The Effects of Fiscal Policy on Economic Growth: Empirical Evidences Based on Time Series Data from Pakistan

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1. INTRODUCTION

Fiscal policy refers to government's efforts to influence the direction of the economy through changes in taxes or expenditures. Optimal fiscal policy in Pakistan and in other developing countries plays a pivotal role in growth process and, hence, serves as a vital instrument for economic growth. The efficacy of fiscal policy in improving economic conditions in the long run is, however, a controversial issue and needs further investigation.

In conventional model, a federal tax cut without a corresponding reduction in federal expenditures will encourage consumption expenditures and interest earnings due to increase in personal disposable income. Contrarily, according to Ricardian Equivalence Theorem (RET), the same change in fiscal policy will not result in any of the above mentioned macroeconomic impacts. In other words, a reduction in deficit-financed federal tax cut will not affect macroeconomic outcomes [Saxton (1999)].

The empirical literature on the effects of fiscal policy on Pakistan's economic growth is still at its infancy, we surmise. Shabbir and Mahmood (1992), Iqbal (1995, 1994, 1998), Khilji and Mahmood (1997) have concluded that fiscal deficit is one of the significant variables that affects economic growth in Pakistan. Haq (2003), on the other hand, has argued that fiscal deficits do not have any effect on key macroeconomic indicators such as investment, inflation and GDP growth. The impact of fiscal policy on economic growth can also be demonstrated and explored through transmission mechanism; it affects economic growth via demand and supply sides. According to Khalid, *et al.* (2008) fiscal policy is considered to have dynamic transmission mechanism, as it carries longer policy lags for different macroeconomic variables and hence, it has different impacts on key macroeconomic variables.

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Recognising the importance of sound fiscal policy, the present study explores the link between fiscal policy and economic growth for Pakistan's economy for the period 1972–2008. The study also examines the effectiveness of fiscal policy in different political regimes. Using dynamic model and various econometric techniques, this study tests the significance of various empirical models. The study also imparts some policy recommendations for the development of sound fiscal policy in Pakistan. This study is the first empirical analysis on the "effectiveness of fiscal policy and its impact on economic growth" in Pakistan.

The rest of this study is organised as follow: Section 2 presents the summary of review of literature on the effects of fiscal policy on economic growth in different parts of the world. Section 3 presents the model specification and methodology. Section 4 represents the empirical findings and the last section provides concluding remarks and policy implications.

2. LITERATURE REVIEW

"The macroeconomic relationship between fiscal policy and economic growth has long fascinated economists. Unfortunately, analyses of that relationship have frustrated empiricists for almost as long. One root of that frustration is the array of possible policy indicators" [Fu, *et al.* (2003)].

A large number of studies have been carried out to examine the impact of fiscal policy variables on economic growth, investment, consumption, inflation, exchange rate, external deficit and other macroeconomic activities [Landau (1986); Höoppner (2003); Perotti (2005), Amanja and Morrissey (2005); Falk, *et al.* (2006); Rezk (2006); Castro, *et al.* (2006); Fatas and Mihov (1998); Sinha (1998); William and Orszag (2003); Claus, *et al.* (2006) and Kukk (2006)]. Government spending, tax revenues and budget deficits as fiscal policy variables have been used by these authors and found different responses of macroeconomic activities to fiscal innovations. According to Höoppner (2003), Claus, *et al.* (2006), Esau (2006), Heppke-Falk, *et al.* (2006) and Castro, *et al.* (2006), shocks to government spending positively affect GDP growth rate, whereas shocks to taxes inversely affect GDP growth rate. Furthermore, GDP growth rate responds negatively to budget deficit in the long run [Balassa (1988); Iqbal and Zahid (1998); Jafri, *et al.* (2006)]. Many researchers [Barro and Sala-i-Martin (1995); Sala-i-Martin (1997); Mendoza, *et al.* (1997); Tanzi and Zee (1997); Kneller and Gemmell (1999); Odedokun (2001); and Bose, *et al.* (2003); Amanja and Morrissey (2005); Romero de Avila and Strauch (2007)] have used fiscal policy variables in the growth equations and have found their significant contribution. The rising budget deficit has been considered as one of the main constraints to economic growth [Iqbal and Zahid (1998); Fischer (1993); Easterly and Rebelo (1992); Levine and Zervos (1993); Barro (1991); Mwebaze (2002) and Balassa (1988)]. From the relevant literature it is clear that fiscal policy affects economic growth. However, the sign and magnitude of the effects of different tools of fiscal policy are ambiguous.

Only few studies have examined the effects of fiscal policy on specific macroeconomic variables in Pakistan [Ahmad and Qayyum (2008); Haque and Montiel (1991); Khalid, *et al.* (2008)]. Few studies have included budget deficit in growth equations and have found that budget deficit is one the significant variables affecting

economic growth [Shabbir and Mahmood (1992); Iqbal (1994, 1995, 1998); Khilji and Mahmood (1997)]. As far as theoretical work regarding the relationship between fiscal policy and economic growth is concerned, the most notable work has been done by Trevala (2005) and Blinder and Solow (1972). Tervala (2005) argued that fiscal growth raises the output of non traded goods and crowds out private consumption of non traded goods. However, Blinder and Solow (1972) argued that in the simplified IS–LM framework the long run sign of the pure fiscal multiplier is undermined a priori, fiscal policy only acts perversely in unstable system.

3. MODEL SPECIFICATION, DATA AND METHODOLOGY

3.1. Model Specification and Data

In order to examine the effects of fiscal policy on economic growth, we estimate the following equation.

$$Y_t = \lambda_o + \lambda_1 FP_t + \lambda_2 X_t + \lambda_3 (FP*DUM)_t + \mu \quad \dots \qquad \dots \qquad \dots \qquad \dots \qquad (1)$$

Where Y = Growth rate of GDP per capita, vector X represents the set of control variables i.e., private investment (PINV), inflation (INF), current account deficit (CAD) and FP represents Fiscal Policy variables. In the above equation changes in FP variables has a dynamic impact on Y. Further, to capture the effects of fiscal policy in democratic and military regimes, we include the interaction term of fiscal policy with political dummy. We use overall fiscal deficit as a proxy of fiscal policy.

The data for this study consist of annual observations for the period 1972–2008. The most important data source is Economic Survey of Pakistan (Government of Pakistan). A multivariate framework is employed in this study.[1]

3.2. Methodology

This study concentrates on the ADF and PP and Ng–Perron unit root tests. To test the long run relationship, this study uses the robust econometric technique, Autoregressive Distributed Lag model (ARDL), popularised by Pesaran and Shin (1998), and Pesaran, *et al.* (2001).

The error correction version of ARDL model is given below for the above given Equation (1).

$$\Delta Y_t = \alpha + \beta_1 \sum_{i=1}^{p} \Delta Y_{t-i} + \beta_2 \sum_{i=0}^{p} \Delta FP_{t-i} + \beta_3 \sum_{i=0}^{p} \Delta X_{t-i} + \lambda_1 Y_{t-1} + \lambda_2 FP_{t-1} + \lambda_3 X_{t-1} + \mu \quad \dots \quad (2)$$

Where Y represents real GDP growth rate, *FP* represent fiscal policy variables such as fiscal deficit as a percent of GDP (FD), current expenditures as a percent of total expenditures (CE) and development expenditures as a percent of total expenditures (DE). X represents control variables. β_0 is drift component and μ is white noise.

In order to find out the short run coefficients, we use the following equation:

$$\Delta Y_t = \alpha + \beta_1 \sum_{i=1}^{p} \Delta Y_{t-i} + \beta_2 \sum_{i=0}^{p} \Delta FP_{t-i} + \beta_3 \sum_{i=0}^{p} \Delta X_{t-i} + \eta EC_{t-1} \qquad \dots \qquad \dots \qquad (3)$$

[1]See Appendix 1 for the definitions of variables.

η is the error correction term in the model indicates the pace of adjustment reverse to long run equilibrium following a short run shock.

Private investment is measured by the sum of business fixed investment, residential investment and inventory investment. Moreover, current account balance is measured by the sum of net exports of goods and services, net income from abroad (Net Factor Payment) and net unilateral transfers.

Samudram and Vaithilingam (2009) in case of Malaysia and Mohammadi, *et al*. (2008) in case of Turkey used Autoregressive Distributed Lag model (ARDL) to examine the impact of public expenditure on economic growth.

To cope up with the endogeneity of explanatory variables, and to avoid inconsistent results, this study uses two-stage least Square (2SLS) instrumental variable techniques.

4. EMPIRICAL RESULTS OF GROWTH EQUATION

4.1. Testing of the Unit Root Hypothesis

ADF test, PP test and Ng–Perron unit root test were applied in order to test the unit root hypothesis to all variables. A summary of these test results is reported in Table 1.

Table 1

Unit Root results

Variables	ADF (Drift and Trend)		P- P (Drift and Trend)	
	Level	1st Diff	Level	1st Diff
Y	–0.56	–4.24**	–0.09	–4.87*
FD	–1.84	–7.91*	–1.84	–7.91
PINV	–6.06*	–3.92***	–1.41	–10.30*
PCON	–1.52	–4.88*	–1.61	–7.23*
INF	–0.72	–4.67**	–1.41	–4.89*
CAD	–4.14*	–6.67*	–5.98*	13.09*

Notes: *(**) Shows significance at 1 percent (5 percent) level.

Results show that each of the variables is integrated of different order. The results of the unit root tests enable us to apply any cointegration technique. The results of ADF and PP unit root tests show that all variables are integrated of order one except PINV and CAD. The results of Ng-Perron unit toot test show that all variables are integrated of order one except CAD. The results of Ng-Perron unit root test are given in Table 2.

Table 2

Ng-Perron Unit Root Results

	Ng-Perron Test Statistics			
	At Level			
	MZa	MZt	MSB	MPT
Y	–0.62	–0.23	0.37	37.15
FD	–36.0	–134.29	0.01	0.01
PINV	–9.69	–2.12	0.21	9.71
PCON	–1.79	–0.49	0.27	24.08
INF	–1.86	–0.84	0.45	40.55
CAD	–17.96**	–2.99	0.16	5.07
	At 1st Difference			
	MZa	MZt	MSB	MPT
Y	–17.61*	–2.96	0.16	5.19
FD	–3.76*	–39.11	10.37	3.10
PINV	–12.13***	–2.46	0.20	7.51
PCON	–15.03***	–2.719	0.18	6.18
INF	–55.82*	–4.80	0.08	3.77
CAD	–13.39**	–2.58	0.19	6.80

Notes: *(**) Shows significance at 1 percent (5 percent) level.

To choose a robust model for estimation of growth equation, we estimate different growth equations and select three of them for comparison. These equations have been estimated via ARDL co-integration technique.

4.2. Lag Selection of ARDL

After finding integrating order of all variable, the ARDL co-integration system is implemented for Pakistan utilising annual data over the period 1972–2008. In the first stage, the order of lag length is usually obtained from unrestricted vector autoregressive (VAR) via Schwartz Bayesian Criteria (SBC) and Akaike Information Criteria (AIC). The order of lag length is "2" which is selected through the minimum value of SBC as shown in Table 3.

Table 3

Lags Defined through VAR-SBC for Overall Model

Lag Selected through VAR-SBC	
Lag	Growth Equation
0	104.69
1	91.73
2	90.33*
3	90.55

Notes: *Indicates minimum Schwarz SBC at the corresponding lag.

Therefore, lag order 2 is selected on lowest value of SBC in Table 3 for the growth equation. In the next step, we determine individual lag order for the estimation of ARDL, which is (2, 2, 2, 2, and 0). Finally, the F-test Statistics is estimated on the basis of Wald-test. The results are given in the following Table 4.

Table 4

Lag Length Selection and Bound Testing for Cointegration

Modal 1 (Growth Equation)				
Order of the lags	AIC	HQ	SBC	F-test Statistics
K = 1	116.65	118.57	117.28	2.31
K = 2	113.98*	117.55*	115.17*	5.75**
Short run Diagnostic Tests				
Serial Correlation LM tests = 1.65 (0.32)				
ARCH Tests: 1.54 (0.24)				
White Hetroscedasticity Test: 0.76 (0.34)				
Ramsey RESET = 1.02 (0.87)				
Jarque-Bera Tests= 897.45 (0.00)				

*(**) Significant at 10 percent (5 percent) level of significant according to Pesaran, *et al.* (2001) and Narayan (2005).

The results of bound testing approach show that calculated F statistics is statistically significant for growth equation and higher than upper bound critical value at 5 percent level of significance implying that there is a co-integration among the variables in the models. The stability of long run relationship among the variables in the model is also clear from the cumulative sum (CUSUM) stability test.[2] Having found a long run relationship, we apply the ARDL method to estimate the long run and short run coefficients.[3] Long run results are shown in Table 5.

Table 5

Estimated Long Run Coefficients Using the ARDL[4]

Dependent Variable Real GDP Growth Rate (Y)	ARDL Technique Order (2, 2, 2, 2, 0)	
Regressors	Coefficients	Coefficients
FD	−1.64*	1.04*
PINV	0.26 *	0.19*
INF	−0.05**	−0.06***
CAD	−0.83*	−0.91*
FD^2	–	−0.04*
FD *DUM	−0.51***	–
	$R^2 = 0.99$	$R^2 = 0.99$
	Adjusted $R^2 = 0.99$	Adjusted $R^2 = 0.99$
	F-statistics = 1298.2	F-statistics = 1576.2
	Dh Stat = 2.14	Dh Stat = 1.81

Note: *, ** and*** represent Significant at 1 percent, 5 percent and 10 percent level of significance.

[2]The results of CUSUM are given in Appendix 3.
[3]For details see Pesran, *et al.* (2001).
[4]ARDL order is   (2, 2, 2, 2, 0) selected based on SBC.

We use fiscal deficit as a percent of GDP (FD), Private investment as a percent of GDP (PINV), inflation rate (INF), current account deficit as a percent of GDP (CAD) as explanatory variables in growth equation. An interaction term of fiscal deficit with dummy of democracy is also included in the growth equation.

ARDL technique provides best results in the presence of endogeneity.[5] The explanatory variables and their lags are used as instruments. It is clear from Table 5 that all variables have expected signs and parameters are significant. The long run results suggest that all variables are important factors affecting economic growth. The coefficient of fiscal deficit is negative and significant at 1 percent level of significance indicating that expansionary fiscal contraction occurs in Pakistan. In the long run rising fiscal deficit reduces national savings and slows down economic growth. These results support the findings of other studies, which evidenced that fiscal deficit negatively affects economic growth [Balassa (1988); Barro (1991); Easterly and Rebelo (1992); Levine and Zervos (1993); Fischer (1993); Barro and Sala-i-Martin (1995); Mendoza, *et al.* (1997); Tanzi and Zee (1997); Kneller and Gemmell (1999); Odedokun (2001); Mwebaze (2002); Bose, *et al.* (2003); Ali (2005); Amanja and Morrissey (2005); Jafari, *et al.* (2006); Kukk (2006); Romero de Avila and Strauch (2007)]. The results of this study also support the findings of the studies in Pakistan [Shabbir and Mahmood (1992); Iqbal (1994, 1995); Khilji and Mahmood (1997); Iqbal and Zahid (1998)]. The main reason of expansionary fiscal contraction in Pakistan is that government activities are mostly politically motivated and unproductive and therefore restrains growth. Moreover, the huge fiscal deficit is due to non development expenditures. Only interest payment of public debt and defence expenditures exceed the development expenditures. Due to these reasons fiscal deficit negatively affects economic growth in the long run. The coefficient of Private investment is significant and its positive sign indicates that high level of investment increases the productivity and, hence, accelerates economic growth. The results show that inflation negatively affects economic growth. This is due to the fact that inflation decreases domestic demand and increases the cost of production. These factors decelerate economic growth. Another important inference drawn from the above result is that the sign of interaction term is negative and significant indicating that fiscal deficit is negatively affecting economic growth in military regime. The sign of current account balance is negative and significant at 1 percent level of significance; it indicates that an increase in current account deficit decreases the foreign exchange reserves with host country and hence, reduces economic growth. The coefficient of fiscal deficit is positive when the square term of fiscal deficit is introduced in the model. The square term with negative coefficient is the indication of fiscal deficit Laffer curve in case of Pakistan. It means that fiscal deficit is not a problem up to some threshold level.

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[5]To check the robustness of the model, we provide the results of 2SLS in Appendix 2. From the results of both techniques (ARDL and 2SLS) it is clear that the parameters of the model are not sensitive to change in econometric technique and hence, it shows the robustness of the model.

Table 6

Estimated Short Run Coefficients Using the ECM

Dependent Variable	ARDL Technique
Change in Real GDP Growth Rate (ΔY)	Order (2, 2, 2, 2, 0)
Regressors	Coefficients
ΔFD	–0.28**
$\Delta PINV$	0.17***
ΔINF	0.08*
ΔCAD	0.98
$\Delta FD*DUM$	–0.56
EC_{t-1}	–0.43*
	$R^2 = 0.81$
	R^2 adjusted $= 0.79$

Note: *, ** and*** represent Significant at 1 percent, 5 percent and 10 percent level of significance.

The estimated lagged error correction term EC (–1) is negative and highly significant. The negative and significant error correction term also indicates that there is a long run relationship among the variables Y, FD, PINV, INF and CAD. The feedback coefficient is –0.43. It suggests that about 43 percent disequilibrium is corrected in the current year. The result also suggests that in the short run fiscal deficit has significant impact on economic growth. In the short run, increase in fiscal deficit leads to a decrease in the real gross domestic product. However, in the short run changes in CAD and $\Delta FD*DUM$ have insignificant impact on economic growth.

4.3. Sensitivity Analysis

Even though we have given the model specification, yet for the purpose of estimation, we conduct sensitivity analysis and use only robust variables, which are not sensitive to different econometric techniques. For this purpose, we run a lot of regressions and choose the most robust variables for our analysis. The robustness of the variables is also apparent from the short run diagnostic test. From the results of the short run diagnostic tests it is clear that there is no serial correlation and hetroscedasticity in the model. To detect the problem of autocorrelation and hetroscedasticty, we use serial correlation Lagrangian Multiplier (LM) and autoregressive conditional heteroskedasticity tests respectively. In order to test the normality of error term, we use Jarque-Bera test. From the calculated value of Ramsey RESET test it is clear that the functional forms of the models are correctly specified. Moreover, the data is normally distributed. In order to analyse the stability of long run and short run coefficients, the CUSUM and CUSUMsq stability test are applied. The results of CUSUM and CUSUMsquare show that all variables are cointegrated. Moreover, the results show that neither the CUSUM nor the CUSUMsq test statistics exceed the critical values, which ensure that all models are stable and correctly specified. Furthermore, the robustness of the variables is also apparent from the constancy of parameters by using both ARDL and 2SLS econometric techniques. The models are not sensitive to changes in econometric techniques.

5. CONCLUSIONS AND POLICY IMPLICATION

In this study we examine the dynamic effects of fiscal policy on macroeconomic activities over the period 1972–2008. ADF test, PP test and Ng Perron unit root test are applied to test the unit root hypothesis to all variables. The results of ADF and PP unit root tests show that all variables are integrated of order one except CAD and PINV. The results of Ng-Perron unit root test show that all variables are integrated of order one except CAD. The results of the unit root tests enable us to apply ARDL co integration techniques.

Using modern econometric approaches, the results show that there is a long run relationship between overall fiscal deficit and economic growth. It is clear from growth equation that all variables are important factors affecting economic growth. The negative and significant coefficient of fiscal deficit indicates that expansionary fiscal contraction occurs in Pakistan. The main reason of expansionary fiscal contraction in Pakistan is that government activities are mostly politically motivated and unproductive and therefore restrains growth. The huge fiscal deficit is due to non development expenditures.

Using the non linear equation, we find that fiscal deficit positively affects economic growth up to some threshold level. Beyond that threshold level, fiscal deficit negatively affects economic growth and has some serious macroeconomic consequences.

For short run dynamics. Error Correction Mechanism (ECM) has been used. The results of ECM suggest that in the short run overall fiscal deficit exert significant impact on economic growth. This reveals the fact that in the short run rising fiscal deficit creates excess demand, which encourages firms to use more of their existing capacity and people to spend more, and hence economic situation in the short run improves, but in the long run rising fiscal deficit has some serious implication for economic growth. The feed back coefficient is negative and significant suggesting that about 0.43 percent disequilibrium in the previous period is corrected in current year.

The study recommends that the government should keep its budget deficit in the narrow band of 3 to 4 percent of GDP. Beyond this limit the unsustainable budget deficit could have undesirable macroeconomic costs and the government's macroeconomic objectives such as low inflation and high economic growth might be in jeopardy. If the government is able to reduce its budget deficit, eventually she would get rid of the vicious circle of debt overhanging problem, because the debt-GDP ratio would increase only if the fiscal deficit as a percentage of GDP exceeds the real GDP growth rate. However, the reduction in fiscal deficit must be due to reduction in the public expenditure rather than an increase in resource mobilisation. The government should curtail non productive expenditures; high attention should also be given to the Public Sector Development Plan (PSDP), as it has a long term impact on economic growth.

Appendices

APPENDIX 1

DEFINITION OF THE VARIABLES

The definitions of all variables (explanatory variables and instrumental variables) used in this study are given below.

Overall Budget Deficit/Surplus = (Current Account Expenditures + Development Expenditures) – (Repayment of Foreign Debt) – (Net Revenue Receipts) – (the contribution by autonomous bodies) – (The amount earned by disinvestment of shares).

Economic Growth = Growth rate in Real Gross Domestic Product (GDP)

Gross Private Domestic Investment = (Business Fixed Investment + Residential Investment) + (Inventory Investment)

Current Account Balance = Net Exports of Goods and Services + Net Income from abroad (NFP) + Net Unilateral Transfers

Inflation = Consumer Price Index (Inflation rate)

Public Debt = Total public debt as a percent of GDP.

Exchange Rate = Real exchange rate

Interest Rate = 6 months T- bill rate for short run and 9 months T-bill rate for long run.

Money Supply = M1 + Saving Deposits including MMDAs (Money Market Deposit Accounts) + Small Denomination time Deposits + MMMFs (Money Market Mutual Funds).

APPENDIX 2

EMPIRICAL RESULTS USING 2SLS

Table 1

Estimated Coefficients Using 2SLS Techniques

Dependent Variable Real GDP Growth Rate (Y) Regressors	2SLS Technique[6] Coefficients
FD	−1.11**
PINV	0.21*
INF	−0.03***
CAD	−0.69***
FD^2	–
FD *DUM	−0.12**
	$R^2 = 0.97$
	Adjusted $R^2 = 0.96$
	F-statistics = 1532.06
	Dh Stat = 1.86

Note: *, ** and*** represent Significant at 1 percent, 5 percent and 10 percent level of significance.

[6]INT, M2, ER, PD and all of the variables in the growth equation that are believed to be uncorrelated with the disturbances are used as instrumental variables.

APPENDIX 3

RESULTS OF CUSUM AND CUSUM$_{SQ}$[7]

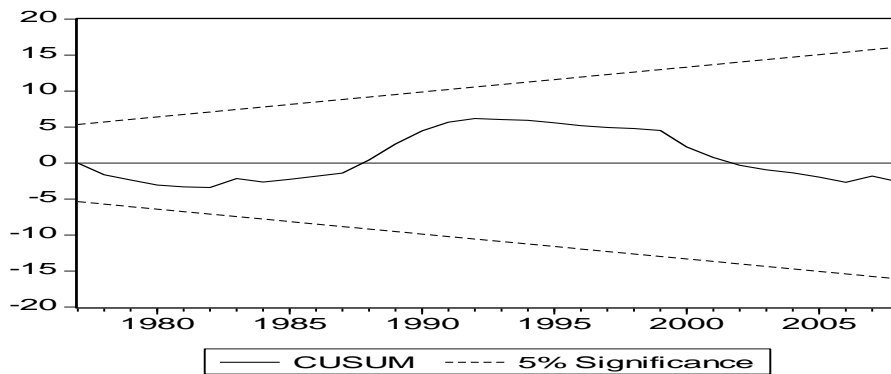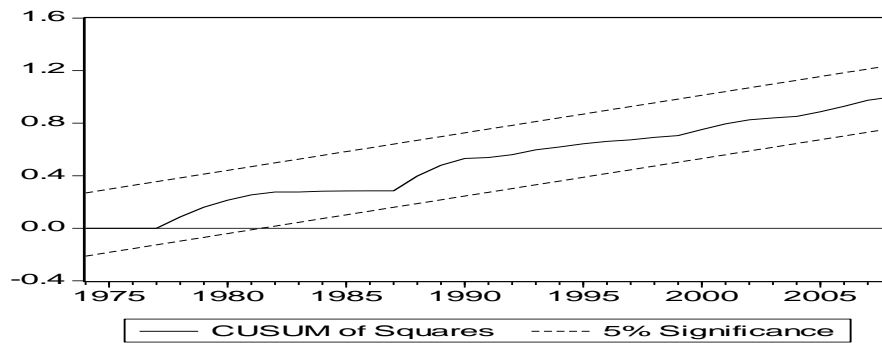**Fig. 1. Plot of Cumulative Sum of Recursive Residuals of Growth Equation**

Fig. 2. Plot of Cumulative Sum of Squares of Recursive Residuals Growth Equation

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[7]The straight lines represent critical bounds at 5 percent significance level.

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