Naveen Shodh Sansar (An International Refereed / Peer Review Multidisciplinary Research Journal)
RNI No.- MPHIN/2013/60638, ISSN 2320-8767, E- ISSN 2394-3793, Scientific Journal Impact Factor (SJIF)- 8.054,
April to June 2025, E-Journal, Vol. I, Issue L (50), ISO 9001:2015 - E2024049304 (QMS)

Effectiveness of Fiscal Policy in India: Evidence from 40 Years using SVAR Approach

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Abstract: This research paper, with the help of the structural vector autoregressive framework (SVAR), attempts to review the size and effectiveness of fiscal multipliers in all the states of India. The value of multipliers is obtained by giving shocks to GDP, government expenditure, and taxes. The paper highlights the policy implications of fiscal multipliers, particularly in terms of designing and implementing effective fiscal policies to address economic downturns. It emphasizes the importance of carefully timing and choosing the composition of fiscal measures to maximize their multiplier effects. By doing so, policymakers can better leverage the impact of fiscal policy to support economic growth and stability.
Keywords: Fiscal multipliers, fiscal policy, Government expenditure, Gross State Domestic Product, Structural VAR.

Introduction - Fiscal policies of India have been a subject of interest for policymakers as it has potential to boost economic growth. India's recent economic slowdown, exacerbated by the COVID-19 pandemic, has prompted increased government intervention through fiscal policies like corporate tax cuts and infrastructure spending. However, the effectiveness of these measures in stimulating growth remains a subject of debate. This research aims to contribute to this discourse by analyzing India's fiscal multipliers and evaluating the impact of current policies on economic growth.

Leveraging empirical data spanning 40 years and employing a Structural Vector Autoregression (SVAR) model, this study addresses a notable gap in existing research by utilizing a more comprehensive dataset. The paper begins with a comprehensive literature review, synthesizing key findings from prior research.

Literature Review

1. Several prominent studies shed light on the dynamics and impact of fiscal multipliers, with a particular focus on the Indian context and broader methodological considerations. Research by **Jain and Kumar (2013)** employed a sophisticated Structural VAR analysis to estimate the size of government expenditure multipliers in India, providing a deeper understanding of how the Indian economy responds to government spending. Further contributions from **Yadav, Upadhyay, and Sharma (2012)** empirically examined the ripple effects of various fiscal policy shocks across the Indian economy, illustrating their short-term and long-term implications. **Bose and Bhanumurthy (2015)** directly estimated fiscal multipliers for India, discussing how fiscal interventions influence changes in GDP and employment within the country. Adding to this, **Goyal and Sharma (2018)** highlighted the critical role of the composition of government expenditure in India, suggesting that different types of spending yield varying multiplier effects, which is a key consideration for effective policy design.

2. Beyond India-specific analyses, broader research addresses fundamental questions about fiscal multipliers. **Ilzetzki, Mendoza, and Végh (2011)** undertook a comprehensive inquiry into the magnitude of fiscal multipliers, emphasizing that their size is not universal but highly context-dependent, and generally indicating that government spending tends to have a more significant multiplier effect than tax cuts. Complementing this, **Serrato and Wingender (2010)** advanced the methodology by focusing on "Estimating Local Fiscal Multipliers," underscoring the importance of granular analysis. Their work recognizes that the impact of fiscal interventions can vary significantly even within a single country, influenced by specific local economic conditions and the nuances of policy implementation.

Data Sources and Methodology

Data Sources: This study utilizes annual data spanning from 1980 to 2021. To conduct our analysis, we have collected state-wise data on GDP, aggregate expenditure, and tax revenues from the EPWRF. The constant prices data for Gross State Domestic Product (GSDP) for the base year 2011-12 is collected from the EPWRF website as well. Nominal data have been deflated to real values using the GDP deflator. The first difference of the logarithm of each

variable has been used to avoid non-stationarity issues. To convert the data into real values, we have calculated the GDP deflator by dividing the GSDP at current prices by the GSDP at constant prices.

Methodology: To demonstrate the connection between GSDP, tax revenues, and aggregate expenditure, we utilize the structural VAR method. Our analysis involves transforming the three variables into logarithmic form to eliminate seasonal fluctuations from the data. The VAR approach is commonly used in research to study the effects of various disturbance terms on the model's endogenous variables, considering all variables as endogenous with lag functions. The two possible ways by which causation can take place, hence the problem of identification occurs are: (a) government expenditures may impact output or (b) output may affect government expenditures (due to automatic stabilizers and explicit/implicit policy regulations). In this scenario, SVAR is used to forecast the effects of particular policy changes on the economy to address the identification problem.

The structural vector autoregression (SVAR) model equation used in research is written as:

$Ae_t = B\mu_t$

This equation tells the relationship between VAR residuals and structural shocks in this model and is defined as follows:

$$\begin{bmatrix} 1 & 0 & 0 & a_{ae}^{gdp} & 1 & 0 & 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} e_t^{gdp} \\ e_t^{ae} \\ e_t^{tax} \end{bmatrix} = \begin{bmatrix} 1 & b_{gdp}^{ae} & b_{gdp}^{tax} & 0 & 1 & 0 & b_{tax}^{gdp} & 0 & 1 \end{bmatrix} \begin{vmatrix} u_t^{gdp} \\ u_t^{ae} \\ u_t^{+ax} \end{vmatrix}$$

The SVAR model provides a framework for examining the dynamic interactions between aggregate expenditure, tax, and GDP and quantifies the link between them. The coefficient a_{ae}^{gdp} represent the response of aggregate expenditure due to unexpected shock in GDP. Similarly, coefficients b_{gdp}^{ae}, b_{gdp}^{tax} and b_{tax}^{gdp} are due to structural shocks. Coefficients e_t^{gdp}, e_t^{ae} and e_t^{tax} are the residuals obtained from the respective equations in the reduced VAR form and the coefficients u_t^{gdp}, u_t^{ae} and u_t^{+ax} are the structural disturbance terms.

Analysis of Results: To ensure the accuracy of results, unit root test was done before applying the VAR model. The findings of unit root test indicated that all the variables such as GSDP, tax revenues, and aggregate expenditure are I(1) that means they are stationary at first order difference and by checking the lag length criteria, VAR satisfied the stability condition. The study employs the structural vector autoregression (SVAR) approach that was run on logarithm of GDP, tax revenues, and aggregate expenditure and used that to plot generalized impulse response functions to investigate the impacts of various shocks on the endogenous variables and their subsequent responses.

Results: For a valid Structural Vector Autoregression (SVAR) analysis, assessing the normality of residuals is crucial, as non-normal residuals can bias coefficient estimates, standard errors, and hinder accurate structural shock identification. This assessment involves examining statistical properties like mean, variance, skewness, and kurtosis, often using the Jarque-Bera test. Our analysis reveals that GDP values are centered around the mean while other variables show greater dispersion. GDP and capital expenditure exhibit positive skewness (right-skewed), whereas tax, aggregate, and revenue expenditure show negative skewness (left-skewed). Furthermore, all variables display kurtosis values less than 3, indicating platykurtic distributions that are less peaked than a normal distribution, with fewer extreme values and more observations concentrated around the mean.

Table 1.1- Descriptive Analysis of All States

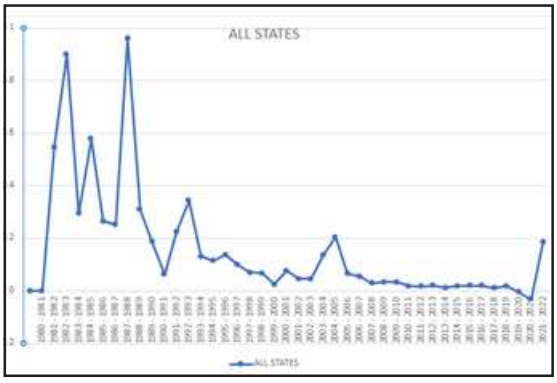
Variable Names	Mean	Std. Dev.	Skewness	Kurtosis	Jarque-Bera
LGDP	15.235	0.783	0.085	1.705	2.984
LAE	12.746	1.593	-0.042	1.834	2.392
LRE	12.496	1.622	-0.102	1.889	2.234
LCE	11.216	1.522	0.146	1.691	3.146
LTAX	12.086	1.654	-0.029	1.802	2.519

All SVAR coefficients are statistically significant ($p < 0.05$), confirming model stability. Table 1.2 indicates that a 1% increase in aggregate expenditure significantly boosts India's GDP by 2.99%, while a 1% tax increase leads to a 0.19% GDP decrease

Table 1.2- Structural Parameter Estimate

Coefficient	Coefficient	Std. Error	z-Statistic	Prob.
a_{ae}^{gdp}	-4.422426	1.391226	-3.178799	0.0015
b_{gdp}^{ae}	2.99982	0.85999	3.488202	0.0005
b_{gdp}^{tax}	-0.196163	0.055794	-3.515833	0.0004
b_{tax}^{gdp}	0.318327	0.090986	3.498652	0.0005

Graph 1- Value of Fiscal Multipliers for period of 40 years for the states of All states

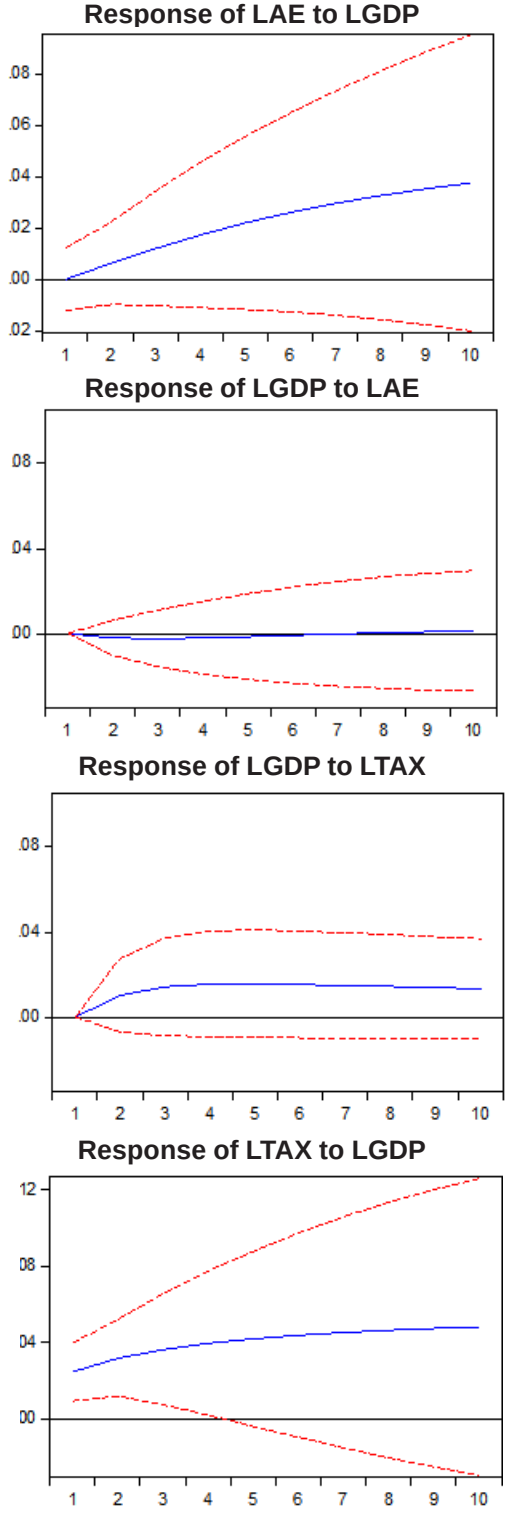


Fiscal multipliers for Indian states, peaking at nearly 1.0 in 1988, generally declined over 40 years, turning negative by 2020 before recovering to 0.2 in 2021 due to pandemic-

related fiscal measures. Higher multipliers during recessions underscore expansionary fiscal policy's potential as a stabilization tool.

Important implications for economic policy and decision-making can be drawn from the impulse response functions generated from SVAR analysis.

Graph 2- Impulse functions of All states Response to Cholesky One S.D. (d.f. adjusted) Innovations ± 2 S.E.



IRFs for response of expenditure on GDP and GDP to tax have a positive effect on output by which policymakers can use fiscal or monetary policy measures to counteract the positive effects and stabilize the economy. Response of tax to GDP is insignificant. IRFs provide details regarding the interactions between the effects of taxes and spending on GDP. The degree to which various variables influence each other, how they interact over time can be determined by policymakers with the help of IRFs.

Conclusion: This study, leveraging a robust SVAR analysis of 40 years, establishes the relationship between GDP, aggregate expenditure, and tax revenues for a growing economy like India. With time, allocations for government expenditure increase. The study highlights how important it is to thoughtfully design and implement fiscal policy actions, taking into account how they will influence total economic activity. The fiscal policy of India could be a helpful tool for fostering economic expansion and minimizing economic inequality. The effectiveness of fiscal policy measures will ultimately depend on a number of factors, including the general macroeconomic environment, the structure of the economy, and the political and institutional context.

Our findings confirm the statistical validity of the model through residual normality checks and the significance of all estimated coefficients, highlighting model stability. Empirically, we establish that aggregate expenditure has a substantial positive impact on India's GDP, with a 1% increase in spending leading to a nearly 3% rise in GDP. Conversely, tax increases are shown to have a minor contractionary effect on GDP.

Additionally, the number of fiscal multipliers might vary depending on how well the state government performs. States with better governance may be better equipped to plan, implement, and manage government spending projects, which will have more positive multiplier effects. It is critical to remember that fiscal multipliers can also be influenced by other factors, such as the structure and financing of governmental spending as well as the general macroeconomic climate. It is essential to carefully prepare and implement fiscal policy measures in order to maximize their impact on economic activity.

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