Research

PUBLIC DEBT AND ECONOMIC GROWTH IN PAKISTAN: A REASSESSMENT

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Abstract

This study examined the effect of public debt on economic growth for Pakistan over the period 1972 to 2012. Autoregressive distributed lag (ARDL) bounds testing procedure was applied to explore the long and the short run liaison between public debt and economic growth. This study examined the effect of public debt on both the Gross Domestic Product (GDP) and the Grass National Product (GNP) unlike other studies, which examined only one indicator of economic growth. Public debt includes both external debt and domestic debt. Our findings reveal a significant negative effect of external debt on GDP and GNP in the long run and in the short run. Further, debt servicing is inversely influencing GDP and GNP in the short run. However, domestic debt is found to have no effect on economic growth. This study suggests that reliance on public debt should be minimized as this adversely effects economic growth in Pakistan.

Keywords: ARDL, Investment, GDP, GNP, Economic Growth
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Introduction

The reliance on public debt by various developed and developing economies of the world has created many crucial issues for economic policy makers. In order to cope up with the fiscal imbalances and non-availability of revenue sources, public debt is taken in order to fill the gaps. The borrowing of the government may stimulate economic growth in the short run but there are long term consequences of public debt. The literature indicates the consequences in terms of debt overhang effect, low profitability, higher interest rates and crowding out effect. According to debt overhang effect, when the debt level of a country increases, there is a rising tendency of future taxes, which will negatively affect the consumption and investment of the economy and hence results in low economic growth. The crowding out effect points to the situation in which private sector investment decreases due to higher interest rates adopted by the government to pay its debt and hence resulting in decrease of private investment (Afonso and Jalles 2013).

According to Keynesian theory a certain level of public debt to fill the gap of fiscal deficit will lead to rise in economic growth of economy, while excess debt for longer period of time will lead to adversely effect the economic growth. This states that in the short run the government borrowings, effect the level and demand of the government securities positively and hence it will give rise to private investment and will further lead to enhance economic growth. On the other side; the theoretical consensus reveals negative effect of public debt on economic growth in the long run. In the long run, a higher level of government debt will give rise to higher interest rate and hence crowded out private investment, so in this aspect it will adversely effect economic growth. The debt overhang effect suggests that higher level of debt will increase the debt burden and will reduce the repayment ability and give rise to debt services which will decline the economic growth. This reveal a negative association between

economic growth and Debt services (Afonso and Jalles 2013; Karagol 2012; Panizza and Presbitero 2014).

Historical Overview of Public debt in Pakistan

After independence of Pakistan in 1947; there was a need of development of the country; it required funds to grow economically. There was a need of investment which it cannot fulfill from financing through savings, so the government borrowed from domestic as well as various foreign institutions like IMF, World Bank and Asian Development Bank to deal with its balance of payment deficits. In the initial years, the government of Pakistan borrowed money domestically for the purpose of fulfilling its fiscal deficits. Similarly, it borrowed money externally to deal with its balance of payment deficits. In 1972, the internal debt was accounted for about Rs. 7.62 billion while external debt was about Rs. 39.85 billion. In 1990, the total public debt was about Rs. 801 billion in which Rs. 374 billion was domestic debt while Rs. 428 billion was external debt. The statistics shows that in the initial years, Pakistan mostly rely on external debt while later on showed that it switched over to rely majorly on domestic debt. The current situation of public debt in Pakistan accounts for approximately Rs. 15,531billion in FY13 and is about 67.8% of the GDP. The total internal debt is Rs. 9833 billion while total external debt is Rs. 5698 billion. The 36% of public debt is made of about short term domestic debt, which will be given in the period of one year, if it didn't get so, that will give rise to interest rates and will further stimulate debt servicing burden. Public debt as % of the GDP is still higher than the rate of 60% that is fixed by Fiscal Responsibility and Debt Limitation Act (FRDL) 2005. The rising tendency of public debt is a major risk for economic stability. Pakistan's public debt burden is rising and it will adversely effect the economy and hence will limit the scope of fiscal and monetary policies of the country[5].

[5] State bank of Pakistan Annual Reports. Budget Wing, Economic Affairs Division, State Bank of Pakistan & Debt Policy Coordination Office Calculation. Provision: End-March 2013

Many studies including (Atique and Malik 2012; Ramzan and Ahmad 2014; Sheikh et al. 2010; Waheed 2006)were carried out to thoroughly investigate the influence of public debt on the economic growth of Pakistan. Majority of the studies provide evidence that external debt tends to have adverse effect on economic health over the long run in the context of Pakistan. This study has been undertaken to explore and revisit the phenomena of the effect of public debt on the economic growth of Pakistan both in the long and the short period of time by quantifying two perspectives of economic growth. Most of the previous studies have used GDP as a measure of economic growth for the country(Akram 2011; Ramzan and Ahmad 2014). This particular study is of unique nature because of using two indicator of economic growth of Pakistan i.e. GDP and GNP .Many researchers disagree that GDP in not the correct representative of the economic health of a country and in this regard they have used GNP as an indicator of economic growth see (Bal and Rath 2014; Karagol 2012). They are of the opinion that in many countries due to a high level of foreign direct and portfolio investment, the income received from domestic production is transferred to foreign investors, thus the economic health goes weak. In this aspect this study has used both the GDP and GNP as economic indicator of the country. This study will be helpful in terms of both GDP and GNP, as it will add to the existing literature in terms of economic growth in both aspects of GDP and also GNP. According to the best of our knowledge, this study will be the first attempt to add to the literature of the impact of public debt on the GNP of Pakistan. The results of the study will be important for government and also economic policy makers. This study will provide them guidelines in terms of the effects of public debt on both economic indicator i.e. GDP and GNP in both short and long run aspects which will be helpful to them for decision making purpose.

The rest of the paper is organized as follows. Section 2 reviews the literature. Section 3 describes the data and methodology. Section 4 is the discussion of results. Section 5 is about conclusion, implications and future research direction.

Review of Literature

Numerous studies have examined the effects of public debt on economic development of diverse economies. From theoretical perspectives public debt have adverse effects on economic growth. For instance Karagol (2012) found unidirectional negative effects of public debt on the GNP of Turkey for a longer period of time ranging from 1956 to 1996. Some studies including Jayaraman and Lau (2009)reported positive effects but for shorter time period. It happens due to the fact that government borrows for the sake of filling the gaps in fiscal budgets, which has positive effects on the economy for shorter time period. But when the time period of debt extend then the debt burden arises and hence create adverse effects on the economic growth of the country. They argue a positive and favorable impact of external debt on economic growth for the short period while negative effects in the long run on economic growth of six major pacific island countries(Jayaraman and Lau 2009).

Afonso and Jalles (2013) studied government debt, its productivity and growth for 155 countries using panel data analysis and found adverse effects of government debt on GDP. Higher maturity of debt enhances the economic growth of the economy. In support (Checherita-Westphal and Rother (2012)extended the literature for 12 Euro countries by examining the association of the government debt with the per capita GDP over the period 1970 to 2008 and found significant long run adverse impact of government debt to GDP ratio. The same theory was tested for India for the period of 1980 to 2011 using ARDL model and found significant negative relationship of internal and external debt on the economic growth in the longer period by Bal and Rath (2014). The study also verified positive effects of debt services on economic growth in the short period of time.

Number of studies examined debt effects on economic growth of Pakistan see for example Akram (2011); Atique and Malik (2012); Rais and Anwar (2012); Ramzan and Ahmad (2014); Sheikh et al. (2010);

Waheed (2006).Waheed (2006) examined various factors for economic growth of Pakistan along with the factors that are responsible for burden of domestic debt. Sheikh et al. (2010) explored domestic debts effects on the GDP of Pakistan over the period 1972 to 2009. By applying OLS methodology it was concluded that domestic debt has positive effect on the GDP while adverse effect of domestic debt servicing on GDP of Pakistan. The positive effect is due to the spending of government on those factors which enhances the economic growth and productivity.

Rais and Anwar (2012)applied OLS technique to determine the effects of domestic and external debt on GDP in case of Pakistan for the period of1972 to 2010. The study found that both external and internal debt has significant inverse effect on the GDP. The results of the effects of domestic debt on GDP were opposite to that of Sheikh et al. (2010).

Atique and Malik (2012)argue that there is significant negative effect of domestic and as well as external debt on GDP. They further concluded that the negative effect of external debt on GDP is stronger than negative effect of domestic debt.Akram (2011) studied the debt overhang and also crowding out effect for Pakistan over the period 1972 to 2009. The study has investigated the public effect on GDP as well as on the investment level in Pakistan. This study found negative effect of external debt on per capita GDP and on investment in long run. They also found evidence of negative relationship of domestic debt with GDP and investment and concluded crowding out effect in this regard. Recently(Ramzan and Ahmad 2014) carried out to study the external growth effects on economic growth with adding new indicator in terms of macroeconomic policy index. They found both short and long run negative effect of external debt on GDP . In examining the policy interactive variable they found significant positive short and long run effect on GDP .

Data and Methodology

The main aim of this study is to empirically examine the effect of public debt on economic growth of Pakistan. For this purpose, this study has taken time series annual data from 1972 to 2012. The data for various variables of the study is obtained from world development indicator, The State bank of Pakistan and Pakistan statistical year book. This study intends to use GDP and also GNP as proxy of economic growth. In this aspect we used two separate econometric models which are discussed below.

Public Debt and GDP

In examining effect of public debt on GDP, we used separate econometric model. The public debt has been classified into external debt, domestic debt and debt services. The inflation and trade openness has been used as control variables that are derived from studies ofAkram (2011); Bal and Rath (2014).The data of GDP is in the US dollars. The data of external debt is in percentage of GDP represented as (ED_Y).The data of debt services is in percentage of exports represented as (DS).The domestic debt data is in percentage of GDP and is represented as (DD).The data of inflation is in annual percentage and is represented as (INF). The data of trade openness is ratio of exports and imports to GDP represented as (OP).The econometric specification can be written as follows:

$$GDP_t = c + \beta_1 ED\_Y_t + \beta_2 DD_t + \beta_3 DS_t + \beta_4 INF_t + \beta_5 OP_t + \varepsilon t \qquad (1)$$

Where GDP_t is the log of GDP at time t, ED_Y islog of external debt at time t, DD_t is the log of domestic debt at time t, DS_t is the log of debt services at time t, INF_t is the log of inflation at time t and OP_t is the log of trade openness at time t and εt is the error term. The β_1, β_2,β_3,β_4 and β_5 are the coefficient respectively.

This study is using auto regressive distributed lag (ARDL) bound testing approach proposed by (Pesaran et al. 2001) to measure both long run and short run liaison of public debt with economic growth. The rationale behind using the model is that ARDL model is suitable for those model in which model is a mixture of $I(0)$ and $I(1)$ variables. The second importance of the model is that itis suitable for small sample size as our sample is only 41(Pesaran et al. 2001). The equation (1) is formulated into ARDL equation. The equation (2) and (3) represents the ARDL long run and short run model. The long run relationship between GDP and public debt is examined by using equation (2). The short run relationship between public debt and GDP is examined by using equation (3).

$$GDP_t = c + \beta_1 GDP_{t-i} + \beta_2 ED\_Y_{t-i} + \beta_3 DD_{t-i} + \beta_4 DS_{t-i} + \beta_5 INF_{t-i} + \beta_6 OP_{t-i} + \varepsilon_t \quad (2)$$

$$\Delta GDP_t = c + \alpha_1 \sum_{i=1}^{p} \Delta GDP_{t-1} + \alpha_j \sum_{j=1}^{p} \Delta ED\_Y_{t-j} + \alpha_k \sum_{k=1}^{p} \Delta DD_{t-k} + \alpha_l \sum_{l=1}^{p} \Delta DS_{t-l} + \alpha_m \sum_{m=1}^{p} \Delta INF_{t-m}$$
$$+ \alpha_n \sum_{n=1}^{p} \Delta OP_{t-n} + ECM_{t-1} + \varepsilon_t \quad (3)$$

The parameters in equation (2); β_1, β_2, β_3, β_4, β_5, β_6 are long run coefficients, while in equation (3), α_1, α_j, α_k, α_l, α_m, α_n are short run coefficients. In equation (3), Δ represents the first difference of variables while ECM_{t-1} shows the speed of adjustment over the long run. Before estimating ARDL model, it is necessary to check the long run relationship between the underlying variables using Bound testing procedure. The bound testing usually represents Wald test or f statistic that is carried out for checking long run relationship. The calculated F-test value through bound testing procedure is compared with the estimated critical values of (Pesaran et al. 2001). If the estimated value of F-test is greater than the tabulated value of (Pesaran et al. 2001), than there exist long run relationship between variables and vice versa.

Public Debt and GNP

For analyzing effect of public debt on GNP, we have developed a separate ARDL model. The most common indicator used for GNP is Gross national income (GNI). The GNP is composition of GDP plus income received from foreign nationals of the country minus income of the foreigners in domestics. In GNP equation the data of external debt is in percentage of GNP represented as (ED_X) and other variables respectively.

$$GNP_t = c + \beta_1 ED\_X_t + \beta_2 DD_t + \beta_3 DS_t + \beta_4 INF_t + \beta_5 OP_t + \varepsilon_t \qquad (4)$$

Where GNPt is the log of GNP at time t and other variables respectively.

The equation (4) has been converted into ARDL model. The long run and short run association between GNP and public debt has been estimated by using ARDL model which is presented in equation (5) and (6). The equation (5) is the long run equation while equation (6) is the short run equation. The log arithmetic transformation has been made to data to capture the aspects of the models.

$$GNP_t = c + \beta_1 GNP_{t-i} + \beta_2 ED\_X_{t-i} + \beta_3 DD_{t-i} + \beta_4 DS_{t-i} + \beta_5 INF_{t-i} + \beta_6 OP_{t-i} + \varepsilon_t \quad (5)$$

$$\Delta GNP_t = c + \alpha_1 \sum_{i=1}^{p} \Delta GNP_{t-1} + \alpha_j \sum_{j=1}^{p} \Delta ED\_X_{t-j} + \alpha_k \sum_{k=1}^{p} \Delta DD_{t-k} + \alpha_l \sum_{l=1}^{p} \Delta DS_{t-l} + \alpha_m \sum_{m=1}^{p} \Delta INF_{t-m}$$
$$+ \alpha_n \sum_{n=1}^{p} \Delta OP_{t-n} + ECM_{t-1} + \varepsilon_t \qquad (6)$$

The parameters in equation (5); are long run coefficients, while in equation (6), are short run coefficients. In equation (6) represents the first difference of variables while shows the speed of adjustment over the long run.

As this study is using time series data; the first step before going for analyses is to check the stationarity of the data. The stationarity of the data is usually checked by using unit root analyses. There are two commonly used methods for checking stationarity, PP

(Philip Perron) (1988) and ADF (Augmented dickey fuller) (1979) test. This study has employed PP (Phillip Perron) (1988) test for checking stationarity of the data.

Results

This study is based on time series data so the first step is to check the stationarity of the underlying variables. This study has opted Phillips and Perron (1988)test for checking the stationarity of the data. The analyses of unit root are represented in Table 1. The results show that few variables are stationary at level while most of the variables are stationary at first difference. So the models are mixture of order $I(1)$ and $I(0)$. So in this situation the Autoregressive distributed lag model (ARDL) is the suitable technique to know about integration between variables (Pesaran et al. 2001).

Table 1:

Unit root test results

Variables	Level	1st Difference	Inference
GDP	-0.3901 (0.90)	-7.8080(0.00)	$I(1)$
GNP	-0.4466 (0.89)	-7.3940 (0.00)	$I(1)$
ED_Y	-1.8781 (0.33)	-9.7188 (0.00)	$I(1)$
ED_X	-1.1107 (0.70)	-7.8491 (0.00)	$I(1)$
DD	-2.6885 (0.08)**		$I(0)$
DS	-1.7041 (0.42)	-9.2089 (0.00)	$I(1)$
INF	-1.6507 (0.44)	-5.2597 (0.00)	$I(1)$
OP	-3.3963 (0.01)*		$I(0)$

Probabilities are shown in parenthesis,
*and ** indicates $p < 5\%$ and 10%.

Before estimating the long run association between the variables, bound testing is carried out to check whether there exist long run liaisons between variables. First the suitable lag value is selected for bound testing, the lag selection criteria is based on Schwartz Bayesian criteria. The results of bound testing are presented in Table 2. The analyses are carried out by tabulating F-statistic values for first model i.e.Public debt and GDP; and than for the second model i.e. public debt and GNP. The analyses show that F statistics value is higher than the upper bound for both models and hence according to (Pesaran et al. 2001),there is association between variables for longer

period of time in both models. Hence, we can now analyze the long run and short run relationship using ARDL model.

Table 2 :

Bounds testing Results

Country		F-statistic value	Lag length	Significance level	Bound Critical Values	
					I(0)	I(I)
				1%	3.15	4.43
Pakistan	GDP	12.0930	2	5%	2.45	3.61
	GNP	9.7764	2	10%	2.12	3.23

Public debt and GDP

The analyses of the long run and the short run effects of public debt on GDP by using ARDL model is represented in Table 3. The results show evidence of significant negative effect of external debt on GDP in long run. This represents that in long period of time external debt tends to have inverse impact on GDP . These results are consistent with previous studies for Pakistan(Akram 2011; Ramzan and Ahmad 2014). The Domestic debt and inflation coefficient is positive but insignificant in long run. The debt servicing coefficient is negative but insignificant in long run. The constant is significant and positive which means that other variables are also contributing to economic growth. The higher value of R-square showed that the model is good fit. The F-statistics is significant and reveal goodness of the model. The LM test is insignificant means there is no issue of autocorrelation.

The short run (error correction model)is estimated to know about the short run association between public debt and GDP . The results are shown in Table 3. The significant negative error correction term shows the evidence of significant long run association between variables. TheECT(-1)(error correction term) reveal the speed of adjustment over the long run between variables. The error correction term shows that 23% adjustment has been made over the long run. The results show that external debt has significant negative effect in short run. These results tallies with previous studies like (Akram

2011; Ramzan and Ahmad 2014). The analyses reveal that external debt will negatively effect the GDP in short run. The analyses further show that in short run debt services has significant and negative effect on GDP. The negative effect of debt services on GDP represents the theoretical contribution of the result with the debt overhang effect. The Domestic debt, inflation and trade openness have insignificant effect in short run.

Table 3:
Public Debt and GDP

Long run equation results				Short run equation results			
ARDL model (1,1,0,0,0,0)				ARDL model (1,1,0,0,0,0)			
Variable	Coefficient	Standard Error	t-statistics	Variable	Coefficient	Standard Error	t-statistics
ED_Y	-1.7235*	.4937	3.4906	ΔGDP(-1)	.7639*	.0917	8.3281
DD	.6724	.7777	.8646	ΔED_Y	-1.2897*	.1903	6.7738
DS	-.0140	.0087	1.6041	ΔED_Y(-1)	.8825*	.2250	3.9209
INF	.0134	.0091	1.4731	ΔDD	.15884	.2114	.7512
OP	.0070	.0068	1.0357	ΔDS	-.0033*	.0013	-2.4741
C	24.3202*	.6176	39.3753	ΔINF	.0031	.0020	1.5348
T	.0550*	.0058	9.3283	ΔOP	.0016	.0014	1.1770
				ΔC	5.7447*	2.1207	2.7089
				ΔT	.0129*	.0062	2.0719
				ECT(-1)	-.2362*	.0917	-2.5756
Dependent Variable= GDP				Dependent variable =ΔGDP			
R-square	0.9984			R-square	0.8579		
Adjusted R-square	0.99804			Adjusted R-square	0.8200		
F-statistic	2417.4*			F-statistic	25.8805*		
LM test	1.44			LM test	1.44		
DW-stat	2.27			DW-stat	2.27		

*and ** indicates p < 5% and 10%.

The next step is to check the reliability of the short run and long run ARDL model which is checked by applying cumulative sum (CUSUM) and cumulative sum of square test on residuals of the model. Figure 1 clearly shows the evidence that the critical values lies under 5 percent level of significance of cumulative sum test. Similarly CUSUM square is also between 5% significance level which reveal that model is fit as shown in figure 2.

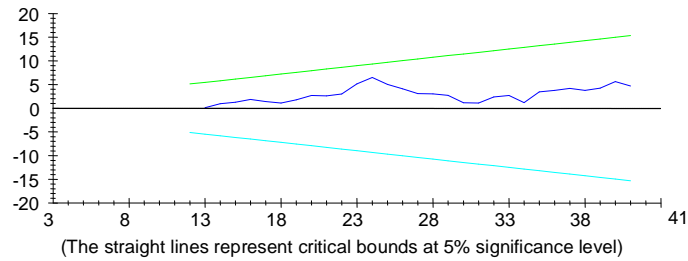(Plot of Cumulative Sum of Recursive Residuals)

(The straight lines represent critical bounds at 5% significance level)

Figure 1

(Plot of Cumulative Sum of Squares of Recursive Residuals)

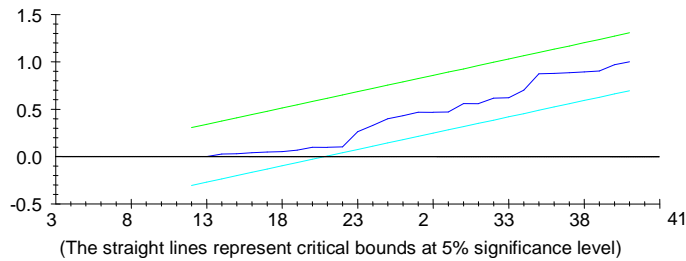(The straight lines represent critical bounds at 5% significance level)

Figure 2

Public Debt and GNP

The ARDL analyses of the long run and the short run effect of public debt on GNP are given in Table 4. The long run equation result shows that in long run external debt is influencing significant negatively the GNP of Pakistan. The domestic debt has been found to have insignificant effect over the long run on GNP. The results also show insignificant impact of debt services on GNP in Pakistan in long

run. The constant is significant and positive means other variables are also contributing to GNP. The higher value of R-square and significant value of F-statistics reveal fitness of the model.

The error correction model has been employed to know about the speed of adjustment over the longer period and also to know about short run relationship. The significant and negative value of the ECT(-1)(error correction term)confirms that there is stable long run association between variables. The error correction term reveal that about 22% adjustment has been made invariables in the long run. The analyses reveal that external debt is influencing significant negatively the GNP in short run. The result also points to the evidence that debt services have significant negative effect on the GNP in short run which points to the existence of debt overhang effect. The domestic debt, inflation and openness have insignificant effects on GNP in short run.

Table 4:

Public Debt and GNP

Long run equation results				Short run equation results			
ARDL model (1,1,0,0,0,0)				ARDL model (1,1,0,0,0,0)			
Variable	Coefficient	Standard Error	t-statistics	Variable	Coefficient	Standard error	t-statistics
ED_X	-.6557*	.2168	-3.0241	ΔGNP(-1)	.7768*	.0919	8.4532
DD	.4717	.8976	.52552	ΔED_X	-.52043*	.0864	-6.0201
DS	-.0161	.0104	-1.5499	ΔED_X(-1)	.37411*	.10202	3.6668
INF	.0106	.0097	1.1003	ΔDD	.1052	.2222	.4736
OP	.0084	.0081	1.0390	ΔDS	-.0035*	.0014	-2.5037
C	26.2965*	.9525	27.6077	ΔINF	.0023	.0021	1.0892
T	.0519*	.0073	7.0985	ΔOP	.0018	.0014	1.2737
				ΔC	5.8675*	2.3397	2.5079
				ΔT	.0115**	.0062	1.8513
				ECT(-1)	-.22313*	.0919	-2.4279
Dependent Variable= GNP				Dependent variable =ΔGNP			
R-square	0.99821			R-square	0.84233		
Adjusted R-square	0.9977			Adjusted R-square	0.80028		
F-statistic	2092.3*			F-statistic	22.89*		
LM test	2.79			LM test	2.79		
DW-stat	2.36			DW-stat	2.36		

*and ** indicates p < 5% and 10%.

In the final step we have checked the reliability of the short run and long run ARDL model in which we have employed cumulative sum (CUSUM) and cumulative sum of square test on residuals of the model. Figure 3 clearly shows the evidence that the critical values lies under 5 percent level of significance in cumulative sum test. Similarly CUSUM square is also between 5% significance level which reveal that model is fit as shown in Figure 4.
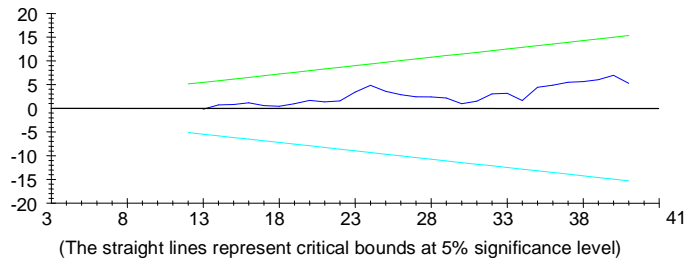
(Plot of Cumulative Sum of Recursive Residuals)

(The straight lines represent critical bounds at 5% significance level)

Figure 3

(Plot of Cumulative Sum of Squares of Recursive Residuals)

(The straight lines represent critical bounds at 5% significance level)
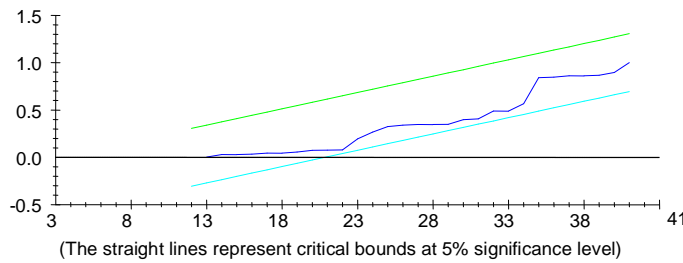
Figure 4

Conclusions and Policy Implications

This study examined the effects of public debt on the economic growth of Pakistan over the period 1972 to 2012. The novelty of the paper is that we have quantified economic growth into GNP and GDP and studied the effect of public debt on both perspective of economic growth. The auto regressive distributed lag model (ARDL) Bounds testing model developed by Pesaran et al (2001) has been used to analyze the long run and short run liaison between economic growth and public debt. The analyses were carried out separately for analyzing the effect of public debt on GDP and also public debt on GNP. The results show evidence of significant adverse impact of external debt on GDP in long run and also in short run. The analyses also show significant negative impact of external debt on GNP in long run and in short run. The analyses also show that debt services have significant negative impact on both GDP and GNP in short run. However domestic debt is found to have in insignificant effect on GDP and GNP over the long and short run.

This study suggests that reliance on public debt would be minimized because it will adversely effect the economic growth of the country. Pakistan is currently not only facing debt crises but also is suffering from debt trap because it is borrowing more money in order to repay its accruing liabilities. The dependence on external debt would also be minimized because it will negatively effect the economic growth. The Pakistan economy mostly rely on domestic debt which may also be discouraged because it may negatively effect the economic process of the country. We suggest that policy makers may make and adopt such policies which increase the revenue of the country rather than depending on acquiring more public debt. They may finance the fiscal deficits with other revenue sources like effective tax structure or may reduce their current expenditure such that the economic process is not effected. In order to further understand the phenomenon, it is suggested to study the effects of public debt on private investment in future.

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