Size of Expenditure Multipliers for Indian States: Does the Level of Income and Public Debt Matter?

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Size of Expenditure Multipliers for Indian States: Does the Level of Income and Public Debt Matter?

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In this paper we apply panel vector error correction model to analyze the role of debt burden and income level in determining expenditure multipliers of Indian states. Our main results based on annual data from 1990-91 to 2015-16 suggest that the size of multiplier is sensitive to expenditure composition, debt level and the per capita income. The development expenditure multiplier is found to be 1.74 times of total expenditure multiplier. Further, the multipliers are found to be larger for low debt states than the high debt states, for both total expenditure and development expenditure. The impact of income on multiplier is, however, asymmetric across expenditures. While total expenditure multiplier is higher for low income states, development expenditure multiplier is found to be highest in high income states.

JEL Codes: C23, E62, H32, H70

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I. Introduction

Fiscal stimulus were implemented by a number of developed and emerging market economies to revive slowdown in demand caused by the global financial crisis (IMF 2010). Consequently, the analysis of expenditure multipliers gained traction and more precise estimates of multipliers such as for short-run and long-run, for different expenditure components, and under specific economic/policy environment are being attempted by the researchers. These estimates are helpful for policymakers to gauge the likely impact of fiscal adjustment/stimulus. Therefore, in the recent period, the focus of analysis is being extended to examine the impact of country/economy specific factors on the size of multipliers.

The expenditure multiplier measures change in output due to change in government spending. The size of multiplier can be measured in terms of the impact multiplier, multiplier

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at some horizon and cumulative multiplier, as defined below (Batini *et al.,* 2014; Spilimbergo *et al.,* 2009).

Impact multiplier = $\Delta Y\ (t)/(\Delta G(t))$

Multiplier at some horizon i = $\Delta Y\ (t+i)/(\Delta G(t))$

Cumulative multiplier = $\sum_{j=0}^{n} \Delta Y\ (t+j)/\sum_{j=0}^{n} \Delta G(t+j))$

where, Δ is change, Y is output, G is government expenditure and t is time period (usually a quarter or year).

Empirical studies finds that the size of expenditure multiplier can be influenced by the level of government debt and economic development apart from other factors such as economic cycle, effectiveness of monetary policy, trade openness and exchange rate regime (Ilzetzki *et al.,* 2012; Koh 2016; Combes *et al.,* 2016; and Deskar-Skrbic *et al.,* 2017). Multiplier are also found to be sensitive to expenditure composition in cross-country (Ilzetzki *et al.,* 2012; Boitani and Perdichizzi, 2018) and Indian context (Guimarães 2010; Jain and Kumar 2013; Bose and Bhanumurthy 2015[3]; Goyal and Sharma 2018; and Mishra, 2019). Therefore, the assessment of expenditure multipliers for different types of expenditures for a given debt level and income level can help policymakers to design an appropriate fiscal stimulus.

While multipliers are usually examined for public expenditure of general /central government, multipliers of states (sub-national governments) assumes importance in India's federal structure in view of their powers to raise revenues and expenditure responsibilities. State governments have been given major expenditure responsibilities *viz.,* agriculture, rural development, education, health, law and order *etc.* which are crucial for improving social and economic infrastructure. States also levy important taxes such as value added tax (VAT)[4], state excise duty, and stamps and registrations. The significance of state level fiscal policy can be observed from states share in India's general government expenditure (Centre + States) which has been greater than 50 per cent since 1990-91 and it has reached to more than 60 percent in 2015-16. Hence, public expenditure at the state level influences state economies as well as the national economy. This is corroborated by fiscal stimulus undertaken by Indian states in the aftermath of global financial crisis. To contribute to the expansionary fiscal policy, deficit

[3] Bose and Bhanumurthy 2015 argued that capital expenditure multiplier would be higher due to crowds-in of private investment led by public investment and an accelerator effect.

[4] With the implementation of goods and services tax (GST) from July 1, 2017, state value added tax is subsumed in GST along with other indirect taxes.

targets of states stipulated under Fiscal Responsibility Legislations were relaxed (2004-08) (IMF 2010 and RBI 2010).

Although the state governments are playing greater and steadily increasing role in terms of provision of public goods and services, large variations in per capita expenditure exists across states. During 1990-2016, the average per capita public expenditure of five low income states *viz.,* Bihar, Madhya Pradesh, Orissa, Rajasthan and Uttar Pradesh was just 51 per cent of the average expenditure of relatively high income states *viz*., Andhra Pradesh, Gujarat, Maharashtra, Punjab and Tamil Nadu, reflecting income as the important determinant of public expenditure. Further, the composition of expenditure is influenced by fiscal position of a state wherein discretionary expenditure (having higher multiplier effects) is curtailed during high debt/deficit phases (Raut and Raju, 2019). For example, during 1990-2016, the average share of development expenditure in total expenditure for high debt states was lower at 63 per cent as compared to 68 per cent for relatively low debt states[5]. Therefore, the impact of debt position could influence multipliers through expenditure composition channel[6] apart from Ricardian equivalence and interest rate channel argued by earlier studies (Ilzetzki*et al.,* 2012; Combes *et al.,* 2016; Deskar *et al., 2017*; and Huidrom *et al.,* 2019).

Against this backdrop of the impact of country characteristics on expenditure multiplier, variations in debt burden and per capita income across Indian states are likely to influence multiplier effects of their expenditures. This particular aspect has not been explored in earlier studies in the Indian context. Accordingly, this paper attempts to fill the gap by examining total and development expenditure multipliers for 'high debt states' and 'low debt states', and 'high income states' and 'low income states'. The paper has been organized into four sections. Section II presents the review of literature on fiscal multipliers focusing on studies examining importance of expenditure composition, and the role of debt and income. Section III discusses the data, methodology and the empirical results. The concluding observations are provided in section IV.

II. Review of Literature

Economic theory provides divergent views about the role of fiscal policy in stabilizing output. Keynesian view of active role of fiscal policy in macroeconomic stabilization suggests positive fiscal multipliers. Keynes advocated that increased public spending through deficit

[5] The explanation of high debt states and low debt states is provided in data and methodology section.

[6] To illustrate, low debt states will have lower committed expenditure such as interest payments which will create fiscal space for these states and will allow them to spend more on discretionary development expenditure/ capital outlay having higher multipliers (Jain and Kumar 2013; Bose and Bhanumurthy 2015).

financing can stimulate aggregate demand and revive the economy during economic slowdown. On the other hand, Ricardian Equivalence hypothesis postulates that debt financed fiscal expansions will not change income as consumers would save more anticipating sooner increase in taxes. However, most of the empirical studies have found positive multipliers supporting the Keynesian view.

Multiplier effects were found to vary across components of public expenditure. Some cross-country studies have found investment expenditure multiplier higher than the consumption expenditure due to demand effects in the short-run and supply/crowding in effects in the long-run (Ilzetzki *et al.,* 2012; Boitani and Perdichizzi, 2018). On the other hand, Garry and Valdivia (2017) found current expenditure multiplier higher than the capital expenditure for Latin America and the Caribbean countries, which was attributed to miniscule share of capital expenditure in total expenditure.

In the Indian context, most of the studies have found higher multiplier for capital/development expenditure compared to total expenditure and revenue expenditure. Guimarães (2010) using structural and recursive vector autoregression (VAR) models based on quarterly data from 1996:Q2 to 2009:Q3 observed impact multiplier for current expenditure at 1 which declined to 0.5 after 4-5 quarters due to crowding out. The multiplier for development expenditure was greater than 1 and persisted for 16 quarters. An analysis of multiplier effects was also undertaken for states using a panel generalized method of moments (GMM) and the multiplier for real primary spending was high and ranged between 0.9 - 1.3. Jain and Kumar (2013) estimated multipliers for central government, state governments and general government applying structural VAR model on annual data from 1980-81 to 2011-12 for different categories of expenditure. The impact multiplier for non-defence capital outlay was highest (1.81) and for revenue expenditure it was the lowest (0.37) implying crowding out of private demand. As regards, the central government, the impact multiplier was lowest for development expenditure (0.19) and highest for non-defence capital outlay (2.10). In case of states, the impact multiplier was lowest for revenue expenditure and highest for development expenditure. The study also found highest cumulative multiplier of capital outlay among all the expenditure categories for both general government, central government and state government. Among layers of government, they found higher multipliers for different categories of states expenditure which was attributed to small scale nature and lower gestation period of projects at states level as compared to the higher level of government. Bose and Bhanumurthy (2015) estimated multipliers for general government in India using the data from 1991 to 2012. The

size of the impact multiplier for transfer payments was 0.98 while that for other revenue expenditure was 0.99. The impact multiplier for capital expenditure was much higher at 2.45. They argued that public investment crowds-in private investment and there is an accelerator effect of investment on output. Goyal and Sharma (2018) estimated multipliers for the central government's total, revenue and capital expenditure using a SVAR model on quarterly data. They found impact multiplier highest for revenue expenditure and cumulative multiplier highest for capital expenditure. Using data for 17 non-special category states for 2001-14, Mishra (2019) found higher multiplier for capital outlay than the revenue expenditure.

Studies comparing multipliers based on income/economic development have found that the size of multiplier was usually lower or negative in developing economies/emerging market economies (EMEs), as against positive or higher in developed/high income countries (Ilzetzki *et al.,* 2012 and Hory 2015). Poorer institutions reducing economic performance (North, 1990), lags in decision and implementation of fiscal policy (Hemming *et al*., 2002), less flexible supply side and larger uncertainty/instability (Hory, 2015) were some of the factors identified in these studies for smaller size of multipliers in developing economies/EMEs. In addition, Ilzetzki *et al.* (2012) found the effect of fiscal policy to be transient in developing countries and highly persistent in high-income countries. Furthermore, Hory (2015) observed differences between advanced economies and EMEs in respect of sensitivity of multipliers to some of its determinants. For example, negative sensitivity of public debt was more pronounced in EMEs; financial development was found to increase efficiency of public spending in EMEs by higher magnitude *vis-à-vis* advanced economies; negative sensitivity of multiplier for saving rate was stronger in EMEs; and the impact of trade openness was negative in EMEs as against positive in advanced economies. Koh (2016) found higher fiscal multipliers for advanced economies than that of developing countries. In contrast, Contreras and Battelle (2014) found size of multiplier higher for developing countries than that for high income countries. They argued that the lower multiplier of high income countries was attributed to relatively bigger crowding out effect.

The level of public debt was found to be one of the most important factor determining the size of expenditure multipliers. Studies have found evidence of higher public debt associated with lower multiplier in both advanced countries and EMEs. Kandil and Morsy (2010) employed annual data on 34 emerging countries from 1950 to 2008 and estimated the long-run and short-run effects of fiscal impulse on output growth using a panel vector error

correction model (VECM). They found higher debt associated with negative effect of fiscal impulse on output growth in the long-run. They argued that higher debt and high cost of borrowing crowds out private activity and erodes confidence in policy credibility. Ilzetzki *et al.* (2012) found negative multiplier during episodes of high debt (defined as central government debt exceeding 60 per cent of GDP). Nickel and Tudyka (2013) examined the impact of fiscal stimulus on GDP using interacted panel vector auto-regression (IPVAR) model based on annual data from 1970-2010 for 17 European countries. They found effects of expansionary fiscal shock on real GDP to be positive, however, at higher levels of debt, the effects on real GDP were negative. Contreras and Battelle (2014) found long-run multiplier lower at 0.39 for high debt countries *vis-a-vis* 1.49 for low debt countries due to increase in interest rates. Hory (2015) found that the high levels of public debt lowered multipliers in both EMEs and advanced economies, however, the reduction was higher in case of EMEs. Koh (2016) found fiscal multipliers lower during episodes of higher debt burden in a sample of 120 countries. Long-run multiplier was at 0.4 when debt-GDP ratio was higher than 60 per cent, and it was 'zero' when debt-GDP ratio exceeded 100 per cent. Combes *et al.* (2016) examined fiscal multipliers in Central and Eastern European Countries using a panel VECM and found lower impact and cumulative multipliers for high debt countries (average debt-GDP ratio 48 per cent) *vis-à-vis* low debt countries (average debt-GDP ratio 22 per cent). Deskar-Skrbic *et al.* (2017) analyzed fiscal multipliers for 11 countries in the Central Eastern and Southeastern European region using a panel VAR model. They found impact and cumulative multiplier lower for high debt countries which was attributed to adverse effects of risk premium and private sector confidence on consumption and investment. Huidrom *et al.* (2019) argued that the impact of fiscal stimulus by government with weaker fiscal position (high debt) will be lesser. The weaker impact was attributed to (i) Ricardian channel – household expecting tax increases sooner than that of the government having stronger fiscal position and thus private sector reduces consumption, and (ii) interest rate channel, where increased sovereign debt and the consequent rise in bond yield/borrowing cost leads to crowding out of private investment.

III. Data, Methodology and Empirical Results

In state budgets, expenditure is classified into revenue (current expenditure) and capital (investment). Additionally, for analytical purpose, it can also be classified into development

and non-development components[7]. In this paper, total expenditure and development expenditure were chosen for analyzing multipliers. In order to examine impact of expenditure on GDP/GSDP, total expenditure is crucial as it directly adds to the aggregate demand. However, in this paper, the development expenditure was also chosen due to its following attributes. First, it does not include committed expenditure (interest payments, pension and administrative services) and thus its nature is relatively discretionary. It includes expenditure on social services such as education, health and social welfare; and economic services such as agriculture, irrigation, rural development and energy. Second, during the period of this study (1990-2016), development expenditure (on an average) accounted for 66 per cent of total expenditure. Finally, the development expenditure multipliers were found to be higher than the total and revenue expenditure by the studies in Indian context. Among other fiscal variables, states' own tax revenue (OTR) was considered as a control variable due to dependence of government expenditures on revenues.

The paper employed annual data from 1990-91 to 2015-16 for 25 states[8]. Data on fiscal variables were sourced from the Reserve Bank of India's State Finances: A Study of Budget (various issues) and data on Gross State Domestic Product (GSDP) were taken from the National Statistical Office (NSO), Ministry of Statistics and Programme Implementation, Government of India. The GSDP data of different base years[9] were adjusted to the latest 2011-12 base. The fiscal variables have been transformed into natural logarithm after converting into real terms by using the GSDP deflator.

In view of the evidence on role of economy/country specific factors in determining expenditure multipliers, state specific characteristics such as debt an income levels were considered. Accordingly, states were divided into 'high debt', and 'low debt' group based on debt-GSDP ratio and 'high income', and 'low income' group based on per capita income. To classify states into high debt and low debt group, the average debt-GSDP ratio during 2003-04 to 2008-09 was considered. The debt-GDP ratio of all states recorded highest level of 31.8 per cent in 2003-04 and remained above 31.0 per cent during 2003-04 to 2005-06, however, it

[7] Apart from non-development and non-development, grants-in-aid contributions to local bodies needs to be added to arrive at total expenditure of states.

[8] In view of bifurcation of states *viz.,* Chhattisgarh, Jharkhand, Telangana and Uttarakhand data of these states have been included in their parent states *viz.,* Madhya Pradesh, Bihar, Andhra Pradesh and Uttar Pradesh, respectively.

[9] From 1990-91 to 2015-16 GSDP data are available in five base years *viz.,* 1980-81, 1993-94, 1999-2000, 2004-05 and 2011-12.

declined sharply in the subsequent years due to adoption of fiscal and institutional reforms[10]. Thus, the period considered for deciding benchmark (2003-04 to 2008-09) captures both fiscal stress (high debt and deficit levels) and fiscal consolidation (revenue surplus and decline in debt) episodes. The state-wise average debt-GSDP ratio during 2003-04 to 2008-09 was 40 per cent. Consequently, states that had average debt-GSDP ratio >40 per cent during 2003-04 to 2008-09 were classified as high debt states while those with debt-GSDP ratio < 40 per cent were considered as low debt states. According to this classification, there were 14 high debt states and 11 low debt states (Table 1).

To classify states into high income and low income group, real per capita net state domestic product (NSDP) of 2011-12 base was considered. The average real per capita NSDP from 2011-12 to 2016-17 of all states (excluding Goa and Sikkim) was Rs.74,780 and hence benchmark value of per capita income was set at Rs.75,000. Thus, states that had an average per capita NSDP of Rs.75,000 or above were classified as high income states (13 states) whereas states whose average per capita NSDP was lower than the benchmark of Rs.75,000 were considered as low income states (12 states).

Table 1: Classification of States based on Debt and Income Levels

Public Debt		**Per Capita Income**	
Low	***High***	***Low***	***High***
Andhra Pradesh	Arunachal Pradesh	Assam	Andhra Pradesh
Assam	Bihar	Bihar	Arunachal Pradesh
Goa	Himachal Pradesh	Jammu and Kashmir	Goa
Gujarat	Jammu and Kashmir	Madhya Pradesh	Gujarat
Haryana	Manipur	Manipur	Haryana
Karnataka	Mizoram	Meghalaya	Himachal Pradesh
Kerala	Nagaland	Nagaland	Karnataka
Madhya Pradesh	Odisha	Odisha	Kerala
Maharashtra	Punjab	Rajasthan	Maharashtra
Meghalaya	Rajasthan	Tripura	Mizoram
Tamil Nadu	Sikkim	Uttar Pradesh	Punjab
	Tripura	West Bengal	Sikkim
	Uttar Pradesh		Tamil Nadu
	West Bengal		
(11)	(14)	(12)	(13)

Note: Figures in parentheses indicates number of states.

With regard to methodology of empirical estimation, studies have used different methods, however, SVAR is used widely following the work of Blanchard and Perotti (2002).

[10] For example, debt swap scheme implemented during 2002-03 to 2004-05 lowered interest burden, value added tax helped in higher own tax revenues, and states restricted deficits and debt putting ceilings under their Fiscal Responsibility Legislations (FRLs).

Further, in panel framework, GMM has been used in some studies (Guimarães, 2010 and Contreras and Battelle, 2014). These methods requires taking first differences of the data to make them stationary as most of data on fiscal and output variables are non-stationary. In the process, there is a possibility of losing information on the relationship among variables at levels. Therefore, following Combes *et al.,* 2016, we have used the panel cointegration and VECM framework. This framework enables an exploration of the time series properties of the data and also helps to capture the common long-term dynamics which are relevant in the context of Indian states given the similarities across states in terms of powers to raise revenues, expenditure responsibilities and the limits on borrowings.

The stationarity of variables was checked using the panel unit root tests of Levin-Lin-Chu (LLC) (2002) and Im, Pesaran and Shin (IPS) (2003) which are based on the following Dickey-Fuller-type regression:

$$\Delta y_{it} = \alpha_i x_{it} + \rho_i y_{i,t-1} + \sum_{j=1}^{ki} \beta_{ij} \Delta y_{i,t-j} + \varepsilon_{it} \quad (1)$$

Where i=1,…..N number of states, t =1, 2……T number of time period (years) and x_{it} represents exogenous variables in the model including fixed effects. ρ_i are autoregressive coefficients and ε_{it} are errors. The LLC test assumes *common unit root process*, whereas the IPS test assumes *individual unit root process*.

The results portrayed in Table 2 indicate that null hypothesis of *panels contain a unit root* could not be rejected in both the LLC and IPS tests for the baseline panel as well as four independent panels *viz.,* high debt states, low debt states, high income states and low income states when the variables were considered in levels. This indicates non-stationary properties of GDSP, total expenditure, development expenditure and own tax revenue. However, when first differences were taken, all variables were found to be stationary for all five panels in both the LLC and IPS tests. Therefore, cointegration was checked estimating the Westerlund (2005) and Pedroni (1999 and 2004) panel cointegration test for the following two variants (i) GSDP, total expenditure and own tax revenue and (ii) GSDP, development expenditure and own tax revenue.

Table 2: Results of Panel Unit Root Test

			Log Real GSDP	Log Real Total Expenditure	Log Real Development Expenditure	Log Own Tax Revenue
All 25 States						
LLC	Level	t-statistics	4.69 (1.00)	5.41 (1.00)	6.52 (1.00)	4.15 (1.00)
	First Difference	t-statistics	-16.02 (0.00)	-23.39 (0.00)	-23.25 (0.00)	-20.92 (0.00)
IPS	Level	W-statistics	11.41 (1.00)	11.08 (1.00)	12.15 (1.00)	10.76 (1.00)
	First Difference	W-statistics	-16.96 (0.00)	-22.96 (0.00)	-22.46 (0.00)	-19.59 (0.00)
High Debt States						
LLC	Level	T-statistics	2.91	3.76	5.28	3.64
		P-value	(1.00)	(1.00)	(1.00)	(1.00)
	First Difference	T-statistics	-14.28	-18.11	-16.99	-17.46
		P-value	(0.00)	(0.00)	(0.00)	(0.00)
IPS	Level	W-statistics	8.53	7.75	8.98	8.69
		P-value	(1.00)	(1.00)	(1.00)	(1.00)
	First Difference	W-statistics	-15.11	-17.67	-16.99	-15.62
		P-value	(0.00)	(0.00)	(0.00)	(0.00)
Low Debt States						
LLC	Level	T-statistics	3.38	3.91	4.14	2.25
		P-value	(1.00)	(1.00)	(1.00)	(1.00)
	First Difference	T-statistics	-9.00	-14.83	-15.91	-11.77
		P-value	(0.00)	(0.00)	(0.00)	(0.00)
IPS	Level	W-statistics	7.56	7.94	8.18	6.43
		P-value	(1.00)	(1.00)	(1.00)	(1.00)
	First Difference	W-statistics	-9.51	-14.68	-14.70	-11.91
		P-value	(0.00)	(0.00)	(0.00)	(0.00)
High Income States						
LLC	Level	T-statistics	3.61	3.39	4.11	2.46
		P-value	(1.00)	(1.00)	(1.00)	(0.99)
	First Difference	T-statistics	-11.94	-16.07	-16.43	-14.15
		P-value	(0.00)	(0.00)	(0.00)	(0.00)
IPS	Level	W-statistics	8.40	7.17	8.38	6.73
		P-value	(1.00)	(1.00)	(1.00)	(1.00)
	First Difference	W-statistics	-12.04	-16.45	-16.60	-13.76
		P-value	(0.00)	(0.00)	(0.00)	(0.00)
Low Income States						
LLC	Level	T-statistics	2.50	4.44	5.38	3.43
		P-value	(0.99)	(1.00)	(1.00)	(1.00)
	First Difference	T-statistics	-11.87	-16.83	-16.26	-15.41
		P-value	(0.00)	(0.00)	(0.00)	(0.00)
IPS	Level	W-statistics	7.70	8.55	8.81	8.55
		P-value	(1.00)	(1.00)	(1.00)	(1.00)
	First Difference	W-statistics	-12.89	-16.02	-15.14	-13.95
		P-value	(0.00)	(0.00)	(0.00)	(0.00)

Note: 1. Automatic lag length selection based on SIC.

2. Figures in parentheses are p-values.

The standard regression to be estimated for panel cointegration is as follows:

$$Y_{it} = \alpha_i + \delta_i t + \beta_{1i} X_{1i,t} + \beta_{2i} X_{2i,t} + \ldots\ldots + \beta_{Mi} X_{Mi,t} + \varepsilon_{i,t} \quad (2)$$

Where i=1, 2…..N number of states, t =1, 2……T number of time period (years), α_i and δ_i are individual and trend effects and M is the number of regressors. Y and X are assumed to be integrated of order one I (1). Under the null hypothesis of no cointegration $\varepsilon_{i,t}$ will be I (1). Thus, if the variables are cointegrated the residual should be I (0). The null hypothesis in both the Westerlund and the Pedroni tests is *'no cointegration'*. However, these test differ in terms of their alternative hypotheses. The alternative hypothesis in the Westerlund test is *'some panels are cointegrated'* whereas in the Pedroni test it is *'all panels are cointegrated'*.

The results of the Westerlund and Pedroni panel cointegration tests are provided in Table 3. The variance ratio statistics of the Westerlund test pointed to the rejection of the null hypothesis of *no cointegration* and supported the alternative that *some panels are cointegrated* for both the expenditure categories, *i.e.,* total expenditure and development expenditure, in all the five panels. Similarly, the results of Pedroni test as indicated by the Phillips-Perron statistic and the Augmented Dickey-Fuller statistic suggest rejection of null hypothesis of *no cointegration* in all the five panels.

Table 3: Results of Panel Cointegration Tests

	Baseline	**Public Debt**		**Income**	
	all 25 states	**High**	**Low**	**High**	**Low**
Westerlund Test					
Log (GSDP), log(total expenditure), log(own tax revenue)					
Variance ratio statistic	-3.21	-2.26	-2.29	-2.66	-1.86
P-value	*0.00*	*0.01*	*0.01*	*0.00*	*0.03*
Log (GSDP), log(development expenditure), log(own tax revenue)					
Variance ratio statistic	-3.03	-2.01	-2.30	-2.62	-1.64
P-value	*0.00*	*0.02*	*0.01*	*0.00*	*0.05*
Pedroni Test					
Log (GSDP), log(total expenditure), log(own tax revenue)					
PP t statistics	-3.29	-3.08	-1.78	-2.91	-1.73
P-value	*0.00*	*0.00*	*0.04*	*0.00*	*0.04*
ADF t statistics	-3.50	-2.04	-2.99	-3.34	-1.59
P-value	*0.00*	*0.02*	*0.00*	*0.00*	*0.06*
Log (GSDP), log(development expenditure), log(own tax revenue)					
PP t statistics	-4.09	-3.27	-2.44	-3.54	-2.15
P-value	*0.00*	*0.00*	*0.01*	*0.00*	*0.02*
ADF t statistics	-3.85	-2.08	-3.41	-3.76	-1.60
P-value	*0.00*	*0.02*	*0.00*	*0.00*	*0.06*

PP: Phillips-Perron ADF: Augmented Dickey-Fuller.
Note: The null hypothesis is "no cointegration".

In the next step, error correction model (Pesaran *et al.,* 1999) as indicated by equation 3 was estimated for cointegrated variables following Combes *et al.* (2016).

$$\Delta gsdp_{it} = \emptyset_i(gsdp_{it-1} - \beta_i' x_{it}) + \sum_{j=1}^{p-1} \propto_{ij}^{*} \Delta gsdp_{it-j} + \sum_{j=0}^{q-1} \delta_{ij}^{*\prime} \Delta x_{it-j} + \mu_i + \varepsilon_{it} \quad \ldots..(3)$$

Where gsdp is the natural logarithm of real gross state domestic product, ∅ is the error correction term, and 'i' and 't' stands for state and year, respectively. x_{it} is the vector of explanatory variables and μ_i indicates state fixed effects. Thus, in equation (3), the first part in levels reflects the long-run relationship while the short-run adjustments are captured in the second part. Equation (3) can be estimated through Mean Group (MG), Pooled Mean Group (PMG) and Dynamic Fixed Effects (DFE) estimator. The MG estimator is considered consistent when the slope, intercepts and error variance vary across states. The PMG estimator is preferred when long-run slope coefficient is homogeneous but short-run coefficients vary across states. Further, a dynamic fixed effect estimator can also be applied, which like the PMG assumes homogenous slope but allows intercept to vary across states. The suitability of the three estimators can also be checked using the Hausman test.

Total Expenditure Multipliers

The results of Hausman test presented in Table 4 and 5 revealed DFE estimator as preferred model over MG and PMG indicating significance of unobserved fixed effects across states. The results of panel VECM in Table 4 shows statistically significant long-run coefficients of total expenditure and own tax revenues in the baseline panel (25 states). The negative and statistically significant error correction term indicates validity of the adopted model. The short- run coefficient of total expenditure (0.054) which represent the elasticity of GSDP with respect to total expenditure was statistically significant. The value of multiplier was 0.34 which was obtained dividing short-run coefficient of total expenditure (0.054) by average expenditure-GSDP ratio (0.159) for 25 states during 1990-2016.

In case of panels of low debt and high debt states, the long-run coefficient of own tax revenue was statistically significant. Further, convergence to long-run equilibrium relationship was confirmed by a negative and statistically significant error correction term for both the panels, however, speed of adjustment was higher for low debt states than that of high debt states. The short-run coefficient of total expenditure was, however, significant only in low debt states panel. Further, as expected, the coefficient was higher at 0.087 than that of high debt states and the baseline panel. Accordingly, the value of multiplier for low debt states was higher

at 0.62 as compared with 0.34 for baseline panel. These results were consistent with empirical studies in the cross-country context finding multipliers positive/higher when debt was low as compared to negative/lower when debt was high (Huidrom *et al.,* 2019; Deskar *et al., 2017*; Ilzetzki*et al.,* 2012 and Combes *et al.,* 2016). These studies argued that the rise in interest expenditure can lead to a widening of deficits and crowding out of private savings due to excessive borrowings. Another argument given for justifying lower multiplier in debt high situation was, the Ricardian Equivalence. In addition, Huidrom *et al.,* 2019, linked lower impact of fiscal stimulus in high debt countries to higher interest rate based on their evidence of rise in bond yields/borrowing cost due to increased sovereign debt. However, evidence for state governments in India suggests that fiscal position do not influence cost of borrowings due to the perception of implicit central government guarantee (Saggar *et al.,* 2017 and Bose *et al.,* 2011). Instead, the higher multiplier for low debt states could be attributed to their favorable expenditure composition – higher capital outlay and development expenditure having larger multipliers (Raut and Raju, 2019). Low debt states will have lower interest burden which facilitates higher discretionary spending such as capital outlay and other development expenditure. This was evident from lower share of non-development expenditure (which includes interest payments) and increased share of development expenditure and capital outlay of states during the low debt phase – 2003-04 to 2008-09 (Chart 1).

Table 4: Results of Error Correction Model – Total Expenditure

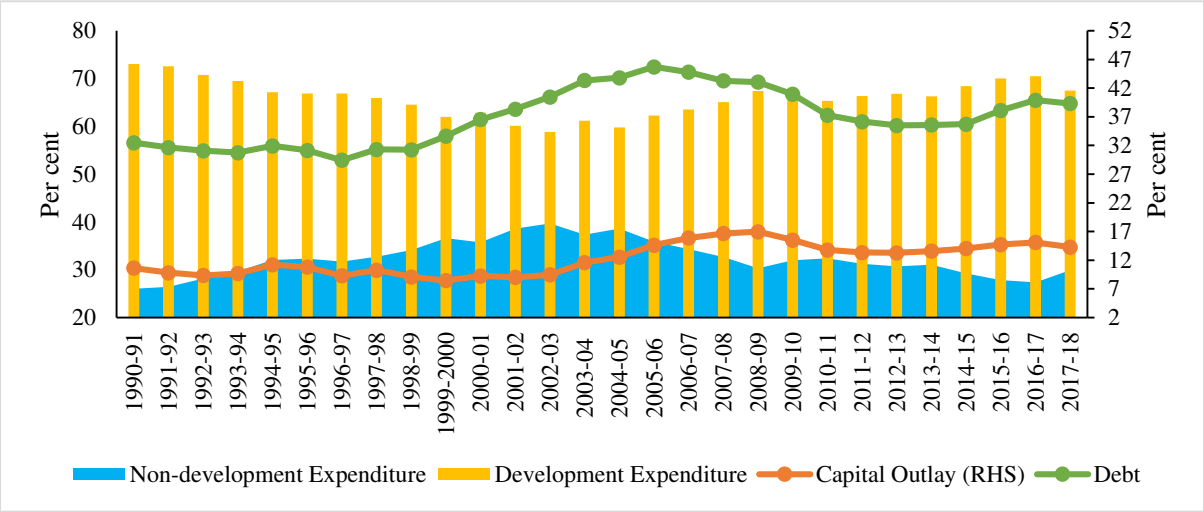
Variables	**Baseline Panel (all 25 states)**	**Debt Level**		**Income level**	
		High	**Low**	**High**	**Low**
Log(Real GSDP)					
Error correction term	-0.07*** (-4.08)	-0.06*** (-2.96)	-0.12*** (-3.67)	-0.04* (-1.89)	-0.16*** (-5.36)
Log(real total expenditure)	0.422** (2.08)	0.333 (1.16)	0.237 (0.78)	0.690* (1.62)	0.351** (2.11)
Log (real own tax revenue)	0.518*** (3.42)	0.546*** (2.83)	0.708*** (2.69)	0.564* (1.80)	0.431*** (3.40)
D(log(Real GSDP))					
D(log(real total expenditure))	0.054** (2.25)	0.041 (1.41)	0.087** (1.95)	0.043 (1.43)	0.077** (1.96)
D(log (real own tax revenue))	0.010 (0.44)	-0.010 (-0.36)	0.081 (1.46)	0.032 (0.92)	-0.015 (-0.48)
Constant	0.550*** (4.31)	0.527** (3.15)	0.938*** (3.72)	0.283* (1.88)	1.34*** (5.55)
Hausman test Pro>chi	0.95	1.00	0.97	1.00	1.00

***, ** and * indicates statistical significance at 1%, 5% and 10%, respectively.

Note: 1. Figures in parentheses are Z statistics.

2. Lag length was one as suggested by AIC tests.

Chart 1: Debt Level and the Composition of Expenditure



In the panels of high income and low income states, long-run coefficients of both total expenditure and own tax revenue were statistically significant. Further, the error correction term also had negative sign and it was statistically significant for both the panel but indicated faster speed of adjustment in low income states. With regard to short- run coefficient of total expenditure, it was statistically significant and higher for low income states. Therefore, the value of multiplier for low income states at 0.41 was higher than that for the baseline panel.

Development Expenditure Multipliers

Similar to total expenditure, Hausman test revealed DFE estimator as preferred model for all five panels of development expenditure (Table 5). The error correction term was negative and statistically significant in all five panels indicating the underlying correction mechanism and validity of the model. However, similar to total expenditure estimation, the speed of adjustment was highest in panel of low income states (-0.15) followed by low debt states (-0.12). The long-run coefficients of development expenditure were statistically significant in baseline, high debt and high income panels while the coefficient of own tax revenue were significant in all the panels except for high income states. The short-run coefficient of real development expenditure at 0.062 for baseline panel was higher than that of total expenditure. Accordingly, the size of multiplier was 0.59 suggesting that one unit change in development expenditure resulted in 0.59 unit change in real GSDP. This value of development expenditure multiplier accounted for 1.74 times of total expenditure multiplier. The higher development expenditure multiplier was on expected lines given its discretionary and productive nature which *inter alia* includes entire investment expenditure. Further, larger

development expenditure multiplier was broadly similar to the findings of earlier studies *viz.,* Guimarães (2010) and Jain and Kumar (2013).

Between high debt and low debt states, the development expenditure multiplier was higher for low debt states, as was the case for total expenditure. However, development expenditure multiplier was higher (0.67) than that of total expenditure (0.62) reflecting the impact of debt on multiplier being channelized through expenditure composition apart from Ricardian Equivalence argued by Huidrom *et al.,* 2019; Deskar *et al., 2017*; Ilzetzki*et al.,* 2012 and Combes *et al.,* 2016.

Between low income and high income states, the development expenditure multiplier was found to be higher for high income states. These results were similar to the findings of lower/negative multiplier for developing countries and higher/positive for industrial countries observed by Ilzetzki *et al.,* 2012; Hory, 2015; and Koh, 2016. These studies argued that implementation lags and weaker management of expenditure leads to lower multiplier in developing countries/emerging market economies. In addition to these factors, higher multipliers of Indian states may be indicating dependency of development expenditure on income level (Chakraborty and Dash 2017).

Table 5: Results of Error Correction Model - Development Expenditure

Variables	**Baseline Panel (all 25 states)**	**Debt Level**		**Income level**	
		High	**Low**	**High**	**Low**
Log(Real GSDP)					
Error correction term	-0.08*** (-4.49)	-0.07*** (-3.36)	-0.12*** (-3.68)	-0.07*** (-2.79)	-0.15*** (-5.20)
Log(real development expenditure)	0.511*** (2.87)	0.467* (1.88)	0.209 (0.74)	0.970*** (3.64)	0.219 (1.50)
Log (real own tax revenue)	0.433 *** (3.41)	0.433*** (2.75)	0.728*** (3.03)	0.248 (1.42)	0.530*** (4.83)
D(log(Real GSDP))					
D(log(real development expenditure))	0.062*** (2.71)	0.061** (2.10)	0.064* (1.67)	0.068** (1.95)	0.059** (1.94)
D(log (real own tax revenue))	0.009 (0.39)	-0.011 (-0.43)	0.080 (1.41)	0.027 (0.78)	-0.009 (-0.27)
constant	0.619*** (4.72)	0.598*** (3.52)	0.956*** (3.76)	0.457*** (2.73)	1.29*** (5.39)
Hausman test Pro>chi	0.98	0.98	0.98	0.99	0.99

***, ** and * indicates statistical significance at 1%, 5% and 10%, respectively.

Note: 1. Figures in parentheses are Z statistics.

2. Lag length was one as suggested by AIC tests.

Summary of multipliers provided in Table 6 shows that irrespective of debt or income level, development expenditure multiplier was higher than the total expenditure suggesting sensitivity of output effects of states expenditure to its composition. In the baseline model, the value of development expenditure multiplier was 1.74 times of total expenditure. A comparison based on debt shows that low debt states had higher multiplier for both total and development expenditure. However, the relatively higher multiplier for development expenditure suggests impact of debt on multiplier was channelized through expenditure composition.

In case of income, total expenditure multiplier was higher for low income states and development expenditure multiplier was higher for high income states. This perhaps reflects the differences in marginal productivity of total expenditure and development expenditure. The higher multiplier of total expenditure for low income states may be pointing to the larger implications of non-development expenditure on fiscal services such as collection of taxes and administrative services *viz.,* police, district administration and public work, to low income states which comprises mainly North-eastern and BIMARU[11] states. Therefore, larger total expenditure multiplier for low income states could be corroborating positive relationship between good governance and economic growth across Indian states (Mundle *et al.,* 2012). On the other hand, larger development expenditure multiplier for high income states may be indicative of lesser implementation lags and better management of expenditure resulting into better infrastructure facilities and higher marginal productivity of discretionary expenditure.

Table 6: Size of Multipliers: A Comparison

	Baseline Panel (all 25 states)	**Debt Level**		**Income level**	
		High	***Low***	***High***	***Low***
Total Expenditure	0.34***	0.21	0.62**	0.31	0.41*
Development Expenditure	0.59***	0.51**	0.67**	0.73*	0.48 *

***, ** and * indicates statistical significance at 1%, 5% and 10%, respectively, as shown in Table 4 and 5.

V. Conclusion

The paper has analyzed multiplier effects for two categories of states expenditure *viz.,* total expenditure and development expenditure. The role of state specific factors such as debt and income level was assessed by separately estimating multipliers for high debt states, low debt states, high income states and low income states. The analysis revealed that the level of

[11] The acronym used to collectively indicate states *viz.,* Bihar, Madhya Pradesh, Rajasthan and Uttar Pradesh which were having similarity in terms of poor economic conditions.

debt and income had an impact on multiplier of total expenditure and development expenditure. The multipliers for low debt states were found to be higher than that of high debt states suggesting prevalence of Ricardian equivalence and crowding out of discretionary expenditure – lower capital outlay and development expenditure due to elevated interest payment. Higher development expenditure multiplier for high income states may be reflecting lesser implementation lags and better management of expenditure in these states. Further, the development expenditure multipliers were found to be higher than total expenditure irrespective of the income level and debt burden. The findings, thus, highlight the importance of development expenditure as a preferred tool for fiscal stimulus at the state level and also suggests that development expenditure should not be reduced when undertaking an expenditure led fiscal consolidation.

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