



Fiscal Deficit and Economic Growth in India: An Empirical Analysis Using Time-Series Data

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Abstract

The primary issue with India's macroeconomic policy is fiscal deficit which can be used for boosting aggregate demand but can also lead to growing debt, interest burden and squeeze on private investment. The current study aims to analyze the link between gross fiscal deficit of Central Government and economic growth of India over the period 1990–91 to 2017–18 on an annual basis. The major sources of data used are the Handbook of Statistics on the Indian Economy (HSIE) published by RBI as well as the Government of India's Economic Survey. Real GDP growth is used to measure economic growth and fiscal deficit is expressed as a percentage of GDP. Descriptive statistics, correlation analysis, Augmented Dickey–Fuller test, ordinary least squares regression, Granger causality and diagnostic tests are used for this analysis. Results show the relationship between fiscal deficit and economic growth is negative and statistically significant at 5% level. The estimated coefficient indicates that a fiscal deficit-to-GDP ratio increase of one percentage point is expected to lead to a real GDP growth decrease of about 0.77 percentage point. The model accounts for 23.1% of the year-to-year variation in the annual growth. But, Granger causality tests do not reveal any significant short run predictive causality from either direction. The results highlight the importance of fiscal deficits not just in terms of size, but also expenditure composition and fiscal sustainability for growth implications. There is thus a need to focus more on productive public investment and sustainable fiscal consolidation.

Keywords: Fiscal deficit; Economic growth; Fiscal policy; India; Time-series analysis; Fiscal consolidation

1. Introduction

The impact of fiscal policy on aggregate demand and investment and resource allocation is of great importance to the economic development. In developing countries, public spending covers also infrastructure, human capital, and social development. But, ongoing fiscal deficits can lead to escalating public debt and debt servicing costs, which can limit private investment and fiscal space. The size, duration, and composition of the deficit, therefore, affect the growth impact of a fiscal deficit (Barro, 1990; Rangarajan & Srivastava, 2005).

The context needs to be studied in the light of India. Economic liberalisation had resulted in a significantly altered fiscal position of the Central Government during various stages. The gross fiscal deficit declined from 7.61% of GDP in 1990–91 to 2.54% in 2007–08, increased to 5.99% in 2008–09 and 6.46% in 2009–10, and subsequently declined to 3.46% in 2017–18. The fiscal alterations were accompanied by significant economic fluctuations, especially in the high-growth years of the 2000s and the international financial crisis.

In theory, fiscal deficit could influence the growth in two ways. Low rates of borrowing can boost aggregate demand and productive investment while high rates can raise the costs of servicing the debt and reduce private investment. Barro (1974) also suggested that the impact of expected future taxes on demand from deficit spending may moderate the impact, and Barro (1990) stressed that the impact of deficit spending on growth is only as strong as its productive contribution.

Empirical evidence also is inconclusive. Easterly and Rebelo (1993) found that fiscal policy effects depended on the nature of the fiscal policy intervention, and Devarajan et al. (1996) demonstrated that the composition of government spending mattered for its impact on growth. Indian evidence has not been consistent either. Kaur and Ahmed (2013) analyzed the fiscal deficit-growth nexus and Singh et al. (2017) investigated fiscal deficit, public debt and growth through dynamic time-series analysis. Kubendran (2018) has also taken an interest in fiscal deficit in relation to the current account deficit and capital flows. Ramu and Gayithri (2016) emphasized on deficit composition.

The effects of economic conditions might also trigger fiscal policy, which can lead to reverse causality. Evidence on the fiscal stance of India has also indicated that fiscal policy can change from being pro-cyclical to counter-cyclical. The choice of fiscal rules has also influenced the relationship between deficit growth.

The background, therefore, is the relation between the gross fiscal deficit of the Central Government and the real GDP growth of Indian economy for the period 1990-91 to 2017-18. It explicitly analyses the

historical dynamics of the two variables, estimates the empirical relationship between them and tests for the presence of short-run predictive causality. The study is a valuable addition to the literature because it provides the same financial-year year-on-year analysis and the period covered is before the 2019 reform.

2. Literature Review

The theory and empirical evidence linking fiscal deficits and economic growth have been controversial. While fiscal expansion can boost demand and productive investment, continued borrowing can lead to an increase in debt service and crowd out private investment. Barro (1974) proposed that the effects of deficit financing on the demand for money would be diminished if one could anticipate that the increase in taxes would follow. Barro (1990) contended that the growth effects of government spending would be heavily influenced by the productivity of the spending.

Empirical research has emphasised that the composition of fiscal policy is as important as its aggregate size. Easterly and Rebelo (1993) found that fiscal policy had different impacts on growth by sector, and they observed that there was a fairly consistent relationship between public investment in infrastructure and growth. With evidence from developing countries, Devarajan et al. (1996) also showed that spending on what is broadly termed as productive activity can have negative marginal effects if used inefficiently. These results showed that the size of fiscal deficit should not be used as a measure of itself (Rangarajan, 1982).

Studies on Indian have yielded mixed results. The correlation between fiscal deficit and economic growth in India has been explored by Kaur and Ahmed (2013) and the integration of fiscal deficit, public debt and economic growth has been analyzed in a dynamic time-series by Singh et al. (2017). Kubendran (2018) expanded the analysis to look at fiscal deficit, current account imbalances and capital flows. Deficit composition is key in linking its relationship with growth, as emphasized by Ramu and Gayithri (2016).

More information has been surfaced on the role of fiscal sustainability and institutional conditions. Fiscal deficits and government debt have been discussed by Rangarajan and Srivastava (2005) and fiscal policy has been explored by Mohanty and Mishra (2017) in a cyclical context in India.

As a whole, the literature indicates that it is a relationship that is sensitive to the composition of the expenditure, fiscal sustainability, economic conditions, and the specification of methods (Somasekharan, Prasad, & Roy, 2011). But sample-to-sample and estimation method-to-estimation method variations still result in different conclusions. In the present study, the issue is explored by studying Central Government

fiscal deficit/GDP ratio and real GDP growth along with stationarity, regression, diagnostic and Granger causality analysis for the period 1990-91 to 2017-18 (Rao & Deshpande, 1986). The institutional and fiscal background of the analysis is from the Government of India (2018) publications and the official fiscal statistics (Singla & Kaur, 2015).

3. Data and Methodology

This empirical model will be used to study the relationship between the fiscal deficit of the Central Government and the economic growth of India using yearly observations for each financial year. The study will involve both descriptive and time series approaches to establish the nature of this relationship.

3.1 Data and Study Period

The sample period is from 1990-91 through 2017-18, providing a total of 28 annual observations. It includes the different periods of fiscal history of India after its reforms, such as economic crisis in early 1990s, fiscal consolidation, high growth period, global financial crisis and fiscal consolidation.

Data for the gross fiscal deficit of the Central Government are sourced from *Handbook of Statistics on the Indian Economy* by the Reserve Bank of India. The fiscal deficit is measured in terms of percentage of GDP. Data on real GDP growth are sourced from government economic data and *Economic Survey of India*.

3.2 Variables and Measurement

The dependent variable is GDP growth (GDPG), which is the annual growth in percentage of real GDP. The independent variable is gross fiscal deficit (GFD), which is the fiscal deficit of the Central Government as a percentage of GDP.

The relationship being considered can be written as:

$$\text{GDPG}_t = f(\text{GFD}_t)$$

where GDPG_t denotes real GDP growth and GFD_t represents the fiscal deficit-to-GDP ratio in year t .

3.3 Model Specification

The baseline empirical model is specified as:

$$\text{GDPG}_t = \alpha + \beta \text{GFD}_t + \varepsilon_t$$

where α represents the intercept, β measures the association between fiscal deficit and economic growth, and ε_t is the error term. A positive coefficient will mean that there is a positive relationship, while a negative coefficient will imply an inverse relationship.

The parsimonious model aims at offering a specific test of the relationship between fiscal deficit and growth. This implies that the estimated coefficient is seen as an empirical relationship and not as a causal effect.

3.4 Econometric Procedure

The following approach will be adopted for the analysis. Descriptive statistics will be used to check the behavior and variation of the variables before evaluating their past trends. An Augmented Dickey-Fuller test will be carried out to identify the nature of the variables. Ordinary Least Squares (OLS) estimation will then be used to obtain the baseline model. Heteroskedasticity-robust standard errors will be used to improve the inference process.

The ADF equation can be written as:

$$\Delta X_t = \alpha + \gamma X_{t-1} + \sum_{i=1}^p \delta_i \Delta X_{t-i} + \varepsilon_t$$

If the unit root null hypothesis is rejected, then this would signify that the variables in the model are stationary. The diagnostic test will be used to check how good the regression model fits. Lastly, the Granger causality test will be used to find out whether the past values of fiscal deficit have any statistical significance in explaining economic growth and vice versa. Granger causality means predictive precedence.

4. Results and Discussion

The findings are explained using descriptive statistics, trend analysis, stationarity tests, regression analysis, diagnostics tests, and Granger-causality test. These techniques, in totality, help identify the statistical relationship as well as the directional causality of the fiscal deficit and economic growth.

4.1 Descriptive Statistics

Table 1 summarises the distribution of the principal variables over the 28-year study period.

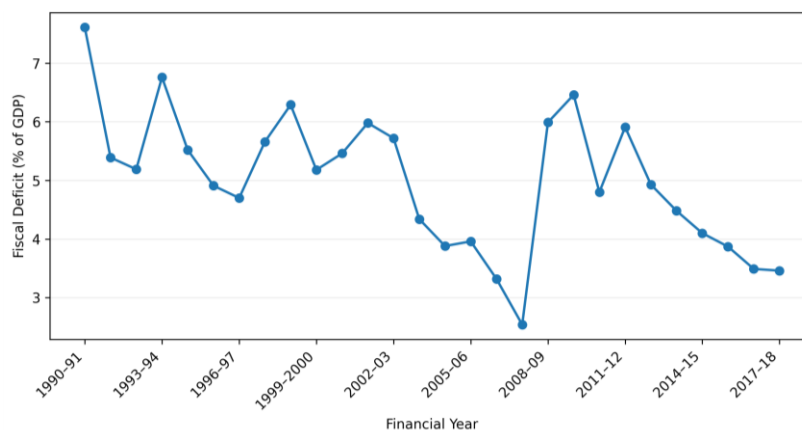
Table 1. Descriptive Statistics, 1990–91 to 2017–18

Statistic	Real GDP Growth (%)	Fiscal Deficit (% of GDP)
Observations	28	28
Mean	6.650	4.996
Median	6.700	5.055
Standard deviation	1.882	1.169
Minimum	1.400	2.540
Maximum	9.600	7.610

Real GDP growth was 6.65%, whereas fiscal deficit was about 5.00%. Variations in growth were higher than that of the ratio of fiscal deficits. The minimum level of growth was witnessed during 1991-92, and the maximum during 2006-07. Fiscal deficit was at the highest during 1990-91 and at the lowest during 2007-08. The value of correlation coefficient -0.481 depicts a weak but inverse relationship between the two variables.

4.2 Trends in Fiscal Deficit and Economic Growth

Changes in the fiscal deficit through time are depicted in Figure 1 below. The data indicates that there was a significant fall in the fiscal deficit in the mid to late 1990s and early 2000s, after which there was a sharp rise during the financial crisis period.

**Figure 1. Central Government Fiscal Deficit, 1990–91 to 2017–18**

Fiscal deficit as a percentage of GDP fell from 7.61% in 1990-91 to 2.54% in 2007-08, showing the extent of fiscal improvement made prior to the financial crisis. The fiscal deficit rose to 5.99% in 2008-09 and then to 6.46% in 2009-10 but has since fallen to 3.46% in 2017-18. The pattern indicates that fiscal policy responded considerably to changing macroeconomic conditions.

Figure 2 presents the corresponding movement in real GDP growth.

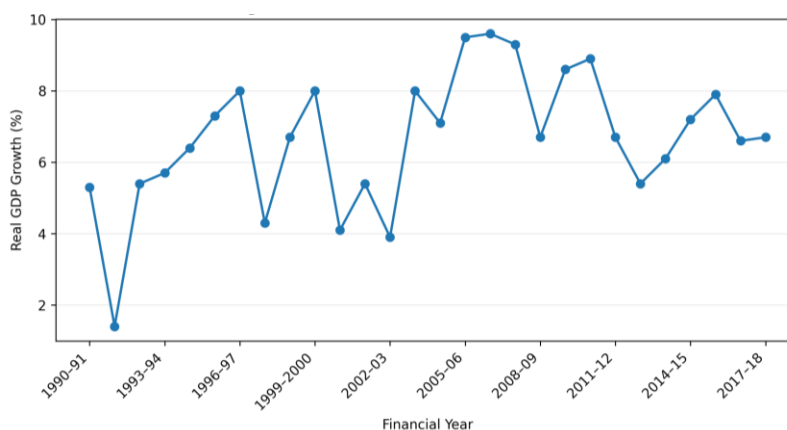


Figure 2. Real GDP Growth, 1990–91 to 2017–18

The growth rate was low during the crisis in the early 1990s but grew to become very strong after that until it hit 9.6% in 2006-07. Growth continued to be high until 2007-08 but weakened during the global financial crisis. This recovery period clearly shows that an expansion of the fiscal budget does not always result in negative growth, especially in case it is done in reaction to an economic shock.

4.3 Stationarity Analysis

The Augmented Dickey–Fuller test was applied to determine whether the variables were stationary.

Table 2. Augmented Dickey–Fuller Test

Variable	ADF Statistic	p-value	Decision
Real GDP Growth	−3.411	0.011	Stationary
Fiscal Deficit	−3.332	0.014	Stationary

The two variables do not confirm the unit root null hypothesis at 5%. The data is therefore stationary at level, justifying the application of the base regression without differencing.

4.4 Regression Results

The estimated relationship is:

$$\text{GDPG}_t = \alpha + \beta \text{GFD}_t + \varepsilon_t$$

The regression estimates are reported in Table 3.

Table 3. OLS Regression Results

Variable	Coefficient	Standard Error	t-statistic	p-value
Constant	10.516	1.418	7.414	<0.001
Fiscal Deficit	-0.774	0.277	-2.797	0.010
R ²	0.231			
Adjusted R ²	0.202			
F-statistic	7.820			0.010
Observations	28			
Durbin–Watson	1.624			

Fiscal deficit ratio is -0.774 and is statistically significant at the 5% level, meaning that one-percentage point rise in the fiscal deficit ratio results in about 0.77 percentage points fall in real growth in GDP. Model accounts for 23.1% variability in GDP growth rate.

Negative association can be because of high borrowing, burden of debt servicing and likely crowding out of private investments. Result is statistically significant even using heteroskedasticity consistent standard errors.

4.5 Diagnostic Tests

The principal diagnostic results are presented in Table 4.

Table 4. Diagnostic Tests

Test	Statistic	p-value	Result
Breusch–Godfrey LM (2 lags)	0.912	0.634	No significant serial correlation

Breusch–Pagan	0.456	0.499	No significant heteroskedasticity
Jarque–Bera	4.688	0.096	Normality not rejected at 5%
Ramsey RESET	1.510	0.231	No significant specification problem

The outcome of the diagnostic tests show no presence of any significant second order serial correlation and heteroskedasticity issues. While the Jarque-Bera test fails to reject residual normality at 5%, the outcome of the RESET test suggests that there is no evidence of functional form misspecification.

4.6 Granger Causality

Considering that there could be a feedback effect between the two variables, Granger-Causality tests were performed. The output is given in Table 5.

Table 5. Granger Causality Tests

Null Hypothesis	Lag	F-statistic	p-value	Decision
Fiscal deficit does not Granger-cause GDP growth	1	2.018	0.168	Do not reject
GDP growth does not Granger-cause fiscal deficit	1	0.422	0.522	Do not reject
Fiscal deficit does not Granger-cause GDP growth	2	0.510	0.608	Do not reject
GDP growth does not Granger-cause fiscal deficit	2	0.274	0.762	Do not reject

There is no statistically significant Granger causality in both directions in one or two-year lag periods. Therefore, despite the presence of a significant negative correlation in the contemporaneous regression, there is no strong short-run predictive relationship between the variables.

4.7 Discussion of Findings

Several observations arise from the analysis. First, there is evidence of a strong negative association between fiscal deficit and economic growth within the time frame covered by the study. Second, this relationship differs depending on the phase of macroeconomic events. Specifically, the rise in fiscal deficit in 2008–10 happened during economic recovery implying the possibility of different dynamics of the counter-cyclical fiscal stimulus under conditions of shock to the economy. Third, the absence of Granger causality implies that the negative coefficient obtained cannot be treated as evidence of a straightforward causal link.

In general, these results are in line with the academic literature stressing the importance of the structure and efficiency of public spending. For example, a deficit allocated for productive investments is likely to generate different impacts compared to a deficit caused mainly by recurrent expenditures.

4.8 Policy Implications

It is clear from the analysis above that fiscal consolidation continues to be a key tool for the maintenance of macroeconomic stability, especially when deficits persist. However, consolidation must ensure that expenditures with significant growth and productivity impacts are not affected, such as expenditures in the area of infrastructure, education, health, and capital formation generally. There is also a lesson learned from the experience around the global financial crisis about the necessity of maintaining enough fiscal space in order to undertake counter-cyclical fiscal policy in case of any shock to the economy.

Thus, it is necessary for fiscal policy to differentiate between productive expenditures and recurrent expenditures instead of using only quantitative deficit targets.

5. Conclusion

The present study explores the link between Central Government's fiscal deficit and real GDP growth in India between 1990–91 and 2017–18. Descriptive statistics, ADF testing, OLS regression, diagnostic tests and Granger-causality analysis were used in the analysis.

The findings show that there was a significant negative relationship between fiscal deficit and economic growth. The fiscal-deficit-to-GDP ratio was estimated to be negatively related to real GDP growth by 0.77 percentage-point increase for a one-percentage-point increase. But when the authors checked for Granger-causality they did not find any important predictive causality in either direction, which means that the relationship does not necessarily imply a direct causal effect.

The results indicate that long-run effects of fiscal policy are not just a function of the level of the deficit, but also the composition and productivity of public spending. Persistent and low productivity expenditure, therefore, must be regulated while productive investment should be protected.

The study has limitations in that it has a small sample and a limit of two variables. Public debt, private investment, inflation and expenditure composition could be included in future research. India's overall experience shows that fiscal sustainability and productive public investment is crucial for sustaining long-term economic growth.

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