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Public Debt, Private Investment, and Economic Growth: Empirical Evidence from Pakistan

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Abstract

Developing economies have mostly used public debt to fill the fiscal gap and hence to finance their expenditures. However, traditional economists consider public debt as a big prevention in the process of economic growth and argue that public debt crowds out private investment in the long run, that in turn reduces pace of economic growth. Like other developing countries, Pakistan also relies largely on public debt to fill its fiscal gap. Keeping in view the propensity of public debt in Pakistan this study empirically analyzed the impact of public debt on economic growth through private investment. In this association, we test the crowding out hypothesis for Pakistan. The estimation has been carried out by using Autoregressive Distributed Lag (ARDL) and Error Correction Method (ECM) using time series data set spanning from 1972 to 2013. The findings of the study reveal that in Pakistan, public debt decreases economic growth indirectly by crowding out the private investment. However, we don't find any evidence about the direct effect of public debt on the pace of economic growth.

JEL Classification: H63; E22; O40

Keywords: Public debt; Private investment; Economic growth

1. Introduction

Economic growth literature accomplishes a conscience on the argument that efficient utilization of endogenous resources is the right way to sustain economic growth. However, at large developing countries have not potentially utilized its endogenous resources and therefore facing two or even three gaps. The governments of these countries go for public debt to finance its expenditures to enhance their productive capacity and economic growth.[4]

Normally, in the existing literature, two hypotheses "debt overhang" and "crowding out" have been tested to explain the relationship between public debt and economic growth. According to the debt overhang hypothesis, if debt exceeds than a country's repayment ability, then the cost of anticipated debt-servicing would be larger that in turn decrease private investment and hence economic growth (Krugman, 1988).However, the crowding out hypothesis implies that when government increases their debt by acquiring funds from the domestic markets then not only it decreases the funds available for the private investors but also increases the cost of these funds as a result private investment is reducing. The crowding out hypothesis explains

the impact of public debt on economic growth with two channels. First, crowding out implies that public debt reduces economic growth through the reduction of private investment. Second, an increase in the existing debt implies higher future taxes which reduces saving and investment in the future and eventually declining economic growth (Sachs & Kenen, 1990).

A number of studies have empirically analyzed the link between public debt and economic growth and tested both the debt crowding out, and overhang hypotheses. Most of the studies justified the crowding out hypothesis with the decline of availability of funds for investment and the increase in the service cost. These studies argued that if a greater portion of foreign capital is used to service external debt, very little will be available for investment. For instance, Karagol (2002) argued that debt-servicing cost of public debt could crowd out public investment expenditure, by reducing total investment directly and complementary private expenditure indirectly. Studies like Greene *et al*. (1991), Fosu (1999), and Chowdhury (2001)found evidence in the support of the debt overhang hypothesis. Some empirically studies on the relationship between public debt and economic growth have been carried out in the case of Pakistan. For instance, Akram (2011) investigated the debt effect on Pakistan's economy and found that in case of Pakistan public debt negatively affect investment and hence economic growth. Similarly, Raiz and Anwar (2012) also analyzed relationship between public debt and economic growth in case of Pakistan and found that public debt negatively explains economic growth in case of Pakistan.

Some studies argued for the ambiguous impact of public debt on economic growth and argued that on the one hand, public debt reduces private investment, but on the other hand, it increases the public investment. For instance, Chango (2013) analyzed the impact of public debt on Zambia's economic growth and showed that public debt have a negative response to private investment and positively related with public investment. Moreover, the study came with the findings that public debt negatively effects economic growth by reducing the private investment and positively affects by increasing the public investment. Therefore, the net effect of public debt on economic growth depends on the magnitude of these two effects, which could be negative or positive. However, literature also presents the evidence that public debt have no relation with the economic growth as well. Ribeiroet *etal*. (2012) analyzed the effect of public debt on the economic growth of selected European Countries and came with the conclusion that no significant relation exists between the level of government debt and GDP growth. Tsintzoset al. (2011) examined the effects of the ratio of internal to external public debt on a country's economic growth and find out that as the internal-external public debt ratio increases, the public to private capital ratio increases which in turn positively affects the long run economic growth rate.

Moreover, Orszag*et al*. (2004) and Ball and Mankiw (1995) observed that a high level of public debt could make investors distrustful and ensuing lower investment in the economy. Furthermore, these studies keep up the findings that not only the higher volume of the debt but high debt servicing also leads to reduction in the private investment that in turn decrease economic growth. Hoffman and Reisen (1991) empirically shown that the high debt servicing payments crowds out the private investment and reduces the economic growth. In addition, higher public debt can increase government's interest bills leading to increase in budget deficit, reduces public savings available for the investment that in turn reduces economic growth.

Overall, we can say that the existing empirical literature is inconclusive on the relationship between public debt and economic growth because existing literature presents all three positive, negative and no relationship evidences of public debt on economic growth. One indication from

these findings is that the relationship between public debt and economic growth varies from country to country. In this association, the aim of this study is to empirically analyze the impact of public debt on economic growth in case of Pakistan. Beside the direct impact of the cumulative debt (sum of both external and internal debt) on the economic growth of Pakistan, the study too estimates the indirect effects of publicdebt on economic growth.

Rest of the paper is organized as follows. Section 2 presents methodology and data. Section 3 presents empirical findings and its interpretation. Section 4 concludes the study.

2. Methodology and Data

To investigate the impact of public debt on economic growth the following empirical models have been estimated.

$$PI_t = \beta_0 + \beta_1 PD_t + \beta_2 PG_t + \beta_3 HC_t + \mu_t \quad (1)$$

$$Y_t = \beta_0 + \beta_1 PI_t + \beta_2 PG_t + \beta_3 HC_t + \mu_t \quad (2)$$

$$Y_t = \beta_0 + \beta_1 PD_t + \beta_1 PI_t + \beta_2 PG_t + \beta_3 HC_t + \mu_t \quad (3)$$

where Y_t is Gross Domestic Product (GDP), PI_t is private investment, $PD_t$is public debt, PG_t *is* population growth, HC_t *is*human capital, and μ_t is the error term. In the existing studieslike Krugman (1989), Cohen (1993), Elmendorf and Mankiw (1999) presented different channels through which public debt can affect economic growth. For instance, these channels include private investment, domestic savings, total factor productivity, and human capital. However, this study analyzed the impact of public debt on economic growth on private investment channel.

2.1 Data

We used time series data of Pakistan spanning from 1972 to 2013. The variables under consideration are real GDP, public debt, private investment, secondary school enrolment (proxy of human capital), and Population Growth. Real GDP is our dependent variable and data on real GDP is taken from World Development Indicator (WDI) of World Bank. Data of public debt and private investment are taken from Economic Surveys of Pakistan (various issues), whereas the data on secondary school enrolment and population growth (proxy of labor force) are taken from WDI of World Bank.

2.2 Estimation Technique

2.2.1 Bound Test for Cointegration

Keeping in view the time series characteristics of the data, empirical estimation have been carried out through Autoregressive Distributed Lag (ARDL)which commonly known as Bound test for Cointegration. The ARDL cointegration is the reliable technique in our case, as data set is small and variables have different order of integration.[1]

The equations under ARDL approach for our three models are as follows:

[1]Ghatak and Siddiqui (2001) argue that ARDL is the most appropriate estimation technique in case of small data set and if variables have different order of integration.

$$\Delta PI_t = \alpha + \sum_{i=1}^{m} \beta_{1i} \Delta PI_{t-1} + \sum_{i=0}^{m} \beta_{2i} PD_{t-1} + \sum_{i=0}^{m} \beta_{3i} \Delta HC_{t-1} + \sum_{i=0}^{m} \beta_{4i} \Delta PG_{t-1} + \beta_{5i} PI_{t-1} + \beta_{6i} PD_{t-1} + \beta_{7i} HC_{t-1} + \beta_{8i} PG_{t-1} + \mu_t \quad (4)$$

$$\Delta y_t = \alpha + \sum_{i=1}^{m} \beta_{1i} \Delta Y_{t-1} + \sum_{i=1}^{m} \beta_{2i} \Delta PI_{t-1} + \sum_{i=1}^{m} \beta_{3i} \Delta HC_{t-1} + \beta_{4i} Y_{t-1} + \beta_{5i} PI_{t-1} + \beta_{6i} HC_{t-1} + \beta_{7i} PG_{t-1} + \mu_t \quad (5)$$

$$\Delta y_t = \alpha + \sum_{i=1}^{m} \beta_{1i} \Delta y_{t-1} + \sum_{i=0}^{m} \beta_{2i} \Delta PD_{t-1} + \sum_{i=0}^{m} \beta_{3i} \Delta PI_{t-1} + \sum_{i=0}^{m} \beta_{4i} \Delta HC_{t-1} + \sum_{i=0}^{m} \beta_{5i} \Delta PG_{t-1} + \beta_{6i} Y_{t-1} + \beta_{7i} PD_{t-1} + \beta_{8i} PI_{t-1} + \beta_{9i} HC_{t-1} + \beta_{10i} PG_{t-1} + \mu_t \quad (6)$$

Where m is lag length and under bound testing approach the null hypothesis of no long-run relationship among y_t and its determinant are

$H_0: \beta_i = 0$

$H_1: \beta_i \neq 0$

where$i = 5,6,7,8,9,10$

The existence of cointegration in the model is checked through Wald F Statistics. If the test statistics exceed from upper critical values at the 5% level of significance, then null hypothesis for no long run cointegrationis rejected and vice versa is the case where the Wald F statistics lies below the lower bound of tabulated F statistic at 5% level of significance. Once it is decided that the co-integration in the model existthen we can find the long-run elasticities by normalizing β_i as

$$PI_{t-1} = \frac{\beta_6}{\beta_5} pd_{t-1} + \frac{\beta_7}{\beta_5} HC_{t-1} + \frac{\beta_8}{\beta_5} PG_{t-1} \quad (7)$$

$$Y_{t-1} = \frac{\beta_5}{\beta_4} PI_{t-1} + \frac{\beta_6}{\beta_4} HC_{t-1} + \frac{\beta_7}{\beta_4} PG_{t-1} \quad (8)$$

$$Y_{t-1} = \frac{\beta_8}{\beta_6} pd_{t-1} + \frac{\beta_9}{\beta_6} PI_{t-1} + \frac{\beta_{10}}{\beta_6} PG_{t-1} + \frac{\beta_{11}}{\beta_6} HC_{t-1} \quad (9)$$

2.2.2 Error Correction Mechanism

The short-run dynamics are examined by using the error correction mechanism (ECM) that explains the changes in dependent variable by the changes in explanatory variables as well as deviations from the long run relationship among the variables and its determinants. To test the co-integration among dependent and explanatory variables ECM equations for our models can be written as follows:

$$\Delta PI_t = \alpha + \sum_{i=1}^{m} \beta_{1i} \Delta PI_{t-1} + \sum_{i=1}^{m} \beta_{2i} PD_{t-1} + \sum_{i=1}^{m} \beta_{3i} \Delta HC_{t-1} + \sum_{i=1}^{m} \beta_{4i} \Delta PG_{t-1} + \beta_{5i} PI_{t-1} + \beta_{6i} PD_{t-1} + \beta_{7i} HC_{t-1} + \beta_{8i} PG_{t-1} + \theta EC_{t-1} + \mu_t \quad (10)$$

$$\Delta y_t = \alpha + \sum_{i=1}^{m} \beta_{1i}\, \Delta Y_{t-1} + \sum_{i=0}^{m} \beta_{2i} \Delta\, PI_{t-1} + \sum_{i=0}^{m} \beta_{3i} \Delta HC_{t-1} + \beta_{4i} Y_{t-1} + \beta_{5i} PI_{t-1} + \beta_{6i} HC_{t-1} + \beta_{7i} PG_{t-1} + \theta EC_{t-1} + \mu_t \quad (11)$$

$$\Delta y_t = \alpha + \sum_{i=1}^{m} \beta_{1i}\, \Delta GDP_{t-1} + \sum_{i=0}^{m} \beta_{2i} \Delta\, PD_{t-1} + \sum_{i=0}^{m} \beta_{3i}\, \Delta PI_{t-1} + \sum_{i=0}^{m} \beta_{4i}\, \Delta HC_{t-1} + \sum_{i=1}^{m} \beta_{5i} \Delta PG_{t-1} + \beta_{6i} GDP_{t-1} + \beta_{7i} PD_{t-1} + \beta_{8i} PI_{t-1} + \beta_{9i} HC_{t-1} + \beta_{10i} PG_{t-1} + \theta EC_{t-1} + \mu_t \quad (12)$$

On left hand side y_t is real GDP. Coefficients on right hand side ($\beta_1\ to, \beta_6$) denoted the short-run dynamics.β_0 Is intercept while difference operator is shown byΔ, random error term is denoted as μ_t, EC_{t-1} is an error correction term and i show lag length. The sign of parameter θ is expected to be negative. The error correction term is formulated as:

$$EC_t = PI_t - \left(\frac{\beta_6}{\beta_5} PD_{t-1} + \frac{\beta_7}{\beta_5} HC_{t-1} + \frac{\beta_8}{\beta_5} PG_{t-1}\right) \quad (13)$$

$$EC_t = y_t - \left(\frac{\beta_5}{\beta_4} PI_{t-1} + \frac{\beta_6}{\beta_4} HC_{t-1} + \frac{\beta_7}{\beta_4} PG_{t-1}\right) \quad (14)$$

$$EC_t = y_t - \left(\frac{\beta_7}{\beta_6} PD_{t-1} + \frac{\beta_8}{\beta_6} HC_{t-1} + \frac{\beta_9}{\beta_6} PI_{t-1} + \frac{\beta_{10}}{\beta_6} PG_{t-1}\right) \quad (15)$$

3. Results and Discussion

3.1 Unit Root Analysis

We start our empirical analysis by checking the time series properties of the data. Although the ARDL methodology does not require pretesting of stationarity analysis but this analysis will guide us to strengthen our stance as the technique is applicable in the case of different integration order of variables. However, if the variables are integrated of order 2 then this ARDL is not applicable (Narayan 2005). Therefore pretesting of unit root to determine the order of integration is important. Theaugmented Dicky& Fuller (ADF) and Phillips-Perron(PP) tests are used to analyze the unit root in the data. Table 1 presents the results of unit root tests.

Table 1: Unit Root Results

	ADF Test		Phillips-Peron Test	
Variables	**Level**	**First Difference**	**Level**	**First Difference**
LDP_t	1.144 (0.909)	-5.603*** (0.000)	-1.344 (0.862)	-5.601** (0.002)
PG_t	-3.210* (0.091)	…..	-3.152* (0.092)	….
D_t	-1.876 (0.649)	-4.871** (0.002)	-2.303 (0.423)	-4.839** (0.002)
PI_t	-1.835 (0.669)	-7.145*** (0.000)	-2.052 (0.556)	-7.115*** (0.000)
HC_t	-1.346 (0.862)	-6.604*** (0.000)	-1.320 (0.869)	-6.607*** (0.000)

Note: ***, **, and * show level of significance at the 1%, 3%, and 10%, respectively.

The results presents in Table 1 indicatethat GDP, public debt (PD_t), private investment (PI_t), and human capital (HC_t) are not stationary as the null hypothesis of 'unit root' is not rejected. Hence, we concluded that all the variables are integrated of order one 1(1) except the PG_twhich is stationary at its level. As the variables under consideration have different order of integration, therefore, the most reliable estimation technique isARDL cointergration technique.

3.2 Lag Length Selection

After analyzing the unit root testing the next step is to choose lag length for co integration because the number of lags capture the dynamics of the series. There are different criterions for selection optimal lag length. Table 2 presents the results of different criterions.

Table 2: Selection of Lag Length

Lag	LnL	LR	FPF	AIC	SC	HQ
0	-331.35	NA	13.85	16.81	17.02	16.89
1	-57.98	464.74	5.66*	4.39	5.66	5.18
2	-31.97	37.71*	5.73	4.34*	4.85*	6.67

Note: *indicates lag length selected by the criterion. LR: sequential modified, FPE: Final prediction error, AIC: Akaike information criterion, SC: Schwarz information criterion, HQ: Hannan-Quinn information criterion.

The results presented in Table 2 indicate for two lags as Akaike Information Criterion (AIC), and also Hannan-Quinn information criterion both suggest lag two as optimal lag.

3.3 Long Run Cointegration Analysis

The next step, after the selection of optimal lag is to find co-integration in ARDL/ Bound testing approach. In this approach we compared our F value of the Wald test with lower and upper bound critical values which as indicated by Narayan (2005). If the computed F-statistic is above the upper bound critical value then H_0would be rejected. On the other hand, H_0 could not be rejected if the computed F-statistics is below the lower bound critical value, which indicates that there is no cointegration. However, if the value falls between upper and lower bound than decision would be inconclusive. Following table 3 presents results of the Wald test.

Table 3:Boud Test for Cointegration

Model	Specification	L. Bound	U. Bound	F-Stat.	Decision
1	$PI_t/PD_t,HC_t,PG_t$	3.81	4.72	10.99	Cointegration
2	$Y_t/PI_t,HC_t,PG_t$	2.893	4.00	8.57	Cointegration
3	$Y_t/ PD_t,PI_t ,PG_t,$	3.51	4.58	9.23	Cointegration

Note: Critical values are obtained from Narayan (2005) table

Results presents in table3 shows that calculated F-statistics value of all three models are greater than the upper bound of the tabulated F-statistics and thus as suggested by Pesaranet al.(2001) there exist a long run relationship among variable under consideration.

3.4 Long Run Estimates

After verifying the existence of long-run relationship, the next step is to find out the long run confidents of the empirical models.Table 4 presents the long run estimated results of our empirical model.

Table 4: Long Run Estimates

Model 1		**Model 2**		**Model 3**	
Dependent variable PI_t		**Dependent variable GDP_t**		**Dependent variable GDP_t**	
Variables	**Coefficients**	**Variables**	**Coefficients**	**Variables**	**Coefficients**
PD_t	-0.196*** (0.000)	PI_t	0.153** (0.010)	PD_t	0.004 (0.764)
PG_t	-3.040** (0.008)	PG_t	-2.174** (0.004)	PI_t	0.110** (0.006)
HC_t	-0.094* (0.077)	HC_t	0.621** (0.006)	PG_t	-0.163* (0.065)
	-------	------	-------	HC_t	0.098** (0.006)
R-Square	0.7005	R-square	0.722	R-Square	0.795
R-Bar-Sq	0.6597	R-Bar-Sq	0.699	R-Bar-Sq	0.74
D.W Stat	2.1368	D.W Stat	1.9641	DW statistic	2.104
F- Stat	61.60 (0.000)	F-Stat	39.61 (0.000)	F-Stat	74.8 (0.000)

Note: Values in parenthesis are p-values.

The results of model 1 suggests that in the long-run public debt and private investment have negative association, as one percent increase in public debt discourage private investment by 19 percent. This finding confirms thedebt overhang hypothesis, which is similar to the findings of Zafar and Zahid (1996) and War (1990) and Cohen (1993). The one possible justification of the result is may be the creation of unstable condition that caused by debt obligations. Among the control variables, population growth enters the model with negative sign, which is statistically significant. The one possible reason behind this adverse effect is that high population growth diverts household income from saving toward consumption so space for capital accumulation decline. The findings are in line with the findings of Sadiqi and Malik (2001) and Kelly (2009).Similarly, our second explanatory variable human capital enters the model with negative sign, which is statistically significant.

The results of the second model indicate that private investment affects economic growth positively, as private investment enters the model significantly and with positive sign.Our findings are in line with the finding of Hague (2013) and Fatima (2012), Pattillo and others (2002).Population growth enters the model with expected negative sign,whereas, the human capital is positively associated with economic growth.In our second, growth equation (Model 3) the variable of interest public debt (PD_t) hold positive sign, however not statistically significant. One possible reason behind these results is the inefficient and improper utilization of debt especially in productivity sector. These results are parallel to the findings of Akram (2011) andRaiz, and Anwar (2012).The subsequent variable private investment, have a positive sign which is statistically significant. The result signifies the positive impact of private investment on

GDP growth in case of Pakistan. It is interesting to be noted that, although in this model there exist positive relation between public debt and growth, which declare that the direct impact of public debt on growth is positive, however indirectly through crowding out of private investment it minimize the economic growth (Model 1). Our subsequent variable human capital (HC_t) hold positive sign, which is statistically significant, the result signify the positive impact of human capital on economic growth in the case of Pakistan. The result can be justified with Lucas (1988) and Lucas (1993) prophecy that human capital serves as an engine of economic growth as it attributes (education, skill, and experience) enhance the productive capacity of labor force that in turn enhancing growth. Similarly, population growth enters in the model significantly and with expected negative sign. These findings are in line with the Mankiw *et al*. (1992) findings, which show that the high level of population growth rate leads to lower per capita income by lowering the steady state value of capital per worker.

3.5 Short-Run Estimates

Table 5 presents the short-run dynamics of our empirical model.

Table 5: Short-Run Estimates

Model 1		**Model 2**		**Model 3**	
Dependent variable PI		**Dependent variable GDP**		**Dependent variable GDP**	
Variables	**Coefficients**	**Variables**	**Coefficients**	**Variables**	**Coefficients**
DPD_t	0.025*	DPI_t	0.0133	DPD_t	0.261
	(0.080)		(0.613)		(0.765)
DPG_t	-0.798**	DPG_t	-0.592	DPI_t	0.139***
	(0.017)		(0.022)		(0.002)
DHC_t	-0.025**	DHC_t	0.169**	DPG_t	0.178*
	(0.030)		(0.021)		(0.095)
-------	--------	--------	-------	DHC_t	0.548***
					(0.005)
ECM(-1)	-0.262**	ECM(-1)	-0.273**		
	(0.008)		(0.003)	ECM (-1)	-0.674**
					(0.015)
R-Square	0.3887	R-square	0.464	R-Square	0.320
R-Bar-Squared	0.1396	R-Bar-Squared	0.303	R-Bar-Squared	0.023
DW statistic	2.0806		1.964	DW statistic	
DW Stat	1.5608	DW Stat	3.704	DW Stat	2.321

Note: p-values are in parenthesis. ***, **and,* showthe level of significance at the 1%, 5%, and 10 %,respectively.

The short-run dynamics have almost the same results as the long-run dynamics. In addition, the model is stable in the short run. The ECM values rectify the short run stability,

which are significant at the 5 percent level. The coefficient of ECM_{-1} is -0.262, -0.27 and -0.67 in Model, 1, 2, and 3, respectively, which shows the speed of convergence to the long-run equilibrium.

3.6 Diagnostic Test

All of our estimated models have no econometric problem as indicated by our diagnostic tests results. These tests are included Langrage Multiplier (LM) test, Jarque-Bera test, and Ramsey Regression Equation Specification Error Test (RESET) and White test. Table 6 presents the results of these diagnostic tests. The results of diagnostic tests suggest that the estimation of long-run coefficients and ECM are free from serial correlation, hetroscedasticity, functional form, and non-normality.

Table 6: Diagnostic Tests Results

TEST STAT.	F-Stat. (Model 1)	F-Stat. (Model 2)	F-Stat. (Model 3)
Lagrange Multiplier (LM) test	0.561 (0.133)	0.002 (0.963)	1.764 (0.213)
Ramsey's test	0.021 (0.884)	0.287 (0.170)	2.129 (0.117)
Jarque-Bera test	2.288 (0.318)	0.955 (0.803)	1.569 (0.253)
White test	0.438 (0.834)	0.739 (0.717)	0.743 (0.839)

3.7 Stability Test

To test stability of model we applied CUSUM and CUSUMQ tests, which rule out the possibility of structural instability of the models.[2]Figures 1 to 3 presented in Appendix A show that the estimatedcoefficients of our models are stable over time as plots of CUSUM do not cross the critical boundaries.

4. Conclusion

This study analyzed the impact of public debt on private investment and economic growth in case of Pakistan over the period 1972 to 2013.The empirical analysis has carried out through ARDL co-integration technique. The short-run dynamic of model and speed of adjustment is captured through Error Correction Method (ECM). The empirical findings of the study have indicated that in the long run, public debt has a negative impact on private investment, which supports the overhang hypothesis. Moreover, the result showed that private investment has a positive impact on economic growth, which implies that public debt have a negative effect on economic growth through its crowding out effect on private investment.Hence, we can conclude

[2]See appendix A.

that public debt is not good for the long-run economic growth in the case of Pakistan as it leads to crowding out effect of private investment. As for as human capital is concerned, it has positive and significant impact on economic growth indicated that an educated and highly productive labor force can lead to accelerate the growth process. Population growth is negatively and significantly correlated to economic growth impliesthat high rate of population growth affects economic growth adversely. Despite the fact that the study has some limitations, though we believe our findings are significant recommendations about public debt, private investment and economic growth. First, as our results support the overhang hypothesis, which direct for the reducing of domestic debt in order to encourage domestic investment.Second, the findings of the study indicated that public debt have a negative effect on economic growth through its crowding out effect on private investment. This suggests a need for government policy to mobilize its endogenous resources instead of taking loans from internal and external resources. The significant adjustment parameter obtained from the cointegration equation confirmed the long-run relationship and an estimation of adjustment parameter suggests a reasonable speed of adjustment that corrects the disequilibria in one year.

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Appendix A

Figure. 1: Plot of CUSUM and CUSUM Sq. of Model 1

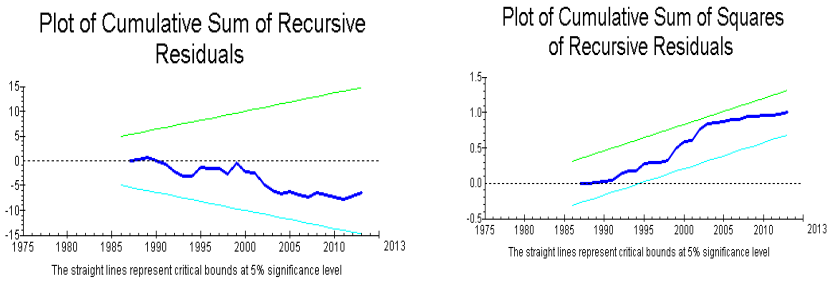

Figure.2: Plot of CUSUM and CUSUM Sq. of Model 2

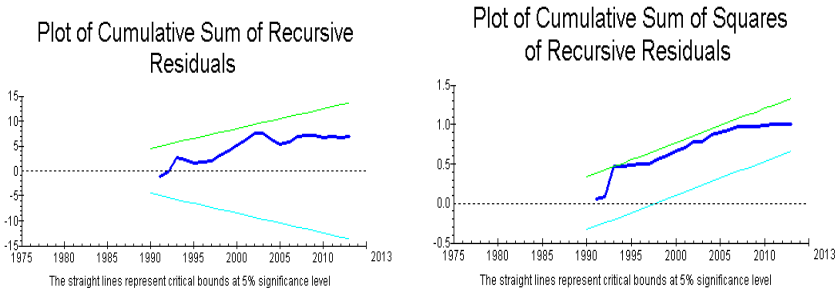

Figure. 3: Plot of CUSUM and CUSUM Sq. of Model 3