Foreign Direct Investment Inflows in Pakistan: A Time Series Analysis with Autoregressive Distributive Lag (ARDL) Approach

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ABSTRACT

Estimating a model of foreign direct investment has been one the central elements of FDI policy makers in Pakistan. This paper attempts to model, Determinants of Foreign Direct Investment Inflow in Pakistan: A Time Series Analysis with Auto Regressive Distributive Lag (ARDL) approach using the time series data for the period 1977 to 2010. However in a specification, FDI is found important with the elasticity of GDP growth rate 10% level of significance and infrastructure at 1% level of significance. These factors show do not show better performance in short-run dynamics like only infrastructure is elastic with FDI at 1% level of significance.
Stability tests of the paper do not contain any serious structural change in the model as case of and CUSUM and CUSUMSQ statistics show the critical value lines lying inside the bounds, presenting the model is stable.

General Terms

Your general terms must be any term which can be used for general classification of the submitted material such as Pattern Recognition, Security, Algorithms et. al.

Keywords

Keywords are your own designated keywords which can be used for easy location of the manuscript using any search engines.

1. INTRODUCTION

As a source of foreign investment, foreign direct investment (FDI) with some level of equity plays a glorious and profit oriented role in a sustainable economic growth of the south Asian countries. South Asian countries whether victimizing a poor infrastructure, poor law and order situation, political instability, scarcity of energy supply the blessed nexus of global FDI especially in Bangladesh is credited to cheapest labor cost, tax concessions, tariff reductions or exemptions and other subsidies. During 1980 to 1990 the above stated offerings by the Board of Investors of Bangladesh made the economy of Bangladesh reaped the rising benefits of FDI Anowar Hussain (2012). Hence Bangladesh in the fiscal year 1999 to 2000 was brought to the track of the most liberal investment regime of south Asia Anowar Hussain (2012).

Hence over the last decades the countries being treated with the tablets of liberal economic policies and capital inflows demand the deepen examination of the determinants that influence foreign direct investment particularly in the developing countries like Bangladesh Shafiun Nahin Shimul (2009), Muhammad SALAHUDDIN (2010).

Majority economic literatures lighten the mixed role of FDI in south Asian countries like Bangladesh. Firstly it sources growth enhancing factor of financial market development, inflation rate, infrastructure and GDP growth Kumar, Nagesh, and N.S. Siddharthan(1997), Pardhan (2001), Zaidi (2004), Shafiun Nahin Shimul (2009), Ahmad Ghazali (2010), Muhammad Arshad Khan (2011) and Muhammad Tahir Mahmood (2012). Secondly FDI transfers business know-how and foreign technologies into the host country production function (Romer (1993) and bridges the gap of physical capital, skill acquisition, labor training for human capital formation and more competitive business environment in developing economies Shafiun Nahin Shimul (2009), Rukhsana Kalim (2009). Thirdly FDI initiates to incorporate new inputs such as new commodities that have not been produced by the local firms Shafiun Nahin Shimul (2009). Fourthly as FDI causes an import of substitute firms come in face to face with the local firms which leads to a healthy competition between the firms. Thus the efficiency and productively of the firms are enhanced Shafiun Nahin Shimul (2009). Fifthly for a recipient country is known as the land employment opportunity is also credited to economic blessing of FDI which moves the graph of GDP along with real sense through the factor income of people and indirectly through the multiplier effect Shafiun Nahin Shimul (2009). It however GDP growth with other multiplier effect on the economy could sluggish the saving habits of the people and hence the domestic investment Shafiun Nahin Shimul (2009). Along with above stated crowding in effect of FDI, FDI could have a crowding-out effect in the long-run also when foreign investors become competitors of the local firms by producing the same commodities and drive out the domestic firms from the competition and become a substitute of domestic investment. Shafiun Nahin Shimul (2009), Ahmad Ghazali (2010), Dr. Ch. Abdul Rehman (2011), Muhammad Muazzam Mughal (2011), Haider Mahmood (2012). Some researchers consider that in the presence of pre-existing trade, price, financial, and other distortions FDI causes misallocation of resources which in turn slows the speed of economic growth Brecher and Diaz-Alejandro (1977), Brecher (1983), Boyd and Smith (1999), Carkovic and Levine (2002). So keeping a deliberate perception a positive impact of the relation between FDI and trade on economic growth a faster economic growth along with the open-trade policies are expected by the people so such interrelationship of FDI and trade along with the economic growth is still needed to be critically examined Shafiun Nahin Shimul (2009).

The present study contributes to supplement the existing literature by empirically examining the behavior of FDI by posing special focus on size of market, gross domestic product growth and public capital in Bangladesh. The study uses time series data from 1972 to 2011 and Autoregressive Distributive Lag Model (ARDL) for empirical estimations. The rest of the paper is organized as follows: section 2 deals with the review of literature, section 3 includes the econometric modeling, data source and the selection of explanatory variables, section 4 presents empirical findings and last section, section 5 concludes the study with some policy recommendations.

2. REVIEW OF LITERATURE

The numerous studies are emphasizing upon a considerable research on the FDI determinants. For example: Shafiun Nahin Shimul (2009) applying ARDL approach concludes no cointegration between foreign direct investment and economic growth in Bangladesh during 1973 to 2007. To ensure the above stated result Shafiun Nahin Shimul (2009) took another chance by using Engle-Granger Causality test and inferred FDI and the openness of trade not causing GDP per capita significantly in short-run dynamics as well as in long-run.

3. DATA SOURCE AND METHODOLOGY:

3.1 Data Sources and Variables

This paper uses annual time series data from 1977 to 2010 analyzing the long-run cointegration among the variables outlined below consisting of Foreign Direct Investment inflow (Current USD) proxied by FDI (FDI_t), Financial Market Development (FMD_t) is proxied by Domestic Credit to Private Sector (% of GDP), Inflation Rate is proxied by inflation: GDP deflator (Annual %), Telephone lines has been taken as a proxy of Infrastructure (IS_t), Gross Domestic Product (GDP) Growth Rate (Annual %) ($GDPR_t$).

Many of the researchers have already taken these variables in several studies of money demand. For example: Dr. Abdul Rehman (2011). The sample period (1977 to 2010) is constrained by the availability of data which is sourced from World Development Indicator (WDI) and only the variables Foreign Direct Investment inflow (FDI_t) and Infrastructure (IS_t) is taken into logarithm form except Financial Market Development (FMD_t), Inflation Rate (INF_t) and Gross Domestic Product Growth Rate ($GDPR_t$).

To examine long-run equilibrium as well as the short-run dynamics of the proposed FDI model we firstly will assure the stationarity properties of the variables selected for estimated in this study. The selected variables if are stationary at level I(0) the researchers used Ordinary Least Square (OLS) method of regression. If the variables are stationary at first difference I(1) or at second difference I(2) then most of the research practitioners relied upon Johansen and Juselius maximum likelihood cointegration method for long-run and Error Correction Model for the short-run dynamics. In case of non existence of long-run cointegration among the variables employing Johansen cointegration technique then to examine the short-run dynamics among the variables Granger causal tests mostly is used.

On some doubtful grounds the reliability of Johansen and Juselius cointegration method was pointed out. Such as if some of variables of the proposed model are stationary at level I(0) and others are at first difference I(1). So the situation which represents all the variables are not showing the same order of stationarity we have to rely on a cointegration technique named Autoregressive Distributive Lag (ARDL) developed by Pesaran, Shin and Smith (1996). ARDL approach contains both long-run and short-run cointegration among the variables as well as it also examines the short-run dynamics named Error Correction Method. ARDL procedure of cointegration for a long-run equilibrium and short-run dynamics of the model has already been utilized by several research economists. Such as: Dr. Abdul Rehman (2011). All calculations are carried out using Microfit 5.1.

3.2 Specification of the Function: Foreign Direct Investment

This study implement the following specification of FDI function can be written as:

$$FDI_t = f(FMD_t, INF_t, IS_t, GDPR_t, u_t)$$

Where:

FDI_t = Foreign Direct Investment inflow (% of GDP) proxied by FDI (FDI_t), FMD_t = Financial Market Development (FMD_t) is proxied by Domestic Credit to Private Sector (% of GDP), INF_t= Inflation Rate (INF_t) is proxied by inflation: GDP deflator (Annual %), IS_t = Infrastructure (IS_t) is proxied by Telephone Lines, $GDPR_t$ = Gross Domestic Product (GDP) Growth Rate (Annual %) ($GDPR_t$) and u_t = Error Term

3.3 Econometric Model

Using the logarithmic form for the above discussed variables and redefining the specification into the following multiple semi log linear regression model.

EQUATION NO: (1.1)

$$\ln FDI_t = \beta_0 + \beta_1 FMD_t + \beta_2 INF_t + \beta_3 \ln IS_t + \beta_4 GDPR_t + U_t$$

Where Foreign Direct Investment (FDI$_t$) in natural log form, is a dependent variable whereas Financial Market Development (FMD$_t$), Inflation Rate (INF$_t$), Infrastructure in natural log form (lnIS$_t$) and Gross Domestic Product Growth (GDPR$_t$) are independent variables. On the basis of preliminary analysis only the variable Infrastructure has been presented in (ln) natural logarithmic form. Natural log transformation of the data reduces the variability of variance especially in Infrastructure. Parametersβ_1, β_2, and β_3 are the long-run elasticities of Foreign Direct Investment net inflow with respect to GDPR, FMD and IS respectively. To summarize the prior expectations for the coefficients are as follows: $\beta_1 > 0$, $\beta_2 < 0$, $\beta_3 > 0$ and $\beta_4 > 0$.

3.4 Variable Descriptions and Expected Signs

TABLE: (1.0)

Variable	Description	Expected Sign
FMD_t	Financial Market Development (FMD_t) is proxied by Domestic Credit to Private Sector (% of GDP)	+
INF_t	Inflation Rate is proxied by inflation: GDP deflator (Annual %)	−
IS_t	Infrastructure (IS_t) is proxied by Telephone mainlines	+
$GDPR_t$	Gross Domestic Product (GDP) Growth Rate (Annual %) ($GDPR_t$)	+

According to the theoretical literature as well as the previous studies the sign of parameter β_1 mostly considered positive as a relation between financial market development and foreign direct investment. It means if financial market development increases this leaves a positive influence in foreign direct investment inflow of an economy and vice versa Wheeler and Mody (1992), Asiedu (2006), Kok and Ersoy (2009), Dr. Ch. Abdul Rehman (2011), Muhammad Muazzam Mughal (2011).

The negative sign of coefficient β_2 shows the inflation rate in host country increases will leave an inverse affect on FDI. In case of coefficient β_2 contains a negative relation with foreign direct investment net inflow as negative relation is supported by Wheeler and Mody (1992), Asiedu (2006), Kok and Ersoy (2009), Dr. Ch. Abdul Rehman (2011), Muhammad Muazzam Mughal (2011).

As cardinal variable to the study with a positive expected sign is Infrastructure. Infrastructure as public inputs reduces the cost of business and remains a dominating factor for attracting FDI inflow. Root and Ahmad (1979), Wheeler and Mody (1992), Kinoshta (1998), Kumar, N. (2001), Asiedu (2002), Asiedu (2006), Kok and Ersoy (2009), Khadaroo and Seetanah (2010), Quazi (2005) claims the insignificant influence of infrastructure on FDI inflow. The proxy of "telephone mainlines" (IS) in included in the model to measure the infrastructure as many studies have already utilized this proxy. For example: Sekkat and Veganzones-Varoudakis (2004) and Asiedu (2006), Dr. Ch. Abdul Rehman (2011).

This research paper attempts to examine the model applying auto regressive distributive lag (ARDL) approach to a long-run cointegration for ARDL model deals with a single cointegration equation as well as the variables included in the model to be integrated at level $[I(0)]$ or at first difference $[I(1)]$ or even both I(0) and I(1) integration Pesaran and Shin (1999). Pesaran and Shin (1999) argued the application of ARDL approach to cointegration provides robust results and super consistent estimates of the long–run coefficients in case of both big as well as small samples. The Engle and Granger (1987) test, maximum likelihood based Johansen (1988, 1991) and Johansen Juselius (1990) tests are the most widely used methods to investigate the cointegration (long run equilibrium relationship) among the variables Dr. Ch. Abdul Rehman (2011) and require all the variables included in the model must be stationary at first difference $[I(1)]$ or at second difference $[I(2)]$. Engle and Granger (1987) test, maximum likelihood based Johansen (1988, 1991) and Johansen Juselius (1990) methods to investigate the cointegration limit the stationarity for most the time series data do not contain the same level stationarity especially at first difference or at second difference as well as the model containing the small samples are estimated with implausible results Dr. Ch. Abdul Rehman (2011). On the other hand Autoregressive distributive lag (ARDL) approach to cointegration avoids the above stated limitations given by Engle and Granger (1987), Johansen (1988, 1991) and Johansen Juselius (1990). Pesaran, Shin and Smith (1996) and Pesaran and Shin (1999) developed this approach whereas Pesaran *et al.*(2001) developed it further.

Due to various econometric advantages over other methods of cointegration this approach has gained wide acceptance. This approach, contrary to other approaches, does not necessitate all the variables to be integrated of the same order, *i.e.* I(1).

Considering above advantages of ARDL approaches to cointegration, we specify the following model:

EQUATION NO: (1.2)

$$\Delta(lnFDI_t) = \beta_0 \sum_{i=1}^{q} \beta_{1i} \Delta(lnFDI_{t-1}) + \sum_{i=0}^{q} \beta_{2i} \Delta(FMD_{t-i})$$
$$+ \sum_{i=0}^{q} \beta_{3i} \Delta(INF_{t-i}) + \sum_{i=0}^{q} \beta_{4i} \Delta ln(IS_{t-i})$$
$$+ \sum_{i=0}^{q} \beta_{5i} \Delta(GDPR_{t-i}) + \beta_6 (lnFDI_{t-1})$$
$$+ \beta_7 (FMD_{t-1}) + \beta_8 ln(IS_{t-1})$$
$$+ \beta_9 (GDPR_{t-1}) + v_t$$

Where Δ is the first difference operator, q is optimal lag length, $\beta1$, $\beta2$, $\beta3$, $\beta4$ and $\beta5$ represent the short run dynamics of the model whereas $\beta6$, $\beta7$, $\beta8$ and $\beta9$ are the long run elasticities. The long-run elasticity between the FDI inflow (FDI) and its determinants can be examined through the formal procedure of computing the F-statistics. The F-statistics includes the null hypothesis H0: $\beta6 = \beta7 = \beta8 = \beta9 = 0$ for no cointegration or no long-run relationship between the variables while the alternative H1: $\beta6 \neq 0$, $\beta7 \neq 0$, $\beta8 \neq 0$, $\beta9 \neq 0$ hypothesis present if there exists a long-run cointegration or long-run relation between the variables. Before running the ARDL model we tested the level of integration of all variables because if any variable is I(2) or above ARDL approach is not applicable. For this we use Augmented Dickey-Fuller test (ADF) and Philips–Perron test (PP). In order to find the long run relationship as given in equation (1.2), we conducted bound test approach using F - test with two bounds, *i.e.* lower bound and upper bound. The null hypothesis assumes no cointegration among variables. If the value of F-statistic is greater than upper bound then the null hypothesis is rejected and if it is less than lower and upper bounds then the null hypothesis is accepted and if it falls between the lower bounds the test is inconclusive. After testing for long-run cointegration the selection of lag orders of variables is very important because the appropriate lag selection enables us to identify the true dynamics of the models. To check the performance as well as the true dynamics of the estimated model we use Akaike Information Criteria (AIC) or Schwarz Bayesian Criteria (SBC) for an optimal lag length of variables. This paper also goes through the stability tests, namely, Cumulative Sum (CUSUM) and CUSUM of Squares (CUSUMSQ) of recursive residuals, originally proposed by Brown et al. (1975) are also conducted. An error correction version of equation (1.3) is given as below:

EQUATION NO: (1.3)

$$\Delta ln(FDI_t) = \beta_0 \sum_{i=0}^{q_1} \beta_{1i} \Delta ln(FDI_{t-i}$$
$$+ \sum_{i=0}^{q2} \beta_{2i} \Delta(FMD_{t-i}) +$$
$$+ \sum_{i=0}^{q_3} \beta_{3i} \Delta(INF_{t-i})$$
$$+ \sum_{i=0}^{q_4} \beta_{4i} \Delta ln(IS_{t-i})$$
$$+ \sum_{i=0}^{q_5} \beta_{5i} \Delta(GDPR_{t-i}) + \lambda EC_{t-1} + \varepsilon_t$$

Where q_1, q_2, q_3, q_4 and q_5 represent optimal lag length, λ is the speed of adjustment parameter and EC represents the error correction term derived from long run relationship as given in equation (1.3).

3.5 Empirical Findings

Modeling foreign direct investment function applying autoregressive distributive lag (ARDL) approach to cointegration and the testing of the order of integration of the individual series selected in this study. The test of order of integration has been developed several procedures the most popular of them are: Augmented Dickey-Fuller (ADF) test due to Dickey and Fuller (1979, 1981), and the Phillip-Perron (PP) due to Phillips and Perron (1988) unit roots test procedure at level and at first difference reported in Table 2.1 showing the analysis of the time series based on ADF and PP unit root tests indicate that the computed values of the time series of variables: Foreign Direct Investment inflow (Current USD) proxied by FDI (FDI_t) has been taken into natural log form, Financial Market Development (FMD_t) is proxied by Domestic Credit to Private Sector (% of GDP), Inflation: GDP Deflator (Annual %) has been taken as a proxy of Inflation rate (INF_t), Infrastructure (IS_t) is proxied by Telephone Lines has been taken into natural log form and Gross Domestic Product (GDP) Growth Rate (Annual %) ($GDPR_t$).

The statistic value of the variables: inflation rate and gross domestic product growth rate at their level I(0) and first difference I(1) is greater than the critical values -3.632900 and -3.639407 respectively at 1% level of significance is shown by (***). The said results are based on Augmented Dickey-Fuller (ADF) unit root test as established by Dickey and Fuller (1979, 1981) and Phillip-Perron (PP) unit root test established by Phillips and Perron (1988).

At level I(0) and at first difference I(1) financial market development (FMD) contains it's statistic values -3.638917 and -5.229230 respectively is greater than the critical values -3.632900 of I(0) and -3.639407 of I(1) at 1% level of significance as indicated by (***) from applying Augmented Dickey-Fuller (ADF) unit root test. On the other hand Phillip-Perron (PP) unit root test shows the statistic value of financial market development (FMD) -2.894099 is significant at 5% level of significance indicated by (**) at level I(0) and 1% level of significance at first difference I(1).

At level I(0) and at first difference I(1) foreign direct investment inflow (FDI) contains it's statistic values -1.098838 and -5.815790 respectively if compared with the critical values -3.632900 of I(0) and -3.639407 of I(1) we will see acceptance of null hypothesis (insignificant result) at level I(0) and rejection of null hypothesis at 1% level of significance (significant result) respectively by applying Augmented Dickey-Fuller (ADF) unit root test. On the other hand Phillip-Perron (PP) unit root test shows the statistic value of foreign direct investment (FDI) -1.027036 is insignificant at level I(0) but At first difference I(1) the statistic value of FDI -5.794487 significance at 1% level of significance at first difference I(1).

Another explanatory infrastructure (IS) contains it's statistic values -1.895201 and -1.876959 is detail examined at level I(0) and at first difference I(1) respectively and compared with the critical values -3.632900 of I(0) and -3.639407 of I(1). Here we see the acceptance of null hypothesis (insignificant result) at level I(0) and I(1) based on applying Augmented Dickey-Fuller (ADF) unit root test. On the other hand Phillip-Perron (PP) unit root test shows only the statistic value of infrastructure (IS) -3.126815 is significant at 5% level of significance as indicated by (**) at first difference I(1).

The application of Phillip-Perron (PP) and Augmented Dickey-Fuller (ADF) unit root tests contain null hypothesis of these present the presence of a unit root.

Given the unit-root properties of the variables, we proceed to estimate whether there is a long-run cointegration relationship among the variables in equation (1.2) by using Autoregressive distributive lag (ARDL) approach to cointegration. This approach lies in the fact that it can be applied irrespective of whether the variables are I(0) or I(1) or I(0) and I(1) both in Model (Pesaran and Pesaran 1997). The results of ARDL approach to cointegration have been taken using Microfit (5.0).

Descriptive Statistics:

TABLE: 2.0 (a)

	FDI_t	FMD_t	INF_t	IS_t	GDPR
Observations	36	36	36	36	36
Standard Deviation	1433232671	2.63	5.08	1674712	2.10
Skewness	2.451312907	0.36	1.44	0.59	0.16
Kurtosis	5.436388334	-0.29	2.44	-1.05	-0.22
Mean	868213265.5	24.86	9.87	1952951	5.11
Maximum	5590000000	29.84	24.89	5240012	10.22
Minimum	8220530.168	19.16	2.46	208000	1.01

Correlation Matrix:

TABLE: 2.0 (b)

	FDI_t	FMD_t	INF_t	IS_t	$GDPR_t$
FDI_t	**1.00**				
FMD_t	0.52	**1.00**			
INF_t	0.15	-0.40	**1.00**		
IS_t	0.74	0.35	0.07	**1.00**	
$GDPR_t$	-0.16	0.20	-0.24	-0.27	**1.00**

Descriptive statistics and correlation matrix of the variables of our selected model are expressed in Table 2.0 A and 2.0 B respectively.

TABLE: 2.1 Unit Root Test Results

Variables	Aug. Dickey Fuller Test Statistic (At Level)	Aug. Dickey Fuller Test Statistic (At 1st Diff.)	Philips-Perron Test Statistic (At Level)	Philips Perron Test Statistic (At 1st Diff.)
$lnFDI_t$	-1.09	-5.82***	-1.03	-5.80***
FMD_t	-3.64***	-5.23***	-2.90*	-5.34***
INF_t	-5.53***	-4.41***	-5.55***	-10.79***
$lnIS_t$	-1.90	-1.88	-1.49	-3.13**
$GDPR_t$	-6.05***	-10.66***	-6.10***	-20.91***

Note: ***, ** and * show significance level at 1 %, at 5 % and at 10 % significance levels, respectively. McKinnon (1996) Critical Values: 1% (-3.632900); 5% (-2.948404); 10% (-2.612874) for ADF and PP at I(0). McKinnon (1996) Critical Values: 1% (-3.639407); 5% (-2.951125); 10% (-2.614300) for ADF and PP at I(1).

Results of the long-run relationship are attached and sensitive to lag-length selected in the model. Table 2.2 presents the computed F-statistic to select optimal lag-length in the model. According to Pesaran *et al.* (2001), with lag if order 1 the lower and upper bound values at 90 percent significance level are 2.7022 and 3.9116 respectively. Table 2.2 shows that the computed value of F-statistic (3.9217) is greater than the upper bound value of F-statistic which helps us to reject the null hypothesis of no long- run relationship. Therefore, we conclude that there is long-run relationship among the variables. Due to the certain limitations of free downloaded software Microfit 5.0 we are unable to try the second lag-length in the model that's why the existence of long-run relationship of the model is ensured by its F-statistic value is little greater than the upper bound at 90 percent significance level.

TABLE: 2.2

F. Statistics for the Existence of Long-run Relation

Order of Lag	F-Statistic
1	3.9217

The lower and upper bound values (2.7022 and 3.9116 at 90 percent) for F-statistic are taken from Microfit 5.0 developed by Bahram Pesaran and M. Hashem Pesaran.

This model was also investigated for any specification error if occurs. For this purpose Ramsey RESET test using the square of the fitted values was incorporated which states if computed F-value is significant then the selected model is considered specifically wrong J. B. Ramsey (1969). In this model the calculated F-statistic lies outside the range of critical values at 5 percent level of significance and therefore, no specification error in our model has been found.

Diagnostic Tests:

Test Statistics	Description	Statistic value with [Prob.]
Serial Correlation	Lagrange Multiplier Test of Residual Serial Correlation	0.3562 [0.550]
Functional Form	Ramsey's RESET Test using the Square of the fitted values	3.1885 [0.074]
Heteroscedasticity	Based on the Regression of Squared Residuals on Squared fitted values	0.2065 [0.650]

To select the optimal lag orders of the variables we have used Schewarz Baysian Criterion (SBC) and concluded the F-static value 3.9217 stays above the upper bounds of the critical values 3.9116 therefore null hypothesis of no long-run cointegration is rejected at 10 per cent level. This result gives

an indication for the existence of a long-run relationship between lnFDI, FMD, INF, LnIS and GDPR.

TABLE: 2.4

Long-Run Coefficient of ARDL (1, 0, 0, 0, 0)
Dependent Variable ($lnFDI_t$)

Regressor	Coefficient	Standard Error	t-Ratio
Constant	-1.9823	2.9965	-.66153
FMD_t	0.10695	0.078320	1.3656
INF_t	-0.015621	0.047826	-.32662
$lnIS_t$	1.3252	0.19751	6.7093***
$GDPR_t$	0.12652	0.10239	1.2357

Note: ***, ** and * show significance level at 1 percent, at 5 percent and at 10 percent significance levels, respectively.

The estimation results provide evidence of the complex dynamics and relatively long effects that seem to exist between FDI and its determinants and fulfill the theoretical expectation about their signs. Table 2.3 reveals that only infrastructure ($LnIS_t$) could found significant at 99% percent level of significance and rest of the variables: financial market development (FMD_t), inflation rate (INF_t) and gross domestic product growth rate ($GDPR_t$) are found to be insignificant factors of FDI in Pakistan.

The coefficient of financial market development which is positively elastic with FDI in Pakistan shows 5.8035 percent variation in FDI as compared to one percent change in lnPCS. The positive empirical relation of FMD with FDI is carried by the following researchers: Haider Mahmood and A.R. Chaudhary (2012).

Rationale behind negative elasticity of market size is that FDI could have a crowding-out effect when foreign investors invest in Pakistan and become competitors of the local firms by producing the same commodities and drive out the domestic firms from the competition. Hence as a substitute of local entrepreneurs FDI contains a negative causality with annual change in the size of market Haider Mahmood (2012), Ahmad Ghazali (2010), Dr. Ch. Abdul Rehman (2011), Muhammad Muazzam Mughal (2011), Haider Mahmood (2012).

Previous economic theories support positive causality of public capital stock or public investment with economic growth. Public capital stock generates employment process that stimulates economic growth by increasing the domestic output. With an increase in public capital stock with the impact of financial development an economic growth seems to be highly improved. This empirical evidence consistently follows the growth empirics of Mankiw et al. (1992) and Barro and Lee (1994). It is documented that one percent increase investment in public capital yields 5.8035 percent increase in FDI as this argument is supported by Muhammad Shahbaz (2010).

One percent change in trade openness (TOPEN) could have the same directional change of 12.4729 percent as yield by FDI in long-run provided the Pakistan's security condition is enough. Such relation between FDI and GDPR is documented and supported by several of researchers in the Pakistan like Ahmad Ghazali (2010), Haider Mahmood and A.R. Chaudhary (2012).

The coefficient 0.72578 shows that one percent increase in GDPR leads to over 0.72578 percent yields by FDI in long-run. Such relation between FDI and GDPR is documented and supported by several of researchers in the Pakistan like Ahmad Ghazali (2010), Haider Mahmood and A.R. Chaudhary (2012).

TABLE: 2.5

Error Correction Representation of the Selected ARDL (1, 0, 0, 0, 0) Model
Dependant Variable $\Delta lnFDI_t$

Regressors	Coefficient	Standard Errors	t-Ratio
ΔFMD	0.041106	0.032944	1.2478
ΔINF	-0.0060038	0.017563	-0.34185
$\Delta LnIS$	0.50931	0.16084	3.1665***
$\Delta GDPR$	0.048625	0.035897	1.3546
$ECM(-1)$	-0.38434	0.11338	-3.3898***

R^2 = 0.41404, Adj. R^2 = 0.30940, F (5, 28) = 3.9569 [.008], DW = 1.8183, Hetero.= 0.2065 [0.650], Ramsey's RESET Test =3.1885 [0.074], Note: ***, ** and * show significance level at 1 percent, at 5 percent and at 10 percent significance levels, respectively.

dLNFDI = LNFDI-LNFDI(-1)
dFMD = FMD-FMD(-1)
dINF = INF-INF(-1)
dLIS = LIS-LIS(-1)
dGDPR = GDPR-GDPR(-1)

The elasticity of the variable financial development (FMD) does not significantly support the model. The coefficient of financial development which is positively elastic with FDI in Pakistan by 0.041106 percent shows one percent change in market size will cause positively by 0.041106 percent change in FDI.

The diagnostic estimations for the short run dynamics of foreign direct investment are presented in the upper panel of Table 2.5 shows gross domestic product growth ($\Delta GDPR_t$) elasticity is 0.048625 which is not significant as reflected by a t-statistics (t-ratio) of 1.3546. The coefficient 0.048625 shows that one percent increase in GDPR leads to increase FDI by 0.048625 percent in short-run period of time.

ECM (-1) presents the convergence of the model towards equilibrium by its negative sign and the value 0.38434shows FDI adjusts to restore 38.4 percent of a disequilibrium from

the previous year to the current year and low speed of adjustment indicates could be the element of political instability, energy crises and currency devaluation.

A microscopic examination of the table indicates that a low coefficient of determination. This can be observed from the value of R-squared 41.4 percent and the adjusted R-squared 30.9 percent. Although there are several findings R-square less than 50% in short run dynamics. For example: the value of R² given in the table 2.4 shows only 58% variation in error correction model (short-run relation equilibrium) is providing better performance of the model in short-run.
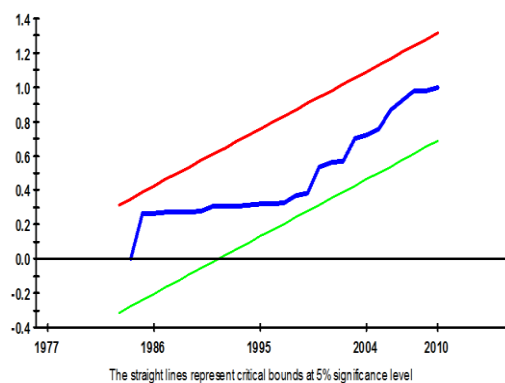
Plot of Cumulative Sum of Recursive Residuals

The straight lines represent critical bounds at 5% significance level
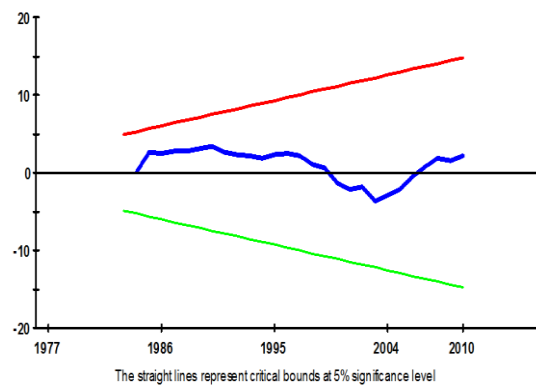
This research paper purposes an estimation of a dynamic demand for money function in Pakistan that could hold a key position for an optimal policy analysis we finally examine the stable:

Model is reported in the table 2.5 apply the level of stability tests CUSUM and CUSUMSQ proposed by Brawn *et al.* (1975). "It is now becoming standard practice to incorporate short-run dynamics in testing for the stability of the long-run parameters of the money demand equation" Olugbenga A. Onafowora *(International Business & Economics Research Journal: Volume 3, Number 8)*. Once variables are confirmed for a long-run cointegration then the stability of foreign direct investment function can be tested. If graphical plot of CUSUM and CUSUMSQ stays within 5% significance level, then our proposed FDI function is said to be a stable function. So incorporating the stability tests using both the CUSUM and CUSUMSQ this paper contain no structural change in the model.

Plot of Cumulative Sum of Squares of Recursive Residuals

The straight lines represent critical bounds at 5% significance level

Model is reported in the table 2.5 apply the level of stability tests CUSUM and CUSUMSQ proposed by Brawn *et al.* (1975). "It is now becoming standard practice to incorporate short-run dynamics in testing for the stability of the long-run parameters of the money demand equation" Olugbenga A. Onafowora *(International Business & Economics Research Journal: Volume 3, Number 8)*. Once variables are confirmed for a long-run cointegration then the stability of foreign direct investment function can be tested. If graphical plot of CUSUM and CUSUMSQ stays within 5% significance level, then our proposed FDI function is said to be a stable function. So incorporating the stability tests using both the CUSUM and CUSUMSQ this paper contain no structural change in the model.

4. POLICY IMPLICATIONS OF THE FINDINGS

The evidence of an important implications derived from the above findings suggest gross domestic product growth, financial market development, size of market, public capital stock and the openness of trade are the important determinants of FDI in Pakistan. The finding of the study may contribute in the following areas: firstly the developing countries like Pakistan are unable to reap the optimal benefits of FDI due to the political instability. The optimal fruits of FDI require firm political stability under democracy. Secondly the government should reshape its image in trust worthy frame to restore the size of local firms (size of market). For this very purpose government should deal with the promises which she has made with the investors and should complete all the energy related projects on primarily bases. Thirdly we second the policy implication by Muhammad Arshad Khan (2007) who argues that having a better ability to absorb the positive impact of FDI and promoting economic performance a well developed financial sector can represent a source of comparative advantage for Pakistan. Fourthly the study strongly supports the effective concentration of the international donor agencies like UNO, ADB and IMF and the friend countries of Pakistan on the economic infrastructure reconstruction. It will result in twofold benefit, first is rehabilitation and second is maintaining and uplifting of FDI inflow 2) the same concentration is required by the policy makers to ensure the significant factors while making policies in respect of FDI. Fifthly the government should redefine the priorities in favor of FDI that could affect foreign capital more. Iqbal Mahmood (2011) argues for government capabilities must be taken into account while it designs its FDI favorable policies. Sixthly economies like Pakistan should rely upon their own resources rather they finance their economies from other external sources to attain self sufficiency and economic growth.

5. CONCLUSION

In this paper we develop an econometric model of foreign direct investment, with application of recent econometric methodology of Auto Regressive Distributed Lag (ARDL) to cointegration analysis of Pesaran and Shin (1998) and Pesaran et al. (2001). The results show that gross domestic product growth rate, financial market development, public capital stock and trade openness have positive relation with FDI while the size of market negatively associated with FDI in short run as well as long run. An annual time series data set over the period 1970 to 2010 is utilized. Recent data techniques are applied to diagnose and check the time series properties of data; later estimation was carried out where Short run and long run elasticities are estimated.

Our results state that capital stock and foreign direct investment are important factors which affect significantly and positively. Our findings are consistent with the findings of Haider Mahmood (2012), Ahmad Ghazali (2010), Dr. Ch. Abdul Rehman (2011), Muhammad Muazzam Mughal (2011), Haider Mahmood (2012).

The stability of our proposed FDI model has been examined to assure the short run dynamics for long run consistency of parameters applying CUSUM test based on cumulative sum of recursive residuals and CUSUMSQ test is based on squared recursive residuals as initially proposed by Brawn *et al* (1975). The CUSUM test is plotted against the break points. The estimated coefficients are said to be stable in case if the plot of CUSUMSQ statistic stays within 5% level of significance.

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