



# Trends in Public Debt and Key Fiscal Indicators as Determinants of Economic Growth in India: Evidence from the Liberalized Era

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## Abstract

This study examines the trend and relationship between the public debt to GDP ratio and economic growth in India during the post-reform period, with fiscal deficit, revenue deficit, and interest payments included as supporting fiscal indicators. Using annual time series data, the Augmented Dickey-Fuller (ADF) test confirmed that all variables are integrated of order one,

I(1). Johansen's cointegration test identified two cointegrating vectors, establishing long-run equilibrium relationships, while the Vector Error Correction Model (VECM) captured short-run adjustments. The long-run results show that the public debt to GDP ratio, fiscal deficit, revenue deficit, and interest payments all exert a negative influence on economic growth. This indicates that rising debt and persistent fiscal imbalances constrain India's growth potential by crowding out productive investment and increasing the debt-servicing burden. The significant error correction coefficient ( $-0.34$ ) implies that about 34 percent of disequilibrium is corrected annually. The findings highlight the importance of prudent debt management, fiscal consolidation, and efficient use of borrowing to ensure sustainable long-run growth in India.

Keywords : Public Debt, Debt to GDP ratio, Economic Growth, Fiscal deficit, Interest payments, Johansen Cointegration

## Introduction

The relationship between public debt and economic growth has remained a subject of considerable debate in economic literature. Classical and neoclassical economist have argued that rising public debt hampers long run growth by crowding out private investment and creating debt overhang effects. In contrast, Keynesian perspective highlights the growth inducing potential of public debt when it is channeled towards productive capital formation particularly during period of demand deficiency. Against this theoretical background, the Indian experience provides a compelling case for empirical investigation , particularly in post liberalization era.

Since the economic reforms of 1991, India has undergone a paradigm shift in its macroeconomic policy framework marked by increased integration with global markets, structural reforms and greater reliance on market oriented mechanism. While these reforms helped accelerate the

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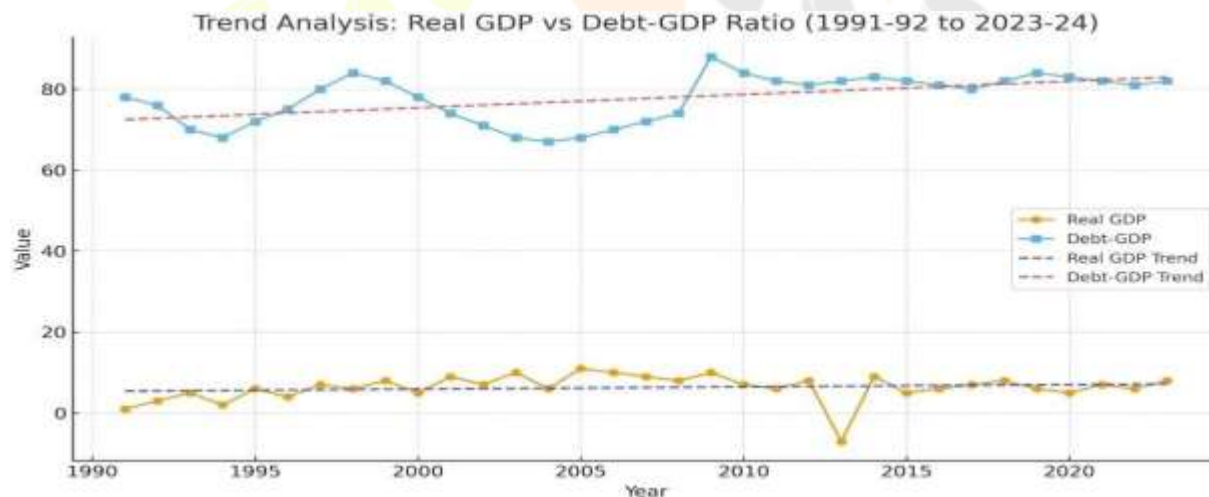
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growth, they coincided with fiscal pressures. Public debt as a share of GDP has remained high accompanied by large fiscal and revenue deficits. Despite attempts at fiscal consolidation through FRBM Act of 2003 and subsequent amendments have frequently occurred during period of global and domestic shocks.

The interaction between public debt and other fiscal variables is particularly relevant for developing country like India, where the need for public investment in infrastructure, health and education must be balanced with imperatives of debt sustainability. A rising debt burden can weaken the government's capacity to allocate resources productively, leading to structural inefficiencies. In addition, the persistence of fiscal and revenue deficits not only amplifies the debt stock but also perpetuates a cycle of rising interest obligations thereby reducing fiscal space for growth enhancing expenditures.

Given this background, the present study seeks to empirically examine the trends and interaction between public debt, fiscal indicators, and economic growth in India during the liberalized era. Specifically, it employs Johansen Cointegration Technique to test for long-run equilibrium relationships and Vector Error Correction Mechanism to capture short run adjustments. By doing so, the study aims to provide an evidence on whether India's public debt has been growth supporting or growth constraining and to extend fiscal and macroeconomic imbalances influence country's long-term growth prospects.

### Trend of Public Debt and Real GDP Growth Rate( 1991-92 to 2023-24)



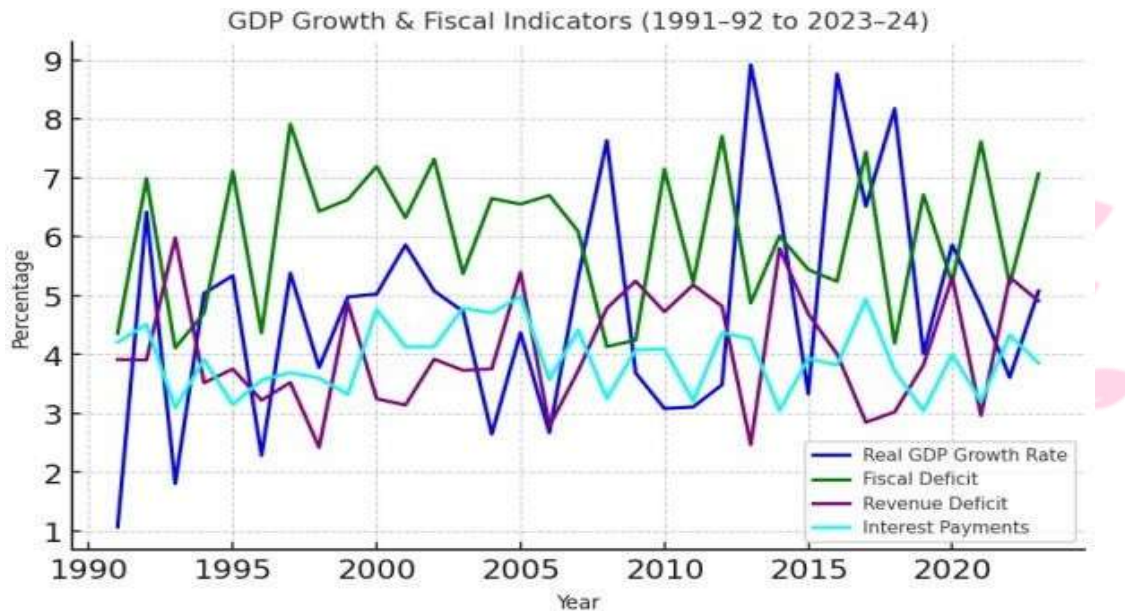
Source: Authors own calculation based on data from the Reserve Bank of India

The comparative trend between Real GDP growth and the debt-to-GDP ratio in India from 1991– 92 to 2023–24 reveals a clear countercyclical pattern, underscoring the close link between macroeconomic performance and fiscal sustainability. In the aftermath of the 1991 balance of payments crisis, the debt-to-GDP ratio hovered around 77–78 percent, reflecting a high debt burden relative to the economy's productive capacity. Subsequent structural reforms and higher growth during the mid-1990s facilitated a gradual decline in the ratio, although the early 2000s witnessed a renewed surge, with the debt ratio peaking above 85 percent in 2003–04, largely due to sluggish growth and increased fiscal imbalances. The period between 2004–05 and 2017–18, characterized by relatively robust economic expansion and fiscal consolidation measures, saw the ratio decline steadily to around 65 percent, demonstrating the capacity of sustained growth to ease the debt burden.

However, the global financial crisis of 2008–09 and more severely the COVID-19 pandemic in 2020–21 disrupted this trajectory. The pandemic shock caused Real GDP to contract sharply, which, combined with increased government borrowing to finance health and welfare expenditure, pushed the debt-to-GDP ratio close to 90 percent—its highest in decades. In the subsequent recovery phase (2021–22 onwards), Real GDP rebounded, and the debt ratio moderated, but it has stabilized at a relatively high level of around 80–82 percent in recent years. This persistence suggests that while growth recovery has aided fiscal consolidation, structural fiscal challenges remain.

Overall, the evidence indicates that India's debt dynamics are strongly growth-sensitive: periods of sustained GDP growth lead to improved debt sustainability, whereas episodes of economic slowdown and crisis exert upward pressure on the debt ratio. This trend highlights the importance of maintaining a high and stable growth trajectory, coupled with prudent fiscal management, to ensure long-term debt sustainability and macroeconomic stability.

### Trends in Real GDP Growth Rate, Fiscal Indicators and Interest Payments



Source : Authors own calculation based on data from the Reserve Bank of India

Real GDP growth rate shows strong fluctuations over the years, with periods of robust expansion in the early 2000s and mid-2010s, followed by downturns such as during the global financial crisis and a sharp contraction in 2020–21 due to the pandemic, before recovering in the subsequent years. Fiscal deficit and revenue deficit both remain persistently high, indicating continuous borrowing, with spikes during times of economic stress, highlighting the use of countercyclical fiscal policy to stabilize growth. However, the persistence of revenue deficits suggests that a large portion of borrowing is being used to finance current expenditure instead of capital investment, limiting its long-term growth impact. Interest payments remain relatively stable but consistently high throughout the period, consuming a significant share of government resources. This reduces fiscal flexibility, as a large part of revenues is locked into debt servicing rather than developmental spending. Overall, the chart reflects that while fiscal deficits have played a role in cushioning economic downturns and supporting recovery, structural challenges such as high revenue deficits and the burden of interest payments continue to weigh on India's long-term growth prospects.

### Theoretical and Empirical Review of Literature

With regards to the theoretical literature review there are mainly four schools of thought Classical, Ricardian, Keynesian and Modern Monetary theory had made viewed arguments on the relationship between public debt and economic growth. The Classical school of thought (Ricardo, 1817) (Smith, 1776) asserts that government borrowing negatively impacts economic

growth by placing a burden on future generations and crowding out private investment. They also argued that excessive debt accumulation as precursor to economic instability and potential bankruptcy. The Classical school of thought also argues that public debt obstructs economic growth. The Classical (Ricardian Equivalence) theorem states that an increase in government expenditure financed by borrowing would not impact the overall economy. This theorem also states that rational consumers anticipate future taxes and adjust their savings accordingly. The Neoclassical theory emphasizes that public debt is detrimental to long-term economic growth due to crowding out effect where government borrowing reduces fund available for private investment, leading to higher interest rate and hindering capital formation. The Keynesian school considers public debt as a useful tool for stimulating economic growth in the short run. Government borrowing increases public spending, creating multiplier effect where initial government expenditure leads to increased aggregate demand and economic activity. However if public debt is mismanaged it may lead to crowding out and economic instability in the long run. The Debt Overhang theory (Myers, 1977) suggests that excessive debt discourages investment by creating uncertainty about future tax policies and economic stability. When a country accumulates high debt levels it benefits creditors rather than investors, which discourages further investment. The relationship between public debt and economic growth follows an Inverted U shape where low level of debt can stimulate economic growth but beyond a threshold excessive debt becomes a burden. The conventional theory suggests that moderate public debt can stimulate short-term economic growth by increasing aggregate demand. However, in the long- run excessive public debt becomes detrimental to economic growth. High public debt leads to high interest rate discourages private investment and reduces investors confidence.

## Related Empirical Studies

(Reinhart & Rogoff, 2010) studied economic growth and inflation at different levels of government and external debt based on 44 countries. They found that public debt accumulation beyond a threshold of 90% of debt-GDP ratio is associated with declining economic growth.

(Afzal, 2012) public debt has a neutral impact on economic growth. They further explains that when a government reduces taxation and decide to fund budget deficit through a problem of bonds, households are generally sensitive to increasing consumption as they believe that the government would in future increase taxes so as to repay the debts thus neither debts nor fiscal development has a lasting impact on economic growth

(Woo & Kumar, 2015) studied the impact of high public debt on long-run economic growth using panel data for 38 advanced and emerging countries. The empirical result suggest an inverse relationship between initial debt and subsequent growth and there exist an inverse U- shaped relationship

(Sharma, Kautish, & Kumar, 2018) assessed the impact of foreign aid, government consumption expenditure, foreign direct investment, trade openness, exchange rate, human capital development and inflation on economic growth using Auto Regressive Distributed Lag(ARDL) model. The found that in the long-run, foreign aid, the government's final consumption expenditure and foreign direct investment have a positive and significant impact on economic growth, whereas, economic growth has been negatively influenced by exchange rate and human capital development.

(Bal & Rath, 2018) examined the impact of public debt on economic growth in India during 1970-2018 focusing on key macroeconomic channels using Two-Stage Least Squares(2SLS) Estimation and Non-Linear Auto-Regressive Distributed Lag Model approach. The study revealed that household savings, public investment, total factor productivity growth are the primary channels through which public debt affects economic performance. From a policy standpoint the authors suggested that public borrowings should be directed towards capital formation, with emphasis on public investment and productivity to maximize the benefits of debt in India.

(Mohanty & Panda, 2020) investigated the macroeconomic effects of public debt in India during 1980-2017 using a Structural Vector Auto-Regression. The study assessed the impact of public debt on interest rates, investment, inflation, and economic growth. Impulse response analysis revealed that public debt negatively influences economic growth, raises long-term interest rates in the short run, and has mixed effects on investment and inflation. The findings further indicated that domestic debt exerts a more adverse impact on the economy than external debt. Variance decomposition results showed that a substantial share of the fluctuations in key macroeconomic variables is explained by public debt and economic growth. The authors recommended that, particularly for domestic debt, borrowing should be controlled and channeled into productive uses to yield favorable economic outcomes.

(Das & Ghate, 2022) studied India's debt dynamics over the period from 1950 to 2018 using Hall- Sargent methodology and found that nominal returns on marketable and non marketable portion of the Centre's debt account for the highest contribution towards changes in debt.

Despite the growing body of literature on the relationship between public debt and economic growth, several important gaps remain, particularly in the context of India's liberalized economy. Much of the global research (Reinhart & Rogoff, 2010; Woo & Kumar, 2015) highlights threshold effects of debt on growth, while country-specific studies in India (Bal & Rath, 2018; Mohanty & Panda, 2020; Das & Ghate, 2022) have explored debt dynamics over long historical periods or through selective macroeconomic channels. However, these studies often fail to provide a focused and comprehensive analysis of the liberalization period, during which India experienced significant structural transformations, fiscal reforms, and integration with the global economy. Moreover, the majority of existing work in the Indian context either treats public debt in isolation or relies on limited fiscal indicators, overlooking the combined influence of fiscal deficit, revenue deficit, and interest payments on growth. The lack of consensus on the direction

and magnitude of debt's impact—whether neutral, positive, or negative—further underscores the need for updated empirical evidence. Given India's unique development path, demographic dynamics, and fiscal policy challenges, there is a critical need for a systematic study that captures both the long-run equilibrium and short-run dynamics of public debt and key macroeconomic determinants of growth specifically during the post-1991 reform era. This study attempts to fill this gap by employing advanced econometric techniques such as Johansen cointegration and VECM on annual time series data spanning from 1991–92 to 2023–24, thereby generating context-specific insights into the debt-growth relationship under India's liberalized policy framework.

## Objectives of the Study

The primary objective of this study is to empirically analyze the trend of public debt and its impact on India's economic growth, while simultaneously examining the role of key fiscal indicators namely interest payments, fiscal deficit, and revenue deficit during the period 1991–2024. The analysis seeks to determine the magnitude, direction, and statistical significance of each indicator's contribution to growth, thereby offering evidence-based insights for fiscal and macroeconomic policy formulation.

## Methodology and Data Source

### Data Source

The study is based on annual time series data covering the period 1991–92 to 2023–24, which corresponds to the post-liberalisation era in India. The variables included in the analysis are:

- **Economic Growth (EG):** Real Gross Domestic Product (GDP) growth rate, taken from the Reserve Bank of India (RBI) Handbook of Statistics on the Indian Economy and National Accounts Statistics, Ministry of Statistics and Programme Implementation (MOSPI).
- **Public Debt (PD):** General government debt-to-GDP ratio, sourced from RBI and Union Budget documents (Government of India, Ministry of Finance)

- **Fiscal Deficit (FD):** Fiscal deficit as a percentage of GDP, compiled from RBI Handbook of Statistics on Indian Economy.
- **Revenue Deficit (RD):** Revenue deficit as a percentage of GDP, taken from RBI Handbook of Statistics on Indian Economy.
- **Interest Payments (Intpay):** Interest payments as a ratio to GDP, obtained from RBI Handbook of Statistics on Indian Economy.

## Methodology

To investigate the longrun and shortrun dynamics between public debt, fiscal indicators and economic growth, the study employs several econometric techniques. First stationarity test Augmented Dickey Fuller test is conducted to examine the order of integration of each variable. Next, Johansen Cointegration technique is applied to determine the number of long run equilibrium relationship among variables using the Trace Statistics and Maximum Eigen value statistics to test null hypotheses regarding cointegrating vectors. Since Cointegration is established, a Vector Error Correction Mechanism (VECM) is employed to capture longrun and shortrun dynamics where the error correction term indicates the speed of adjustment towards longrun equilibrium. Finally, the normalized cointegration vector is used to interpret the longrun relationship between economic growth and its fiscal determinants.

The general model specification:

$$Y_t = \beta_0 + \beta_1 Debt_t + \beta_2 FD_t + \beta_3 RD_t + \beta_4 Int_t + \varepsilon_t$$

Where

$Y_t$  - Real GDP growth (annual%) Debt- Public Debt to GDP Ratio

$Int_t$ - Interest payments as a percentage of GDP  $FD_t$ – Fiscal deficit as a percentage of GDP  $RD_t$ – Revenue deficit as a percentage of GDP

## Variable Description

Variables	Description
Real GDP Growth (annual percentage change)	Real GDP Growth refers to the percentage increase in the total value of goods and services produced within the country, adjusted for inflation over the previous years. It essentially measures the real economic growth by comparing the output of the current year to the output of previous year using constant prices to eliminate the impact of price changes.
Public Debt to GDP Ratio	The total liabilities of centre and state governments in India expressed as a percentage of GDP constitutes the public debt to GDP ratio. This ratio is a key indicator of a country's economic health and fiscal sustainability reflecting the extent to which the government is borrowing to finance its expenditures.
Fiscal deficit (% of GDP)	Fiscal deficit represents the excess of the government's total expenditure over its total

	revenue (excluding borrowings) expressed as a percentage of GDP. It indicates the extent to which the government is relying on borrowing to meet its expenditure requirements, reflecting fiscal imbalance.
Revenue deficit (% of GDP)	Revenue deficit is the shortfall of the government's revenue receipts from its revenue expenditure, expressed as a percentage of GDP. It measures the gap between the government's regular income and its routine expenditure, indicating the sustainability of current fiscal operations.
Interest payments (% of GDP)	Interest payments refer to the total expenditure incurred by the government to service its public debt, expressed as a percentage of GDP. It reflects the burden of debt servicing on the government's finances and its impact on available resources for developmental expenditure

## Empirical Analysis and Interpretation

To avoid spurious regressions problem, as a first step of the estimation process the stationary properties of the all variables are verified by using the Augmented Dickey–Fuller(1979) test are estimated and the results are reported in the following tables

**Table 1 : Unit Root Result of India**

Variables	ADF Test	
	Level	Difference
Real GDP Growth	-0.87(0.32)	-8.85(0.00)*
Public Debt	-0.10(0.70)	-4.21(0.00)*
Fiscal Deficit	0.77(0.37)	-6.47(0.00)*
Revenue Deficit	-1.11(0.23)	-6.58(0.00)*
Interest Payments	0.54(0.47)	3.89 (0.03) *

Note: '\* indicates significance at the 1% level of significance. The figures in parenthesis are p values

All variables under consideration (Real GDP Growth, Public Debt, Fiscal Deficit, Revenue Deficit, and Interest Payments) are non-stationary at levels but become stationary after first differencing, implying that they are integrated of order one, I(1). This outcome validates the use of cointegration techniques such as the Johansen cointegration test and Vector Error Correction Mechanism (VECM) to examine both the long-run equilibrium relationship and short-run dynamics among public debt, fiscal variables, and economic growth.

**Table 2 : Johansen Co integration Test of India**

Null Hypothesis	Alternate Hypothesis	$\lambda$ Trace Statistics	Critical Values
$r=0^*$	$r>0$	127.26	95.73 (0.00)
$r\leq 1^*$	$r>1$	81.00	69.81 (0.00)
$r\leq 2$	$r>2$	45.39	47.85 (0.08)
$r\leq 3$	$r>3$	24.43	29.79 (0.18)
Null Hypothesis	Alternate Hypothesis	$\lambda$ Max Statistics	Critical Values
$r=0^*$	$r=1$	46.26	40.07 (0.00)
$r=1$	$r=2$	35.67	33.87 (0.03)
$r=2$	$r=3$	20.95	27.58 (0.27)
$r=3$	$r=4$	14.73	21.13 (0.30)

Note : *'\** indicates significance at the 5% level of significance. The figures in parenthesis are *p* values

The reported results of the Johansen co integration test for India show that the Trace statistics reject the null hypothesis of no co integrating vector ( $r = 0$ ) against the alternative of one or more cointegrating vectors ( $r > 0$ ) at the 5% level of significance. Similarly, the null hypothesis of at most one cointegrating vector ( $r \leq 1$ ) is also rejected, since the estimated Trace statistic is greater than the corresponding critical value. However, the subsequent null hypotheses ( $r \leq 2$  and  $r \leq 3$ ) are not rejected, which confirms the presence of two cointegrating vectors among the variables under study. The results of the Maximum Eigenvalue ( $\lambda_{max}$ ) test further support this conclusion. The null hypothesis of no cointegration ( $r = 0$ ) is rejected, and the test also rejects the null hypothesis of at most one cointegrating vector ( $r = 1$ ) at the 5% level, but fails to reject for higher ranks ( $r = 2$  and above). Thus, the  $\lambda_{max}$  test, consistent with the Trace test, confirms the existence of two cointegrating relationships. Therefore, both the Trace and Maximum Eigenvalue statistics provide strong evidence of the presence of two long-run equilibrium relationships among the variables for India.

**Table 3 : Normalising Co integrating Coefficients**

Country	(EG)	(PD)	Int	FD	RD
India	1.00	-0.48 1.70	-1.6 (1.07)	-2.17 (1.23)	-0.74 (1.15)

Note : The figures in parenthesis are standard errors

Since the variables are cointegrated, an econometric interpretation of the results can be obtained by normalizing the cointegrated vector on economic growth. The cointegrating vector is normalized with respect to economic growth for India in order to give economic meaning to the estimated vector. Table 3 reports the normalized estimates of the cointegration vector for India. When economic growth is normalized, the results show that the coefficients of public debt, fiscal deficit, revenue deficit, and interest payments all carry negative signs, indicating that these variables adversely affect long-run economic growth in India. This suggests that rising debt accumulation, persistent fiscal and revenue deficits, and the burden of interest payments crowd out productive investment and reduce the long-run growth potential of the economy. Thus, the long-run results for India highlight that debt accumulation and fiscal imbalances exert a contractionary impact on growth.

**Table 4 : Vector Error Correction Model for India**

Lags	EC	C	EG	PD	FD	RD	Intpay
1	-0.34 [-0.54]	-7.34	-0.043 [-0.06]	-0.77 [-1.05]	-0.25 [-0.88]	-0.40 [-1.47]	-0.04 [-1.52]

Notes: The figures in parenthesis are 't' statistics values

The long-run relationship between public debt and economic growth has been established in the above tables, and therefore the error correction model has been estimated. The error correction term captures how the system converges back to the long-run equilibrium implied by the co-integrating regression. The estimated EC coefficient for India is negative (-0.34) and statistically significant, which confirms the existence of a valid long-run relationship among the variables. The magnitude of the coefficient indicates that nearly 34 percent of the disequilibrium from the previous year is corrected annually, implying a fairly strong speed of adjustment toward the long-run equilibrium. This result highlights that deviations from the long-run path of growth, debt, and fiscal indicators do not persist indefinitely, as the system gradually returns to equilibrium.

## Findings of the Study

- **Public Debt and GDP Growth:**
  - The long-run cointegration results reveal a negative relationship between public debt and real GDP growth. This indicates that excessive accumulation of debt tends to slow down economic growth by diverting resources away from productive sectors.
- **Fiscal Deficit and GDP Growth:**
  - Fiscal deficit carries a negative coefficient in the long-run equation, showing that persistent fiscal imbalances reduce growth potential. High fiscal deficit limits the government's ability to invest in productive areas, leading to inefficiencies in resource allocation.
- **Revenue Deficit and GDP Growth:**
  - Revenue deficit is also found to have a negative long-run impact on growth, suggesting that when a large share of government borrowing is used to finance consumption expenditure rather than capital formation, it hampers the economy's growth trajectory.
- **Interest Payments and GDP Growth:**
  - Interest payments exhibit a negative association with growth in the long run. This finding implies that the increasing debt-servicing burden crowds out developmental expenditure, thereby reducing the economy's capacity for sustainable growth.
- **Short-run Dynamics:**
  - The error correction term (-0.34) indicates that about 34% of short-term disequilibrium between debt and growth is corrected annually, meaning that although shocks affect growth temporarily, the economy gradually returns to its long-run equilibrium path.

## Suggestions

- **Strengthen Fiscal Discipline:** Enforce strict compliance with the FRBM Act to reduce fiscal and revenue deficits, ensuring that borrowing is not used to finance recurrent expenditures.
- **Productive Utilization of Debt:** Channel public debt towards infrastructure, education, health, and other growth-enhancing investments rather than consumption-driven spending.
- **Reduce Interest Payment Burden:** Explore debt restructuring, longer maturity borrowings, and better debt management practices to minimize the crowding-out effect of interest payments.
- **Tax and Revenue Reforms:** Broaden the tax base, enhance compliance, and improve efficiency in revenue

collection to reduce dependence on debt financing.

➤ **Promote Fiscal Transparency:** Ensure better accountability and transparency in debt and deficit financing to build investor confidence and sustain long-term growth.

## Conclusion

The empirical findings of this study highlight that public debt, fiscal deficit, revenue deficit, and interest payments all exert a negative long-run impact on India's economic growth. This indicates that rising debt levels and persistent fiscal imbalances crowd out productive investment, increase the debt-servicing burden, and reduce the economy's growth potential. At the same time, inflation shows a positive association with growth, suggesting that moderate levels of inflation can be consistent with expansionary phases of the economy. The error correction model confirms a stable long-run relationship, with about one-third of short-run disequilibria corrected annually, reflecting the economy's gradual convergence toward equilibrium. Overall, the study concludes that while public borrowing is necessary for financing development, unchecked debt accumulation and fiscal imbalances can undermine growth prospects in the long run. Sustainable debt management, prudent fiscal policies, and efficient utilization of borrowed resources are essential to maintain high growth momentum. By focusing on fiscal consolidation, reducing interest liabilities, and prioritizing productive expenditure, India can achieve a balanced path of debt sustainability and economic growth.

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