The Effects of Public Debt on Economic Growth and Gross Investment in India: An Empirical Evidence

Amanpreet Kaur
Research Scholar,
Punjab School of Economics, GNDU,
Amritsar, Punjab (India)

Dr. Baljit Kaur
Assistant professor,
Punjab School of Economics, GNDU,
Amritsar, Punjab (India)

Abstract

Public borrowing is one of the major instruments of resource mobilization which divert the flow of resources into right channels, especially in case of developing economies. Given the current drive towards government borrowings there is a need to have an understanding of the factors which influence public debt. The aim of the present paper is to analyze the empirical relationship between public debt and economic growth in India. The present study covers the period of 32 years (i.e., from 1981-82 to 2012-13). To achieve this objective, the trends in public debt, investment and GDP for a period of 32 years' regular time series have been analyzed. Granger's causality analysis has been carried out in order to examine the cause and effect relationship between economic growth and public debt. Furthermore, Multiple Regression has been worked out to investigate the indirect relationship between economic growth and public debt. The present study provides us the evidence of positive, but indirect relationship between public debt and economic growth via investment. The results show the positive and statistically significant relationship between public debt and investment and also Public debt effects the economic growth significantly.

Keywords:

Public Debt, Economic Growth, Outstanding Liabilities, Debt Sustainability

Introduction

A developing economy needs to tap all possible resources to mobilize required financial resources for the implementation of its developmental plans. Public borrowing is one of the major instruments of resource mobilization which diverts the flow of resources into right channels, especially in case of developing economies, as they lack resources required for development. The study of public debt is not of recent origin. Therefore, India after independence decided to go for economic development that was based on centralized planning which assigned a great role to public debt. Shoup (2006) defines Public Debt or government borrowings as “the receipt from the sale of financial instruments by the government to individuals or firms in the private sector to induce the private sector to release manpower and real resources; and to finance the purchase of those resources or to make

welfare payment or subsidies".

Public debt may be acquired from both internal as well as external sources. An internal debt involves only transfer of wealth within the borrowing community. In case of external loans, it involves firstly, a transfer of wealth from the lending to the borrowing community, when the loan is raised and secondly, a transfer in the reverse direction, when the interest on principal is repaid (Meade, 1958). Public debt includes domestic and external liabilities excluding small savings and total liabilities. Internal debt includes market loans and bonds, treasury bills and special securities issued to RBI etc. Other liabilities include Small Savings, Provident Funds, Reserve Funds and Deposits.

How public debt is affecting the macroeconomic variables like income, interest and investment etc., is an issue which has not been considered much. The relationship between public debt and various economic policy indicators is well discussed in international research studies; but in Indian context, it is not much focused.

Central governments' financial status which the present study aims to address is of significant concern as it has a greater potential to affect macroeconomic instability. Given the current drive towards government borrowings, there is a need to have an understanding of the factors influencing public debt. The relationship between public debt and economic growth is a debatable issue as there has been contrasting views of the economists on the relationship between public debt and economic growth. The present paper aims at analyzing the empirical relationship between economic growth and public debt.

2. Review of Literature

Various studies being conducted in the recent past have mainly concentrated on the direct relationship between debt & growth by considering debt-GDP ratio only and have given less emphasis on the indirect effects of debt on economic growth through investment and output. Traditionalists viewed negative relationship between public debt and economic growth whereas Ricardian viewed neutrality of debt to growth. Keynesian new theory of public debt (or 'no burden' thesis) relied on positive aspects of public borrowings; according to which, through debt creation, the government can tap savings streams, put the resources thus raised to productive use and bring out an increase in national income.

Singh (1999) investigated recent trends in domestic debt, economic growth and their relationship covering the period from 1959 to 1995 and examined both the variables in the light of previous literature considering two views - one is traditional view point depicting negative relationship and other is Ricardian equivalence hypothesis implying the neutral relationship. The author tested the hypothesis by using the concept of co-integration and the causal relationship between debt and growth. The granger causality test indicated that there is no causal relationship between unanticipated domestic debt and growth, supporting the Ricardian equivalence hypothesis.

Reinhart and Rogoff (2009) examined the economic growth at different levels of government debt for a period of about two hundred years in a sample of forty four countries. Their empirical analysis provided the evidence of negative link between economic growth and public debt.

Kumar and Woo (2010) studied the impact of high public debt on long run economic growth for advanced and emerging economies during 1970-2007. The empirical results suggested an inverse relationship between initial debt and subsequent growth. On an average, it was estimated that a 10 percentage point increase in initial debt to GDP ratio is associated with 0.2 percentage point fall in growth of annual real per capita income per year.

Presbitero (2010) studied the comprehensive analysis of debt and growth in developing countries covering the period 1990-2007 and found that rising debt-GDP ratio has negative and monotonic effect on growth in case of developing countries. Further, debt is a constraint for the economies with sound macroeconomic policies and institutions. In these economies, public debt has real effects and the economies where debt sustains for a long time and the volume of debt is large, macroeconomic policies are worse and volatile.

Thus, various studies show mixed results regarding the impact of public debt on growth. But growth is not the only economic factor that is being affected by public debt; growth also affects the debt dynamics and fiscal policy variables. There is a vicious cycle of budget deficits, inflation and private capital share which widens the fiscal gap and results in rising public debt (Easterly, 2004).

3. Database and Methodology

The aim of present paper is to analyze the empirical relationship between public debt and economic growth. Therefore, the present study covers the period of 32 years (i.e., from 1981-82 to 2012-13). To fulfill this objective, the data on the various policy variables like public debt, Gross Domestic Product, Gross Fixed Capital Formation, Population Growth rate has been compiled from various issues of government publications like Indian Public Finance Statistics, Economic Surveys, Handbook of Statistics on Indian Economy (Reserve Bank of India) and various reports of the Ministry of Statistics and Programme Implementation.

The study confines only to the central government debt and excludes the debt of state governments, union territory governments, central public sector undertakings and public financial institutions. The reason behind this exclusion is that the central government is a major borrower among all the government entities within the economy. In the paper, the words government debt and public debt has been used interchangeably. The government debt is defined as the total

liabilities of Government of India and it comprises both internal and external liabilities.

Central governments' finances are of significant concern as it has a greater potential to affect macroeconomic instability, therefore, the trends in public debt, investment and GDP have been analyzed over a period of 32 years. Before analyzing the causal relationship between gross state domestic product and education expenditure, trend stationary, which is a basic assumption in case of time series data analysis, has been checked by applying Augmented Dickey Fuller (ADF) test. This test is conducted by adding the lagged values of the dependent variable and it consist of estimating the regression equation as:

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

For examining causal relationship between Gross Domestic Product and Public Debt, Granger's causality analysis (1969) was performed. As per Granger's causality theorem, a time series $\{Y_t\}$ is said to be caused by a time series $\{X_t\}$, if forecasts of variable Y using both the lagged values of Y and the lagged values of some other variable X are superior to the forecasts obtained by using past values of Y alone. In the same way, if past values of Y improve the forecasts of X in the presence of past values of X, then Y is said to Granger cause X. The test involves the estimation of following two regression equations:

$$Y_t = \sum_{i=1}^{p} \alpha_i X_{t-1} + \sum_{j=1}^{p} \beta_j Y_{t-j} + u_{1t} \quad \ldots\ldots\ldots\ldots\ldots (1)$$

$$Y_t = \sum_{i=1}^{q} \gamma_i X_{t-1} + \sum_{j=1}^{q} \delta_j Y_{i-j} + u_{2t} \quad \ldots\ldots\ldots\ldots\ldots (2)$$

Where the disturbance terms u1t and u2t are assumed to be stochastically independent. Now four alternative cases could be distinguished:

1. If $\sigma 2\ (Yt\ |Xt\text{-}1, Yt\text{-}1) < \sigma 2\ (Yt\ |Yt\text{-}1)$, then X is said to cause Y (abbreviated as X Y). Here $\sigma 2\ (Yt\ |Xt\text{-}1, Yt\text{-}j)$ is the prediction error variance of Y based on past values of X and Y, and $\sigma 2\ (Yt\ |Yt\text{-}1)$ is the prediction error variance of Y based on its past values alone;
2. If $\sigma^2 (X_t | X_{t-1,} Y_{t-1}) < \sigma^2 (X_t | X_{t-1})$ then Y is said to cause X (abbreviated as Y X);
3. If both the above outcomes occur simultaneously, there is feedback or bilateral causality (abbreviated as X Y); and
4. If $\sigma^2 (Y_t | Y_{t-1}) < \sigma^2 (X_t | X_{t-1}) > \sigma^2 (X_t | X_{t-1,} Y_{t-j})$, then the two series are not temporally related (abbreviated as X ~ ~ ~ Y), meaning stochastic independence among the series.

Furthermore Multiple Regression has been worked out to investigate the relationship between economic growth and public debt. The two regression equations are as follows:

$$I_t = \beta_0 + \beta_1 G + \beta_2 D + \beta_3 V + u_i \quad \ldots (1)$$

$$G_t = \beta_0 + \beta_1 I_t + \beta_2 D + \beta_3 V + u_i \quad \ldots (2)$$

Where, G_t is gross domestic product, I_t is gross investment, D is public debt or outstanding liabilities of government, V is population growth and u_i is error term.

Results and Discussion

Trends in Public Debt and Economic Growth

It is first required to understand the behavior of public debt before going for further analysis. Therefore, the trends in government debt and gross domestic product have been analyzed. Table1 depicts the trends in Debt-to-GDP ratio.

The continuous increase in the ratio implies unsustainability of debt. Debt sustainability at the sub national level is much more complicated due to the legislative mandates of central and state governments. Many policies that effect economic growth & fiscal policy are designed largely by central governments. Further, it depends upon macroeconomic & financial market developments that are uncertain by nature. In the literature of public finance, the issue of fiscal health of state governments has been a priority area of concern. Borrowing being an easier alternative to raising taxes or cutting expenditures; states have continued to borrow to a

greater extent. This has given rise to the problems of state's indebtedness and fiscal imbalances.

Sustainability of debt is an important tool to assess the macroeconomic health of a country. Sustainability is a situation when debt-to-GDP ratio reaches an excessive proportion. This ratio signifies the fiscal health and sustainability of debt as it is clearly stated in the previous literature that the declining trend of debt to GDP ratio implies sustainability. For the present investigation this ratio has been calculated from 1980-81 to 2012-13. The perusal of the table reveals that the debt/GDP ratio in 2012 is higher than the initial level.

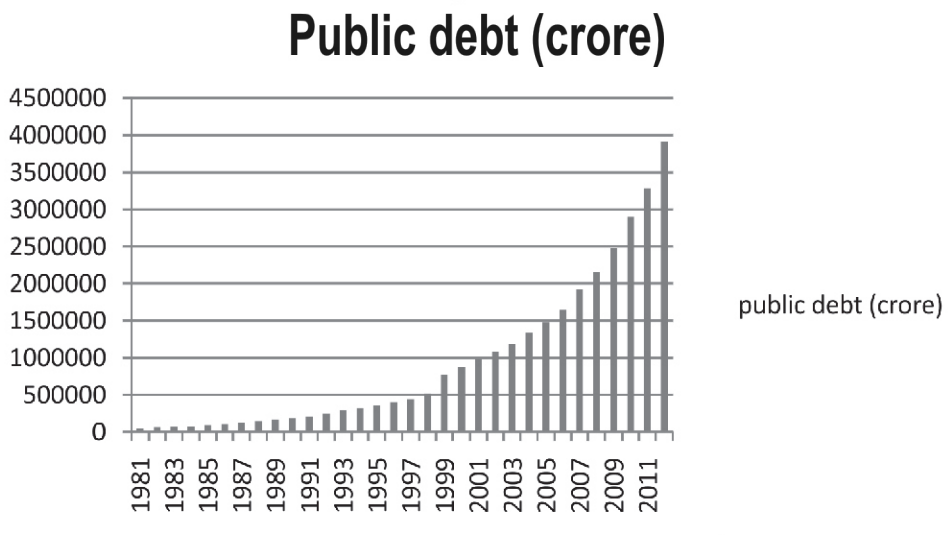
Table 1: Ratio of Public Debt to Gross Domestic Product during different years

Year	PD/GDP	Year	PD/GDP
1981-82	27.29	2001-02	41.79
1985-86	30.81	2005-06	40.18
1991-92	31.12	2010-11	37.24
1995-96	29.27	2012-13	38.78

Source: Author's own calculations by using data available in Indian Publ ic Finance Statistics, 2012-13.

Furthermore, the figure 1 shows the clear picture of volume of central government debt over a period of 32 years i.e., from 1981 to 2012. There has been continuous increase in the volume of government debt in India. It is 39 percent of Gross Domestic Product during 2012-13. India's public debt has been increasing since 1980s. As per RBI statistics, India's public debt increased from 32.1 percent of GDP in 1952 to 71.4 percent in 2001-02. The major increase in public debt was due to the increase in domestic debt which increased from 30.8 percent in 1952 to 68.2 percent in 2001-02.

Figure 1



Source: Author's own calculations by using data available in Indian Public Finance Statistics, 2012-13.

Economic Growth, Public Debt and Investment

Various studies available in literature show a mixed impact of public debt on economic growth. How public debt is affecting the macroeconomic variables like income, interest and investment etc; is an issue which has not been considered much. The various factors that affect economic growth are (1) Private saving (2) Public investment (3) Total Factor Productivity (TFP) and (4) Sovereign long term nominal and real interest rates.

For the present paper, Granger's Causality analysis and Regression analysis has been carried out. Both the tests are based on times series data. Time series data analysis has the underlying assumption of stationary data. Therefore, the testing of stationarity is the basic requirement for time series data. In the present analysis, Augmented Dickey Fuller test is applied for all the variables by taking Null hypothesis as 'presence of unit root' (i.e, presence of non stationarity). If the absolute computed value exceeds the absolute critical value, then, we reject the null hypothesis. And conclude that series is stationary and vice –versa. The variables under study are public debt, gross domestic product, gross investment and population growth. All the variables are expressed in logs. Here, log_PD_ is the log value of Public debt, GDP is the gross domestic product, and INV is the gross domestic capital formation. The variables are not stationary in levels at 5 percent level of significance. Therefore, all the variables are differenced once and Augmented Dickey Fuller test is conducted. The results of the test are shown in the Table no. 2

Table no 2. Result of Unit Root Test

First difference and Intercept alone		
Variables	Absolute Computed value	Absolute Critical value (5% level of significance)
log__PD_	5.715	(2.963)**
log_GDP	3.077	(2.963)**
log_INV	6.161	(2.963)**
Pop_growth_rate	5.197	(2.967)**

***Source**: Author's Estimation using Eviews 7.0. **Note**: * indicates the significance at 5 %.*

The table reveals that all the variables are stationary at first difference and intercept. Therefore, it can be concluded that the variables are stationary.

To analyze the relationship between economic growth and public debt Granger's causality analysis has been carried out which provides us the evidence of no causal linkage between the two variables. However, the correlation coefficient is 0.99.

Public Debt and Investment

In case of developing economy like India where Public debt is an important source used for planned investment. It will be imperative to first go for analyzing the relationship between public debt and investment. For this it is hypothesized that investment is determined by the economic growth of the economy, population growth and public debt.

$$_{it} = \beta_0+\beta_1 G+\beta_2 D+\beta_3 V+u_i \quad \text{.... (1)}$$

Where, I_t is investment, G is economic growth, D is the government debt and V is the population growth rate and u_i is the error term. The variables have been expressed in log terms. To estimate the relationship between public debt and investment, the equation has been estimated using the principle of ordinary least squares.

Table no.3: Regression results

(Heteroskedasticity-corrected, using observations 1981 -2012, (T = 32) Dependent variable: log_INV_)

Variables	*Coefficient*	*Std. Error*	*t-ratio*	*p-value****
Const	-1.02999	0.169483	-6.0773	<0.00001**
log__PD_	0.309234	0.119157	2.5952	0.01488***
log_GDP_	0.809615	0.125785	6.4365	<0.00001***
pop__Grwth_rate	-0.0724246	0.0340747	-2.1255	0.04250**

(Source:** Author's calculations using Gretl software**)

A perusal of the results of first regression equation provides us with the econometric estimates where public debt is associated with investment. The results show the positive and statistically significant relationship between investment and public debt (at 3 percent level of significance). One percent point increase in public debt is associated with 0.30 percent increase in investment. The results indicate that public debt effects investment in a positive manner i.e., if the resources generated through public debt is used for productive purposes then it will not affect the investment harmfully. Other variables like GDP and Population Growth also affect investment significantly. But the relationship is negative in case of population growth (at 5 percent level of significance). However, the relationship of GDP with Investment is positive and significant.

Public Debt and Growth

Next step is to analyze the effect of public debt on economic growth. We found evidences from the previous theoretical literature for the effect of public debt on economic growth. Here it is hypothesize that the economic growth or GDP will be determined by the public debt, investment and population growth rate.

$$G_t = \beta_0+\beta_1 I_t +\beta_2 D+\beta_3 V+u_i \quad \text{.... (2)}$$

All the variables are expressed in log terms. Here OLS method has been applied to investigate the relationship between economic growth and public debt.

Table no. 4: Regression results

(Heteroskedasticity-corrected, using observations 1981 -2012, (T = 32) Dependent variable: log_GDP_)

	Coefficient	*Std. Error*	*t-ratio*	*p-value*
Const	0.936642	0.0698313	13.4129	<0.00001***
log__PD_	0.394279	0.0348957	11.2988	<0.00001***
pop__Grwth_rate	0.0557864	0.0165394	3.3729	0.00219***
log_INV_	0.515598	0.0314635	16.3872	<0.00001***

(Source:** Author's calculations using Gretl software**)

Now the interpretation of second regression equation gives us the estimates where public debt is associated with economic growth. Here also results depict the positive and significant relationship between public debt and economic growth. All the three independent variables have positive and significant association with economic growth. One percent point increase in public debt is associated with 0.39 percent increase in GDP. Public debt and investment have positive and significant relationship with economic growth (at 0.1 percent level of significance) and population growth rate has positive and statistically significant relationship with economic growth (at 1 percent level of significance).

Conclusions and Policy Implications

In the present paper, an attempt has been made to investigate the empirical relationship between economic growth and public debt in India. The relationship between public debt and various economic policy indicators is well discussed in international research studies; but in Indian context, it is not much focused. There has been contrasting views of the economists on the relationship between public debt and economic growth.

From the analysis of the trends in public debt and Debt/GDP ratio it is very much clear that there has been continuous rise in Public debt. As far as relationship between economic growth and public debt is concerned, no causal relationship was found between them. But there was an evidence for the indirect relationship between public debt and economic growth through investment. Public debt was detected to be affecting the economic growth significantly. Also a statistically significant relationship between public debt and investment was found. The relationship of public debt turned out to be positive with both the variables. The positive relationship indicates that the resources being generated through debt have been used productively. It is clear from the fact that debt affects the investment positively; and investment and debt both affect GDP positively.

The positive and significant relationship implies that with rise in public debt there will be increase in investment and thus through investment it will lead to economic growth indirectly. However, it does not imply that there should be a substantial rise in the government debt because it may lead to various financial problems if the debt is not used productively. Another side of the story is the cost of servicing debt. It is also an important aspect and no government can go for raising debt to an unlimited extent as it poses the problem of financial instability for the economy. The rapid building up of public debt of central government may give rise to the emergence of several critical issues.

It has already been discussed that there are contrasting views regarding the impact of public debt on economic growth, the present study provides us the evidence of positive indirect relationship between public debt and economic growth via investment. Keynesian theory of public debt also relies on the positive aspect of public borrowings. Thus, the present study supports the Keynesian 'no burden' thesis. But the complete reliance on public debt for the investment is not a good alternative. Therefore, there is a need to take measures not to raise debt but to channelize the resources in the productive direction too.

References

Carl S, Shoup (2006). Public Finance, Transaction publishers, 2006.

Easterly,W. (2004).The widening gyre: the dynamics of rising public debt and falling growth. *NIPFP- IMF conference paper*, (January). New Delhi.

Economic Survey, *Government of India*, 2012-13.

Kumar, M.S. and J.Woo (2010). Public Debt and Growth. *International monetary fund working paper*. Cambridge university press: 1-45.

Meade, J.E (1958). Is the National Debt a Burden?. *Oxford economic papers*. New Series, Vol. 10, No. 2: 163-83.

Presbitero, A.F. (2010). Total public debt and growth in developing countries. *European Journal of development research*, Vol. 24, Issue: 4606-26.

Reinhart, C. and K. Rogoff (2009). The Aftermath of financial crises. *American Economic Review*, Vol.99, No.2: 466-72.

Singh, C (1999). Domestic Debt and Economic Growth in India, *Economic And Political weekly*. Vol. 34, No. 23: 1445-453.