is based on GDP growth as dependent variable while explanatory variables were foreign direct investment to GDP ratio, labour force, change in capital stock as a proxy of capital, private sector credit to GDP ratio and an interaction term, the product of financial liberalization and foreign direct investment used. In his rigorous analysis he found that FDI has positive impact on growth in the short run while in long run it also has positive impact provided that there are better domestic financial conditions.

James (2009) analyzed the crowding out /in impact of PI and FDI for Malaysia through a VECM model. The study period consist of 1960 to 2003 and the aftermath shows that PI and FDI both are complementary to the PDI. Dolly and Aditi Sawant (2012) investigated the crowding in/out relationship between FDI and domestic investment in case of India and China using the “Agosin and Mayor (2000) coefficient” for crowding in/out approach, they further estimated the long run relationship through co-integration and Granger causality. Two separate models were estimated for each country for the time period 1980 to 2010, the results evident that there is crowding-in in the case of India while in China a strong crowding-out exist while the co-integration and causality test show that there is no co-integration and no Granger causality is found in the case of China.

Lean and Bee Wah (2011) examined and investigated the relationship among growth, FDI and gross fixed capital formation as domestic investment for Malaysian economy with the help of data set from 1970 to 2009 through VECM model. The results show that FDI has positive effect on growth while domestic investment has negative effect on growth while the major finding is that FDI crowd in domestic investment. Saglam and Yalta (2011) examined the dynamic association of public investment, private investment and foreign direct investment using a VAR model for Turkey while the study period consist of 1970 to 2009, but the results do not find any long run relationship among the variables and a very weak association exist among these variables as only 0.45% and 2% variation in private investment and public investment respectively is caused by foreign direct investment.

Titarenko (2006) investigated the relationship between FDI and domestic investment in case Latvia by applying a quarterly data set from 1995 to 2004. The results showed that FDI has a normative impact on domestic investment. Tanget. al. (2008) estimated the impact of FDI on domestic investment and economics growth in China for the period of 1988-2003 through a VECM model. In their trivariate

model consisting FDI, GDP and domestic investment (DI) they found a positive significant effect of FDI on domestic investment. Furthermore the causality results show that there is unidirectional causality from FDI to DI and FDI to GDP.

Sevilet. al.(2012) analyzed the crowding in/Out effect of FDI in Middle Eastern and North African (MENA) states through a panel GMM technique, while the study period consist of 1980 to 2008. They drew the conclusion that FDI crowd out domestic investment for both oil rich and oil poor countries. Agosin and Ricardo(2000) examined the crowding out. In effect of FDI to domestic investment in a panel data for 32 developing countries (12 African, 8 Asian and 12 Latin American) over the period 1970–1996. They found the largest crowding in effect in Asia and then Africa while there was crowding out in the case of Latin America. Eregha (2012) investigated the link between FDI and domestic investment among economic community of West African states (ECOWAS) through a panel co-integration, by using the data of 10 countries from 1970 to 2008. The study found a negative FDI impact on domestic investment and support a crowding-out effect.

### **Theoretical Framework**

After the famous work of Barro (1990) many extension have been made in endogenous growth model under the assumption that public goods and public expenditures are productive [Sala-i-Martin (1997), Ghosh-Roy (2004), Tsoukis-Miller (2003)]. Similarly PDI also considered very important for economic growth as it increases aggregate demand and capital stock Firebaugh (1992). However the combined effect of these two types of investment is arguable and varies across the nations and many studies found crowding-out [Ganeli (2003), Voss (2002), and Majumder (2007)] while other based on crowding-in [Easterly and Rebelo (1993), Baotai (2004) Bose (2007)].

This crowding in/out impact of PI and PDI raises the question of relationship between FDI and PDI, whether FDI and PDI are

complements or substitute in the recipient country. The relationship of FDI and PDI is very important for each country, as these variables are closely related to each other and in some cases there is unilateral causality or even bilateral causality. On the theoretical ground, it is known that a good infrastructure situation attracts private investors at domestic level as well as from abroad, as the better infrastructure reduces the cost of doing business which is a main determinant of FDI, similarly PDI also stimulate FDI as higher level of PDI indicates good economic situation in the country which also attracts FDI. Interestingly, the empirical evidences varies among countries, some empirical studies noticed crowding in the effect of FDI on PDI by establishing new industries, investment opportunities, demand for local inputs as discussed by [Luo (2007), Tang et al. (2008), Lipsey, (2002)]. On the other hand many other found a crowding out effect of FDI [Agosin and Machado (2005), Misun and Tomsik (2002)] when the FDI compete with domestic industry by using domestic resources, skilled labor, capital and other inputs.

These empirical contradictions advises that the impact of the FDI on PDI varies country to country, depending on available infrastructure, government policies, trade policies, domestic market structure and others, therefore it is an empirical matter for each country. On the basis of these theoretical considerations following empirical specification can be formulated

$$PDI_t = f(FDI_t, PUB_t)$$

Where PDI is the steady state Private Domestic Investment, public is PI and FDI is the foreign direct investment while signs are indeterminate. However an important determinant of private investment, the user cost of the capital, is not incorporated as argued by Agosin & Mayor (2000) and Dolly & Aditi (2011) that in case of development countries most of the investment models did not find significant effect of interest rate and other proxies for user cost.

### **Data and Methodology:**

The variables of interest of this study are FDI, PDI and PI, all variable are taken from world development indicator (WDI) data set at current US\$; based on 35 annual observations, covering the period from 1977 to 2011. Furthermore all the variables are transformed by dividing GDP.

For measuring the long run, the short run and the causal link among the stated variables, the above function of private domestic investment can be transformed into the following model:

$$PVTGDP_t = \lambda_0 + \lambda_1 FDIGDP_t + \lambda_2 PUBGDP_t + \varepsilon_t, \dots \dots \text{Equation 1}$$

Equation 1 is the linear formulation of the model where

PVTGDP is the private domestic investment to GDP ratio

PUBGDP is the public investment (PI) to GDP ratio

FDIGDP is the foreign direct investment to GDP ratio

$\varepsilon$  is the error term.

### **Autoregressive distribute lag (ARDL) model**

There are various approaches to find the co-integration among the variables such as Engle-Granger (1987) test, maximum likelihood based Johansen (1991, 1992), and Johansen and Juselius (1990) test etc, these approaches have a severe short coming that the order of integration must be same for all variable and usually better for large data size. Since this study has a limited or small data set and the order of integration is not same, hence we adopted an Autoregressive Distributed legs (ARDL) Model by Pesaran and Shin (1995, 1999) and Narayan (2004) or ARDL bounds testing approach to co-integration

that is much suitable for small samples (Haug, 2002). There are several other advantages to use this approach even like it does not required any pre-testing of order of integration of regressors, whether they are I(0), I(1) or the mixture of both. Furthermore with ARDL approach, different variables can have different optimal lags, that are not possible with the test of standard co-integration.

The following unrestricted error correction model (UECM) is utilized to assess long and short run relationship among the study variables:

$$\Delta PVTGDP_t = \kappa + \sum_{i=0}^{K_1} \delta_i \Delta PVTGDP_{t-i} + \sum_{i=0}^{K_2} \beta_i \Delta PUBGDP_{t-i} + \sum_{i=0}^{K_3} \omega_i \Delta FDIGDP_{t-i} + \lambda_0 PVTGDP_{t-1} + \lambda_1 PUBGDP_{t-1} + \lambda_2 FDIGDP_{t-1} + v_t \quad \text{---Equation 2}$$

Now Equation 2 is used to find co-integration between economic growth and revenue side of the fiscal policy, while 6 is used to find co-integration between growth and the expenditure side of the fiscal policy. Where  $\Delta$  is first-difference operator and K1, K2 and K3 are the optimal lag length. The long-run relationship existence is known through the F test. Null hypothesis is for no co-integration among the variables in equation 2

$$H_0 : \lambda_0 = \lambda_1 = \lambda_2 = 0 \quad \text{against the alternative hypothesis } H_1 : \lambda_0 \neq \lambda_1 \neq \lambda_2 \neq 0.$$

Since this study consist of relatively small sample size which is 38 observations, Narayan reported that the critical values are (2204) used asymptotic critical value bounds, which depends on the order of integration whether the variables are I(0) or I(1) or a mixture of both. In this test there are two sets of critical values one set for I(1) which is upper bound and the other is I(0) series which is lower bound limit. If the calculated F test statistic exceeds from upper bound limit, the conclusion may be drawn that there is evidence of a long-run relationship between the variables i.e. there is co-integration exist. If the test statistic is below the lower bound value, the null hypothesis of no co-integration cannot be rejected and if the test statistics lies

between the lower and upper bounds limits, the test of co-integration is indecisive.

Once after obtaining the long-run relationship (co-integration) of variables afterwards long-run and error correction models can be derived from equations 2.

$$\Delta PVTGDP_t = \kappa + \sum_{i=0}^{k_1} \delta_i \Delta PVTGDP_{t-i} + \sum_{i=0}^{k_2} \beta_i \Delta PUBGDP_{t-i} + \sum_{i=0}^{k_3} \omega_i \Delta FDIGDP_{t-i} + \lambda_1 ECM_{t-1} + v_t$$

-Equation 3

The above equation 3 is the error correction model measuring short run dynamic relationship of the study variables. All equations are analyzed in the software Microfit5.

### Empirical Results

Stationarity is one of the main properties for econometric analysis and even it guides for econometric methodology selection. Augmented Dickey-Fuller test is used and the result of the test is depicted in table 1.

**Table 1:**  
*Unit Root Test*

Variable	Trend/ Intercept	Augmented Dickey-Fuller test statistic				Phillips-Perron test statistic				
		Level		First Difference		Level		First Difference		
		t-Statistic	Prob.*	t-Statistic	Prob.*	Adj. t-Stat	Prob.*	Adj. t-Stat	Prob.*	
FDIGD P	C	1.7216	0.9994	-4.7572	0.0007*	-	2.1355	0.2326	-3.4366	0.016*
PVTGD P	CT	-3.3380	0.0768	-5.0591	0.0012*	-	1.4588	0.8257	-5.0486	0.0012*
PUBGD P	CT	-4.8016	0.0023*	--	--	-	4.7341	0.0027*	--	--

C: Constant, CT: Constant with Trend

\* Significant at 1%

Table 1 shows that foreign direct investment to GDP ratio (FDIGDP) and private domestic investment to GDP ratio (PVTGDP) are stationary at first difference while PI to GDP ratio (PUBGDP) is

stationary at level. The results of mix stationarity of the variables enforce us to use an ARDL model instead of VAR/VECM.

Once after measuring the order of integration equation 2 is used for co-integration analysis through a bound testing approach Pesaran et al. (2001) and Narayan (2004), while the lags selection is based on usual information criteria which is 2 lags. The result of F-Statistics for bound testing are depicted in table 2, the result of F-statistics show that at 5% there is a long run relationship among the variables.

**Table 2:**

*F-statistics for co-integration relationship*

	Value	Bound Critical Values* (Restricted Intercept with no trend)			Bound Critical Values* (Restricted Intercept with trend)	
			I(0)	I(1)	I(0)	I(1)
		1%	4.948	6.028	6.14	7.527
		<b>5%</b>	<b>3.478</b>	<b>4.335</b>	<b>4.183</b>	<b>5.333</b>
F-statistics	5.485	10%	2.845	3.623	3.393	4.41

\* Note: Based on Narayan (2004)

After the confirmation of co-integration, the long run effect of FDI on PDI is reported in table 3; the result evident that in long run FDI have significant positive impact on PDI in other words FDI is complement with PDI. PI is showing a significant normative effect on PDI in the long run. The lower part of table 3 based on diagnostic tests which show that the model is good fitted with a high  $R^2$ , the functional form of the model is checked by Ramsey's Reset test and the test results support the correct functional form. The Normality and Heteroscedasticity tests also support the assumptions of normality and homoscedasticity, for autocorrelation LM test result show that there is no serial correlation. The parameter's stability is checked through cumulative sum and cumulative sum square, which results are presented in appendix A; Figure-1 and Figure-2, where the graph of CUSUM and CUSUMSQ lie within the significance boundaries at

5% showing the parameters stability in short and long run, as Brown et al. (1975) discussed.

**Table 3:**  
*Estimated Long Run Coefficients*

Dependent variable is PVTGDP			
Repressors	Coefficient	Standard Error	T-Ratio[Prob]
PUBGDP	-.49815	.090933	-5.4782[.000]
FDIGDP	1.4911	.26239	5.6826[.000]
INPT	.11949	.0091587	13.0470[.000]
Diagnostic Test			
R-Squared	0.93756	R-Bar-Squared	0.92418
F-stat. F( 6, 28)	70.0701[.000]		
A:Serial Correlation	F( 1, 27)= 1.2207[.279]		
B:Functional Form	F( 1, 27)= .88248[.356]		
C:Normality	CHSQ( 2)= 1.2020[.548]		
D:Heteroscedasticity	F( 1, 33)= .48138[.493]		

Note: A: Lagrange multiplier test of residual serial correlation

B:Ramsey's RESET test using the square of the fitted values

C:Based on a test of skewness and kurtosis of residuals

D:Based on the regression of squared residuals on squared fitted values

The outcomes of error correction model or short run behaviour of PDI with respect to FDI are generated from equation (3) and presented in Table 4. ECM variable is depicting the short run adjustment in PDI due to the reason of change in FDI and PI, the coefficient of ECM (-1) is -0.738 which is highly significant and also confirming the existence of co-integration and it shows that a deviation from equilibrium during the current year will be corrected by 73.8% in the next period. The short coefficient of FDI is also showing a complementary effect on PDI.

**Table 4:***Error Correction Representation of the Model*

Dependent variable is dPVTGDP			
Regressor	Coefficient	Standard Error	T-Ratio[Prob]
PVTGDP1	0.28836	0.12227	2.3584[.025]
dPUBGDP	-0.20774	0.19184	-1.0829[.288]
dPUBGDP1	0.55571	0.15399	3.6088[.001]
dFDIGDP	1.1007	0.2727	4.0363[.000]
dINPT	0.088211	0.015291	5.7689[.000]
ecm(-1)	-0.7382	0.1184	-6.2346[.000]

### Conclusion and Policy Implications

This articulation is an attempt to examine the effect of FDI on PDI; whether FDI crowd in or crowd out the PDI in Pakistan. The results of this study demonstrate that in the long run FDI has a strong positive impact on PDI and a unit increase in FDI to GDP ratio will increase share of PDI in GDP by 1.5 units<sup>4</sup>. The short run results also indicate positive effect of FDI on PDI significantly. The results conclude that foreign direct investment crowd in the PDI in Pakistan. These findings are much similar to other studies [James(2009), Kim and Seo (2003), Dolly and Aditi (2011)<sup>5</sup>] and suggest that government should create such an economically and politically viable environment which attracts foreign investment, instead of providing direct incentive to private investors. This increase in foreign investment will increase the PDI. For further research in future researchers need to measure the threshold level of FDI, which is up to what level the FDI has a positive impact on domestic investment. Another dimension of research could be; an industry level analysis is required to measure effect of FDI in various sectors and could find which sector has favorable effect of FDI and where it has an adverse impact.

4- As in table 3 the coefficient of FDIGDP is positive and highly significant.

5- Found crowding in effect in Malaysia, Korea and India respectively.

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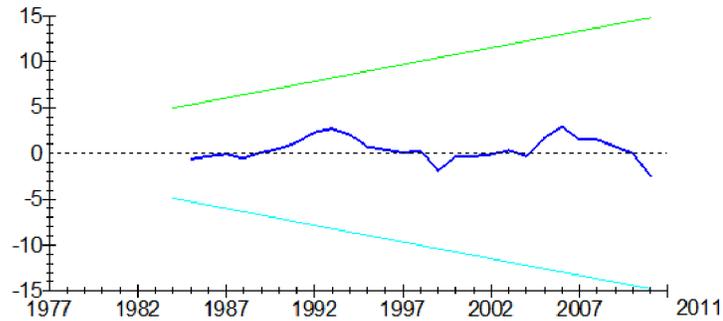
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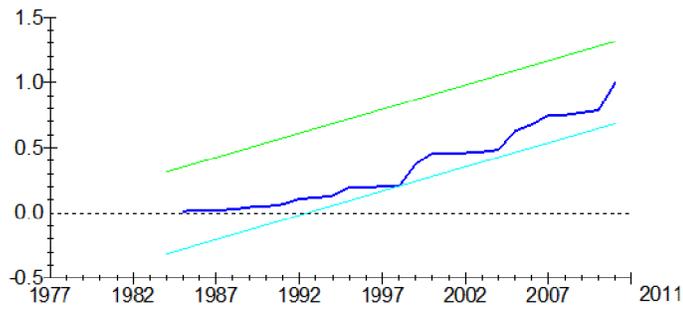
**Appendix A:**

**Plot of Cumulative Sum of Recursive Residuals**



The straight lines represent critical bounds at 5% significance level

**Plot of Cumulative Sum of Squares of Recursive Residuals**



The straight lines represent critical bounds at 5% significance level