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Analysing the impact of quality of government expenditure on economic growth: evidence from Indian states

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Abstract: Proliferation of endogenous growth theories has engendered different models connecting government expenditure with a country's long-term growth. Numerous studies based on this growth theory revealed that different components of government expenditure have distinct impact on economic growth due to their differing productivity. Following fiscal consolidation measures in India, the quality of states' government expenditure has been compromised periodically. Therefore, overarching purpose of this study is to empirically examine which component of government expenditure more productively contributes to states' economic growth using a panel data of 29 states/union territories over a period 2004–2005 to 2019–2020. Empirical findings ratify a priori, that capital (revenue) expenditure is productive (unproductive) and positively (negatively) impacts states' economic growth, whereas, economic and social services expenditures are unproductive. The findings have some policy implications in order to sustain and enhance the regional economic growth and to maintain fiscal discipline while persevering with fiscal consolidation.

Keywords: government expenditure; capital expenditure; revenue expenditure; generalised method of moments; GMM; state; economic growth; productive government expenditures; unproductive government expenditures; panel data; social service expenditure; economic service expenditure.

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1 Introduction

Since the 19th century, the liaison between economic growth and government spending has been explored, debated and discussed by many (Wagner, 1883; Keynes, 1936; Ram, 1986; and so on). Accordingly, in a country, the government spending either is being stimulated due to increase in the economic activities or it stimulates the economic activities. Nevertheless, in a globalised world, apart from promoting and accelerating economic growth and development, in developing countries like India, government spending also has to satisfy diverse socio-economic objectives namely reducing income inequalities, alleviating unemployment and poverty, increasing standard of living of the people, removing regional disparities by developing social and economic infrastructural facilities, growth of basic and heavy industries, etc. (Saxena et al., 2018). Consequently, this results into steady increase in the rate of growth of government spending due to the ever-increasing socio-economic role of the government. This implies that the government spending contributes positively and proportionally to the economic growth.

Furthermore, the extant macroeconomics literature also has identified several conventional and new channels through which government expenditure contribute to economic growth (Mallick, 2013; Mo, 2007). Government spending through its forward and backward linkages in various sectors of the economy contribute to the economic growth by increasing employment, productivity, investments and aggregate demand. Overall, it has been deduced that the spending by the governments have substantial growth-multiplier effects (Mondal and Maitra, 2020), although there exist divergent views on the effectiveness of these multipliers.

Nevertheless, the effect of government spending in promoting economic growth is linked to the cost it imposes on the country through distortionary taxes or by crowding-out private investments. Accordingly, a reduction in total government expenditure positively or negatively may affect the growth of the economy either by lowering the expectations regarding rise in future taxes or otherwise by lowering the aggregate demand in future. Additionally, varied components of government expenditure may also have differential impacts on economic growth due to varying degree of intermediate and final output (Landau, 1985). As suggested by Barro (1990), a cut in government consumption expenditure and in investment expenditure has expansionary effect and contractionary effect respectively on the growth of output in the country. This

was further reiterated by number of empirical studies undertaken by various scholars like, Bose et al. (2007), De Avila and Strauch (2003), Easterly and Rebelo (1993), Engen and Skinner (1992), Gremmell et al. (2009), Grier (1997), Levine and Renelt (1992) and few others. Contrary, studies by Devarajan et al. (1996) and Ghosh and Gregoriou (2008) found that public consumption (current) expenditure has positive effect (productive) on growth rate rather than public investment (capital) expenditure. This may be because of excessive use of investment spending by squeezing out other types of government expenditure by developing countries.

It is thus pertinent and rationale to examine the association between the composition and nature of government spending and economic growth in India at sub-national level for two reasons – first, the aftermath of high debt crisis of national and sub-national governments in 1990s in India led to implementation of various fiscal consolidation measures over the years both by central and state governments. An important step towards fiscal consolidation was introduction of the Fiscal Responsibility and Budget Management (FRBM) Act which came into effect in 2004 in India. The main aim of FRBM Act was to reduce fiscal deficit to no more than three per cent of gross domestic product (GDP). This led many states in India to carry out fiscal correction measures like increasing states' own revenues, reduction in non-interest expenditure, pruning of government expenditures, etc. Second, although, on the whole, government spending has a potential to promote economic growth, the issue still remains on how productive are the different components of these expenditure allocations to achieve sustainable economic growth apart from other specified objectives, since there may be trade-offs within and across sectoral expenditures.

The present study thus adds to this debate by revisiting a framework originally developed by Devarajan et al. (1996) and later modified by Ghosh and Gregoriou (2008) to examine the link between the differing productivities of components of government spending and economic growth rate. Hitherto, to the best of knowledge, none of the studies at sub-national have examined the productivity of different components of government expenditure and its impact on economic growth of the states in India.

Given the above setting, the intent of the present study is twofold – the first objective is to determine whether revenue (current) or capital (investment) spending or both are productive component of government spending specifically when the states are under pressure to control their discretionary expenditure post FRBM Act. The second objective is to investigate whether the functional components (viz., economic services and social services) within two classifications of government spending contribute to growth productively at sub national level in India.

In recognition of the need for this study, dynamic panel data using generalised method of moments (GMM) approach is employed. This approach was chosen for two reasons: first, this method is flexible to deal with country fixed effects; second, it helps to accommodate the endogeneity of explanatory variables by using lagged values of internal instruments.

The outline of remaining sections is as follows: Section 2 provides an overview of classification of government expenditure and in particular glance of trends in government expenditure across states in India; Section 3 outlines various strands of existing literature on association between government expenditure and economic growth; Section 4 sets up analytical framework which links the composition of government expenditure with economic growth; Section 5 summarises the qualitative and quantitative research

methodology; Section 6 discusses the empirical results; Section 7 focuses on the conclusions and policy implications.

2 Overview of state government expenditures

States/union territories (UT) in India are not only diverse in context of geographic and demographic characteristics but there also exists wide regional and economic disparities. Evidence suggests that regional income inequalities among the states in India have been widening (Rao et al., 1999; Bhattacharya and Sakthivel, 2004) which endangers the economic development of the country. India's federal system allows autonomy to all the states/UT with regard to local administrative regulations, providing the basic services and infrastructural facilities and also decisions related to levying of the state taxes. Thus, the efficacy of government spending on socio-economic environment is highly susceptible to the composition of expenditure allocation and magnitude of expenditure in the states/UT.

The central and states/UT government expenditures are broadly classified as expenditures on general, social and economic services. Based on their impact on welfare, these expenditures are further grouped as developmental and non-developmental. The former enhances social (education, employment, health, housing, etc) and economic (industry, agriculture, transportation, communication, etc.) activities whereas latter is inclusive of enforcement of law and order, and other government and general activities and administrative services[1]. Both these expenditures encompass components of capital and revenue expenditures (RE).

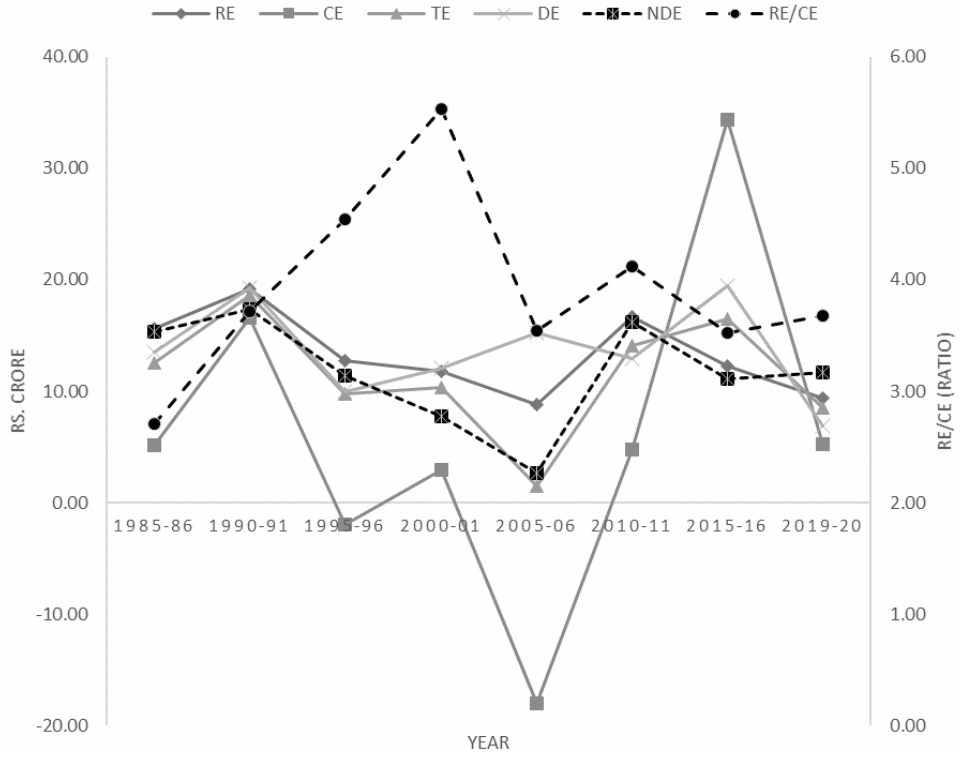
According to Reserve Bank of India (RBI), RE also known as current expenditure is the usual expenditure (like wages, raw material etc.) generally, predominates social services expenditure. Capital expenditure (CE) is non-recurrent in nature and is incurred on creation, acquisition and disposal of assets (like transport, industry, education, housing, medical, etc.) of the country (Reserve Bank of India Bulletin, 2021). The expenditure on economic services is determined by revenue as well as CE. Indirectly this indicates that incurring expenditure on economic activities will create and sustain the new assets and services in the economy, as compared to spending on social services. Implicitly this suggests that since government current expenditure (RE) does not create any assets, it may not have any impact on the aggregate supply. Therefore, government investment expenditure (CE) in capital formation has more growth enhancing benefits than the corresponding levels of RE, thus aiding a country's productive capacity (Reserve Bank of India Bulletin, 2021).

However, on account of the rising burden of committed expenditure (specifically in the form of salary, pension and interest payments), introduction of FRBM Act coupled with restricted revenue mobilisation due to implementation of goods and service (GST) since July, 2017 (even though central government has guaranteed compensation for the first five years), states across India engaged into rationalising and compromising their expenditures more specifically the developmental expenditure on capital account (see Figure 1). Given that the capital expenditure is generally discretionary in nature, the use of such expenditure is thus dependent on the financial capabilities of the state governments compelling them to rationalize the expenses in order to meet their fiscal objectives.

The cut in CE by the states were almost on an average 0.5% of GDP (Reserve Bank of India, 2020). This indicates that the factors impinging states' spending might impose

challenging trade-offs for them. Moreover, the decreasing trend in development expenditure of the states also implies that the quality of expenditure was compromised as measured by ratio of RE to CE. This further indicates that regional economic growth is negatively affected. Thus, given the regional disparities, from economic policy perspective, an attempt to understand how the different components of government expenditure productively impact the states' economic growth to achieve balanced and steady regional growth is imperative.

Figure 1 Expenditure pattern of state governments in India



Notes: RE = revenue expenditure, CE = capital expenditure, TE = total expenditure, DE = development expenditure, NDE = Non-development expenditure, RE/CE = quality of expenditure.

Source: Based on data from RBI (https://dbie.rbi.org.in/DBIE/dbie.rbi?site=statistics)

3 Literature review

Several studies have been undertaken to investigate the association between different components of government expenditure and economic growth both in developed and developing economies. However, there are glaring disagreements among researchers regarding the impact of components of government expenditure on economic growth.

3.1 Impact of government spending on economic growth in developed and developing economies

According to Eid (2020), the impact of increase and decrease in government expenditure on economic growth has asymmetrical effect in Qatar. More specifically the rise in government expenditure positively and significantly affects non-mining and quarrying GDP, while the fall in government expenditure is negatively related to economic growth. Studies by Kimaro et al. (2017), Asghari and Heidari (2016), Alexiou (2009), Yasin (2000), Easterly and Rebelo (1993) and others found positive impact of aggregate government expenditure on economic growth, whereas, Chirwa and Odhiambo (2016), Altunc and Aydın (2013), Ndambiri et al. (2012), and others concluded negative impact of aggregate government expenditures on economic growth.

Bose et al. (2007) examined the growth effects of disaggregated government expenditure for a panel of 30 developing countries and observed that, the share of government CE in GDP is positively and significantly correlated with economic growth, but current expenditure is insignificant. Similarly, Lupu et al. (2018), Al-Fawwaz (2016), and Egbetunde and Fasanya (2013), etc., examined different components of government expenditure and concluded that mostly developmental or CE positively affects economic growth.

Whereas, Ghosh and Gregoriou (2008) and Devarajan et al. (1996) investigated the relationship between the composition of public expenditure and economic growth of developing countries and show that an increase in the share of current expenditure has positive and statistically significant growth effects. At the same time the relationship between the capital component of public expenditure and per-capita growth is negative. Thus, seemingly productive expenditures, when used in excess, could become unproductive. These results imply that developing country governments have been misallocating public expenditures in favour of CEs at the expense of current expenditures. Likewise, Hasnul (2015), Nurudeen and Usman (2010), Taban (2010), etc., in their analysis concluded that developmental or CE has negative impact on economic growth.

3.2 Impact of government spending and economic growth in India – national level

Numerous relevant studies in the context of Indian economy, explored the impact of public expenditure on economic growth at national level using varied methodologies. Unnikrishnan and Kattookaran (2020) indicate that both public infrastructure investment and private infrastructure investment are having significant impact on the economic growth of India. When compared with public investment, it is private investment that is capable of giving a better impetus to economic growth in India. Sasmal and Sasmal (2020) have examined the impact of public expenditure on economic growth and viability of fiscal policy when the deficit in budget is financed by public borrowing. It is found that the share of RE of the government has significantly increased over time and many of the components of RE are non-developmental in nature.

Mallick (2013) examined the combined revenue and CE of the States and the Centre and noticed that high performance states were found to be incurring higher RE than the medium and low performance states. However, the high-performance states did not incur as much CE as the medium performance states. This could be due to the greater role of

private investment in the high-performance states. Ram and Kaur (2011) examined the impact of public expenditure on per capita GDP and confirm that per capita GDP growth is positively and significantly influenced by both expenditure on economic services and expenditure on social services. Khundrakpam (2003) analysed the dynamic interaction between the public sector expenditure and national income in India and finds a stable long-run relationship between them. Further, the study also indicates that long-run positive impact of public sector expenditure on national income would turn adverse if the growth of the former is excessive. In the short-run, however, there is a trade-off between growth in public sector expenditure and income.

3.3 Impact of government spending and economic growth in India – sub-national level

Few studies that either have investigated impact of government expenditure on the state domestic product or have assessed the multiplier effect or efficiency of government expenditure are mostly limited to few major states of India. Aneja and Banday (2021) in their study examined the sectoral contributions to overall inequality and disparity in per capita development expenditure in India in the post-reform period. The study finds that, the share of secondary and tertiary sector has increased in total inequality whereas the share of primary sector has decreased over time. The authors opine that for a developing country like India where a large proportion of population is engaged in primary sector, government should create new opportunities for the development of primary sector, which will reduce poverty, inequality and enhance balanced economic growth.

Nirola and Sahu (2019) investigate the impact of government size (share of total government expenditure in GDP) on economic growth across 23 states in India and finds that a bigger government is detrimental for state-level economic growth. However, the extent of the negative growth impact depends on the quality of institutions of the states, measured by a newly available index. States that have better quality of institutions register a lower negative impact on economic growth compared to their less progressive counterparts for similar increase in government size. Also, reduction in non-development government expenditure has a better growth impact compared to reduction in development government expenditure, especially for higher levels of institutional quality. Rastogi et al. (2019) address the question whether economic growth is associated with public expenditure in low-income states by decomposing public expenditure into social sector expenditure and expenditure on economic services. The study indicates that economic growth in low-income states leads to increase in public expenditure. In the long run, increase in the income in low-income Indian states results in more than 1% increase in expenditure on social sector and economic services. The results are, however, different for individual low-income states.

Saxena et al. (2018) empirically analyses the relationship between public infrastructure investment and economic growth for India using yearly data for its 28 states considering six major sub-sectors falling under infrastructure sector. The study also estimated the efficiency score for the six major sectors at state level. Mishra (2019) attempted to measure the fiscal multipliers in India using the state-level panel dataset of 17 non-special category states. The study indicates that the effects of fiscal variables on income in longer horizon are greater than the immediate impact. Both in the short run and long run, the multiplier effect of capital outlay on income is greater than the multiplier effect of RE. It provides a rationale for taxation wherein the government should resort to

taxation with an objective to spend it on productive investment and thereby raise the economic activity.

Ganaie et al. (2018) examines the relationship between fiscal decentralisation and economic growth in the case of India using panel data for 14 non-specialised states. The study indicates that spending decentralisation has a positive and significant impact on the state domestic product and revenue decentralisation has a negative and significant effect on state domestic product. The overall measure of fiscal decentralisation is found positively associated with the state income. While examining the role of fiscal policy implemented by the states in reducing the regional disparities in the economic growth across states Trivedi and Rajmal (2011) finds that fiscal deficits of the states result in contraction of growth. As regards the impacts of the various items that constitute the fiscal deficit on the growth of the states differ. CEs, particularly those on transport, communications and education are found to promote economic growth, albeit with a time lag. The study advocates increased CE at the state level as an integral part of the strategy for regionally-balanced growth.

Against this backdrop, the present paper thus redresses the gap in extant literature by uniquely attempting to investigate empirically, which component of government expenditure is more productive at sub-national level in order to achieve long-run economic growth using GMM approach. In Indian context, the distinction between productive and unproductive government spending is necessary since few states, in the recent years, have incurred more RE compared to CE to achieve the FRBM led fiscal objective.

4 Analytical framework

An analytical approach is developed to examine the relationships between different components and nature of government spending and economic growth across the states /UT in India. Proliferation of endogenous growth theories has engendered different models connecting government expenditure with a country's long-term growth. Scholars like Feder (1983), Ram (1986), Devarajan et al. (1996), and others investigated the links between government spending and economic growth using aggregate production function framework. Accordingly, to show the impact of government expenditure on the economic growth, the productive and unproductive government expenditure was treated as input in the aggregate production function (constant elasticity of substitution). Devarajan et al. (1996), in their model considered two types of government spending (g_1 and g_2) with differing productivities.

$$y = \left[\alpha k^{-\zeta} + \beta g_1^{-\zeta} + \gamma g_2^{-\zeta}\right]^{-\frac{1}{\zeta}} \tag{1}$$

where $\alpha > 0$, $\beta \geq 0$, $\gamma \geq 0$, $\alpha + \beta + \gamma = 1$, $\zeta \geq -1$, k is private capital and y is output.

After mathematical derivations, for an economy with a balanced budget constrain, the authors derive endogenous growth rate λ as follows:

$$\lambda = \frac{\alpha(1-\tau)\left\{\alpha\tau^{\zeta} / \left[\tau^{\zeta} - \beta\phi^{-\zeta} - \gamma(1-\phi)^{-\zeta}\right]^{-(1+\zeta)/\zeta} - \rho\right\}}{\sigma} \tag{2}$$

where τ is income tax rate (is constant over time), ϕ is share of government expenditure towards g_1 and $1 - \phi$ is share of government expenditure towards g_2, ρ is rate of time preference.

This framework thus gives an insight into which component of government spending is productive [for further details see Devarajan et al. (1996)]. The link between the coefficient of growth rate and the share of government spending in the budget indicates if a component is productive or not. Consequently, in this model, the economic growth is function of two exogeneous variables – tax rate and expenditure shares. This model was empirically tested for developing countries to know which component of government spending is more productive. Surprisingly their empirical results indicate that the current expenditures are more productive and positively linked to economic growth rather than CEs. Thus, apparently productive government expenditures, if used excessively, might result into unproductive expenditure. The findings of their study thus indicate that developing economies perhaps have been misallocating their government spending towards capital spending at the cost of current spending.

Whereas, Ghosh and Gregoriou (2008), further extended Devarajan et al. (1996) model to include a decentralised economy, wherein the government's objective is welfare maximisation with help of fiscal tools at its disposal [see Ghosh and Gregoriou, (2008), pp.487–489]. Accordingly, the government's task is to implement optimal fiscal policy. Their mathematical derivation for optimal growth rate is as follows:

$$\lambda^* = \frac{\alpha^{-1/\zeta}\left[1-\beta^{1/(\zeta+1)}-\gamma^{1/(\zeta+1)}\right]^{(1+2\zeta)/\zeta}-\rho}{\sigma} \tag{3}$$

Hence, their model resolves for three endogenous variables (viz. the optimal growth rate, the optimal expenditure shares and the optimal tax rate). The revenue side of variables are also incorporated in the model to overcome the biased coefficients. Empirically, the data from developing countries indicated that the current expenditure productively (positively) contributes to economic growth rather than CE.

5 Empirical analysis

5.1 Data and choice of variables

The study employs annual time series data of 28 states[2] and one union territory (i.e., Delhi)[3] of India for a period of 16 years (2004–2019). The data has been sourced from Handbook of Statistics on Indian States and State Finances published by RBI. The analytical framework (in Section 4) of Devarajan et al. (1996) and Ghosh and Gregoriou (2008) develops link between the shares of government expenditure and economic growth. In this section, an attempt is made to empirically examine how the growth performance of states/UT of India was impacted by share of different components of government expenditures over a period of time. Following two sets of dynamic models to be estimated are developed.

Model A

The empirical models developed in this study are adopted from Devarajan et al. (1996) with subsequent modifications. Devarajan et al. (1996) in their empirical model include share of various component in total government expenditure as the main explanatory variable and economic growth as dependent variable. Also, in their model, the share of government expenditure in GDP has been used to control for effects of financing the government budget.

Contrarily, according to Ghosh and Gregoriou (2008), non-inclusion of government budget constraint in the empirical analysis may result into systematic omitted variable biasedness of coefficient estimates. Further, according to Kneller et al. (1999) and Bose et al. (2007), ignoring revenue side variables and concentrating only on expenditure side may lead to biased coefficient estimators. Therefore, inclusion of government budget constraint variables like budget deficit (surplus), tax revenues and non-tax revenues are essential to overcome this problem. However, including all balanced budget constraint variables may pose perfect collinearity problem among regressors.

Therefore, following Gupta et al. (2005), and given that the objective of the present study is to investigate the impact of components of government expenditure on the output, states' tax revenue has been included in the present empirical model to correct the omitted variable biasedness. Additionally, in order to capture for state specific factors that determine state's economic growth, apart from productive government expenditure, the present study includes population growth as control variable. To avoid the problem of collinearity, different components of government expenditure are included in separate regression. Thus, the following equations were estimated:

$$GSDP_{it} = \alpha_0 + \beta_1 (TE / GSDP)_{it} + \beta_2 POP_{it} + \beta_3 TR_{it} + \varepsilon_{it} \tag{4}$$

$$GSDP_{it} = \alpha_1 + \gamma_1 (GE / TE)_{it} + \gamma_2 POP_{it} + \gamma_3 TR_{it} + \varepsilon_{it} \tag{5}$$

Since GE/TE represents ratio of different components of expenditure to total government expenditure for a State/UT viz., revenue expenditure (RE/TE) and capital expenditure (CE/TE), equation (5) further can be subdivided into:

$$GSDP_{it} + \alpha_2 + \gamma_4 (CE / TE)_{it} + \gamma_5 POP_{it} + \gamma_6 TR_{it} + \varepsilon_{it} \tag{5.1}$$

$$GSDP_{it} + \alpha_3 + \gamma_7 (RE / TE)_{it} + \gamma_8 POP_{it} + \gamma_9 TR_{it} + \varepsilon_{it} \tag{5.2}$$

Apart from revenue and capital components of the government expenditure, following Landau (1985), Ram (1986), Devarajan et al. (1996) and Ghosh and Gregoriou (2008), this study also explores the effect of different functional classification of government expenditure (viz., social and economic expenditures) on economic growth.

$$GSDP_{it} = \alpha_4 + \delta_1 (FE / TE)_{it} + \delta_2 POP_{it} + \delta_3 TR_{it} + \mu_{it} \tag{6}$$

Since, FE/TE indicates ratio of functional classification of government expenditure to total expenditure for State/UT, viz., total economic services expenditure (TEE/TE) and total social services expenditure (TSE/TE), therefore equation (6) is further segmented as:

$$GSDP_{it} = \alpha_5 + \delta_4 (TEE / TE)_{it} + \delta_5 POP_{it} + \delta_6 TR_{it} + \mu_{it} \tag{6.1}$$

$$GSDP_{it} = \alpha_6 + \delta_7 (TSE / TE)_{it} + \delta_8 POP_{it} + \delta_9 TR_{it} + \mu_{it} \tag{6.2}$$

where i and t denote the cross-sectional and time series dimensions respectively GSDP is real GSDP growth rate

ε, ϵ, and μ, are error term.

POP is population growth rate of a State/UT.

TR is Share of tax revenue in GSDP for a State/UT.

Model B

As suggested by Landau (1985) and Ram (1986), the share of total government expenditure and share of various components of expenditure in national income will be superior approach to include if one expects different components have different impacts on economic growth. Thus, in this study, an attempt is made to examine whether real revenue/capital government spending should be construed as more productive component of government expenditure from a fiscal policy perspective. The following equations to be estimated includes share of various components of government expenditure in GSDP:

$$GSDP_{it} = \alpha_7 + \varphi_1 (GE / GSDP)_{it} + \varphi_2 POP_{it} + \varphi_3 TR_{it} + \psi_{it} \tag{7}$$

In above equation GE/GSDP is share of different components of expenditures in GSDP for a State/UT viz., revenue expenditure (RE/GSDP) and capital expenditure (CE/GSDP), therefore following equations can be obtained:

$$GSDP_{it} = \alpha_8 + \varphi_4 (CE / GSDP)_{it} + \varphi_5 POP_{it} + \varphi_6 TR_{it} + \psi_{it} \tag{7.1}$$

$$GSDP_{it} = \alpha_9 + \varphi_7 (RE / GSDP)_{it} + \varphi_8 POP_{it} + \varphi_9 TR_{it} + \psi_{it} \tag{7.2}$$

Further, the functional form of government expenditure is expressed as follows:

$$GSDP_{it} = \alpha_{10} + \eta_1 (FE / GSDP)_{it} + \eta_2 POP_{it} + \eta_3 TR_{it} + \theta_{it} \tag{8}$$

As mentioned above, FE/GSDP is share of functional classification of government expenditure in GSDP for State/UT viz., total economic services expenditure (TEE/GSDP), total social services expenditure (TSE/GSDP) and so equation 8 is further divided into:

$$GSDP_{it} = \alpha_{11} + \eta_4 (TEE / GSDP)_{it} + \eta_5 POP_{it} + \eta_6 TR_{it} + \theta_{it} \tag{8.1}$$

$$GSDP_{it} = \alpha_{12} + \eta_7 (TSE / GSDP)_{it} + \eta_8 POP_{it} + \eta_9 TR_{it} + \theta_{it} \tag{8.2}$$

where ψ and θ are error terms.

The present study in order to overcome the problem of endogeneity employs GMM model developed by Arellano and Bond (1991) and uses only real gross state domestic product (GSDP) growth rate as dependent variable like Ghosh and Gregoriou (2008). Further, to avoid variability issues in data, all variables are log transformed and are further deflated using GSDP deflator (except for population growth variable) to arrive at their real values.

5.2 Methodology

The first step is to test data for stationarity using Im-Pesaran-Shin (IPS) unit root test, since Dickey-Fuller, Phillips-Perron and augmented Dickey-Fuller tests do not give efficient results of unit root for panel data due to lack of power (Levin and Lin, 1992, 1993). Next to analyse whether the components and nature of government expenditures is linked with higher growth rates, ordinary least square (OLS) fixed effect method can be employed.

However, given the heterogeneity due to cross-section observations, the problem of endogeneity in regression may be expected. Endogeneity in regression means either the error term is associated with explanatory variable (endogenous) or two error terms are associated (Ullah et al., 2018). Consequently, this leads to spurious results, erroneous interpretations and conclusions and wrong sign of coefficients (Ketokivi and McIntosh, 2017). Ullah et al. (2018) and Ketokivi and McIntosh (2017), advocated GMM model developed by Arellano and Bond (1991) and Blundell and Bond (1998) to resolve the problem of endogeneity. For each time period, GMM estimator utilises lagged instruments of endogenous variable to address potential endogeneity in the panel. Therefore, in the present study, lags of endogenous variable as instruments are used in GMM model to address the issue of endogeneity. This model thus provides consistent estimators when the panel data is plagued with endogeneity, heterogeneity and simultaneity issues [Wintoki et al., (2012), p.588]. Rewriting equations (4), in GMM form:

$$Y_{it} - Y_{it-1} = (\alpha - 1)Y_{it-1} + \beta_0 X_{it} + \mu_{it} + \varepsilon_{it} \tag{9}$$

where $Y_{it} - Y_{it-1}$ is rate of GSDP growth, X_{it} is a vector of explanatory variables, μ_{it} is an unobserved state specific effect, ε_{it} is the error term.

To remove state-specific effects by taking first difference, equation (9) is stated as follows:

$$Y_{it} - Y_{it-1} = \alpha\left(Y_{it-1} - Y_{it-2}\right) + \beta_0\left(X_{it} - X_{it-1}\right) + \varepsilon_{it} - \varepsilon_{it-1} \tag{10}$$

where $\varepsilon_{it} - \varepsilon_{it-1}$ is lagged error term which is correlated with lagged dependent variable and thus equation (9) resolves endogeneity problem. The GMM uses following moment conditions:

$$E\left[X_{it} - s\left(\varepsilon_{it} - \varepsilon_{it-1}\right)\right] = 0 \quad \text{for} \quad s \geq 2; t = 3,\text{A}\ , T \tag{11}$$

$$E\left[Y_{it} - s\left(\varepsilon_{it} - \varepsilon_{it-1}\right)\right] = 0 \quad \text{for} \quad s \geq 2; t = 3,\text{A}\ , T \tag{12}$$

with an assumption that error term is not serially correlated and explanatory variables X, are weakly exogeneous. Likewise, equations (5)–(8) were also estimated using GMM approach.

6 Results and discussion

Table 1 reports the results of IPS unit root. The results indicate that the null hypothesis of presence of unit root in all variables is rejected.

Table 1 Im-Pesaran-Shin unit root test

Variables	*Statistics*	*p-value*	*Remarks*
GSDP*	–3.98625	0.00	H0 is rejected
POP*	–6.14048	0.00	H0 is rejected
TR/GSDP**	–1.52348	0.06	H0 is rejected
TE/GSDP*	–3.1173	0.00	H0 is rejected
RE/GSDP*	–3.09216	0.00	H0 is rejected
RE/TE*	–4.19556	0.00	H0 is rejected
CE/GSDP**	–2.20216	0.013	H0 is rejected
CE/TE*	–2.47667	0.00	H0 is rejected
TEE/GSDP*	–2.61305	0.00	H0 is rejected
TEE/TE*	–3.5479	0.00	H0 is rejected
TSE/GSDP*	–3.74208	0.00	H0 is rejected
TSE/TE*	–5.30144	0.00	H0 is rejected

Notes: *Significant at 1%, **significant at 5%.

Source: The authors

In the succeeding step, two econometric methods are used to study the link between different composition of government expenditure and economic growth of the states/UT of India. First is OLS fixed effects model which is widely used in panel datasets. The results of OLS fixed effect estimates as suggested by Hausman test are considered in the present study.

Table 2 indicates that the CE in equation (7.1) though positive is not at all impacting the economic growth of the states/UT, whereas, it impacts economic growth positively and significantly in equation (5.1). The other components of government expenditure in model A and B are negatively and significantly related to economic growth. A unit increase in ratio of CE to total expenditure leads to 0.55 units rise in economic growth whereas a unit rise in ratio of RE to total expenditure leads to 0.23 units fall in economic growth. Further, the share of total government expenditure in GSDP is positive but not significant. The models were tested for heteroscedasticity using Breusch-Pagan-Godfrey test. The null hypothesis of homoscedasticity is not rejected by the test indicating that models do not suffer from heteroscedasticity.

However, OLS fails to capture cross-state heterogeneity. Therefore, to overcome the issues of heterogeneity and also endogeneity, the second method employed is first difference GMM method. Table 3 reports first-difference GMM estimators. As no standard lag length is specified in the literature, in the present study one lag length is used. To have robust estimate, a two-step GMM is used since one-step GMM leads to potential loss of data due to internal transformation problems.

Table 2 Contribution of various components of government expenditure on economic growth – OLS (fixed effect)

Variables	*Dependent variable – GSDP*				
	Model A				
	(4)	*(5.1)*	*(5.2)*	*(6.1)*	*(6.2)*
TE/GSDP	0.10	-	-		-
CE/TE	-	0.55**	-	-	-
RE/TE	-	-	–0.23**	-	-
TEE/TE	-	-	-	–0.23***	-
TSE/TE	-	-	-	-	–0.28**
POP	0.13	0.12	0.12	0.12	0.11
TR/GSDP	–0.69*	–0.67*	–0.66*	–0.67*	–0.66*
D-W statistics	1.97	1.97	1.98	1.98	1.99
	Model B				
	(7.1)	*(7.2)*	*(8.1)*	*(8.2)*	
CE/GSDP	0.12	-		-	
RE/GSDP	-	–0.59**		-	
TEE/GSDP	-	-	–0.28**	-	
TSE/GSDP	-	-	-	–0.31*	
POP	0.12	0.16	0.14	0.12	
TR/GSDP	–0.70*	–0.53*	–0.48*	–0.44**	
D-W statistics	1.97	1.95	1.97	1.98	
Observations	464	464	464	464	
Number of states and UT	29	29	29	29	

Notes: *Significant at 1%, **significant at 5%, ***significant at 10%.

Source: The authors

Interestingly, the results of GMM estimators as reported in Table 3 are consistent with that of OLS estimators. The total expenditure as a share of GSDP [equation (4)] is found to be positively and significantly affecting the economic evolution, which is in line with the findings of Ahuja and Pandit (2020), Bhat and Sharma (2021) and Wahab (2011). The result supports the Keynesian theory that proposes a rise in government expenditure will lead to social and economic growth in a country. In other words, this may also suggest that increasing the share of government expenditure may be instrumental in increasing GSDP of the states/UT.

Evidently from GMM estimators, the CE is significant and positively related to the economic growth of the states. A unit rise in real CE leads to 0.37 unit [equation (7.1)] and 1.43 unit [equation (5.1)] rise in economic growth respectively. However, the RE [equation (7.2) and equation (5.2)] is negatively and significantly impacting the economic growth of the states/UT in India. The results corroborate with findings of Barro (1991), Bose et al. (2007), Easterly and Rebelo (1993), Gremmell et al. (2009), Levine and Renelt (1992) and Wahab (2011) who concluded that government current expenditure has negative output growth effect whereas government CE has positive output growth effects.

However, this is in contrast to findings of Devarajan et al. (1996) and Ghosh and Gregoriou (2008). The findings suggest that the CE of states/UT is productive, whereas, the RE is unproductive in real terms.

Table 3 Contribution of various components of government expenditure on economic growth – first differenced GMM

Variables	*Dependent variable – GSDP*				
	Model A				
	(4)	*(5.1)*	*(5.2)*	*(6.1)*	*(6.2)*
$GSDP_{t-1}$	–0.05*	–0.05*	–0.06*	–0.07*	–0.08*
TE/GSDP	0.40*	-	-	-	-
CE/TE	-	1.43*	-	-	-
RE/TE	-	-	–0.65*	-	-
TEE/TE	-	-	-	–0.71*	-
TSE/TE	-	-	-	-	–0.65*
POP	0.10*	0.08*	0.11*	0.09*	0.05*
TR/GSDP	–0.62*	–0.53*	–0.62*	–0.60*	–0.55*
Hansen J-test (prob)	0.30	0.42	0.39	0.36	0.43
AR (1)	0.00	0.00	0.04	0.01	0.00
AR (2)	0.56	0.68	0.64	0.52	0.51
Observations	464	464	464	464	464
Number of states and UT	29	29	29	29	29
	Model B				
	(7.1)	(7.2)	(8.1)	(8.2)	
$GSDP_{t-1}$	–0.05*	–0.06*	–0.07*	–0.08*	
CE/GSDP	0.37*	-	-	-	
RE/GSDP	-	–1.55*	-	-	
TEE/GSDP	-	-	–0.53*	-	
TSE/GSDP	-	-	-	–0.46*	
POP	0.09*	0.16*	0.03***	0.07*	
TR/GSDP	–0.59*	–0.69*	–0.34*	–0.33*	
Hansen J-test (prob)	0.32	0.31	0.28	0.30	
AR (1)	0.01	0.01	0.01	0.01	
AR (2)	0.58	0.51	0.46	0.47	
Observations	464	464	464	464	
Number of states and UT	29	29	29	29	

Note: *Significant at 1%, **significant at 5%, ***significant at 10%.

Source: The authors

Intuitively, government CE presumably adds to the country's assets (specifically infrastructure), which furthers the productivity in the economy thereby increasing the economic growth. As suggested by Aschauer and Greenwood (1985) and Barro (1990), there is difference between public goods and services used by households and those used

by private sector. They argued that the household's utility function which consists of public goods and services mostly is comprised of government consumption expenditures. Even though, these expenditures provide utility to the households, they possibly have negative output growth effect owing to the fact that higher taxes are required to finance such expenditures that may further lower the returns on investments and also reduces the incentive to invest in the economy. In contrast, the government investment expenditures in form of core infrastructure (viz., streets, highways, airports etc) generally have more positive effect on growth and also increases private sector productivity.

To put it differently, a rise in CE by the states/UT indicate that rise in consumer demand can be sustained through increasing and enhancing activities which create assets, jobs, and assures income flow over the years, whereas providing subsidies through RE does not guarantee sustained consumer demand. Empirical evidence on state government expenditure in India, suggests that the multiplier effect of CE on income is more than the multiplier effect of RE (Mishra, 2019). Additionally, as shown by Bose and Bhanumurthy (2013), a rise of Rs. 100 in capital spending adds Rs. 245 to the economy whereas a rise of Rs 100 in revenue spending adds to only Rs. 98–99 in the economy. Thus, CE increases aggregate demand and fosters long term growth in the economy.

Surprisingly, total expenditure on economic services and total expenditure on social services [equations (6.1), (6.2) and equation (8.1), (8.2)] are negative and significantly affecting the growth of the states/UT. The negative relationship between economic growth and expenditure on social services corroborates the findings by Paike and Pal (2020).

This requires some explanation. First, the expenditure on economic and social services of the states/UT in the present study is inclusive of revenue and capital components of total government expenditure. Examining the allocation of government expenditure in social service sector by states/UT over a period under the study, it is found that the share of revenue component in social service expenditure has remained high (around 70–99%) compared to that of CE for all the states/UT (except for Manipur). Contrarily, the revenue component of the expenditure in economic services among the states/UT was mostly in the range of (51–90%) during the same time period. Interestingly, of the total states/UT, Delhi, Uttar Pradesh, Madhya Pradesh, Tripura, and Uttarakhand, had incurred either equal share of revenue and CE or more of CE on economic services. Overall, this indicates that the pattern of incurring expenditure by the states is against the grain of general hypothesis that economic services have higher proportion of CE. Given the fact that most states/UT in India incur more of RE both on social and economic services, the findings that they are negatively correlated with GSDP growth is consistent with the negative association derived between RE and GSDP.

Second, given the regional economic disparities between the states/UT, the less developed states/UT, in spite of receiving more funds from the Centre compared to their developed counterparts, either might be inefficiently using the public expenditure, or have distorted incentive structures or produce lower quality of public goods (like hospitals, schools, roads etc.) from government spending leading to overall negative impact of expenditure in economic and social sector on GSDP. Third, the revenue component of government expenditure too comprises of few productive elements. However, when such productive elements used expendably, they might become unproductive. These implies that the few states/UT have been allocating more of RE at the cost of CE. The results are in line with the findings of Devarajan et al. (1996).

Lastly, as expected states' tax revenue has negative and significant impact on growth indicating distortionary effect of the tax on economic growth which is in agreement with Bose et al. (2007). In simple terms, this implies that higher taxes generate disincentives in form of low productivity, inefficiency, etc., which ultimately leads to negative growth rate in the economy.

The consistency of the above GMM estimators significantly depends on whether or not the lagged explanatory variables are valid instruments and whether the error term is not serial correlated. For this, Hansen test (J-statistics) for validity of the instruments and Arellano and Bond (AR) statistics for testing serial correlation among the residuals are used. The models of the study pass through the diagnostic tests viz., Hansen test (J-statistics) for validity of the instruments and AR statistics for testing serial correlation among the residuals. The J test (probability) confirms that instruments are valid and the AR statistics validate the absence of serial correlation among the residuals of first order.

7 Conclusions and policy implications

This study examined and analysed the impact of composition of government expenditure on economic growth of 29 states/UT of India for a period of 16 years (2004–2019) using GMM technique. A simple analytical model developed by Devarajan et al. (1996) and further extended by Ghosh and Gregoriou (2008), was used to examine which component of government spending is more productive than the other. Typically, capital and revenue (current) components of government expenditure are generally inferred as more productive and less productive respectively. Based on the model, the empirical results of this study confirm *a priori*.

Findings suggest that a rise in CE by the states/UT will raise their economic growth rate, and reverse occurs when RE is raised confirming that in real terms, the CE is more productive than the RE. However, the expenditure on economic services and social services were found to be negatively correlated with growth rate. This is because, the revenue component of expenditure for both economic services and social services for almost all the states/UT under the study is high as compared to that of CE. The coefficient of states' tax revenue is negatively but significantly correlated to economic growth indicating that any additional finance raised by state/UT will lessen the positive effects of CE. Overall, the total government expenditure incurred by the states/UT in India is found to have positive and productive impact on the growth rate.

Although, Blundell and Bond (1998) argued that compared to system GMM, differenced GMM estimator may have poor finite sample properties if time series are persistent resulting into weak instrument predictors of endogenous changes, Bun and Windmeijer (2010) in their study showed that the system GMM estimator may have larger absolute bias than differenced GMM estimator. The findings of the present study therefore are reliable and have important policy implications. First, the evidence that CE is positive and more productive to GSDP rather than RE, will help states/UT to reallocate resources in favour of CE. Consequently, this will increase the productivity and GSDP growth rate in long-run and will also improve the efficiency of spending among states/UT. Second, this will also guide states/UT to relentlessly pursue their budgeted CEs, in order to avoid vicious cycle of austerity augmenting the economic slowdown which consequently leads to contraction of state/UT revenues and further drives down the expenditure. Third, tax revenue having negative impact on GSDP growth rate, implies

that to finance increased level of government expenditure state/UT governments need higher distortionary taxes. However, if states/UT, finance productive expenditure with these taxes, then the productivity of expenditure will surpass the net loss accompanying the taxes and thereby resulting into growth promoting economic activities. Fourth, although states/UT are persevering with fiscal consolidation, managing resource crisis by improving mobilisation of tax revenue and maintaining fiscal discipline is possible if states/UT are aware about the degree of productiveness of government spending across various sectors (like social, economic etc.) and accordingly prioritise their allocation of CE in these sectors of the economy. Thus, sustainable economic growth across states/UT is attainable through effective allocation of productive expenditure in conjunction with improved tax generation capacity.

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Notes

1 Unlike developmental expenditure, non-developmental expenditure is generally fixed in nature.

2 States included in the study are Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Chhattisgarh, Goa, Gujarat, Haryana, Himachal Pradesh, Jammu and Kashmir, Jharkhand, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Manipur, Meghalaya, Mizoram, Nagaland, Odisha, Punjab, Rajasthan, Sikkim, Tamil Nadu, Tripura, Uttar Pradesh, Uttarakhand, and West Bengal. Jammu and Kashmir which earlier was a state is now two UT since October 2019. Telangana state was formed in 2014.

3 Unavailability of data of other UT and newly formed state (Telangana).