

## The Substitution of Foreign Savings for Domestic Savings: An Empirical Analysis of Pakistan

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### **Abstract**

*The empirical study estimates the factors affecting substitution of Foreign Direct Investment for domestic saving in Pakistan. The study has used time series data over the period from 1990 to 2014. The study has applied Autoregressive distributed lag approach to test the cointegration among variables used in analysis. The findings are supported by the unit root test and standard diagnostic tests. Long run and short run results are estimated by following error correction mechanism. Findings reveal that there is positive and significant relationship between domestic saving and foreign saving. The study reveal that to increase the domestic investment can be a sourcefull substitution for foreign saving. The long term sustainable economic growth can be achieved by developing a policy plan to encourage the behavior of domestic private and public saving in Pakistan.*

**Key Words:** Domestic Saving, Foreign Saving, ARDL, Cointegration

### **1. Introduction**

The economic growth is the common goal of all nations. Government implement various kinds of policies such as encourage saving, stimulating investment and production to achieve the main target of economic growth. Investment plays a crucial role in economic growth of a country. But the investment cannot increase without increasing in the amount of saving. Thus, accumulated savings consider as the source of capital stock which play a major role in providing the national capacity for investment, production and employment. Further all these activities eventually enhance the economic growth.

From last few decades it has been of great interest for the economists both theoretically and empirically that domestic savings rate can play a critical role in the process of economic growth of a country particularly since the formulation of Horrad- Domar model (Horrad 1939 ) which suggests that the ratio of saving rate to capital output must always equal to the natural growth rate of the economy for stability and full employment in the economy (yeladan,2009). Low saving rate is a serious constraint to sustainable economic growth. The neoclassical growth model reveals a clear connection between saving and economic growth. According to Solow growth model higher saving leads to higher investment, which in turn leads to higher economic growth (Solow, 1956).

National savings is composition of private and public savings of the economy. Domestic private savings play a vital role in the economic growth and stability of the country. Higher savings and the related increase in capital formation can result in a permanent increase in economic growth rates (Lucas, 1988). Economic growth requires investment and it can be financed through domestic savings or through foreign capital inflows. Sustained low savings contributed to the emergence of large current account imbalances. The increase in current account deficit raised the magnitude of a country vulnerability as it signals reliance on foreign financing. (Khan et al, 2013)

The investment demands of developing economies are much higher than the available domestic capital. When domestic savings are not enough to fulfill the need of domestic investment then such a situation cause to demand for foreign savings. Foreign capital fills in the gap between the domestic savings and domestic investment. Many empirical studies have found a strong

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positive correlation between domestic & foreign savings and domestic investment. Domestic investment is financed by domestic savings and foreign savings (defined as the current account balance which equals approximately the difference between domestic investment and domestic savings). There exist a high correlation between domestic investment and domestic savings when there is limited capital mobility (Feldstein & Horioka, 1980).

All development theories have a reasonable assumption that at a certain level of technical progress and the way available resources are allocated, the higher the savings and investment rates, the higher the economic growth. On the other hand in the 40s and 50s with the classical studies of Rosenstein-Rodan, Nurkse, Lewis, a second assumption also formed that given the developing countries shortage of savings, adopt mechanisms of forced domestic savings by increasing public savings, foreign savings would be the way of promoting such a development. Between the 30's and the 60's, however, this proposition was not put into practice since the amount of savings transferred by rich countries to the most developed countries was small. In the 50's, direct external investments in the industry of developing countries became a reality, and in the 70's it was finally possible for many countries to incur in high current account deficits, and finance them by increasing financial or equity debt.

The idea of growth with foreign savings became dominant only in the 90's. The extensive literature on the opening of the capital account does not discuss the growth with foreign savings strategy because it assumes that rich countries should always transfer their capital to poor countries. On the other hand, in the economic literature, foreign savings are confused with direct investments. It isn't clear that direct investments do not necessarily finance current account deficits that are foreign savings; they may even finance the increase in international reserves of the receiving country or direct investments made by this country abroad.

There is today an extensive empirical literature dealing with the relationship between domestic and foreign savings. Several studies try to measure the sensitivity of domestic savings to the use of foreign savings in developing countries. The central focus of the studies is empirical, and the attention is generally drawn to the possible determinants of domestic savings. Most studies point to the result of the substitution of foreign for domestic savings. Before the classic research of Feldstein and Horioka (1980) regarding rich OCDE countries, Fry (1978) was one of the pioneers in econometric studies with the intent to measure the possible determinants of domestic savings. Although he was not primarily concerned with the relationship between domestic and foreign savings, he provides interesting results on the degree of substitution between the two, in his empirical analyses.

At the level of policy analysis, emerging countries' excessive reliance on foreign savings has been a continuing target of criticism. Many empirical studies show the negative effects of the use of foreign savings on domestic savings, in what has become known in the literature as "*savings displacement*" (Reinhart & Talvi 1998). The channels through which foreign savings exert a negative impact on domestic savings, however, remain subject of a few studies, with the exception of Bresser-Pereira (2006) and Bresser-Pereira & Nakano (2003). In their study, Montiel and Served (2008) point to the growing number of economists embracing the notion that real exchange rate levels may exercise an important influence on growth through its effects on savings and accumulation of capital.

## 2. Review of Literature

A number of studies are in line with the subject such as Montiel and Serven (2008) investigate the link between real exchange rate and growth through the capital accumulation channel. A panel data of 94 countries used over the time period from 1975 to 2005. They conclude that there exist positive correlation between exchange rate appreciation and savings. There is little support that depreciated exchange rate increase domestic savings and through increased savings promote larger rates of domestic capital accumulation and growth. In developing

countries exchange rate policy has significant impact on economic growth only through total factor productivity channel rather than through the capital accumulation channel.

Mohsin and Qazi (2002) used the data for the time period of 1972-2000 to assess the relationship between foreign capital inflows and domestic savings in Pakistan. By applying these variants of co-integration techniques it has been found that there exist a long run valid relationship between estimated variables. The results also support the “substitution thesis” hypothesis that foreign capital inflows may substitute the domestic savings in Pakistan.

Edwards (1995) Analyses the determinants of savings in Asian & Latin American countries and why saving rates are different across countries. He use panel data of 36 countries from 1970-1992 to made a clear distinction between private and public savings. By using instrumental variable method he found that GDP per capita is most important determinant of both public and domestic savings. He further argue that public savings crowd out private savings and higher foreign savings are associated with lower domestic private and public savings. In both region foreign savings and domestic savings are substitute. Griffin (1970) carried out a study of 32 less developed for the period 1962-1964. He investigate the relationship between the foreign savings and domestic savings by estimating simple model employing the Ordinary least square technique. He used current account deficit as measure of foreign capital inflows and found inverse relationship between domestic savings and foreign capital inflows.

Weisskopf (1972) used time series data for seven years for 44 underdeveloped countries. In his empirical study he tested the hypothesis that in the underdeveloped countries the level of domestic savings not only related to the level of national income but also with level of net foreign capital inflows. He found that foreign capital inflows have negative impact on domestic savings. He further concluded that approximately 23 % net foreign capital inflows substitute domestic savings in underdeveloped countries.

Over (1975) by using data for thirty- six countries for the two year period of 1962-1964 estimated the simple system of two equations by assuming foreign aid as endogenous variable. In the first equation he regressed the ratio of foreign saving to GNP on the ratio of investment to GNP. While in the second equation he regressed the ratio of domestic savings to GNP on the theoretical values of foreign aid. He obtained significant positive relationship between foreign aid and domestic savings and conclude that foreign aid supplemented rather than substituted domestic savings.

Islam and Gupta (1983) by making three income and three geographical groups of 51 developing countries for the time period 1970s. They estimate nine-equation simultaneous model by using both OLS and TSLS methods. The results of the OLS method shows that both domestic savings and foreign capital made a significant contribution to economic growth. And foreign Aid more adversely affect domestic savings than foreign private investment.

Reinhart and Talvi (1998) used data for the time period of 1970-1995 of 24 countries in Latin America and Asia to estimate the relationship between capital flows and savings in both regions. They find negative correlation between domestic and foreign savings for most of the countries in the sample.

Dowling (1983) investigate the relationship between Foreign aid, savings and growth by using the data of 52 countries of Asia regions for the time period of 1968-79. They found statistically significant relationship of Foreign aid, other capital inflows and savings with economic growth by using Ordinary least square estimation. Saving is inversely related to foreign aid and other capital inflows.

Khan and Rahim (1993) by using the data from 1960-1988 estimated the impact of foreign assistance on saving and economic growth of Pakistan. They also estimated the effect of different types of foreign capital inflows on savings and GNP growth by OLS method. They

conclude that foreign assistance has negative effect on saving of Pakistan. The different types of foreign inflows have different effect. For Example, FDI has inverse relationship with domestic savings, foreign aid have no measured effect and Loans were negatively related with savings. All these variables shows positive effects on the growth rate of GNP.

Bowles (1987) performed a time series study (1960-81) of 20 countries to find the causal relationship between domestic savings and foreign aid. By applying granger causality test he found mix results. All most in half of the countries data did not indicate any causal relationship between foreign aid and domestic savings. In some cases Aid caused domestic savings and in other cases domestic savings caused aid in rest of the countries.

By using data of 1970-85 for 10 countries Hebbel et al, (1992) find that income and wealth variables effect household saving function strongly. Inflation and interest rate do not show clear effects on savings. Monetary assets and foreign savings have strong negative effect on household savings.

Papanek (1973) empirically investigate a cross country regression analysis on thirty-four countries for 1950s and fifty-one countries in 1960s. He disaggregated Foreign Capital Inflows into three components: foreign private investment, foreign aid and all other foreign inflows. He finds that both total and disaggregated foreign capital inflows have negative impact on savings.

Angomorty & Tandoh-ofin (2014) carried out a study to find that whether the foreign capital inflows crowd out the domestic savings in devolving countries, a specific empirical study in Ghana. More precisely it examine the impact of three component of foreign capital including FDI, Foreign Aids, and foreign grants separately on domestic savings. They used quarterly data from 1983Q1 to 2012Q4. to estimate the long run effect study used the co-integration technique and short run dynamics through Error correction model. The results shows that in the long run foreign capital have a significant impact on domestic savings in Ghana but in short run there is no significant effect of foreign capital on domestic savings. So. The components of foreign capital do not crowd out domestic savings in Ghana.

Bowen (1998) conducted a cross country study of 67 less developed countries for the period 1970-1988. he measure the direct and indirect relationship between component of foreign capital, foreign aid and economic growth. By using two stage least squares methods of estimation he disclosed the indirect relationship between foreign aid and economic growth through its interaction with domestic savings. Foreign aid has a significant negative effect on domestic savings.

Razzaque and Ahmad (2000) argued that there exist negative relationship between foreign aid and domestic savings. They conduct a time series study from 1973 to 1998 for Bangladesh economy by using ordinary least square method to check the relationship between foreign aid and domestic savings. They found negative relationship between both variables in long as well as in short run.

Rehman (1968) conduct a study of foreign capital and domestic savings by using haavelmo's hypothesis which postulate that the domestic saving is not only a function of income but foreign aid also. In 1962 He use cross section data for 31 less developed countries and estimates the OLS regression of saving ratio on the ratio of capital inflows to GNP. He concluded that haavelmo's hypothesis may be right and governments can voluntarily relax domestic savings efforts when more foreign aid is available.

Kabruka and Namuberu (2014) investigate the effect of Remittances on the domestic savings in Uganda for the time period of 1999Q1 to 2011Q4. the results of maximum likelihood framework imply that there exist significant but negative relationship between remittances and domestic savings in Uganda.

Sothan (2014) empirically analyzed the causal relationship between domestic savings and economic growth of Cambodia by using the Granger causality test. The study covered the time

period from 1988 to 2012. The empirical analysis found that there exist no casualty between domestic savings and economic growth. Economic growth also did not Granger cause savings rate in Cambodia economic growth and saving rate is independent of each other in Cambodia.

Leshoro (2014), examine the effect of foreign resource inflows and domestic savings on South Africa economy. The data span used in this study is over period of 1975 to 2011. estimation techniques used in this study are both vector autoregressive (VAR) and impulse response function (IRF). the result of VAR granger casualty test shows that domestic savings lead increase in the economic growth of African country and growth leads investment. The results of impulse response function also indicate that higher saving rate improve the economic growth in South Africa

### 3. Materials and Methods

It is useful to specify the variables and model that we have taken into account in this study. The model for the research is adopted from the model developed by Breeser and Gala, (2014).

$$PVS = \beta_0 + \beta_1 REE + \beta_2 FS \quad (a)$$

Where:

**PVS**=private domestic savings

**REE**= real effective exchange rate

**FS**=foreign savings (equal to current account deficit)

Edwards (1995) made a clear distinction between public and private savings. he argue that public savings crowd out domestic private savings. another independent variable include in this study is public saving (PBS).

$$PVS = \beta_0 + \beta_1 REE + \beta_2 FS + \beta_3 PBS \quad (b)$$

Afridi and Asma (2012) analyse the negative and insignificant impact of trade openness on private savings in Pakistan. I used trade openness (TO) as a control variable in this study.

$$PVS = \beta_0 + \beta_1 REE + \beta_2 FS + \beta_3 PBS + \beta_4 TO \quad (c)$$

At the end Error term ( $\mu$ ) included to make an econometric model.

$$PVS = \beta_0 + \beta_1 REE + \beta_2 FS + \beta_3 PBS + \beta_4 TO + \mu \quad Eq: (1)$$

In this model we analyze the effect of real effective exchange rate on domestic private savings of Pakistan. it will also incorporate the effect of foreign savings on domestic savings of Pakistan. Parameter  $\beta_2$  that is foreign savings substitute domestic savings in Pakistan or not.

#### Description of variables:

##### (1) Private Savings (PVS)

Private saving is the difference of disposable income and consumption. (Y-T-C).

##### (2) Foreign savings: (FS)

Foreign savings defined as the current account balance which equals approximately the difference between domestic investment and domestic savings. Here we will assume that foreign savings are equal to current account deficit.

##### (3) Public Saving: (PBS)

Public saving is the difference between government revenues and government spending (T-G).

##### 4) Real effective exchange rate: (REE)

Real Effective Exchange Rate (REER) is a measure of the trade-weighted average exchange rate of a Pakistani currency PKR against a USA Dollar after adjusting for inflation differentials with regard to the county concerned and expressed as an index number relative to a base year.

**Trade Openness:** Trade openness is the ratio of the sum of imports of goods and services and exports of goods and services to GDP. It can be defined as  $Openness = \frac{(Exports+Imports)}{Gross Domestic Product}$

It is expected that foreign savings and real effective exchange rate has negative effect the private savings. The appreciation of domestic currency means higher the purchasing power of domestic currency which in turn lead to higher real wage of labor. Thus the higher real wage means more cost of production the lower the profit of producer. Further as exchange rate appreciated in favor of domestic currency then imports become cheaper which In turn generate higher aggregate demand and reduce the saving of household. As variations in the latter thereby lead to a substitution between domestic and foreign savings. (Bresser et al, 2008).According to Edward (1995) public savings has negative effect on private saving because of the reason that governmental saving tend to displace private savings.

An increase in trade opens gives more incentive to consumer greatr portion of imported goods because of demonstration effect that's why trade openness has negative impact on private savings.

The data set for this study is mainly secondary data. The secondary data comprises Annually time series spanning 1982 through 2014. We have included the observation from 1982 to onward because before 1970s there are many inconsistencies in data due to the separation of East and West Pakistan in 1971. and from 1975-1981 Pakistan followed a fixed pegged exchange rate of PKR 9.90=1\$. The Annual data for private and public saving is taken from the handbook of statistics on Pakistan economy and State bank of Pakistan annual reports in Million rupees. The data of current account balance is taken from International Financial Statistics (IFS). And the real effective exchange rate data is taken from IFS as base year of (2005=100). Trade openness is generated variable= $\text{export} + \text{imports} / \text{GDP}$ . and data for these variables is taken from World development indicators(WDI).

#### 4. Results and Discussion

The study used time series data from Pakistan over the period of 1982 to 2014 having 33 observations from five indicators. The analysis includes means values, minimum values, maximum values, median, stander deviation, sum and sum of squares. The variables of the interest are private saving million rupees (PVS) as dependent variable. Real effective exchange rate (REER), Foreign saving million rupees (FS), Public saving million rupees (PBS) and trade openness (TO) used as independent variables. Descriptive statistics are given in the table 1.

	PVS	PBS	FS	REE	TO
Mean	8384.106	1005.354	-239413.3	121.3229	34.05849
Median	6537.219	856.3074	-191190.0	110.5611	34.01173
Maximum	16080.65	3423.705	384201.7	209.7394	38.90949
Minimum	2819.576	-1545.428	-1311166.	93.71730	28.12961
Std. Dev.	3820.689	959.3983	313053.6	34.23536	2.571515
Skewness	0.476117	0.283051	-1.162779	1.660023	-0.034389
Kurtosis	1.982433	3.942650	6.041514	4.504983	2.678027
Jarque-Bera	2.670516	1.662458	20.15616	18.27056	0.149046
Probability	0.263090	0.435514	0.000042	0.000108	0.928186
Sum	276675.5	33176.69	-7900640.	4003.655	1123.930
Sum Sq. Dev.	4.67E+08	29454242	3.14E+12	37505.91	211.6061
Observations	33	33	33	33	33

Table 1 indicates that mean value of PVS is 8384.106 million rupee and minimum value is 2819.576 and maximum is 16080.65, the data is taken on annual basis. The average value of FS is -239413.3 and minimum value is -1311166 and maximum value is -3842017. The

statistics of TO shows an average value of 34.01% of GDP and minimum is 28.13 and maximum value is 38.91 and stander deviation is 2.59. Average interest rate is 8.67% and minimum is observed at 2.14% and maximum is seen at 12.47%.

### Unit Root Test Results

There are a number of tests have been developed to test Stationarity in time series analysis, however in this study we researcher discusses only Augmented Dickey-Fuller test of unit root which is widely used in the literature. The main intention of the unit root is to determine whether the series is stationary with me (1) with stochastic trend or me (0) that is stationary series with deterministic trend. So to examine the Stationarity of the data, Dickey & Fuller (1979) present a test for unit root problem in the data this test is known as Dicky - Fuller (DF) test. DF test is estimated in different three forms i-e given below:

I.  $Y_t$  is a random walk without drift:

$$\Delta Y_t = \delta Y_{t-1} + \mu_t$$

II.  $Y_t$  random walk with drift:

$$\Delta Y_t = \beta + \delta Y_{t-1} + \mu_t$$

III. With drift and stochastic trend

$$\Delta Y_t = \beta_1 + \beta_2 t + \delta Y_{t-1} + \mu_t$$

Among these three forms that are briefly described above, the researchers can use any one depending on the nature of the data. However, every test has some strength and weakness so the major problem with DF is that it may contain autocorrelation means error terms are correlated with explanatory variables. To overcome this problem Dickey & Fuller (1981) presented the augmented form of Dickey Fuller test which is commonly known as Augmented Dickey Fuller (ADF) test. The regression that is estimated with help of ADF is given below.

The ADF test estimates the following equation:

$$\Delta y_t = \alpha_1 + \alpha_2 t + \delta y_{t-1} + \beta_1 \Delta y_{t-1} + \beta_2 \Delta y_{t-2} + \dots + \beta_n \Delta y_{t-n} + \epsilon_t$$

Null hypothesis and alternate hypothesis is written as:

$H_0: \alpha = 0$

$H_1: \alpha < 0$

Where  $y_t$  is the time series and  $\epsilon_t$  is the residual term while  $\delta t$  is the time trend. The major difference between DF and ADF is that in ADF lag of dependent variable includes as independent variable. In ADF we still test the null hypothesis whether  $\delta = 0$  and the ADF test also follow the same asymptotic distribution as the DF test, so the same critical values can be used. The results of the unit root test are given in table 2.

Augmented Dickey-Fuller test results					
At level			At difference		
Variables	With intercept	Intercept and trend	With intercept	Intercept and trend	Decision
PVS	-2.06[13] (0.9998)	-0.63[7] (0.9694)	-5.05[1] (0.0003)***	-9.93[3] (0.0000)***	I(1)
FS	-2.85[0] (0.0625)*	-2.80[0] (0.2049)	-----	-----	I(0)
REE	-3.96[0] (0.0046)***	-1.82[0] (0.6669)	-----	-----	I(0)
PBS	2.74[7] (1.0000)	0.22[7] (0.9968)	-6.54[3] (0.0000)***	-4.83[3] (0.0036)**	I(1)
TO	-2.65[0] (0.0936)*	-3.21[0] (0.0988)*	-----	-----	I(0)

\*, \*\*, \*\*\* indicates the level of significance at 10%, 5% and 1% respectively.

The results of ADF test of unit root suggested that except FS, REER and TO all other variables are stationary at first difference. The results are also tested with Phillips-Perron test which

provides similar results. So with the combination of I(0) and I(1) we cannot apply OLS directly on the this situation the results will be considered as spurious.

### ARDL Approach for Co-integration

In the first step of ARDL approach of co-integration there is need to check the optimal lag selection for the further analysis. The study applied unrestricted VAR model and followed AIC to select lags in ARDL model. The results for optimal lag selection criterion under VAR model are given in table 3.

Endogenous variables: PVS REER FS PBS TO						
Lag	LogL	LR	FPE	AIC	SC	HQ
0	-1276.815	NA	8.91e+30	85.45432	85.68786	85.52903
1	-1187.496	142.9099	1.26e+29	81.16641	82.56761	81.61466
2	-1156.527	39.22785	9.83e+28	80.76845	83.33731	81.59025
3	-1079.665	71.73802*	4.79e+27*	77.31097*	81.04750*	78.50632*

\* indicates lag order selected by the criterion

The results of VAR model suggested that lag selection criterion of AIC indicated three lags as optimal lags to incorporate in the ARDL model. In the second step in ARDL the study applied the following model for bond testing to check co-integration among the variables.

$$\begin{aligned}
 DPVS_t = & \beta_1 + \beta_{2i} \sum_{i=1}^3 DPVS_{t-i} + \beta_{3i} \sum_{i=0}^3 DREER_{t-i} + \beta_{4i} \sum_{i=0}^3 DFS_{t-i} + \beta_{5i} \sum_{i=0}^3 DPBS_{t-i} \\
 & + \beta_{6i} \sum_{i=0}^3 DTO_{t-1} + \beta_7 PVS_{t-1} + \beta_8 REER_{t-1} + \beta_9 FS_{t-1} + \beta_{10} PBS_{t-1} \\
 & + \beta_{11} TO_{t-1} + \varepsilon_t \dots \dots (5.1)
 \end{aligned}$$

In model 5.1 there are two kinds of coefficients in the equation which includes short run as well long run coefficients. For testing the existence of co-integration the study applied Wald test on following hypothesis.

$H_0: \beta_7 = \beta_8 = \beta_9 = \beta_{10} = \beta_{11} = 0$   
(No co-integration exists between variables)

$H_1: \beta_7 \neq \beta_8 \neq \beta_9 \neq \beta_{10} \neq \beta_{11} \neq 0$   
(There is Co-integration)

The results of Wald test determined that  $H_0$  is rejected in favor of existence of co-integration among the variables. F-statistics is 6.48 and probability value is 0.0080 which is significant at 5% level of significance.<sup>1</sup> The F-statistics is compared with F-critical from Pesaran et al. (2001).

### Long Run and Short Run Results

Long run results indicate that Foreign saving significantly reduces private savings and public saving has positive and significant impact on private savings. The long run results are given in table 4.

Dependent Variable: PVS				
Method: Least Squares				
C	33705.35***	6089.310	5.535167	0.0000
FS	-0.003325**	0.001558	-2.133601	0.0418
PBS	0.972081*	0.507302	1.916177	0.0656
REE	-58.17010***	13.87846	-4.191395	0.0003

<sup>1</sup> For results see chapter appendix table A5-2



TO	-588.3179***	176.6149	-3.331078	0.0024
<b>Diagnostics</b>				
R-squared	0.643682	F-statistic	12.64	
Adjusted R-squared	0.592779	Prob(F-statistic)	0.0000	

\*, \*\*, \*\*\* indicates the level of significance at 10%, 5% and 1% respectively.

Long run results in table 4 indicate that FS has negative and PBS has positive and significant impact on PVS with t-statistics of -2.13 and 1.91 respectively and probabilities are 0.0418 and 0.0656 which indicates the 10% and 5% level of significance respectively. Other measures used in the study are TO and REER which are also significant drivers of PVS. Overall the diagnostics of the regression shows Reasonable results, R square is 0.64 and F probability is 0.0000 which confirms the model significance.

In the next step error term named ECM is generated from long run regression and a unit root test is applied on it, the results of ADF test shows that ECM is stationary at level and this is regressed in with first lag in short run estimates. Short run results are given in table 5

<b>Table 5 Short run results (ECM)</b>				
Dependent Variable: DPVS				
Method: Least Squares				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	272.9817	196.2006	1.391340	0.1821
DFS	0.0044***	0.001188	3.744522	0.0016
DFS(-1)	0.0006	0.000853	0.714716	0.4845
DFS(-2)	0.0006	0.000915	0.705835	0.4899
DFS(-3)	-0.0025**	0.000985	-2.543321	0.0210
DPBS	-1.0565***	0.220773	-4.785786	0.0002
DPBS(-1)	0.1127	0.300382	0.375400	0.7120
DPBS(-2)	0.9402***	0.252713	3.720603	0.0017
DPBS(-3)	0.6904**	0.288995	2.389089	0.0288
DREER	-2.7302	24.73799	-0.110367	0.9134
DTO	32.448	107.2704	0.302495	0.7659
ECM(-1)	-0.2493**	0.115886	-2.151511	0.0461
<b>Diagnostics</b>				
R-squared	0.836994	F-statistic	7.935527	
Adjusted R-squared	0.731520	Prob(F-statistic)	0.0000	

\*, \*\*, \*\*\* indicates the level of significance at 10%, 5% and 1% respectively.

The results of short run ECM models shows that ECM(-1) is significant and negative in the regression which reconfirmed the relationship is true in the long run estimates. The indicators in the regression like DFS and DPBS are significant and their signs are according to theory. Overall model diagnostics shows that R-squared is 0.83 which indicates that on average 83% variation in dependent variable is due to independent variables used in the model. Probability of F- test is 0.00 which shows high level of significance and good fit of model.

Diagnostics tests which are applied on the short run ECM model one are, Breusch-Godfrey Serial Correlation LM Test, Heteroskedasticity Test of Breusch-Pagan-Godfrey, Jarque-Bera Test of Normality, and Ramsey RESET Test. The results of the diagnostics tests are given in the following table 6

<b>Table 6 Diagnostic tests for ECM Model Two</b>			
Breusch-Godfrey Serial Correlation LM Test			
Obs* R-Squared	2.26	Prob. Chi-Square	0.3216
Heteroskedasticity Test: Breusch-Pagan-Godfrey			
Obs* R-Squared	9.17	Prob. Chi-Square	0.6062
Jarque-Bera Test of Normality			

Jarque-Bera	1.03	Prob.	0.5954
Ramsey RESET Test			
t-statistic	1.9754	Prob.	0.1715

Table 6 shows the results for standard diagnostic tests on short run ECM model. It indicates that there is no serial correlation in the model, no heteroskedasticity in the model, no normality problem and there is no misspecification problem in the model. The probability value of all tests shows more than 0.05 which confirmed the non-existence of the problem related to tests. To check the stability of the results and parameters in the short run ECM model the study applied CUSUM and CUSUM squared tests of stability. The results are presented in the graphs which are given in figure 1.

**Figure 1 CUSUM and CUSUM squared test for stability of ECM model**

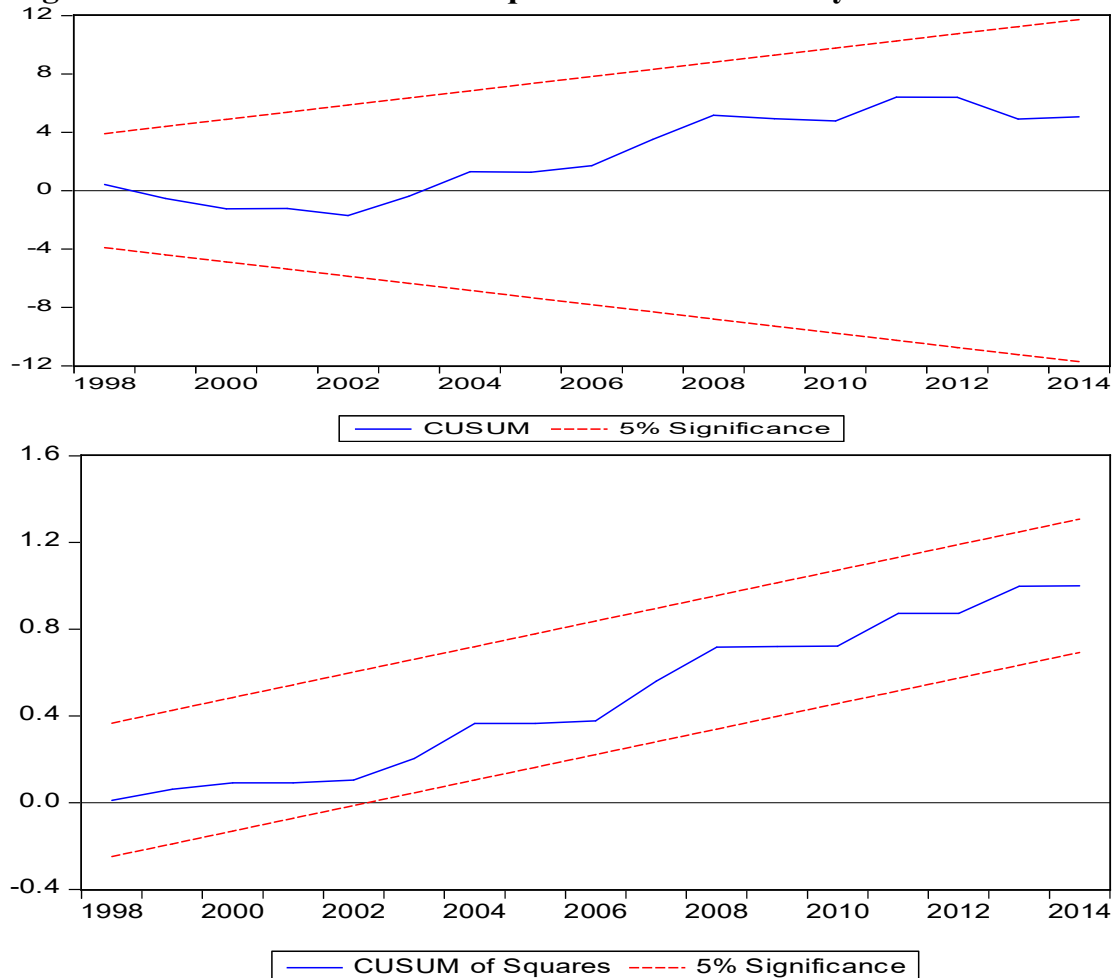


Figure 1 indicates that the CUSUM and CUSUM squared lines are within the 5% wall for significance. So this reconfirmed the results validity in the short run and then to the long run estimations.

## 5. Conclusion

This study examines the relationship between real effective exchange rate and domestic and foreign savings in Pakistan over the period from 1982 to 2014. The study used standard tests of ADF and PP for unit root and applied ARDL approach of co-integration. The econometric

analysis is also supported by standard diagnostic test for serial correlation, heteroskedasticity, normality problem and misspecification problem.

The econometric analysis includes Augmented Dicky fuller, ARDL Approach ECM model for short run, diagnostic and stability test on short run ECM and impulse response function. The ARDL approach is selected on the basis of ADF test of stationarity results. Because variables are combination of I (0) and I(1) so we cannot apply OLS directly. The results of Wald test determined that  $H_0$  is rejected in favor of existence of co-integration among the variables Long run results indicated that FS and PBS have significant negative and positive impact on PVS Pakistan. REER is also significant and negatively affecting PVS in Pakistan in the long run. TO use as control and shows significant results. Standard diagnostic tests on short run ECM model. It indicates that there is no serial correlation in the model, no heteroscedasticity in the model, no normality problem and there is no misspecification problem in the model. The probability value of all tests shows more than 0.05 which confirmed the non-existence of the problem related to tests. CUSUM and CUSUM squared lines are within the 5% wall for significance. So this reconfirmed the results validity in the short run and then to the long run estimations. The results of the current study are consistent with recently conducted studies in other similar economies.

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