Impact of Foreign Direct Investment on Growth in Pakistan: The ARDL Approach

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ABSTRACT

Investment is vital ingredients of growth in an economy. Saving contributes to investment which contributes to physical and human capital formation both of which promote growth of Gross Domestic Product (GDP) of a country. This study aims at determining the role of the three types of investment i.e., public, private and foreign direct investment (FDI) in the growth of Pakistan economy with a special focus on the contribution of FDI in GDP growth of the Pakistan. Cointegration analysis of time series data was used to analyze model. Autoregressive Distributed Lag (ARDL) approach has been used to analyze the long run relationship between GDP growth, investment and government expenditure for Pakistan using data (1970-2015). The results indicate that while public and private investment and lending rate have a positive impact on growth, public consumption and FDI decelerate GDP growth. Also the investor confidence should be bolstered by improving the law and order and security situation of the country and introducing investment friendly policies to further harness the positive impact of investment on growth.

Keywords: Investment, FDI, Growth, Cointegration, Autoregressive Distributed Lag Model, Bounds Testing, Pakistan.

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Note: This study is extracted from the MPhil Economics thesis of Nilofer.

1. INTRODUCTION

Growth, specifically GDP growth is used widely as a measure of economic performance of a country (Hassan, 1997). Growth, specifically economic growth is driven by consumption, investment and net exports & services through output expansion (Government of Pakistan, 2013). Most economies are demand driven economies and among them some attain consumption led growth; Pakistan is a classic example of consumption oriented economy (Government of Pakistan, 2013). Investment in technical progress, education and training helps create skilled labor and boost productivity, also, investment by government can help overcome market failures associated with private sector investment, complementing it and paving the way through technological advancement for sustained long-run growth as has been demonstrated for developing countries including Pakistan by Phetsavong and Ichihashi (2012). No economy can grow without investment, as is postulated by the vast amount of literature including the endogenous growth theories and the recent extensions of neo-classical growth models [Clark (1923); Romer (1986); Grier and Tullock (1989); Fischer (1993); Barro and Sala-i-Martin (1999)].

All three components of investment; the public, private and the foreign investment play a vital role in the growth of an economy. As far as the foreign direct investment is concerned, for a developing country like Pakistan which faces regular budget deficits and is lagging behind in production technology, foreign direct investment (FDI) can fill in the gap though technological transfers, development of human capital, creation of competition in the input market and corporate revenue creation in the host

country [Gudaro, et. al., 2012)], however, a major hurdle in the way of attracting FDI and embarking on a path of sustainable growth is the unstable political and law and order situation of the country. When the political structure in the country moved somewhat towards stability, the law and order situation would deteriorate and vice versa, so the macro-economic stability required for better growth could not be achieved for more than a few years at a time, and those few years, the growth spurts have been obvious.

The inter-linkage of growth and investment has been explored in literature separately but a comprehensive analysis using all three aspects has not been conducted specifically for Pakistan which is what this study attempts to conduct besides extending the analysis of the data up to the existing time period to observe the impact of changing political and investment scenario of the country on its economy.

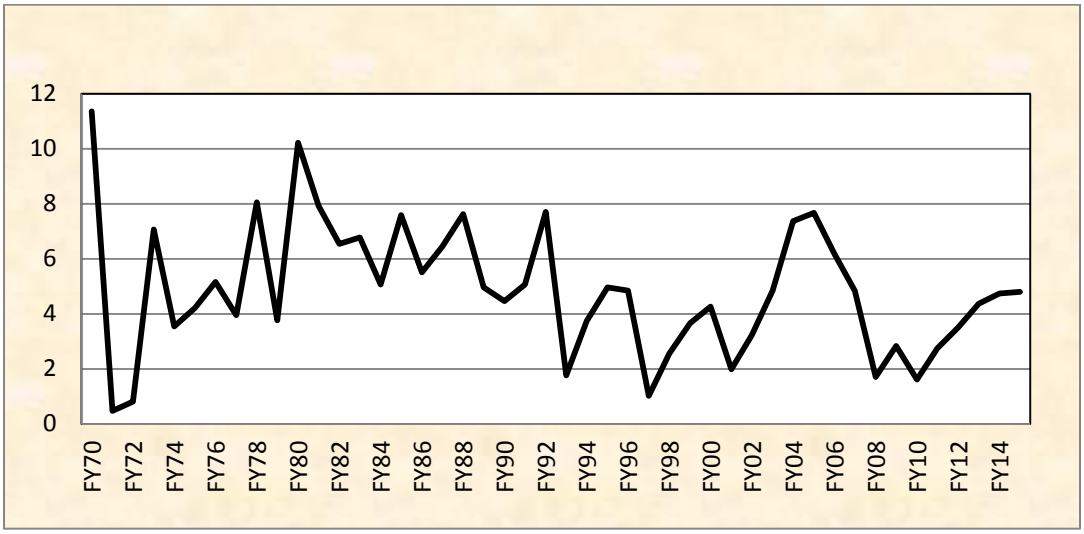
1.2. GROWTH AND INVESTMENT OF PAKISTAN

Growth in case of Pakistan has remained unsteady, fluctuating from highs to lows based on the political and economic situation. Average growth rate in the 50's ranged around 2.7% with frequent changes in the political leadership, in 60's it ranged around 6.5% with the agricultural reforms, bumper crops and industrialization based on agriculture, in 70's growth dipped to around 5.1% in the wake of cessation of East Pakistan the nationalization policy which resulted in inefficient entities and wasted resources (Hassan, 1997).

The 80's observed a growth spurt that averaged around 6.4% due to privatization, export promotion and regulation, however, in the 90's gain due to unstable political environment and the economic restrictions post the nuclear blasts by the country, the

growth averaged around 4.7%. Post 9/11 and the war on terror and the inflow of Aid and rescheduling of loans and implementation of strict IMF conditionalities, the growth in Pakistan started climbing and reached a record high of 8.96% in 2004 before tumbling down again to a record low of 1.21% in 2008 due to energy crisis, the worsening debt situation and the internal security issues (Bint-e-Ajaz and Ellahi, 2012). The trend graph below (Figure 1.1) shows the growth rate of GDP over time for Pakistan.

Figure 1.1: GDP Growth Rate of Pakistan (1970-2015)



Data Source: World Bank (2016)

In 1947 when Pakistan appeared on the map of the world, it did not have any industrial set up, it was a purely agrarian economy. It was apparent to the policy makers of the time to establish an industrial set up for the existing raw material in the 50's. Due to the focus of investment on industrialization, agriculture suffered. But not for long, as investment in agriculture picked pace with the agricultural reforms in early 60's. At the same time disbanding of controls and liberalization of imports doubled the private investment in the country, but after the war of 1965 private investment shrank due to

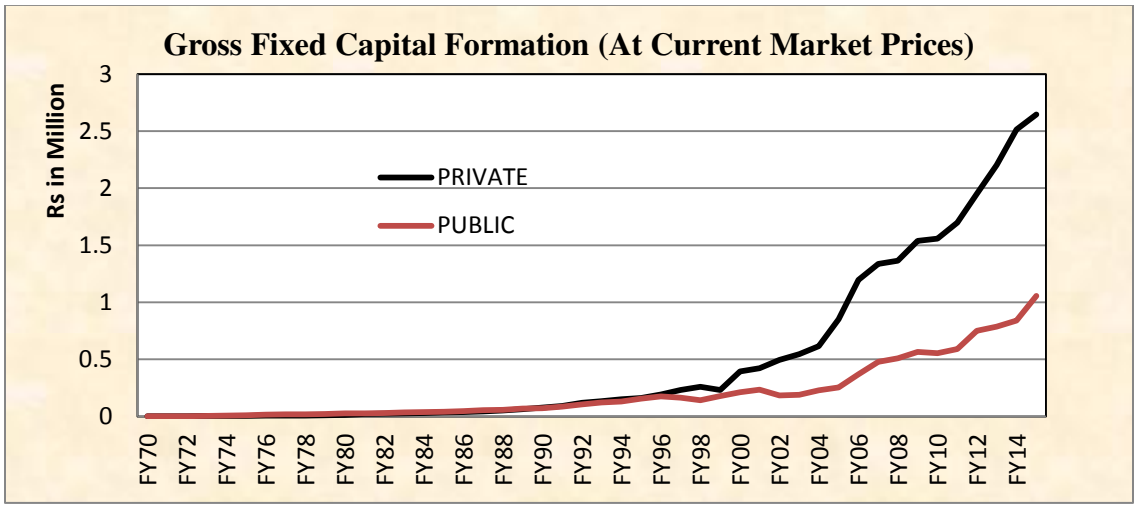
increased defense budget. The investment recovered somewhat in the latter half of the 60's but this recovery was marred by the cessation of East Pakistan (Ahmed and Qayyum, 2007).

The nationalization policy of the 70's nipped private investment even further, whereas the public investment rose to almost double with a growing emphasis on capital rather than consumer goods. With the gradual reversal of nationalization under the military government, the private investment showed a positive trend but was dominated by public investment nevertheless. The soviet invasion of Afghanistan lead to an increased inflow of aid and investment into Pakistan in the early 80's but in the wake of drying up of the foreign aid and budget deficit accumulation, Pakistan had to turn to IMF for assistance. The continued privatization by later governments pushed up the private investment and with the encouragement of interest in the information technology industry, the promotion of small and medium enterprises, easy access of farmers to loans through banks and the creation of Independent Power Projects, investment would have gone up had it not been for the economic sanctions post nuclear blasts by Pakistan and the freezing of foreign currency accounts by the government (Ahmed and Qayyum, 2007).

With the onset of another military government, and the economic revival plan, coupled with the foreign aid flow in the aftermath of 9/11 and the structural adjustment plan following the strict conditionalities of IMF, the economy revived; investment in services industry flourished. Even with the materialization of energy crisis, internal security threat and political turmoil in 2007-2008, when growth of the country nosedived, the private investment in services industry showed an increasing trend as can be seen in

the figure below. Although the share of public investment has been on the rise, but private investment seems to have far surpassed it in playing its role in the growth of the economy (Ahmed and Qayyum, 2007).

Figure 1.2: Public and Private Gross Fixed Capital Formation (1960-2015)



Data Source: State Bank of Pakistan (2010)

FDI in Pakistan remained fairly low over the first four decades with the stress on built up of local industry and its pronounced role in the 60's and the nationalization trend in the 70's. FDI did pick its pace somewhat in the 80's with promotion of Export Promotion Zones and increased remittances but due to high regulation, the results were not as good as they could have been. Finally in the 90's FDI started showing an increasing trend due to trade liberalization and establishment of special industrial zones but post the nuclear blasts by Pakistan FDI dipped again (Atique, et. al., 2004). However, after the 9/11 terrorist attacks, Pakistan's coalition with US in fight against terrorism, and the reformative policy pursuance under the Musharraf regime, FDI inflows surged until the reinstatement of a democratic government in 2007 after which the investor confidence

seemed to have declined tremendously especially due to the debt conditions and declining security situation of the country.

1.3. SIGNIFICANCE OF STUDY

The current study will analyze the effects of Foreign Direct Investment on growth in Pakistan. Although there is a vast amount of literature on investment and growth in Pakistan but all the papers have observed the inter-linkages between the components of investment and growth in piecemeal. Blejer and Khan (1984), Ghani and Din (2006), Sial, et al. (2010), Bint-e-Ajaz and Ellahi (2012) and Phetsavong and Ichihashi (2012) have tried to take a comprehensive look at the subject in question. This study will not only use Autoregressive Distributed Lag (ARDL) approach for the joint analysis of Investment, Growth and Political structure, not used in case of Pakistan before but will also be extending the data analysis up to the prevailing time period so as to incorporate the effects of foreign investment on growth.

The objective of this study is to assess the long-run and short-run impact of foreign direct investment on growth in Pakistan using the ARDL approach.

2. LITERATURE REVIEW

Growth has been an area of interest for the economists ever since the beginning of economics. Theories were propounded about factors affecting growth by the classicals, the Keynesians, the neo-classicals and the endogenous growth theorists. Various models were presented, new techniques introduced to estimate the models, theoretical and micro-foundations developed by economists like Clark (1923); Solow (1956); Blejer and Khan

(1984); Kormendi and Meguire (1985); Romer (1986); Grier and Tullock (1989); Barro (1990); Barro (1991); Mankiw et al. (1992); Fischer (1993); Barro and Sala-i-Martin (1999); Rodrik (1999); Baum and Lake (2003); Ghani and Din (2006).

This study intends to explore the relationship of investment and growth with a focus on the FDI for Pakistan. The literature being discussed has been bifurcated as follows, first discussed is the literature on the investments both public & private and growth, next the literature regarding the impact of FDI on growth has been presented. Both foreign and national literature has been discussed in each section encompassing and keeping the focus on the topic under discussion.

2.2. INTERNATIONAL LITERATURE

Blejer and Khan (1984) developed a variant flexible accelerator model incorporating the role of fiscal and monetary policies with theoretical consistency. They then estimated the model through restricted least squares method using time series pooled data from 1971-1979 for 24 developing countries and assuming similar basic economic parameters. They found that the government can affect the private investment through its own policy decisions; a strict monetary policy would discourage growth unless private sector credit is not reduced, also shortage of foreign investment would negatively impact private investment due to higher public borrowing, but fiscal contraction has rather vague results so the government should make infrastructural investment reductions very carefully.

Phetsavong and Ichihashi (2012) have also performed a cross country analysis of 15 developing Asian countries using annual data from 1984 to 2009 using correlation

test, deducing that domestic private investment is the most important contributor of economic growth, followed closely by FDI whereas the public consumption is a deterrent of growth. Their results also state that public investment acts as a substitute for private investment and FDI in developing Asian economies weakening the positive impact of private investment and FDI on growth when its own share in GDP increases.

The significance of Foreign Direct Investment (FDI) for developing countries is undeniable according to the economic research done internationally and specifically for Pakistan. Doces (2010) analyzed why FDI bypasses the developing countries, linking FDI with democracy for a sample of 55 low and middle income countries over the period of 1990-99 and controlling for various important variables. He used Generalized Method of Moments (GMM) improved by Arellano and Bond to prove that more democratic countries attract more FDI. He concluded that most poor countries fail to attract FDI due to unstable political condition and there is dis-incentive for foreign investment due to absence of democratic framework.

Gudaro, et. al., (2012) have used multiple regression models to investigate the impact of FDI and Consumer Price Index (CPI) in relation to growth over the period of 1981-2010 in case of Pakistan. They found out that FDI and growth are related positively whereas inflation has a negative relation with growth and both these relations are significant however, like Falki (2009) they also suggest to focus on infrastructure, improving the education and creating a friendly environment to attract direct investment from abroad.

2.3. LITERATURE FROM PAKISTAN

Research from Pakistan includes the paper by Iqbal and Zahid (1998), separating the impact of vital macroeconomic factors like education and stock of capital on growth for Pakistan using framework of multiple regression from 1959 to 1997. Their results show that growth is linked to openness, better education and higher physical capital stock in case of Pakistan; however, due to the negative impact of external debt, they recommend reliance on domestic sources and sound long-run policies for sustainable growth.

Another important analysis in this regard was carried out by Ghani and Din (2006) using Vector Autoregressive Approach (VAR) and time series data from 1973 to 2004 to check the impact of public investment on growth. Their analysis is based on four variables, including also the private investment and public consumption due to theoretical considerations. Their investigation led them to the conclusion that public investment and consumption have an insignificant negative impact on growth whereas private investment is a major driver of growth. Following the same model Sial et al. (2008) also focused on the role of investment in growth incorporating political and economic uncertainty in their VAR analysis for Pakistan extending their data analysis from 1973 up to 2008. The variables were estimated in log-form using Johansen's cointegration technique and Error Correction Mechanism (ECM) and the deductions were the same as Ghani and Din, with an additional finding that a positive short run relationship exists between economic uncertainty (used as a proxy for inflation) and growth.

Bint-e-Ajaz and Ellahi (2012) used a comprehensive approach based on incorporating different models to link the public and private investment with growth for Pakistan. They used a three equation model, one equation for each variable and estimated

the model using unit root, Johansen ( ) and Johansen and Juselius ( ) tests for cointegration and short-run ECM for each equation. Their evaluation shows that both public and private investments depend on exchange rates, inflation and GDP level. Private investment depends also on the lending rate but public investment seems not to be affected by revenue generation through taxation. They also deduce a robust positive relationship and a two-way causal relationship between private and public investment, and growth.

Ahmed and Hamdani (2003) studied 32 developing countries over 1965 to 1992 pooling cross-section and time series data and using three techniques; common, fixed and random-effects models to check the impact of labor, public expenditure, private investment and FDI on growth. They concluded that despite its significance for growth FDI does not play as major a role as domestic private investment which has more consistent and reliable results, that there is low labor productivity in LDCs and that public spending has a positive impact on growth but only as long as its share in GDP does not grow too large to crowd out private investment.

Falki (2009) used Engle and Granger ( ) cointegration to test the production function based on endogenous growth for Pakistan for the period 1980-2006. Her impact assessment of FDI on growth is not as significant as it could be if some pre-requisite conditions like liberal trade policy, effective competition and adequate market are created.

The literature on the topic of the study was discussed in this chapter with the initial literature pertaining to the growth due to public and private investment including both the foreign and the national literature, the second portion, likewise, pertained to the

inter-linkage of investment to growth explored by various authors besides the incorporation of the FDI component and finally the incorporation of the political perspective in the analysis of investment and growth was discussed through relevant literature.

3. METHODOLOGY

This section outlines the methodology used for the analysis and delineates how the relationship between investment and growth will be drawn out using the ARDL model with GDP growth as a dependent variable and investment, government expenditure and political structure as the independent variables. The section includes the theoretical background of the study, followed by the modeling and the econometric techniques used; the sources of data and the conclusion.

3.2. THEORETICAL BACKGROUND

The classical theories regarding growth and development include the Linear Growth Theories by Rostow (1960) and Harrod (1939)-Domar (1946) both of which are centered on Capital fundamentalism. While Rostow (1960) was of the opinion that foreign aid can help trigger capital generation through investment at Take-off Stage, Harrod (1939) and Domar (1946) focused on investment and growth through saving, more a country saves out of a given GDP, greater the GDP growth will be.

Even the neo-classical revival of the classical theories focused on growth being brought about by an exogenous change in technology. The classicals believed in growth based on the law of variable proportions and diminishing utility from the factors of

production contributing to growth, however, they assumed technology, a vital ingredient of growth, to be constant and ignored the economies of scale. Solow (1956), a neo-classical, proposed a growth theory with diminishing returns on capital and labor, and substitutability between labor and capital where eventually a state of no further economic growth is reached called the steady state given that there is no technological change implying technological advancement to be exogenous. His model is based on four parameters; technological growth rate, population growth rate and depreciation rate besides the saving rate explained by Harrod (1939)-Domar (1946) as the motivators for growth, however, his model failed to explain how to increase growth rate and could not justify overtime increase in growth rate since it still assumed the technological advancement as exogenous. Ramsey (1928), Diamond (1965) and other neo-classicals later improved upon Solow's model by variation in one assumption, that the saving rate is not exogenous; rather, it is the decision of the consumer, and that population turnover exists in case of the latter's model, but the results of their models model were the same as regards growth, as those of Solow. Their results regarding welfare, however, were different with Ramsey's social planner having no role while Diamond's social planner having a say in the welfare of the economy.

The endogenous growth theorists like Romer (1986), Lucas (1988), Barro (1990) and Barro and Martin (1999) who tried to explain technological advancement mathematically, believing technological growth to be caused by knowledge production and human capital.

3.3. MODELLING GROWTH AND INVESTMENT

The link between private, public investment and economic growth has been explored by researchers like Blejer and Khan (1984), Barro (1990), Barro (1991), Iqbal and Zahid (1998), Ibrahim (2000), Sial, et al. (2010), Phetsavong and Ichihashi (2012), Bint-e-Ajaz and Ellahi (2012).

The models being used and are expressed in functional form as;

$$Y_t = f\ (CG_t, IP_t, IG_t, FDI_t, LR_t, \varepsilon_t) \qquad 1$$

Where

Y_t = Growth of GDP

CG_t = Government Consumption Expenditure

IG_t = IG = Public Investment

IP_t = Private Investment

FDI_t = Foreign Direct Investment

LR_t = Lending Rate

ε_t = the Error Term

The growth of GDP in real terms depends not only on both public (positive relationship) and private investment (positive relationship) theoretically, but also on the lending rate, since lower interest rates lower the borrowing costs, garnering investment and growth.

We improve upon the earlier models used ARDL approach impact of foreign direct investment on growth. FDI which has not been incorporated in any combined analysis of growth and investment for Pakistan yet, is also incorporated in model.

The ARDL approach to test cointegration has been used here due to all the variables used in this analysis are not integrated of the same order. ARDL also captures the data generating process in a general-to-specific framework by incorporating sufficient lags and incorporates the short-run dynamics through ECM without losing the long-run information (Laurenceson and Chai, 2003). Furthermore, the dynamic ECM from ARDL can be derived via a 'simple linear transformation' (Bnaerjee, et. al., 1993; Akram and Afzal, 2015).

The dynamic Autoregressive Distributed Lag (ARDL) Model based on the pattern of Pesaran, et. al., (1996, 2001) is:

$$\Delta LY_t = \alpha_0 + \alpha_1 \mathrm{T} + \sum_{i=0}^{p-1} a_i \, \Delta \, LC_{g\,t-i} + \sum_{j=0}^{q-1} b_j \, \Delta \, LI_{p\,t-j} + \sum_{k=0}^{r-1} c_k \, \Delta \, LI_{g\,t-k} + \sum_{l=0}^{s-1} d_l \, \Delta \, LFDI_{t-l} + \sum_{m=0}^{u-1} e_m \, \Delta \, LR_{t-m} + \lambda_1 \, LY_{t-1} + \lambda_2 \, LC_{g\,t-1} + \lambda_3 \, LI_{p\,t-1} + \lambda_4 \, LI_{g\,t-1} + \lambda_5 \, LFDI_{t-1} + \lambda_6 \, LR_{t-1} + \varepsilon_t \quad \ldots 2$$

The difference terms in the above equation represent the short-run process whereas the lag terms in the latter half of the equation show the long run variables. The co-efficient of the lagged dependent variable in Eq 2 (λ_1) is the error correction co-efficient which gives the speed of adjustment. If this co-efficient is insignificant it implies that a change in dependent variable does not depend on past errors.

3.4. ECONOMETRIC METHODS

For the model being used in this study, discussed above, the data analysis was conducted and the variables were first tested for the existence of unit root before moving on to the analysis of cointegration.

3.4.1. ADF Test for Unit Root

To check for such non-stationarity, many tests have been developed, out of which the Dickey and Fuller (1979) test with the augmentation for the error term which is not white noise and has the problem of autocorrelation has been used here. The Augmented Dickey-Fuller (ADF) test tackles the problem of serial correlation of error terms by incorporating the lagged dependent variable in the equation as additional repressors (Qayyum, 2002). The ADF equation in general form is given below:

$$\Delta LY_t = \alpha + \beta T + \rho LY_{t-1} + \sum_{i=1}^{p+1} \gamma_{t-i} \Delta L Y_{t-i} + \varepsilon_t \qquad 3$$

Where i= 1,2,3,…….,n

Since the standard t-statistics do not apply to non-stationary series due to the downward bias in the ADF distribution, we compare the estimated ADF stat with Mackinnon (1990) t-values instead of the normal t-values. The serial correlation problem is checked by using the Breusch-Godfrey (1978) serial correlation Lagrange Multiplier test and the lags of the dependent variable are included until the error term becomes white noise.

3.4.2. ARDL Bounds Testing Approach for Cointegration

Cointegration is a statistical property of time series variables. Two or more time series are cointegrated if they share a common stochastic drift. In other words if there exists a stationary linear combination of non-stationary random variables, the variables combined are said to be cointegrated. The ARDL approach to test cointegration was developed by Pesaran and Shinn (1997) which utilizes both the theory of unit roots and the long-run economic theory to provide the basis for developing an error correction mechanism. They suggested a two-step strategy for developing an appropriate ARDL model for inference. First, they recommend selecting the required number of lags of dependent variable (denoted by p) and the regressor/s (denoted by m) by utilizing the information criteria like Akaike (1969, 1973) Information criterion (AIC), Schwartz Bayesian (1978) Information Criterion (SC) or The Hannan Quinn (1979) Criterion (HQ). Then the estimation of the model should be carried out based on the number of lags suggested by the information criteria suggested.

Bound testing approach was developed by Pesaran et al (1996, 2001) to check for cointegration when the underlying regressor are a combination of trend or difference stationary series. Two sets of asymptotic critical values was developed with one set assuming all regressor to be I(1) or difference stationary and the other set assuming them to be I(0) or trend stationary. Under this scenario, if the computed statistic falls outside the critical value bounds, a conclusive inference can be drawn regarding the cointegration among the variables.

The unrestricted error correction model in general form is given below:

$$\Delta Y_t = \alpha_0 + \alpha_1 t + \sum_{i=0}^{p-1} a_i \Delta Y_{t-i} + \sum_{j=0}^{q-1} b_j \Delta X_{t-j} + \lambda_1 Y_{t-1} + \lambda_2 X_{t-1} + u_t$$

Where Y $\longrightarrow$ p (n) and X $\longrightarrow$ q (m)

The estimation of the ARDL equation is done by applying ordinary least square technique and testing the hypothesis using Wald Co-efficient test where:

H_0: $\lambda_1=\lambda_2=\lambda_3=\lambda_4=\lambda_5=0$ (No Cointegration)

H_1: At least one λ is non-zero. (Cointegration exists)

The estimated Wald F-Statistic is then compared to the critical value bounds to conclude about the existence of cointegration among the variables with or without the knowledge of the rank of the forcing variables depending on whether the computed value lies within the bounds or outside them.

3.4.3. Diagnostic Tests

We will apply the diagnostic checks for autocorrelation, ARCH and normality. For autocorrelation we use the Breusch-Godfrey (1978) serial correlation Lagrange Multiplier test with the null hypothesis being that there is no serial correlation among the errors in the regression model. To test for the presence autoregressive conditional heteroskedasticity we use the ARCH test of Engle (1982). Jarque-Bera (1987) Test has been used to check for normality or the goodness of fit of the model.

3.5. DATA SOURCES

Time series data has been obtained for GDP growth (Y), Government Consumption Expenditure (C_g), Private Investment (I_p), Public Investment (I_g) and Foreign Direct Investment (FDI) from the Government of Pakistan (2016); Lending Rate (L.R) from Sate Bank of Pakistan (SBP) (2015).

4. RESULTS AND DISCUSSION

We analyze the impact that FDI on growth in the Pakistan by using the ARDL method of co-integration. What follows is the summary of the data descriptive, the results of the model with focus on FDI, the results of the model explaining the political impact on growth for Pakistan and the concluding remarks.

4.2. Data Summary

The summary statistics of the variables under consideration were obtained and are presented in Table 1.

Table 1: Summary Statistics of Data Series

Statistic	GDP	CG	IP	IG	FDI	LR
Mean	4,533,449.	504,958.0	508,515.3	210,468.5	6,313,613.	11.21217
Median	1,139,036.	165,123.5	126,823.0	114,179.0	731,427.0	11.04500
Maximum	25,821,943	3,242,656.	2,644,947.	1,056,680.	33,832,601	15.00000
Minimum	43,347.00	4,846.000	3,493.000	3,267.000	996.0000	5.000000
Std. Dev.	6,928,766.	789,340.4	747,424.0	261,258.8	10,354,969	2.010413

These statistics include the mean, median, maximum and minimum of the series besides the standard deviation from mean. As can be seen in the following table, the mean GDP of Pakistan over the period under consideration is 4.5 million rupees where the mean public consumption and private investment each ranges around 0.5 million, average public investment is 2.1 million rupees and average FDI inflow for Pakistan is Rs 6.3 million. The minimum FDI inflows in the country were observed in 1972 post separation of East and West Pakistan, whereas the maximum inflow of 33.8 million was seen in 2008 after the restoration of democracy which was welcomed worldwide.

The graphical analysis of the variables under consideration follows:

Figure 4.1 (a): LGDP and LFDI.

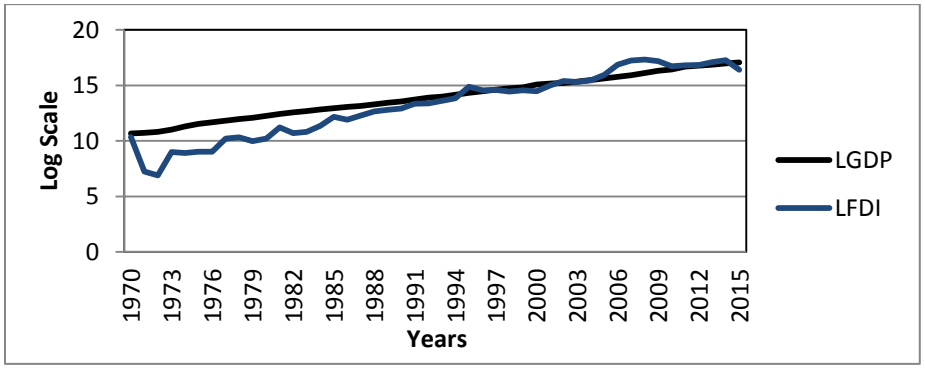


Figure 4.1 (b): Rate of Change of GDP and FDI

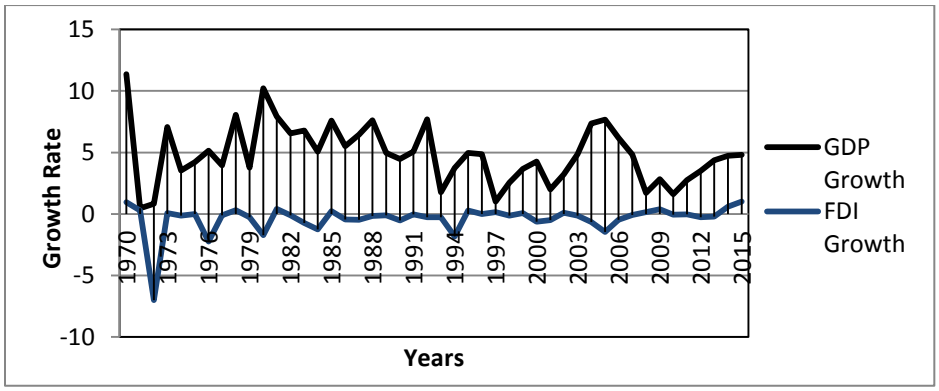


Figure 4.3: Lending Rate of Pakistan

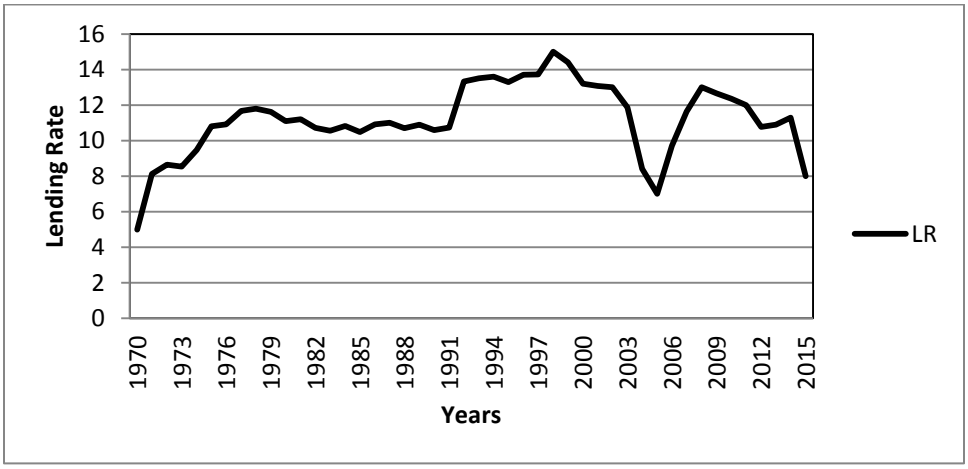


Figure 4.1 (a) clearly shows that GDP and FDI rise steadily while 4.1 (b) shows that GDP growth being faster than the FDI growth in the first three decades and the reverse being true for the last decade or so.

The same can be observed for the variables Government Consumption (Cg), Private Investment (Ip), Public Investment (Ig) and Lending rate (LR) in the figures 4.2 and 4.3. All these variables have been growing over time showing that a linear time trend term should be incorporated in the analysis of these variables.

4.3. ADF Test for Unit Root

ADF unit root test was applied to the variables under consideration to assess the stationarity of the series. Table 2 shows the variables in log-level and log-difference forms where the variable is non-stationary at level. The number of lags used to remove the problem of autocorrelation is also shown in the table along with the order of integration.

As can be seen from the table the logged series of GDP, CG, IP, IG and LR are non-stationary in level form but taking first difference of the series makes them stationary, whereas the variable FDI is stationary in log-level form. The t-statistic values shown in the table for the model with drift and trend are compared with the critical value given at the bottom of the table at 5% level of significance.

Based on the orders of integration obtained from the table above ARDL approach has been used instead of Engel Granger and Johansen approach since it is a pre-requisite for both of them that all the variables used in this analysis be integrated of the same order. And as is required by the ARDL model, the dependent variable is non-stationary i.e. it is integrated of order 1.

Table 2: ADF Unit Root Test

Variables	Co-efficient	Trend	P	Number of Lags	Order of Integration
LGDP	✓	✓	-2.240082	2	I(1)
ΔLGDP	✓	✓	-5.275161	0	I(0)
LCG	✓	✓	-1.866987	0	I(1)
ΔLCG	✓	✓	-7.135121	0	I(0)
LIP	✓	✓	-2.197379	0	I(1)
ΔLIP	✓	✓	-6.665761	0	I(0)
LIG	✓	✓	-2.198326	0	I(1)
ΔLIG	✓	✓	-4.501620	0	I(0)
LFDI	✓	✓	-5.568588	1	I(0)
LR	✓	✓	-2.573439	1	I(1)
ΔLR	✓	✓	-4.930919	0	I(0)

Note: Critical Value @ 5% level of significance = -3.51

4.4. Modeling Effect of FDI on Growth in Pakistan

Hit and trial method was used to select the optimum number of lags to be incorporated and the results were corroborated by using the lag selection criteria like Akaike (1969, 1973) Information criterion, Schwartz (1978) Information Criterion or the Bayesian Information Criterion and The Hannan Quinn (1979) Criterion. The lag order of the underlying VAR model was obtained and is presented in the following table:

Table 4.3: Statistics for Selecting the Lag Order of the Growth Equation

VAR Lag Order Selection Criteria
Endogenous variables: LGDP LCG LIP LIG LFDI LR
Sample: 1970 - 2015

Lag	AIC	SC	HQ
0	6.812939	7.102550	6.919093
1	-4.542982	**-2.226089***	-3.693749
2	-4.351717	-0.007543	-2.759405
3	-5.184563	1.186892	-2.849173
4	**-7.124127***	1.274610	**-4.045658***

* indicates lag order selected by the criterion
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

According to the results obtained from the AIC and HQ information criteria mentioned above, 4 lags are the optimum number to be incorporated in the analysis. The importance of the number of lags of the underlying VAR model can be judged from the fact that if the number of lags is not sufficiently large enough, the residual serial correlation problem will not be mitigated, and simultaneously, if the number of lags is not sufficiently small, the conditional ECM may become unduly over-parameterized, hence a delicate balance has to be maintained while selecting the appropriate number of lags of the variables to be incorporated (Pesaran et al.; 1996, 2001).

Substituting the value obtained in the first unrestricted error correction equation we estimated it using OLS technique and dropped the insignificant variables from the results obtained before re-estimating the equation using the General to Specific Modeling Approach of Hendry (2003). Since the dropping or deletion is a subjective decision the insignificant middle lags have been deleted.

4.4.1. Test of Cointegration: Bound Test

To test the cointegration of variables the bounds testing approach developed by Pesaran et al. (1996, 2001) was used. Wald coefficient test was applied on the equation estimated to test the hypothesis as a check for cointegration. The test with unrestricted intercept and unrestricted trend yielded an estimated value of $F_{(6,20)}$= 8.144844 where the upper and lower bounds for $F_{(6,20)}$ are 2.87 and 4.00 respectively at 5% level of significance.

4.4.2. Long Run Model

The estimation results of the long run model of the final equation selected are given below:

LGDP = 7.11 + 0.10 **TREND** -0.19 **LCG** +0.10 **LIP** + 0.25 **LIG** - 0.08 **LFDI**+ 0.01 **LR**
(4.96) (4.74) (-4.20) (1.96) (3.65) (-2.90) (2.53)

In the long-run, the co-efficient of Government consumption expenditure turned out to be negative and significant and as is pointed out by Ghani and Din (2006), Government consumption or the public consumption can hinder economic growth if the

nature of such expenditures diverts resources from productive usage. Similar results have been derived by Kormendi and Meguire (1985), Grier and Tullock (1989), Barro (1991) and Rebelo (1991).

The co-efficient of Private investment turned out to be positive as defined by the theoretical evidence of, among others, Blejer and Khan (1984) who are of the view that private investment through infrastructural development leads to economic growth and the monetary or fiscal policy adopted by a country must take into account this fact. Khan and Kumar (1997), Ahmad and Hamdani (2003), Ghani and Din (2006), Sial et al (2010) and Bint-e-Ajaz and Ellahi (2012) also concur that private investment has a positive influence on economic growth.

Public investment also turns out to have a positive relation with growth, and in this case, a more dominant positive impact on growth is exhibited by public investment than the private investment. In fact we can safely say that public investment is twice as productive as private investment similar to the analysis of Romer (1987), Barro and Sala-i-Martin (1992) and Naqvi (2003).

Foreign Direct Investment comes up with a negative relationship of FDI and growth is not a strange result in case of Pakistan. Similar negative relationship was observed by Atique et al (2004), Khan (2007) and Falki (2009) for Pakistan. Finally, the lending rate exhibits a positive relationship with growth against the results obtained by earlier studies.

4.4.3. ECM or Short Run Model

The results of the Short Run Model are given in the following table:

$$DLGDP = 0.50\ DLGDP_{(-3)} + 0.12\ DLCG + 0.21\ DLCG_{(-1)} + 0.27\ DLCG_{(-2)} + 0.22\ DLCG_{(-3)}$$
$$3.16 \qquad 2.20 \qquad 3.32 \qquad 5.02 \qquad 3.86$$

$$+0.11\ DLIP - 0.12\ DLIP(-3) + 0.15\ DLIG - 0.17\ DLIG(-2) - 0.18\ DLIG(-3)$$
$$1.89 \qquad -2.57 \qquad 3.76 \qquad -3.69 \qquad -4.04$$

$$-0.062\ DLFDI + 0.04\ DLFDI(-1) + 0.01\ DLR + 0.02\ DLR(-3) - 0.74\ ECM(-1)$$
$$-3.78 \qquad 3.03 \qquad 2.61 \qquad 5.29 \qquad -5.13$$

Diagnostic Test Results

Adjusted $R^2 = 0.793585$ F-statistic = 8.506150 JB TEST $\chi^2_{(2)} = 0.161452$

Serial Correlation LM Test $\chi^2_{(2)} = 4.441273$ ARCH $\chi^2_{(1)} = 0.231392$

The results of the diagnostics checks applied indicate that meaning that the problems of autocorrelation and autoregressive conditional heteroskedasticity do not exist in the ARDL equation estimated. Jarque-Bera test results also show the data is distributed normally.

The ECM results of the ARDL equation show that the coefficient of the lagged-level dependent variable is significant. θ (where $\theta = \lambda_{1)}$ comes out to be -0.744716 i.e. the speed of adjustment of lags of past errors is -0.74 approx. before the long term variables converge to the long-term equilibrium path.

The negative sign of θ also tells us that error in GDP Growth in the past was positive which is why the change in the variable turns out to be negative for the sake of correction of the error in the next period.

The ECM results also indicate that in the short run, GDP growth is affected by all five independent variables under consideration significantly. Whereas in the long-run, the public consumption impacts the growth of GDP negatively, but in the short run we observe the opposite results, since public consumption expenditure through provision of public goods can promote growth (Ghani and Din; 2006), however, in the long run, if the nature of such expenditures crowds out the resources for productive long-term benefits, the positive impact of the short run may deteriorate. The impact of private and public investments in immediate short-run is positive, just as in the long-run. The aggregated short-run impact of FDI is still negative even though by the second lag, FDI starts to show a positive impact on growth. The lending rate decidedly has the same positive impact on growth as in the long-run.

5. CONCLUSIONS AND POLICY RECOMMENDATIONS

This study analyzed the role of investment in the growth of the economy using the three components of investment; public, private and foreign investment besides public consumption and lending rate. ARDL Bounds testing approach was used to test for cointegration and long-run and short run analysis of the variables.

5.1. Conclusions

It has been observed that while the public and private investment have a positive impact on growth for Pakistan generally and the FDI and public consumption have a

negative effect on growth in case of Pakistan. Public investment including the expenditure on the Public sector development program (PSDP) and other such public investment expenditures are twice as effective as private investment in case of Pakistan. The negative role of FDI in case of Pakistan is supported also by the earlier studies; this may be because of the relatively low FDI inflows in case of Pakistan over the decades as compared to other developing countries. Another reason for the negative impact of FDI could be that a portion of these FDI inflows comprises of the loans, the borrowing cost of which outweighs the benefits of the FDI.

The public consumption expenditure predictably has a negative impact on growth of the economy since public consumption expenditure diverts the scarce resources away from productive and developmental usage.

5.2. Policy Recommendations

Based on the results obtained in this study, it is recommended that:

1. To ensure a positive role of FDI in growth of Pakistan, the government needs to create an investor friendly environment in the country to attract more FDI and make the existing infrastructure and system more conducive to the utilization of the FDI for productive and developmental purposes.
2. The capital flight should be checked and loan agreements made after a thorough cost and benefit analysis so as to avoid the negative impact of the FDI. Also there should be a focus on the technology import into the country and facilitation should be made for the investors for technological advancement in the country.

5.3. Future Research Prospects

Further research in this area can be made with a focus on the investment-growth possibilities of the developing China-Pakistan Economic Corridor (CPEC).

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