Public Debt, Economic Growth and Fiscal Balance: Alternative Measures of Sustainability in the Indian Context

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Abstract

This article has examined the impact of public expenditure on economic growth and viability of fiscal policy when the deficit in budget is financed by public borrowing. A number of alternative criteria have been used as indicators of solvency in fiscal balance. The study is based on the theoretical framework and supported by the results of time series analysis in the Indian context. It is found that the share of revenue expenditure (RE) of the government has significantly increased over time and many of the components of RE are non-developmental in nature. The article argues that if growth suffers, it will put adverse impact on fiscal balance. The ratio of gross fiscal deficit (GFD) to net national product (NNP) and growth of NNP are co-integrated, and the ratio is found to increase with increase in NNP indicating deterioration in fiscal balance. The increase in total expenditure of the government has caused rise of the ratio of revenue deficit to total spending. Interest payment on public debt has led to the increase of the ratio of GFD to income. These results are indicators of non-viability of fiscal policy in India at least in the short run.

Keywords

Public borrowing, economic growth, gross fiscal deficit, interest payment, fiscal balance, viability

Introduction

The government expenditure has important role in the development of infrastructure, economic growth, health and education, employment generation and social welfare. The expenditure of the government can be broadly classified as expenditure for productive services and expenditure for consumption. The expenditure for productive services helps production and income of the country, whereas consumption expenditure renders utility to the households directly. The expenditures are also classified as revenue

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expenditure (RE) and capital expenditure (refer to the reports of the Reserve Bank of India (RBI)). The RE includes salary and wages, pension, subsidy, interest payment on public debt and various allowances of the government. It basically covers current expenditures of the government. The capital expenditure, on the other hand, includes investment for long-term growth. Both revenue and capital expenditures have developmental and non-developmental components. The government spending is financed by tax and non-tax revenues of the government. The taxes are imposed on income, capital, human skill and consumption. If there is deficit in the budget, the government resorts to the policy of public borrowing. Even in the absence of deficit, the government may adopt the policy of public debt to increase public expenditure. The net borrowing of the government is called fiscal deficit. If public expenditure is financed by public debt, then the viability of such fiscal policy becomes important and it depends on the nature and size of government spending, composition of public expenditure and productivity of various components of government spending, given the tax and revenue policies. If the available funds in the budget are allocated to less productive or unproductive heads or the funds are used for distributive purposes, economic growth is adversely affected and in effect, the collection of tax revenue of the government declines. In that case, the fiscal balance deteriorates. So, the nature of government spending and its impact on growth is important for sustainability of fiscal balance.

Barro (1990) has shown in an endogenous growth model with government spending that productive public expenditure enhances economic growth. Since taxation may have adverse impact on the economy he has determined the growth maximizing tax rate. However, optimum fiscal policy does not always mean maximization of economic growth. Distributive politics plays an important role in the developing countries, especially in countries with democratic set up. The size and nature of public expenditure are political decisions in many cases. The government and the politicians in power may be interested in maximization of political gain rather than maximization of growth while designing fiscal policies. If political gain from distributive expenditures is higher, the government will be encouraged to spend more on such heads at the cost of long-term growth (Sasmal, 2011). In that case, the debt burden of the government will increase putting adverse impact on fiscal balance. So, here again, economic growth becomes important for maintaining sound fiscal health.

The theory of economic growth suggests that public expenditure for the development of infrastructure, such as roads and railways, power generation, irrigation, telecommunication, etc., is important for economic growth. The expenditure on health and education, social welfare and cultural activities may also increase productivity but its effect on growth is generally realized in the long run. It is argued that the distributive expenditures, such as wages and salaries, allowances, pension, subsidies and direct transfers, generally slow down growth because a major part of such spending is non-developmental or less developmental in nature. Banerjee and Newman (1993) and Galor and Zeira (1993), however, demonstrate that if redistributive policies can enhance human capital, they can also accelerate growth. So, the nature of government spending is important for growth as well as for sustainability of fiscal balance.

In India, the share of RE in the annual budget of the government has increased over time and in the recent years, it has crossed 80 per cent of the total expenditure. Naturally, allocation of funds for capital expenditure has declined to less than 15 per cent. This is likely to have an adverse impact on the economic growth, and if growth suffers, fiscal balance will deteriorate. It may so happen that fresh loan is being taken to make payment of interest on previous loans. This is an indication of insolvency in fiscal position. The simple argument is that if public debt is taken for financing public expenditure but the funds are used for non-productive or distributive purposes, the fiscal policy will not be viable in the long run. This article tries to analyse the impact of public debt on economic growth and fiscal balance. A number of alternative criteria have been used in this article to judge the sustainability of fiscal balance in the country.

The structure of the article is as follows: the review of literature has been presented in the next section. The objectives of the study have been stated in the third section. Fourth section gives the theoretical

framework. The data source and the methodology of analysing data have been explained in fifth section. The econometric analysis, results and discussion have been presented in sixth section. Seventh section gives conclusion and managerial implications of the study. At the end of the article, there is acknowledgement followed by references.

Review of Literature

The ratio of government spending to the GDP is taken as a measure of the size of government. The Median Voter theory suggests that if inequality is high in the society there will be demand for a larger government. That means, size of public expenditure will be large. Now, if income and capital are taxed at high rates in order to finance larger spending, the incentive for investment and growth will decline (Alesina & Rodrik, 1994; Meltzer & Richard, 1981; Persson & Tabellini, 1994). Alesina and Rodrik (1994) and Persson and Tabellini (1994) have demonstrated that inequality is harmful for growth. Their explanation is that growth is driven by accumulation of capital and if the inequality is high, the demand for redistribution of income will be also high. In that case, capital and income will be taxed at high rates and this will discourage investment and growth.

Apart from size of government spending, the composition of public expenditure is also important for growth. So far as the effect of composition of government expenditure on economic growth is concerned, mixed results are obtained. In Devarajan, Swaroop and Zou (1996) and Ghosh and Gregoriou (2008), current expenditure of the government is found to be more productive than capital expenditure in a cross-country study based on panel data. The findings of the study do not support the view that capital expenditure of the government is more helpful for economic growth. Barro (1991) and Chen (2006) have obtained opposite results. They have found that capital expenditure has significant positive impact on growth. Agenor (2008) demonstrates that government expenditure helps economic growth if human capital is formed in the process of government spending. The study of Marjit, Sasmal and Sasmal (2013) in the Indian context has shown that public expenditure on infrastructure has significant positive impact on per capita income. Similar results have been obtained by Sasmal and Sasmal (2014, 2016).

This article analyses the question of sustainability of fiscal balance in the context of public debt, government spending and economic growth. Apart from public expenditure, there are many other factors that accelerate growth. For example, capital accumulation, trade liberalization, foreign investment and financial structure are also very important in this respect. Chirwa and Odhiambo (2017) show the key macroeconomic determinants of economic growth in Zambia using autoregressive distributed lag (ARDL) bounds testing approach. Their study finds that investment and human capital formation are positively associated with economic growth. Similar results have been obtained in the study of Bal, Dash and Subhasish (2016) who show in the Indian context that capital formation has significant positive impact on economic growth along with trade openness, total factor productivity and exchange rate. Sehrawat and Giri (2017) and Best, Francis and Robinson (2017) have concluded that financial structure is also important for economic growth. The study of Shahbaz and Rahman (2012) show that financial development, imports and FDI have positive and significant effect on economic growth in Pakistan.

Most of the growth models assume balanced budget government spending. But this article has considered economic growth with deficit budget and the deficit is financed by borrowing of the government. The structure of Bruce and Turnovsky (1999) has been used as analytical framework of this article in a modified way. Bruce and Turnovsky (1999) have considered a deficit budget growth model and examined the sustainability of fiscal balance in a balanced growth path. They have concluded on the basis of theoretical results that the fiscal balance will be sustainable in the long run if it can generate sufficient primary budget surplus to repay the initial outstanding debt of the government. If it fails to

generate sufficient surplus in primary budget, the provision of lump-sum tax will be needed to repay the outstanding loans. Since the model has assumed a balanced growth path, both income and public debt will grow at the same rate. So, there is no scope for making outstanding public debt zero unless sufficient surplus is generated in primary budget or lump-sum taxes are collected from the people of the country. The collection of lump-sum tax to fill up the gap in fiscal balance is theoretically plausible but it may not be a feasible option in practice. Using the term 'dynamic scoring', Bruce and Turnovsky (1999) have developed a sustainability index of fiscal policy, denoted by V . Their article suggests that given the fiscal measures, such as tax rates and expenditure ratios, if the system can generate sufficient primary budget surplus along the balanced growth path, V will be equal to zero indicating that the fiscal policy is viable in the long run. If V is positive, then the fiscal policy is unsustainable in that lump-sum tax that is necessary to maintain sustainability in the fiscal balance. It also indicates that if the government is running a primary deficit (PD), it means that the debt burden of the government with respect to income is piling up. In any case, if primary budget deficit declines, the fiscal balance improves. There is rich literature on public expenditure and economic growth but how fiscal balance is affected by public debt and composition of public expenditure has not drawn much attention in the study of public finance and fiscal policy. Therefore, the present study makes an attempt to analyse the effect of public debt on economic growth and sustainability of fiscal balance, especially when the government spends more on distributive purposes at the cost of long-term growth.

Objectives

Using the framework of Bruce and Turnovsky (1999) in modified form, this article proposes alternative criteria for judging solvency in fiscal balance and the viability of fiscal policy. The theoretical propositions on fiscal balance have been empirically verified by time series analysis based on Indian data. Here, the ratio of gross fiscal deficit (GFD) to net national product (NNP) and the ratio of GFD to total expenditure of the government have been taken as measures of solvency in fiscal position. If these ratios decline, it will suggest that fiscal position improves. Similar interpretation is made by the ratio of revenue deficit to total expenditure of the government. Interest payment on public debt is an important component of RE and it is also an indicator of the size of debt burden. If the ratio of GFD to NNP increases, interest payment on public debt will increase implying that the condition of fiscal balance deteriorates. On the other hand, if the ratio of GFD to NNP remains constant, it may be considered as a kind of stability in fiscal balance at least in the short run. So, this article is not considering the long-run sustainability of fiscal policy as such. It is trying to judge the condition of fiscal balance in the short run on the basis of the aforementioned criteria.

Therefore, the objectives of this study are:

1. to examine whether the ratio of GFD to NNP and the ratio of GFD to total expenditure of the government are increasing over time.
2. to examine the long-run relationship between the growth rate of the ratio of fiscal deficit to NNP and the growth rate of NNP using time series analysis.
3. to examine the long-run relationship between the ratio of GFD to NNP and interest payment on public debt using the test of co-integration and causality.
4. to find the test of co-integration between the rate of growth of the ratio of fiscal deficit to NNP and the rate of growth of total expenditure.

Theoretical Framework

The Model

The model of Bruce and Turnovsky (1999) has been used in this article with some modifications to build up the analytical framework of the present study. Here, we have considered an economy where output Y is produced from private capital stock, K and productive service from government expenditure, denoted by G_p . In Cobb–Douglas form, the production function is:

$$Y = G_p^\infty K^{1-\infty}, \quad (1)$$

where the production technology exhibits constant returns to scale (CRS) with diminishing returns.

The iso-elastic inter-temporal utility function of the representative household is as follows:

$$u = \frac{1}{\gamma} (CG_C^\eta)^\gamma, \quad (2)$$

where C is private consumption, G_C is consumption expenditure of the government, η is the measure of utility of the households from G_C and γ is the measure of elasticity of inter-temporal utility. Here, $\eta > 0$ and $-\infty < \gamma < 1$.

The budget constraint of the household is:

$$\dot{B} + \dot{K} = (1 - \tau)(Y + rB) - C, \quad (3)$$

where τ is the tax rate on income, B is value of government debt and r is rate of interest paid by the government on public debt. The imposition of lump-sum tax is not always possible. Tax is imposed on income and again, consumption is a function of income. So, to keep the model simple, it is assumed that there is no lump-sum tax and tax is not imposed on consumption. Tax is imposed only on income.

The government follows a deficit budget expenditure policy and faces the following budget constraint in the short run:

$$\dot{B} = r(1 - \tau)B + G - \tau Y \quad (4)$$

The difference between current spending and tax revenue in Equation (4) is deficit in the budget which is financed by fresh borrowing of the government denoted by $\dot{B}$. G is the sum of expenditure on productive services, G_p and consumption expenditure, G_C , that is, $G = G_p + G_C$. The given fiscal parameters are τ , G_p and G_C . The saving of the household is divided into two parts—(a) accumulation of private capital and (b) lending to the government by purchasing bonds. The return from these two types of assets is same.

The objective of the representative household is:

$$\text{Max } U = \int_0^\infty \frac{1}{\gamma} (CG_C^\eta)^\gamma e^{-\rho t} dt \quad (5)$$

s.t. Equation (3) and the given fiscal parameters.

ρ is the rate of discount of future utility. It is a dynamic optimization problem. Following Chiang (1992), the problem in Equation (5) can be solved using the Maximum Principle of the optimal control theory. The current-value Hamiltonian is:

$$H = \frac{1}{\gamma} (C G_C^\eta)^\gamma + \lambda \left[\{ (1 - \tau)(Y + rB) \} - C \right]. \quad (6)$$

Here, K is the state variable and λ is co-state variable and it is current-value shadow price of K .

The FOCs for maximization of H are:

$$\frac{\partial H}{\partial C} = (C G_C^\eta)^{\gamma-1} G_C^\eta - \lambda = 0 \quad (7)$$

$$-\frac{\partial H}{\partial K} = \dot{\lambda} = \lambda \rho - \lambda (1 - \tau)(1 - \alpha)(G_P/K)^\alpha \quad (8)$$

along with transversality conditions. The second-order condition is satisfied by strict concavity of H in C and K jointly.

The marginal product of K is $\frac{\partial Y}{\partial K} = (1 - \alpha)(G_P/K)^\alpha$, which is equal to r . After-tax return on K is $(1 - \tau)r$ and it is equal to the after-tax rate of interest on government borrowing. If productive expenditure of the government (G_P) per unit of K increases, rate of return also increases (follows from $\frac{\partial Y}{\partial K}$).

Taking log of Equation (7) and differentiating w.r.t. time we get,

$$\frac{\dot{\lambda}}{\lambda} = (\gamma - 1) \frac{\dot{C}}{C} + \eta \gamma \frac{\dot{G}_C}{G_C}. \quad (9)$$

The simplification of Equation (8) gives

$$\frac{\dot{\lambda}}{\lambda} = \rho - (1 - \tau)r, \text{ where } r = (1 - \alpha)(G_P/K)^\alpha. \quad (10)$$

Assuming balanced growth, we can determine the equilibrium growth path of consumption from Equations (9) and (10) as

$$\frac{\dot{C}}{C} = \frac{r(1 - \tau) - \rho}{1 - \gamma(1 + \eta)}. \quad (11)$$

In balanced growth, all the variables grow at the same rate and then we get the growth rate

$$\mu = \frac{\dot{C}}{C} = \frac{\dot{Y}}{Y} = \frac{\dot{K}}{K} = \frac{\dot{G}_P}{G_P} = \frac{\dot{G}_C}{G_C} = \frac{\dot{B}}{B} = \frac{r(1 - \tau) - \rho}{1 - \gamma(1 + \eta)}.$$

Since G_P and K will grow at the same rate r which is constant and then it satisfies the requirement of endogenous growth. Given the tax rate τ , growth rate μ is also constant. G_P and G_C are constant at a particular point in time but they grow at the same rate with Y in balanced growth. Now we can express the ratios as follows:

$$\frac{G_P}{Y} = g_P, \quad \frac{G_C}{Y} = g_C,$$

where g_P and g_C are constant over time. Again, from the production function in Equation (1), we can write constant r as $r = (1 - \alpha)(g_P)^{\frac{\alpha}{1-\alpha}}$ where g_P is constant in balanced growth.

Some Comparative Static Results

$$\frac{\partial \mu}{\partial \eta} = \frac{r(1-\tau) - \rho}{-\gamma} < 0 \quad (12)$$

$$\frac{\partial \mu}{\partial g_p} = \frac{(1-\tau)(1-\alpha) \left(\frac{\alpha}{1-\alpha} \right) g_p^{\frac{\alpha-(1-\alpha)}{1-\alpha}}}{1-\gamma(1+\eta)} > 0 \quad (13)$$

$$\frac{\partial \mu}{\partial \tau} = \frac{-r-\rho}{1-\gamma(1+\eta)} < 0 \quad (14)$$

The implication of Equation (12) is that if the households get higher utility from consumption expenditure of the government, a greater share of the fund will be allocated for G_c , and the expenditure share for productive activities (G_p) will decline with the result that growth rate will also decline. As $\left(\frac{G_p}{K}\right)$ declines, marginal product of K (i.e., r) also declines. In effect, growth rate of the economy declines. It is likely to have adverse impact on fiscal balance. The implication of Equation (13) follows from production function and rate of return on capital. If g_p increases, rate of return on capital increases. As a result, accumulation of capital stock will be higher leading to higher growth rate in the economy. Equation (14) can be interpreted in the same line. If tax rate τ is increased, after-tax return on capital will decline. This will create disincentive for capital accumulation thereby reducing the growth rate.

Sustainability of Fiscal Balance

Following Bruce and Turnovsky (1999), the short-run budget constraint of the government has been specified in (4) as

$$\dot{B} = r(1-\tau)B + G - \tau Y, \quad (4)$$

where B is the value of public debt and B' is the number of perpetuities. Here, $B' = r \cdot B$, that is, $B = \frac{B'}{r}$ and $G = G_c + G_p$.

We can write Equation (4) as

$$\dot{B} = r(1-\tau)B + G_c + G_p - \tau Y. \quad (4)'$$

Now expressing Y in terms of its equilibrium ratio of K and using B' in place of B we can write (4)' as

$$\frac{\dot{B}'}{r} = (1-\tau)B' + \left\{ \frac{g_c + g_p - \tau}{1-\alpha} \right\} r \cdot K \text{ where } \frac{Y}{K} = \frac{r}{1-\alpha} \text{ and } Y = rK \frac{1}{1-\alpha} \quad (15)$$

Deducting $\frac{\dot{B}'}{r}$ from both sides of Equation (15), we obtain

$$0 = (1 - \tau) B' - \frac{\dot{B}'}{r} + \left\{ \frac{g_C + g_P - \tau}{1 - \alpha} \right\} rK \quad (16)$$

After simplification, Equation (16) can be expressed as

$$\{\tau - g_C - g_P\} = \left(\frac{B}{K} \right) \{r(1 - \tau) - \mu\} \cdot \frac{(1 - \alpha)}{r}, \quad (17)$$

where $\left(\frac{B}{K} \right)$ is constant along the balanced growth path.

Here, $\{\tau - g_C - g_P\}$ can be written as $\frac{1}{Y} \{T - G_C - G_P\}$,

where $(T - G_C - G_P)$ is defined as Primary Deficit (PD). So, $\frac{1}{Y} \{T - G_C - G_P\}$ is the ratio of current primary deficit to income (PD/Y). Therefore, Equation (17) can be expressed as

$$\psi = \frac{PD}{Y} = \left(\frac{B}{K} \right) \{r(1 - \tau) - \mu\} \cdot \frac{(1 - \alpha)}{r}. \quad (18)$$

The right-hand side of Equation (18) is constant. The implication is that the ratio of PD/Y remains constant in a balance growth model. This constant ratio may be conceived as an indicator of short-run stability in fiscal balance. Since there is Cobb–Douglas production function with CRS and the economy is in a balanced growth path, government debt (B) increases at the same rate with Y and as a result, the ratio of PD/Y remains constant. So long as this ratio remains constant, it maintains a sort of sustainability in fiscal balance. But in practice, if this ratio increases, the fiscal balance deteriorates. Conversely, if this ratio declines, fiscal balance improves. One point to be clarified here is that if interest payment on public debt is excluded from revenue deficit, it is called PD. In this article, interest payment on government loan has been considered separately (refer Equation (4)). However, in empirical analysis, both revenue deficit and GFD have been taken as measures of viability of fiscal balance in the short run. Here, from Equation (18), we get

$$\frac{\partial \psi}{\partial \mu} = - \left(\frac{B}{K} \right) \left\{ r(1 - \tau) \cdot \frac{(1 - \alpha)}{r} \right\} < 0, \quad (19)$$

That means, if growth rate increases, the fiscal balance will improve. Similarly, if tax rate is reduced it will lead to improvement in fiscal balance via its impact on growth rate, where $\frac{\partial \mu}{\partial \tau} < 0$.

$$\frac{\partial \psi}{\partial \tau} = \left(\frac{B}{K} \right) \left[- \frac{\partial \mu}{\partial \tau} \right] \cdot \frac{(1 - \alpha)}{r} > 0. \quad (20)$$

Data Source and Methodology

The source of data used in this study is RBI (2010–2011 and 2015–2016). The data on revenue and capital expenditures of the government, total expenditure of the government, GFD, revenue deficit, interest payment on public debt, NNP (both at current and constant prices) and private capital formation have been used in this article. These are all time series annual data for the period from 1970–1971 to 2015–2016.

Apart from providing empirical information on the nature of public expenditure, magnitude of public debt and rate of economic growth in India over time, these data have been used for the exercises of time series analysis of the problems of this study. In time series analysis, the test of stationarity of the series of the variables has been done using augmented Dickey–Fuller unit root test following the methods outlined in Enders (2004). After the test of stationarity, the Engle–Granger co-integration test has been done to examine the long-run relationship among the variables. When the series are found to be co-integrated, OLS regression has been done to find out the nature and magnitude of relationship between the variables over time. In certain cases, pair-wise Granger causality test has been carried out to check the direction of causality between the variables. Since most of the variables have been expressed in ratios or fractions, the variables of big numbers have been taken in log. The whole exercise of time series analysis of this study is based on the techniques outlined in Enders (2004), and the results have been estimated using the software Eviews.

Empirical Evidences from India

This section gives information on the share of RE and capital expenditure in total expenditure of the government, the ratio of GFD to NNP, the ratio of revenue deficit to NNP and other aspects of fiscal condition in India over time. This information will help us to have an idea of the fiscal position of the country at a glance. At the same time, these data will be used for analysing sustainability of fiscal balance of India in terms of alternative criteria.

The data in Table 1 show that the share of RE in total expenditure of the Central Government of India has increased over time. It has increased from 55 per cent to more than 80 per cent during the period from 1970–1971 to 2015–2016. On the other hand, the share of capital expenditure has declined from 45 per cent to below 15 per cent in the same period. This has important implication for economic growth. The RE includes wages and salaries, interest payment on public debt, subsidy, pension, etc. As per RBI classification, interest payment and pension are included under the category of non-developmental expenditures. Wages and salaries, on the other hand, may be part of both developmental and non-developmental expenditures. For example, salary of an engineer in a power plant or wage of a worker in a railway workshop is considered as part of developmental expenditure. At the same time, wages and salaries for administrative services, such as Police, District administration, etc., are included under non-developmental category of expenditures in RBI classification (Reserve Bank of India, 2010). It is true that spending more on wages and salaries does not always increase productivity and income. Subsidy, in general, is a part of developmental expenditure because subsidy on food, fertilizer, electricity, health service, etc., helps social and economic development of a country. But there are cases where subsidies are not supported by pure economic logic and it is advised to curtail such subsidies to reduce the fiscal burden of the government. The share of interest payment in RE has increased from 10 per cent to 30 per cent during this period. The purpose of highlighting these figures is to show that not only the share of government expenditure on non-developmental or economically less important heads has increased but also the debt burden of the government has increased over time. This has important implication for both economic growth and stability of fiscal balance. The GFD as percentage of NNP has exhibited an increasing trend over time although it has fluctuations at certain points of time (refer Table 1 and Figure 1). The revenue deficit as percentage of NNP has shown an increasing trend throughout the period. These are reflections of unfavourable situation in fiscal balance in the country. Figure 2 shows that the annual growth rate of NNP at constant prices has fluctuations around 4 per cent–8 per cent over the years. That means, the growth rate is not constant and neither is it identical with the growth rates of other macroeconomic variables. That means, India has not experienced balanced growth during the period of

Table 1. The Nature of Expenditure of the Government of India over Time

Year	Revenue Expenditure (RE) as Percentage of Total Expenditure	Capital Expenditure (CE) as Percentage of Total Expenditure	Interest Payment on Loan as Percentage of Revenue Expenditure	Gross Fiscal Deficit as Percentage of NNP	Revenue Deficit as Percentage of NNP
(1)	(2)	(3)	(4)	(5)	(6)
1970–1971	55	45	10.77	0.32	–0.04
1971–1972	57	43	9.72	0.39	0.02
1972–1973	57	43	9.87	0.48	0.00
1973–1974	58	42	10.73	0.37	–0.05
1974–1975	57	43	10.07	0.50	–0.17
1975–1976	56	44	9.92	0.55	–0.16
1976–1977	60	40	10.89	0.75	–0.06
1977–1978	58	42	10.61	0.66	–0.08
1978–1979	56	44	10.57	0.99	–0.05
1979–1980	62	38	11.43	1.16	0.13
1980–1981	63	37	11.43	1.41	0.35
1981–1982	60	40	12.64	1.40	0.06
1982–1983	60	40	12.78	1.68	0.21
1983–1984	62	38	13.49	1.91	0.37
1984–1985	63	37	13.69	2.47	0.60
1985–1986	64	36	14.26	2.97	0.80
1986–1987	64	36	14.69	3.45	1.02
1987–1988	67	33	16.48	3.43	1.16
1988–1989	68	32	18.04	3.56	1.21
1989–1990	69	31	19.11	3.87	1.30
1990–1991	69	31	20.41	4.61	1.92
1991–1992	73	27	23.87	3.72	1.67
1992–1993	75	25	25.34	3.90	1.81
1993–1994	76	24	25.90	5.53	3.00
1994–1995	75	25	27.41	4.98	2.68
1995–1996	78	22	28.07	4.84	2.39
1996–1997	79	21	29.59	4.95	2.43
1997–1998	77	23	28.28	6.33	3.31
1998–1999	77	23	27.88	7.57	4.47
1999–2000	83	17	30.27	6.59	4.25
2000–2001	85	15	30.50	7.21	5.17
2001–2002	83	17	29.65	8.08	5.74
2002–2003	81	19	28.50	8.03	5.97
2003–2004	76	24	26.33	6.28	5.01
2004–2005	77	23	25.47	4.79	2.99
2005–2006	86	14	26.20	5.10	3.21
2006–2007	88	12	25.13	4.84	2.55
2007–2008	83	17	24.82	4.37	1.53
2008–2009	89	11	21.74	6.70	5.04
2009–2010	89	11	20.79	7.24	5.87
2010–2011	86	14	19.54	5.38	3.63
2011–2012	87	13	20.39	6.41	4.90
2012–2013	88	12	22.20	5.59	4.15
2013–2014	87	13	23.99	5.06	3.59
2014–2015	88	12	24.18	4.64	3.32
2015–2016	86	14	24.79	4.47	2.85

Source: The figures have been calculated by authors from the data taken from the Reserve Bank of India (2010–2011 and 2015–2016).

Figure 1. Ratio of gross fiscal deficit (GFD) to net national product (NNP) at current prices.

Source: Based on the data taken from Handbook of Statistics on the Indian Economy, Reserve Bank of India, 2010–11 and 2015–16.

this study. Then, it is necessary to see what happens to the ratio of GFD to NNP or the ratio of revenue deficit to NNP. Table 1 shows that both ratios have increased giving indication that fiscal position has deteriorated over time.

Time Series Analysis: Results and Discussion

Time series analysis has been carried out in this subsection to examine the long-run relationship among the macro-variables in this study. For the purpose of time series analysis, the test of stationarity of the series of growth rate of NNP at current prices (GR_NNP), growth rate of the ratio of private capital to NNP at current prices (GR_Pvt_Cap_NNP), growth rate of the ratio of GFD to NNP at current prices (GR_GFD_NNP), growth rate of NNP at constant prices (GR_NNP_CNBP), growth rate of total expenditure of the government at current prices (GR_TE_BN), ratio of revenue deficit to total expenditure at current prices (Rev_def_TE), log of total expenditure (ln_TE), ratio of GFD to NNP at current prices (GFD_NNP), interest payment on public debt (INT) and RE of the government (RE) has been done using augmented Dickey–Fuller unit root test. The series have been found stationary as required in co-integration test. After the test of stationarity, the Engle–Granger co-integration test has been carried out to find the long-run relationship among the variables.

The results in Table 2a show that growth rate of the ratio of private capital to NNP and growth rate of NNP are co-integrated. That means, there is meaningful long-run relationship between them. It is evident from OLS regression in Table 2b that growth rate of private capital has significant positive effect on NNP growth. But all components of public expenditure are not helpful for growth (Sasmal & Sasmal, 2014).

Figure 2. Growth rate of NNP at constant prices over time.

Source: Based on the data taken from Handbook of Statistics on the Indian Economy, Reserve Bank of India, 2010–11 and 2015–16.

If the share of non-productive expenditure increases, economic growth will suffer and this will, in turn, adversely affect fiscal balance.

The ratio of GFD to NNP (GFD_NNP) is a key indicator of the condition of fiscal balance. If GFD_NNP increases, debt burden of the government increases relative to income and it adversely affects the viability of the fiscal policy. On the other hand, if this ratio declines, fiscal balance improves. In Table 3a, growth rate of the ratio of GFD to NNP is found to be co-integrated with the growth of NNP implying that there is meaningful long-run relationship between these two variables. Since the variables are co-integrated, the estimates of OLS regression are efficient. The results of OLS regression in Table 3b show that the effect of growth rate in NNP on the growth rate of the ratio of GFD and NNP is statistically significant and negative. That means, if growth rate of NNP falls, the ratio of GFD and NNP will increase indicating that the condition of fiscal balance deteriorates. It is important to note that the viability of fiscal policy is being considered in this article in the context of public debt and economic growth. If public expenditure is financed by government borrowing but government spending fails to generate sufficient growth in income, debt burden of the country will increase with respect to income and this will lead to deterioration of fiscal balance. Figure 2 exhibits fluctuating growth rates of NNP at constant prices. According to the econometric results, when growth rate declines, it puts adverse impact on the ratio of GFD and NNP, and it is consistent with the theoretical arguments. It also indicates that the economy is not on a balanced growth path.

Table 4a shows that growth rate of the ratio of GFD to NNP and the growth rate of total expenditure of the government (at current prices) are co-integrated. That means, there is a meaningful long run relationship between them. So, OLS regression estimates will be efficient estimates. Interestingly, the effect of the growth rate of the total expenditure on the growth rate of the ratio of GFD and NNP is positive and statistically significant (refer to the results in Table 4b). That means, if total expenditure increases, it will raise the ratio of GFD to NNP. The implication of the result is very interesting. When

Table 2a. Engle–Granger Co-integration Test Between Growth Rate of the Ratio of Private Capital to NNP (GR_Pvt_Cap_NNP) and Growth Rate of NNP (GR_NNP)

Series: GR _ Pvt _ Cap _ NNP GR_NNP

Sample (adjusted): 1971–2007

Observations: 37

Null hypothesis: Series are not co-integrated.

Dependent	tau_statistic	Prob *	Z-statistic	Prob *
GR_NNP	–5.326	0.000	–30.495	0.000
GR_Pvt_Cap_NNP	–8.580	0.000	–153.617	0.000

Source: The results are based on the data taken from the Reserve Bank of India (2010–2011 and 2015–2016).**Note:** * Mackinnon (1996) *p*-values.**Table 2b.** OLS Regression of GR_NNP on GR_Pvt_Cap_NNP

Variable	Coefficient	<i>t</i> -statistic	Prob
GR_Pvt_Cap_NNP	–0.080	1.816 *	0.077
Constant	12.292	14.501 **	0.000

Source: The results are based on the data taken from the Reserve Bank of India (2010–2011 and 2015–2016).**Notes:** $R^2 = 0.08$;

* indicates significant at 5% level; and

** significant at 1% level.

Table 3a. Engle–Granger Co-integration Test Between Growth Rate of the Ratio of Gross Fiscal Deficit to Net National Product (GR_GFD_NNP) and Growth Rate of Net National Product at Constant Prices (GR_NNP_CNSP)

Series: GR _ GFD _ NNP GR _ NNP _ CNSP

Sample (adjusted): 1971–2015

Observations: 45

Null hypothesis: Series are not co integrated.

Dependent	tau_statistic	Prob *	Z-statistic	Prob *
GR_GFD_NNP	–7.7724	0.000	–51.471	0.000
GR_NNP_CNSP	–7.1878	0.000	–47.219	0.000

Source: The results of have been obtained by the authors from the data taken from the Reserve Bank of India (2010–2011 and 2015–2016).**Note:** * Mackinnon (1996) *p*-values.**Table 3b.** OLS Regression of GR_GFD_NNP on GR_NNP_CNSP

Dependent variable: GR_GFD_NNP

Sample (adjusted): 1971–2015

Observations: 45

Variable	Coefficient	<i>t</i> -statistic	Prob
GR_NNP_CNSP	–2.3658	–2.822 *	0.007
Constant	20.5917	3.894 *	0.000

Source: The results have been obtained by the authors from the data taken from the Reserve Bank of India (2010–2011 and 2015–2016).**Notes:** $R^2 = 0.15$; and

* indicates significant at 1% level.

the government plans to increase total spending, it has to depend more on public borrowing. Naturally, the ratio of GFD to NNP increases signifying that debt burden of the government with respect to income is increasing and the fiscal position deteriorates.

Revenue deficit is another important indicator of fiscal health. It is defined as the difference between RE and revenue receipt from current activities. If there is revenue deficit, it means that revenues from current activities are not sufficient to meet the expenditures, such as wages and salaries, interest payment on previous loans, subsidy, allowances and other expenses in the current account. The results in Table 5a show that the ratio of revenue deficit to total expenditure (Rev_def_TE) is co-integrated with total expenditure. That means, long-run relationship between them is meaningful. It is plausible that revenue receipt is inadequate to finance the expenditures of the current account. As a result, the government has to depend on public borrowing. Naturally, the ratio of revenue deficit to total spending increases as total expenditure increases. It is an indication of financial insolvency. This argument is supported by the results in Tables 5b and 5c. In the test of causality in Table 5b, total expenditure is found to Granger cause the ratio of revenue deficit to total expenditure. In OLS regression also in Table 5c, total expenditure is found to have positive and statistically significant effect on the ratio of revenue deficit to total spending. The implication is very clear. If total spending of the government increases, it will cause revenue deficit to increase because the government has to depend on public borrowing for higher spending. It is to be noted here that Rev_def_TE is a fraction while TE is a big number. That is why TE has been taken in log.

Interest payment on public debt is an important indicator of judging the sustainability of fiscal policy. It is an important component of RE also. When revenue deficit is very high, fresh loan is required to make payment of interest on previous loans. This is not a healthy situation in fiscal policy. In Table 6a, the ratio of GFD to NNP (GFD_NNP) is co-integrated with interest payment on public debt (INT). That means, the long-run relationship between them is meaningful. There is a circular reasoning in this relationship. If the amount of public debt is high, interest payment will be high. Then greater amount of fresh borrowing will be needed to make the payment of interest on previous loans. As a result, GFD as ratio of NNP will increase. In the test of causality in Table 6b, INT Granger causes GFD_NNP and in OLS regression in Table 6c, interest payment has significant positive impact on GFD. These results have very important economic implications. If outstanding debt burden is high, the amount of interest payment will be also high. In that case, revenue receipt will not be sufficient to make the payment of interest on loan after meeting other liabilities of RE. Naturally, fresh borrowing will increase and as a result, the ratio of GFD to NNP will increase. All these are symptoms of insolvency in fiscal balance. The results of Tables 6a, 6b and 6c are further substantiated by the results of Tables 7a, 7b and 7c. The results in 7a show that the series of the share of RE in total expenditure (RE) and the share of interest payment in RE (INT_R) are co-integrated. Not only that INT_R Granger causes RE and INT_R has significant positive impact on RE (refer Tables 7b and 7c). Therefore, it follows that one important reason of increasing share of RE in total expenditure of the government is interest payment on public debt.

Conclusion

This article has analysed the viability of fiscal policy and sustainability of fiscal balance using a number of criteria, in a situation when the government resorts to the policy of public borrowing to finance public expenditure. The ratio of GFD to NNP (GFD_NNP), ratio of revenue deficit to NNP (Rev_def_NNP), ratio of GFD to total expenditure (GPD_TE), the share of interest payment on public debt (INT) in RE have been taken as indicators of solvency in fiscal balance and viability of fiscal policy. The analytical framework of this study is based on Bruce and Turnovsky (1999). The theoretical propositions have been

Table 4a. Engle–Granger Co-integration Test Between the Growth Rate of the Ratio of Gross Fiscal Deficit to NNP at Current Prices (GR_GFD_NNP) and Growth Rate of Total Expenditure of the Government at Current Prices (GR_TE_BN)

Series: GR _ TE _ BN GR _ GFD _ NNP

Sample (adjusted): 1971–2015

Observations: 45

Null hypothesis: Series are not co-integrated.

Dependent	tau_statistic	Prob *	Z-statistic	Prob *
GR_GFD_NNP	–8.1130	0.000	–53.232	0.000
GR_TE_BN	–8.1371	0.000	–53.229	0.000

Source: The results are authors' calculations based on the data taken from the Reserve Bank of India (2010–2011 and 2015–2016).

Note: * Mackinnon (1996) *p*-values.

Table 4b. OLS Regression of GR_GFD_NNP on GR_TE_BN

Dependent variable: GR_GFD_NNP

Sample (adjusted): 1971–2015

Observations: 45

Variable	Coefficient	t-statistic	Prob
GR_TE_BN	1.2923	3.7890 *	0.000
Constant	–10.3059	–1.9096 **	0.062

Source: The results are authors' calculations based on the data taken from the Reserve Bank of India (2010–2011 and 2015–2016).

Notes: $R^2 = 0.25$;

* indicates significant at 1% level; and

** significant at 5% level.

Table 5a. Engle–Granger Co-integration Test Between the Ratio of Revenue Deficit and Total Expenditure (Rev_def_TE) and Log of Total Expenditure of the Government (ln_TE)

Series: Rev_def_TE ln_TE

Sample: 1970–2015

Observations: 46

Null hypothesis: Series are not co-integrated.

Dependent	tau_statistic	Prob *	Z-statistic	Prob *
Rev_def_TE	–3.423	0.055	–20.560	0.025
ln_TE	–2.707	0.215	–15.154	0.104

Source: The results are obtained from the data taken from the Reserve Bank of India (2010–2011 and 2015–2016).

Note: * Mackinnon (1996) *p*-values.

Table 5b. Pair-wise Granger Causality Test

Sample: 1970–2015			
Lags: 2			
Null Hypothesis:	Obs	F-statistic	Prob.
ln_TE does not Granger cause Rev_def_TE	44	3.565	0.037
Rev_def_TE does not Granger cause ln_TE		0.818	0.448

Source: The results are obtained from the data taken from the Reserve Bank of India (2010–2011 and 2015–2016).

Table 5c. OLS Regression of Ref_def_TE on ln_TE

Sample: 1970–2015			
Observations: 46			
Variable	Coefficient	t-statistic	Prob.
ln_TE	5.358	11.859 *	0.000
Constant	–24.508	–7.434 *	0.000

Source: The results are obtained from the data taken from the Reserve Bank of India (2010–2011 and 2015–2016).

Notes: $R^2 = 0.76$; and

* indicates significant at 1% level.

Table 6a. Engle–Granger Co-integration Test Between (GFD_NNP) and Interest Payment on Public Debt (INT)

Series: GFD_NNP INT				
Sample: 1970–2015				
Observations: 46				
Null hypothesis: Series are not co-integrated.				
Dependent	tau_statistic	Prob *	Z-statistic	Prob *
INT	–2.952	0.142	15.449	0.097
GFD_NNP	–3.272	0.076	–17.657	0.055

Source: The results are authors' calculations based on the data taken from the Reserve Bank of India (2010–2011 and 2015–2016).

Note: * Mackinnon (1996) *p*-values.

Table 6b. Pair-wise Granger Causality Test

Sample: 1970–2015			
Lags: 2			
Null Hypothesis:	Obs	F-statistic	Prob.
GFD_NNP does not Granger cause INT	44	1.399	0.258
INT does not Granger cause GFD_NNP		5.344	0.008

Source: The results are authors' calculations based on the data taken from the Reserve Bank of India (2010–2011 and 2015–2016).

Table 6c. OLS Regression of GFD_NNP on INT

Sample: 1970–2015			
Observations: 46			
Variable	Coefficient	t-statistic	Prob.
INT	0.299	13.331 *	0.000
Constant	−2.036	−4.310 *	0.000

Source: The results are authors' calculations based on the data taken from the Reserve Bank of India (2010–2011 and 2015–2016).

Notes: $R^2 = 0.80$; and
* indicates significant at 1% level.

Table 7a. Engle–Granger Co-integration Test Between Share of Revenue Expenditure (RE) and Share of Interest Payment on Public Debt in RE (INT_R)

Series: RE INT_R
Sample: 1970–2015
Observations: 46
Null hypothesis: Series are not co-integrated.

Dependent	tau_statistic	Prob *	Z-statistic	Prob *
INT_R	−2.6233	0.2503	−20.1951	0.0232
RE	−2.8954	0.1621	−28.8451	0.0012

Source: The results are authors' calculations based on the data taken from the Reserve Bank of India (2010–2011 and 2015–2016).

Note: * Mackinnon (1996) *p*-values.

Table 7b. Pair-wise Granger Causality Test Between RE and INT_R

Null Hypothesis:	F-statistic	Prob.
RE does not Granger cause INT	1.1062	0.34
INT_R does not Granger cause RE	3.8932	0.03

Source: The results are authors' calculations based on the data taken from the Reserve Bank of India (2010–2011 and 2015–2016).

Table 7c. OLS Regression of RE on INT_R

Variable	Coefficient	t-statistic	Prob.
INT_R	1.2657	18.6264 *	0.0000
Constant	44.8976	31.7838 *	0.0000

Source: The results are authors' calculations based on the data taken from the Reserve Bank of India (2010–2011 and 2015–2016).

Notes: $R^2 = 0.90$; and
* indicates significant at 1% level.

empirically verified by time series analysis using data in the Indian context. This study argues that if government expenditure is financed by public borrowing but it fails to generate sufficient income in the economy, it will be difficult to repay the loan and the interest on the loan. In effect, the fiscal balance will deteriorate. The study proposes that non-viability of the fiscal policy at least in the short run will be reflected in increasing ratios of GFD to NNP, revenue deficit to NNP, revenue deficit to total expenditure and increasing share of interest payment in RE. If the ratio of GFD to NNP (GFD_NNP) remains constant, it can be considered as a kind of sustainability of fiscal balance in the short run. If this ratio increases, it will be an indication of deterioration of fiscal balance.

The empirical study in the Indian context has shown that the share of RE in total expenditure of the government has increased significantly over time. Since many of the components of RE, such as pension, allowances, interest payment on previous loans and administrative expenses, are, in general, non-developmental in nature, this expenditure pattern is not helpful for economic growth and fiscal sustainability.

The results of time series analysis show that the growth rate of the ratio of GFD to NNP (GR_GFD_NNP) and the growth rate of NNP (GR_NNP) are co-integrated, and GR_NNP is found to have significant negative impact on GR_GFD_NNP implying that if growth rate of NNP declines, it increases the ratio of GFD to NNP. On the other hand, the growth rate of total expenditure of the government (GR_TE) has positive impact on the ratio of GFD to NNP (GR_GFD_NNP) indicating that if the government intends to spend more, it has to depend more on public borrowing. In the causality test, it is found that total expenditure of the government Granger causes rise of revenue deficit. That means, when the government spends more, it leads to higher revenue deficit.

Interest payment on public debt is another important indicator of fiscal health. From time series analysis it has been found that interest payment on public debt (INT) is co-integrated with the ratio of GFD to NNP (GFD_NNP). It is also found that INT Granger causes GFD_NNP implying that payment of higher amount of interest on previous loans increases the ratio of GFD to NNP. The payment of higher amount of interest on public debt has been found to be causally responsible for increasing the share of RE in total expenditure of the government. All these results are indicators of insolvency in fiscal balance and lack of viability of fiscal policy. So, the analysis and conclusion of this study are important to the policy makers and to those who deal with public debt and fiscal management. The conclusion also implies that a good mix of taxation and government expenditure is required to make the policy of public debt sustainable because it will have significant impact on income sustainability.

Managerial Implications

The article has very important managerial implications in respect of public expenditure, public debt, economic growth and fiscal health. First of all, when the government does not have sufficient budgetary provisions, it has to resort to the policy of public borrowing. But if the available funds from public borrowing are not properly utilized and the funds are disbursed on unproductive or distributive purposes, economic growth will suffer due to lack of productive investment. In that case, the debt burden of the country with respect to income will increase. So, from the viewpoint of management of public finance, it is necessary to ensure that economic growth does not suffer due to wrong allocation of funds in the budget. Second, the growing revenue deficit with respect to total expenditure indicates that as total expenditure of the government increases, revenue deficit increases. The implication of growing revenue deficit is that revenue receipts from current activities are not sufficient to meet the current expenditures of the government. It is an indicator of dismal fiscal position. So, from the managerial point of view, it

may be suggested that unnecessary and less important expenditures should be curtailed and kept at the minimum possible level. On the other hand, tax base in the country should be widened so that revenue receipts of the government increases. When the government is not in a position to meet its current (revenue) expenditures from revenue receipts, the fiscal policy is not sustainable. Third, in continuation of the aforementioned point, it can be mentioned that the share of interest payment on public debt in total expenditure and in RE of the government is increasing over time. That means, not only debt burden of the country is increasing, the government is being forced to take fresh loans to make payment of interest on existing loans. This is not a viable policy from the viewpoint of management of public debt. It is necessary to ensure that public spending does not cross a critical limit and the available funds from public borrowing are utilized for economic growth in a best possible way. Last, public finance is largely guided by political considerations. Economic arguments are overlooked for electoral gains in many cases. But distributive policies and populist measures of the government cannot continue for long time depending on public debt. If the economy fails to generate sufficient income, distributive policies may be self-defeating. So, with respect to both revenue collection and public expenditure, the government is required to maintain a balance. Welfare measures for the people and political interest will be there but the issues of economic growth and efficient management of public finance cannot be neglected.

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