

Implications of Goods and Service tax on Revenue Productivity of Indian States: A Panel Data Analysis

Shubham Garg

Research Scholar,
Haryana School of Business,
GJUS&T, Hisar
Shubhamgarg1230@gmail.com
<https://orcid.org/0000-0001-8980-5849>
*Corresponding Author

Priyanka

Research Scholar,
Haryana School of Business,
GJUS&T, Hisar
priyankarunach0803@gmail.com

Karam Pal Narwal

Professor,
Haryana School of Business,
GJUS&T, Hisar
karampalhsb@gmail.com

Sanjeev Kumar

Professor,
Haryana School of Business,
GJUS&T, Hisar
sanjeev.aseem@gmail.com

Abstract

The government of India has implemented the Goods and Service Tax in July 2017 in India to remove the weaknesses in the Value Added Taxation system. The implementation of GST has started a debate among state governments that the adoption of GST will adversely impact their revenue collection. Therefore, the current study tries to examine the implication of GST on the revenue productivity of Indian states via panel regression analysis. The result indicates that the adoption of the GST has improved the revenue productivity of the states. However, the results affirm that richer states have greater revenue productivity from the adoption of the GST which may widen the gap of existing inter-state disparity as GST collection contribute a major share in Own Tax Revenue of the Indian states in aggregate.

Keywords: Goods and Service Tax; interactive dummy; Revenue Productivity; Random effect model; and State Revenue;

JEL Classification: C33, H21, H24, H25, H27, H71

Introduction

Tax revenue is a major source of revenue for government spending on public goods and services around the world. It builds the government's capability to meet basic needs, provide security to its citizens, and fosters economic growth, but the ability of the government to generate revenue from taxation is limited and depends on a lot of factors (Musimenta et al., 2017, and Ibrahim et al., 2015). Similarly, Indirect taxes constitute a major role in the economic development of a country by influencing the production and consumption rate of a country (Khan and Shadab, 2013). The government of India has introduced many fiscal reforms in indirect taxation system primarily driven by domestic concerns and due to the influence of international institutions in the recent past. These fiscal reforms of the government have caused various structural adjustments as well as changes in the relative importance of various direct and indirect tax revenue streams of the state government. One of the major indirect tax reforms in this phenomenon is the

introduction of Value Added Tax (VAT) in India in 2005. VAT was one of the major taxes for state government and accompanied a significant proportion of the state's own tax revenue. But this taxation system has been associated with many weaknesses, i.e. taxes on already paid taxes, tax competition, and multiplicities of tax rates in different states of India. Similarly, different states have different VAT rates, separate procedures for the implementation of VAT, and different timelines for filing VAT returns and payment of VAT taxes. In addition to this, many states levy some additional taxes according to their jurisdictions under the VAT system i.e. octroi and entertainment taxes which make the VAT system more weak and complex. However, the government of India has introduced the VAT system to eliminate the cascading effect of the then-existing sales tax system. A cascading effect implies the charging of taxes by the government at each stage of the sale, where a consumer ends up by paying some extra taxes to the government on already paid taxes. However, the VAT system was a right move in the right direction to remove the cascading effect that prevails in the Indian indirect taxation system, But this taxation system fails in eliminating the cascading effect of taxation as the input tax credit is not allowed for services and CENVAT (Central VAT) that are already paid by the taxpayers at the distribution and consumption stages (Nepam, 2011; Khoja and Khan, 2020). This may even distort the purpose of equity in a taxation system by charging higher taxes from those who have less ability to pay resulting in the transfer of resources from the weaker section of the society to the richer section and hence directing to more regression in taxation system (Keen, 2013). Moreover, this cascading effect works as a snowball and gives birth to a number of inconsistencies and weaknesses in a prevailing taxation system of a country i.e. complexities, opaqueness, and transparency (Chelliah, 1991; Poddar and Ahmad, 2009; and Mukherjee, 2015). Thus, the VAT system is an attempt to pass on the entire burden of taxation on consumers by performing some improvement in the prevailing sales tax system by the integration of taxes. The passing of this extra burden to the consumers in the form of double taxation leads to an increase in the general price level of the country which

implies the transfer of the resources from the weaker section of the society to the richer section. The tax compliance behavior of the taxpayers is widely affected by the tax burden on him/her under the prevailing tax system in an economy. Therefore, the greater the cascading affects, the lower the compliance behavior of the taxpayer. Thus, the VAT system is resulting in lower tax compliance by the taxpayers due to its cascading nature. But despite all these drawbacks in the prevailing VAT system, the journey of the Goods and Services tax system in India is not easy and smooth due to political disagreement and administrative reasons which took a time period of around 17 years from the constitution of the committee for drafting of GST law in 2000 to final adoption of the GST in July 2017 in India. The adoption of GST in India has been considered as a major taxation reform in the Indian taxation structure to encompass all indirect taxes under an umbrella for the creation of 'One Nation, One Market, and One Taxation' (Sehrawat and Dhanda, 2015).

The Current paper has been structured into six different sections. Section 2 of the study deals with the theoretical framework and previous empirical studies conducted in this domain. Similarly, it covers up the research gap formulated from the available literature for conducting this study. Section 3 presents the objective of the current study and Section 4 explains the research methodology used for conducting the present study. Section 5 and 6 summarizes the results, findings, policy implications and scope for conducting future study.

Literature Review

The field of public finance, especially, taxation in general has received a major attention of the policy makers, academicians and the professionals over time. The change of taxation policy in a country by their respective government creates an environment of uncertainty and anxiety among various taxpayers, state governments and households. The government of India has recently adopted the Goods and Service Tax (GST) in India by replacing the prevailing Value Added Tax (VAT) system (except some items which are still out of GST preview i.e. petroleum, alcohol etc.) in India. GST is a superior to the VAT system in

terms of revenue generation for the government in spite of reducing the cascading effect of taxation as the GST has a better-inbuilt mechanism for greater compliance. Tiwari and Singh (2018) also found that the adoption of GST will support the government initiatives i.e. digital India, made in India, etc., and will stimulate the prospect of economic growth of the Indian economy. However, the implementation of the Goods and Service tax is expected to have an enduring impact on the state's budget over the medium term for several causes. The superiority of the VAT/GST over the sales tax system regarding revenue generation has presented a mix results worldwide. Nellor (1987) in their study of 11 European countries found that the adoption of the VAT has resulted in an increase in government tax revenue to GDP ratio. Venkadasalam (2014) conducted a study on the impact of GST implementation on the national growth of Asian countries. They found that the impact of the GST in Asian countries varies country wise and a favorable impact of GST on a nation largely depends on a neutral and rational design of GST structure in a country. Moreover, they found a positive relationship with national growth for Singapore and a negative for the Philippines and Thailand. Similarly, Narayanan (2014) examined the four major concerns of implementation of GST in Malaysia as an increase in the price level, regressive nature of GST law, the possibility of increasing GST rate regularly with time, and potential misuse of GST revenue by the negligent government due to corruptive practices. Islam et al., (2017) found that the people in Malaysia believed that the adoption of GST would have a detrimental effect on society and cause inflation, as their economy has heavily dependent on household spending currently. Similarly, Palil and Ibrahim (2011) also found that consumers are worried about price hikes of at least 4% with the implementation of GST in Malaysia. Nutman et al., (2021) found in their study that GST computation complexities, exaggerated rules, and frequent amendments in GST rules are the major cause for the abolishment of the GST in Malaysia. Similarly, John and Dhannur (2019) studied the impact of the GST in India on the manufacturing and service sectors. They found that the uncertainty caused in the Indian market due to the

announcement of the GST adversely affected the service sector, but does not have any significant or major impact on the manufacturing sector. Dey (2021) found in their study of Orissa state that the indirect tax revenue in India has an increasing trend except for some exceptional years of Covid-19 after GST implementation. However, when we considered Orissa state in a vacuum, expected revenue is not generated till now which may cause a sense of worry for the states in case of the abolishment of transfer of compensation cess by the central government. Similarly, Nayaka and Panduranga (2020) studied the impact of GST on the indirect tax revenue of Karnataka state. They found that although the registrations, filing of GST returns, and tax collections of the Karnataka state are increasing rapidly after the GST adoption, but the release of the compensation cess by the central government is constantly delayed. Chakravarty and Dehejia (2017) found that the adoption of GST in India will deepen the inter-state income disparity. Khan and Azam (2012) found in their study that the adoption of GST in India would increase the tax burden on consumers and may reduce the compliance and administrative cost of the government. Paliwal et al., 2019 found in their study that after the adoption of the GST in India, the tax revenue has become less responsive to change in the GDP, however, it has reduced the tax burden on consumers and corporate. Similarly, Ebrill et al., (2001) studied the impact of the Value-added Tax adoption on the government revenue to GDP ratio of 189 countries at international level where 99 countries are those who have adopted VAT and 84 those who have not adopted VAT. They found that from the VAT adoption richer countries have gained more and countries which have substantial larger share of agriculture sector in GDP have gained less from VAT adoption. Azaria and Robinson (2005) also analyzed the impact of the VAT on 24 countries. Their results revealed that the countries have been assisted from the adoption of the VAT and performance was found to be better in nations where international trade was more significant.

Before the adoption of the GST, the state governments' charges the central sales tax (CST) in addition to the VAT on supply of goods, in which CST is being an origin based taxation system which goes in the lap of the manufacturing

states. However, the adoption of the GST changes the CST with destination based tax resulting in a loss for manufacturing states as now this revenue will pass on to those states who consume the goods and services in case of inter-state supply. This has created an environment of anxiety, worries and shocks among the state governments that the newly adopted taxation law will negatively impact their GST revenue. Therefore, the current study tries to examine the implication of GST reform on the revenue productivity of the Indian states. The present study is different from past studies conducted in this area for India in many ways. There is hardly any national or international econometric based study which has focused on the implication of GST on revenue productivity of the states or nations. Secondly, the majority of the existing studies in this domain are conceptual and theoretical. Besides being the first study on the impact of the GST on revenue productivity of the Indian states, this study may act as a benchmark in examining the impact of the GST on revenue productivity of countries at the national, sub-national and international level. As a novel study, it contributes significantly to the available literature and provides a pathway of future directions for further study in this domain.

Objective and Research Methodology

The objective of the study is to examine the implication of the GST implementation on the revenue productivity of the Indian states. In order to achieve this objective, the study has employed panel data analysis. This helps in determining whether the adoption of GST in India has a positive or negative impact on revenue productivity of the state governments, where, a positive result of the study affirms the revenue productivity of the states under the GST regime. For this purpose, we have used the VAT/GST contribution to the state's NSDP as a dependent variable, called as VAT/GST tax ratio, with some additional usual Regressors of tax efforts of the state government, which are, the agriculture sector contribution in state's income, dependency of states on central transfers in terms of their total revenue, per capita net state domestic product of the states, urbanization rate, and a dummy for Goods and Service Tax (GST). The relationship of the variables of the study is expressed as below:

VAT/GST Tax Ratio = F (ASC, DSCT, UR, PCNSDP, GSTDummy)

Where,

ASC = Agriculture Sector Contribution in state's NSDP

DSCT = dependency of states on central transfers in terms of their total revenue

UR = Urbanization Rate

PCNSDP = Per Capita Net State Domestic Product of the states

GSTDummy = dummy for Goods and Service Tax (GST)

Model Specification

To examine the strength of the relationship between the dependent (VAT/GST ratio) and independent variables (ASC, DSCT, UR, PCNSDP, and GSTDummy), the study has employed the panel regression analysis with pooled OLS, fixed and random effects whose equation is as below:

$$\gamma_{it} = \alpha + \beta X_{it} + \delta GST_{Dummy} + u_{it} \quad (1)$$

$$\gamma_{it} = \alpha_i + \beta X_{it} + \delta GST_{Dummy} + u_{it} \quad (2)$$

$$\gamma_{it} = \alpha + \beta X_{it} + \delta GST_{Dummy} + \varepsilon_{it} \quad (3)$$

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Where suffix 'i' denotes a particular Indian state and 't' represent a year, GST_{Dummy} is the dummy variable for the GST which takes value 1 when there is GST implementation in India and 0 when there is no GST or VAT is applicable, and $\varepsilon_{it} = \vartheta_{it} + u_{it}$, $\alpha_i = \alpha + \gamma_i$

The equation of the model constructed under the study is as below:

$$VAT/GST\ ratio_{it} = \beta_0 + \beta_1 ASC_{it} + \beta_2 DSCT_{it} + \beta_3 UR_{it} + \beta_4 PCNSDP_{it} + \beta_5 GSTdummy_{it} + u_{it}$$

Where:

Where:

VAT/GST ratio $_{i,t}$ is VAT/GST revenue of states divided by NSDP for states i in time t ;

ASC $_{i,t}$ is the Agriculture Sector contribution in NSDP for state i in time t ;

DSCT $_{i,t}$ is the Dependency of States on Central transfers in terms of their total revenue for state i in time t ;

UR $_{i,t}$ is the urbanization rate for state i in time t ;

PCNSDP $_{i,t}$ is the Per Capita Net State Domestic Product for state i in time t ;

GSTdummy $_{i,t}$ is the dummy variable for GST for state i in time t ;

$u_{i,t}$ is the error term of the model

With a view to select the appropriate panel regression model, the study has used the likelihood ratio test to select the appropriate model between the pooled OLS regression and fixed effect model. Similarly, Hausman develop a test to select the appropriate model between the fixed effect and random effect panel regression model. Before examining the relationship between dependent and independent variables of the study, we have developed a priori relationships between the variable of the study based on available literature and correlation performed in figure 2 of the study. The agriculture sector's contribution to the state's income is expected to be negative, while the coefficient of PCNSDP is expected to be positive. As a higher dependency of the states on central transfers can discourage resource mobilization efforts of the states, therefore, its coefficient is expected to negative effect on the tax ratio. On the contrary, the coefficient of the urbanization rate is expected to be positive as a higher urbanization population demonstrates a more rich population from which taxes can be realized easily.

Hypothesis Development

The hypothesis of the study is as below:

i.) **Hausman test:** H0: The random effect model is suitable and efficient in comparison to the fixed effect model. There is no correlation between the independent variables and the error term of the model i.e. correlation is statistically insignificant: $Cov(\alpha_i, X_{it}) = 0$

i.) Likelihood ratio: H0: Pooled OLS model is more efficient in comparison to the fixed effect model.

Sample of the Study

This study has been conducted to examine the impact of GST implementation on the revenue productivity of the Indian states. Therefore, the population of the study is 28 states and 9 Union Territories (UTs hereafter) of India. This study includes 25 states and 2 union territories of India. The study has excluded 4 states namely: Haryana, Arunachal Pradesh, Telangana, and Gujarat as these states have not provided the data subsumed in GST to the GST council and RBI. Moreover, Telangana has been formed on 2 June 2014 by separating it from Andhra Pradesh; therefore, this state is also excluded from the analysis due to the non-availability of the data before its formation. Similarly, the study has included only two UTs namely Delhi and Puducherry and excluded 7 other UTs due to the non-providing of the data on revenue of UTs from VAT taxes subsume in GST.

Research Data of study

To compile the data on state finances, the study has used the data from RBI publications on states for various issues namely "State Finances: A Study of Budgets and Handbooks of statistics on state government and Indian economy. The data on the urbanization rate of the states is collected from "Population projections for India and States 2011-36" issued by the national commission on population, Ministry of Health and Family Welfare, under the chairmanship of the Registrar General of India (RGI). Similarly, the data pertaining to NSDP of states, agriculture sector contribution to state's NSDP, and GDP of Indian economy is compiled from National Statistical Office (NSO) reports. The contribution of the agriculture sector in the state's income is measured as a percentage of NSDP. Similarly, the dependency of states on central transfer is measured as a contribution of central transfers to states in their total revenue receipts. The central transfers to the states from the central government (Panda, 2009) are classified as below:

(a) Statuary transfers to states i.e. shares in central taxes and statuary grants;

- (b) Discretionary grants from the center i.e. grants for central sponsored schemes and grants for central sectors
- (c) Grants offered for the state plan schemes from the center;
- (d) Any other resources transfer from the center, except given in (a), (b), (c), and excluding statutory grants.

The study has considered the time period from 2012-13 to 2019-20. The starting year (2012-13) is selected as an initial year as it is a base year for RBI for various statistics i.e. PCNSDP, the contribution of agriculture sectors in NSDP, and India's GDP. And the finishing year (2019-20) is selected to include the most recent year in the study and to

make data more comparable and realistic. The year 2020-21 is excluded from the current study due to the non-availability of the data to RBI for 10 states² for the recent year.

Result and Discussion

GST is a destination-based taxation system in which tax is levied on value addition in each stage of the manufacturing process. It is an important part of the long-term fiscal reform initiative of the Indian government. The adoption of the GST has removed the cascading effect which prevails under the VAT regime and has improved the revenue productivity of both the state and central governments.

Table 1 VAT/ GST³ Statistics to major indicators of Indian Economy (in %)

Year	VAT/GST A. E. ⁴	VAT/GST OTR ⁵	VAT/GST TRR ⁶	VAT/GST GDP
2012-13	20.69	47.53	24.54	3.11
2013-14	19.99	46.93	24.16	3.15
2014-15	18.62	48.15	23.16	3.15
2015-16	16.50	45.19	20.53	2.96
2016-17	15.81	46.64	20.37	3.03
2017-18	17.00	45.22	21.25	3.29
2018-19	24.20	68.60	30.57	5.02
2019-20	24.91	67.49	32.34	5.20

Notes to Table VAT stands for Value added tax; GST: Goods and Service Tax; A.E.: Aggregate Expenditure; OTR: Own Tax Revenue; GDP: Gross Domestic Product.

Estimation from “*State Finance: A Study of Budgets*, RBI, Various Issues”

Source: Author's Computations

All the Indian states and UTs have adopted the Goods and Service Tax in India. However, some of the states i.e. Gujarat, Tamil Nadu, and Maharashtra are among the major industrial states which are afraid of loss in state revenue due to the implementation of the GST in India.

To compensate for this loss to the state governments, the central government has guaranteed a revenue growth rate of 14% per annum to the state government over the base year 2015-16. The aggregate VAT/GST ratio to the GDP has

gone up from 3.29 percent to 5.2 percent after the adoption of the GST, which is the highest tax to GDP ratio in the past 8 years as presented in the below table. Similarly, the total VAT/GST ratio to own tax ratio has gone up from 45.22% to 67.49% which illustrates the dependence of the states on the tax as a resource of revenue after the adoption of the GST in India. Similarly, table 2 presents the results of the tax ratio to the state's NSDP before and after the adoption of the GST in India.

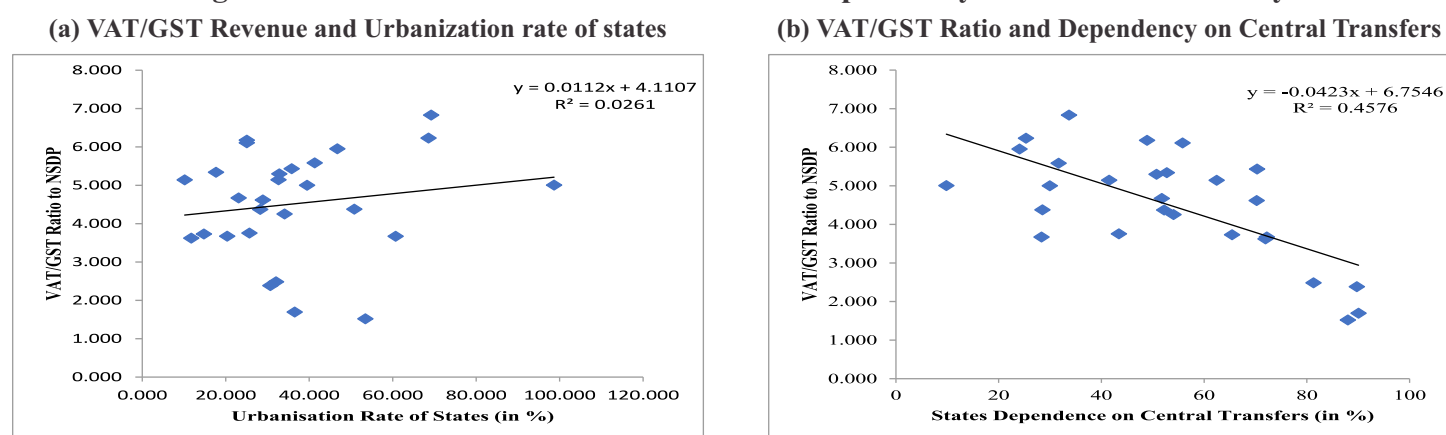
Table 2: Tax Ratios of States Pre and Post GST (in %)

Name of the State	Tax Ratio* 2014-17	Tax Ratio** 2017-20	Increase/ decrease in Tax Ratio	Name of the State	Tax Ratio* 2014-17	Tax Ratio** 2017-20	Increase/ decrease in Tax Ratio
Maharashtra	4.28	8.56	4.28	Goa	5.23	7.65	2.42
Chhattisgarh	4.27	9.54	5.27	Kerala	4.13	3.08	-1.06
Punjab	5.70	3.65	-2.05	Tamil Nadu	3.45	5.89	2.44
Uttar Pradesh	4.18	5.56	1.38	Pondicherry	6.49	8.14	1.65
Bihar	4.53	2.77	-1.76	Andhra Pradesh	4.50	3.98	-0.52
Sikkim	1.95	11.09	9.14				
Uttarakhand	3.80	7.95	4.15				
Delhi	3.72	7.07	3.36				
Assam	3.68	3.97	0.29				
Manipur	2.94	1.62	-1.32				
Mizoram	1.66	1.29	-0.37				
Tripura	3.05	1.54	-1.51				
Rajasthan	3.38	4.67	1.29				
Nagaland	2.01	1.43	-0.58				
Meghalaya	3.01	5.54	2.53				
West Bengal	3.78	5.33	1.55				
Jharkhand	4.10	9.81	5.71				
Orissa	4.42	6.97	2.55				
Madhya Pradesh	4.15	4.83	0.68				
Jammu and Kashmir	5.55	3.57	-1.98				
Himachal Pradesh	4.23	6.98	2.75				
Karnataka	4.79	7.16	2.37				

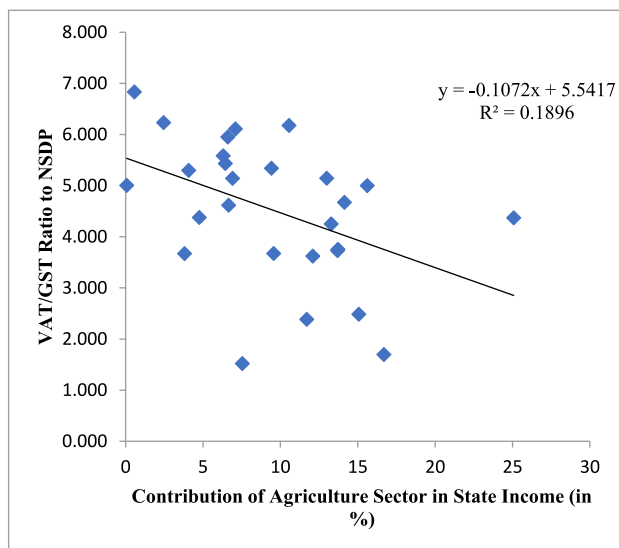
Source: Author's Computations from RBI, GST council, and NSO data

* Compilation from VAT revenue of states from taxes Subsumed in GST (Average of 2014-17 VAT revenue to GDP ratio)

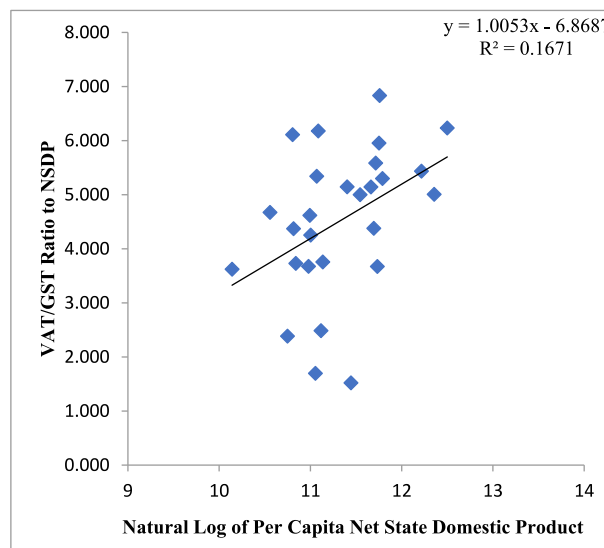
** Compilation from GST revenue of states (Average of 2017-20 GST revenue to GDP ratio of state)

Figure 2: Correlation between Tax Ratio and Explanatory variables⁷ of the Study

(c) VAT/GST Ratio and ASC in States Income



(d) VAT/GST Revenue and PCNSDP of States



Source: *GST and VAT Revenue⁸: Estimations from GST Portal;*

Dependency on Central Transfers of States: Estimations from “State Finance: A Study of Budgets, RBI, Various Issues (2012-2021);

Urbanization rate: Registrar General of India (RGI), (July 2020) Population Projections;

PCNSDP and Contribution of agriculture sector in states income: Estimation from Central Statistical Organization (CSO) statistics

Tax ratio = VAT/GST Revenue of states/NSDP of states

The VAT/GST ratio to NSDP has been constructed after taking the average of the VAT/GST revenue and NSDP of the states from the year 2014-17 (Pre-GST) and 2017-20 (Post-GST) for each state of India. The results indicate that states like Sikkim, Chhattisgarh, Maharashtra, and Jharkhand which has traditionally low tax ratio (VAT/GST to NSDP) have witnessed significant improvement in their tax to NSDP ratio. On the contrary, Jammu and Kashmir, Bihar and Tripura are the major states whose tax to GDP ratio has been lowered down after the adoption of GST in India.

In order to examine the relationship between the VAT/GST tax ratio and other explanatory variables of the study, the correlation analysis has been performed as depicted in

figure 2. The figure has been formulated after taking the average (eight-year average from 2012-13 to 2019-20) for the dependent and explanatory variables for each state of India. The results showed that PCNSDP and urbanization rate are positively related to the VAT/GST ratio of the states. On the Contrary, VAT/GST ratio is found to be negatively correlated with the contribution of agriculture income in the state's NSDP and the dependency of the states on central transfers in terms of their total revenue receipts. The correlation between the VAT/GST ratios to central transfers to the states is found to be the highest and lowest between VAT/GST ratios and PCNSDP. Nepram (2011) also found the highest relationship between central transfers and the tax ratio of the Indian states.

Table 3 present the result of the analysis with pooled, fixed, and random effect model for VAT/GST to NSDP ratio (in percentage) with some of the usual regressors of the tax ratio of states and a dummy variable for GST. The coloum1 of table 3 presents the result of the pooled panel regression which depicts that the dummy variable of GST is positive and significant. As per the expectation of the model, the coefficient of the agriculture sector's contribution to state NSDP, and states dependency on central transfer is negative and significant. On the contrary, the coefficient of PCNSDP

is positive and significant. However, the coefficient for the urbanization rate is negative and significant. The significant value of f-statistic for all the three computed models shows that overall all three models are fit. But as the constituted model is based on highly rigid postulations which may potentially mislead the relationship between the variable of the study, therefore, the results are being provided only for the comparative purpose (Gujrati, 2007). The result of the likelihood ratio shows that ($\chi^2 = 58.57$) the fixed random effect model is appropriate in comparison to pooled OLS model as the p-value is significant at 1%.

The result of the fixed effect model is provided in the second column of Table 3 in which only the dummy variable of GST is significant. However, the Hausman test ($\chi^2 (5) = 7.636$) shows that random effect model is better than the fixed effect panel regression model as depicted by the insignificant p-value (0.1775) in column 3 of the table. This shows that there is no correlation between the unobserved values and the explanatory variable (Nerpram, 2011). Thus, the random effect model is more consistent, appropriate, and efficient in comparison to the other two computed models. The diagnostic testing confirms that the computed model does not have multicollinearity as the correlation matrix shows that the value for all the independent variable is less than 0.75. Therefore, in further explanation, only the random effect model has been considered.

The results of the random effect model show that the coefficient for the Dependence of the States on Central Transfers (DSCT) and Urbanization Rate (UR) is significant at 1% level of significance. The coefficient of the

DSCT is as per the expectation of the model and is negative which illustrates that the higher dependency of the states on central transfers reduces the tax ratio of the states. A lot of studies in the past also affirm the notation that liberal transfers by the central government to the state could lower down their mobilization from their own sources. Panda (2009) also found in their study that the transfer to states from the center has a negative effect on the revenue efforts of the state government. Similarly, Garg et al., (2017) found with the use of the stochastic frontier analysis for 14 major states of India from 1991-92 to 2010-11. They found that intergovernmental transfers have a negative association with the tax efforts of the states. Jha et al., 1999 also revealed that an increase in center grants to states dampens the tax collection efficiency of the states. Similarly, Naganathan and Sivagnanam (2000) also examine the impact of the transfer of resources from the union government on the tax efforts of the state government. They revealed that union transfers of resources negatively impact the tax efforts of the Indian states. Similarly, the coefficient of the agriculture sector's contribution to the state's NSDP (ASC) is negative and significant which is highly persistent with the perception of the inadequate tax potential of the agricultural sector in India and that the agriculture sector is less-taxed in India. Additionally, the under-taxation of the agricultural sector in India has resulted in horizontal inequality in small and richer farmers (Krishna, 1972). Bhargava (1999) also revealed that the importance of the agricultural taxes in India is drastically reduced after the third 5-year plan in India.

Table: 3 Performance of VAT/GST in India (in % of state's NSDP)

Variables	Pooled OLS Model	Fixed Effects Model	Random Effects Model	Random Effects Model
	Tax Ratio	Tax ratio	Tax Ratio	Tax Ratio
C	2.580 [0.625] (0.5328)	-3.510 [-0.189] (0.8501)	1.278 [0.229] (0.8191)	12.555 [2.114] (0.0357)**
ASC	-0.077 [-2.646] (0.0087)*	0.043 [0.415] (0.6784)	-0.067 [-1.732] (0.0848)***	-0.091 [-2.361] (0.0191)**

Variables	Pooled OLS Model	Fixed Effects Model	Random Effects Model	Random Effects Model
	Tax Ratio	Tax ratio	Tax Ratio	Tax Ratio
DSCT	-0.046 [-6.690] (0.0000)*	0.002 [0.074] (0.9409)	-0.042 [-4.616] (0.0000)*	-0.045 [-4.993] (0.0000)*
UR	-0.041 [-4.301] (0.0000)*	0.110 [1.283] (0.2012)	-0.037 [-2.872] (0.0045)*	-0.042 [-3.211] (0.0015)*
Log (PCNSDP)	0.529 [1.478] (0.1409)	0.260 [0.151] (0.8799)	0.609 [1.254] (0.2111)	-0.344 [-0.667] (0.5053)
GST _{Dummy}	1.582 [6.078] (0.0000)*	1.424 [3.714] (0.0003)*	1.565 [6.199] (0.0000)*	-22.845 [-5.019] (0.0000)*
GST _{Dummy} * Log (PCNSDP)	- - -	- - -	- - -	2.145 [5.369] (0.0000)*
	0.363	0.514	0.287	0.43
N	216	216	216	216
Likelihood ratio/Hausman test	-	$\chi^2 = 58.57$ (0.0003)	$\chi^2 (5) = 7.636$ (0.1775)	$\chi^2 (6) = 2.918$ (0.8203)
F-Statistics	23.952 (0.0000)*	6.288 (0.0000)*	16.886 (0.0000)*	20.198 (0.0000)*

Notes to the table: Tax Includes VAT/GST revenue of the states. VAT includes revenue of states only from those taxes which are subsumed in GST. T-statistics are provided in [] and p-value (). ASC is an acronym for agriculture sector contribution in state's NSDP; DSCT denotes dependency of states on central transfers; UR stands for Urbanization rate; Log (PCNDP) denotes natural log of Per Capita Net State Domestic Product;

Source: Author's Computations

*implies significant at 1%, ** at 5% and *** at 10%

Sen (1997) also found that agricultural taxation is a weak area for states which have higher tax efforts for exploration of the available tax base. Similarly, Garg et al., (2017) also found that increase in agriculture sector contribution to the state's income negatively impacts the overall tax GSDP ratio of the Indian states. However, Nepram (2011) found the negative and insignificant coefficient of the agricultural sector's contribution to the state income.

The coefficient of the urbanization rate is also significant and negative as presented in table 3. However, its coefficient sign is not as per the expectation of the study. Mahdavi (2008) also found that the total tax ratio was positively associated with the relative size of the urban

population in developing countries. Nambiar and Rao (1972) also found the urbanization rate as a main regressor of the taxable capacity of the Indian states. Similarly, Rao et al., (2005) found in their study that the urbanization rate has a positive impact on the per capita tax revenue of the 15 major states of India. Thus our result for this variable is in contradictory to these studies. However, this may be because of the reason that the study has included some small states i.e. Sikkim, Mizoram, Meghalaya, Tripura, and Manipur which have higher urbanization base due to the small population base but their tax ratio is low. Similarly, Nepram (2011) found a positive impact of urbanization rate on the tax ratio of the states but statistically insignificant. They also found that if they exclude the small states from

their sample, then their coefficient for urbanization rate become statistically significant.

Similarly, the coefficient of the dummy variable for GST is significant and positive at 1% level of significance as shown in column three of table 3. The significant and positive coefficient of the GST dummy variable indicates that the introduction of the GST in India has increased the revenue productivity of the states in comparison to the value-added taxation system. Thus, we conclude that the GST adoption in India helps the states in mobilizing their resource. Thus, the finding of the study can dispel the fear of the states that the adoption of the GST has reduced their revenue productivity. Similarly, the result indicates that the GST would increase the tax base of the states in the long run even without compensation to the states from the central government.

The coefficient of the Per Capita Net State Domestic Product (PCNSDP) is highly positive but statistically insignificant. However, Rao et al., (2005) found in their study that per capita tax is significantly influenced by the per capita income. On the contrary, Nepram (2011) found a positive coefficient of per capita income for the Sales/Vat ratio of the Indian states, but statistically insignificant. Similarly, Nambair and Rao (1972) and Sen (1997) also revealed a positive but statistically insignificant coefficient of per capita income.

The study has used the interaction term of the $GSTDummy * \log PCNSDP$ to analyze the impact of the Goods and Service Tax to change with the income level of the Indian states. In order to select the appropriate model for running the panel regression, we have again applied the likelihood ratio and Hausman test which confirms that the random effect model is consistent and appropriate in comparison to pooled and fixed panel regression effect model as indicated by $\chi^2(6) = 2.918$, which is statistically insignificant resulting in acceptance of null hypothesis for random effect model. Upon running the results with the interaction term, the $GSTDummy$ variable become negative but the interaction term becomes positive and highly statistically significant, this signifies that richer and major states have greater revenue productivity from

taxation reforms in India with the abolishment of the Value Added Taxation system (except some items which are still out of GST preview i.e. petroleum, alcohol etc.). This is also indicated in table 2 results where Maharashtra, Tamil Nadu, Jharkhand Uttarakhand, and Delhi face a tremendous increase in their tax ratio to the NSDP except for Sikkim. These results are supported by the finding of Ebrill et al., (2001); Azaria and Robinson, (2005); Keen and Lockwood, (2010), and Nepram (2011). However, these studies are primarily focused on the adoption of the VAT system after the abolishment of the Sales taxation system. Secondary, the first three studies are confined to country-level analysis, however, Nepram (2011) study results are based on the Indian states for VAT system. Similarly, Gupta (2012) studied the impact of VAT revenue on the Indian states. They found no indirect impact of VAT on VAT base (a proxy by GDP) and base growth. They found positive direct revenue impact of VAT on 2/3 of the sample jurisdictions. Thus, the results indicate that richer states or countries' revenue productivity is increase with the adoption of the GST which is mainly due to the efficient, transparent, and more compliant tax machinery of the technology-based GST model.

Conclusion

India is being a developing country where taxes reforms are introduced at a slower pace in the country. In spite of several weaknesses in the sales tax system of the country i.e. cascading effect of taxation, tax competition, and complexities, the government has adopted the Value Added Taxation system in India to remove these weaknesses in the prevailing taxation system. However, the VAT system was a right move in the correct direction to remove the cascading effect that prevails in the Indian indirect taxation system, but the VAT system was not able to do that completely. Finally, the government of India has adopted the Goods and Service Tax in the country amidst strong opposition from the political parties and Indian states. However, the central government has promised the states for a revenue growth rate of 14% per annum to state government over the base year 2015-16. The result of the study indicates that the adoption of the GST has improved the tax ratio of the states

which ultimately improves the revenue productivity of the states by making the GST self-regulated compliant tax law. Thus, the current study will act as a guide for the government in the future formation of policies regarding compensation to the states. However, the results affirm that richer states have more revenue productivity from the adoption of the GST as indicated by positive and statistically significant interaction terms. This implies that inter-states disparity in tax collection will become more deepen and worst for India after the GST adoption in India as GST collection contribute nearly 67.5% of the own tax revenue of the Indian states in aggregate. Therefore, it becomes necessary to give proper importance to the per capita income and improvement in the tax efforts of the states through a better compliance system in comparison to the devolution of resources from the center to the states.

Future Directions and Policy Implications: The study has major findings which will help the government and policymakers in future policy formations regarding the Goods and Service Tax in India. The results indicate that the adoption of GST has improved the tax ratio of the states to their NSDP. However, richer states have earned more revenue from the adoption of the GST in India which may deepen the interstate disparities in India as GST collection occupies a major share in the aggregate own tax revenue of the country. With the successful implementation of the GST in India, the government can move ahead to rationalize the GST rate structure in India and can include other products i.e. petroleum and alcohol under the GST regime which are still out of its preview. Similarly, a future study can be conducted in this domain on ascertaining the major cause of the increase in revenue of states under the GST regime. Moreover, the study can be taken as a base for conducting a future study on the impact of GST on macroeconomic variables i.e. employment, production, and price level in India and at the international level.

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Endnotes:

1. Haryana, Arunachal Pradesh and Gujarat have provided the data for revenue from taxes subsume in GST only for the year 2015-16.
2. Uttarakhand, Nagaland, Manipur, Mizoram, Assam, Gujarat, Maharashtra, Kerala, Puducherry, and Arunachal Pradesh have not provided the data for 2020-21 for NSPD, ASC, and PCNSDP.
3. GST revenue includes state and UT government revenue as considered under study as used by GST portal of India government.
4. Aggregate Expenditure (A.E.) is calculated only for those states which are considered under this study.
5. Own Tax Revenue (OTR) is calculated only for those states which are considered under this study.
6. Total Revenue Receipts (TRR) of the states is calculated only for those states which are considered under this study.
7. Variables are computed on the basis of average of Eight years data 2012-13 to 2019-20.
8. VAT Revenue includes revenues of states only from those taxes which are subsumed in GST to provide Unbiased and Realistic estimations.