IMPLICATIONS OF GOODS AND SERVICE TAX ON STATE'S REVENUE EFFICIENCY: AN EMPIRICAL STUDY ON INDIAN STATES

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ABSTRACT. The current study tries to assess the implications of GST adoption on the revenue efficiency of the Indian states. The results indicate that the GST implementation has increased the C-efficiency ratio of the country. Similarly, at the sub-national level, the GST implementation has increased the revenue efficiency for the consumptive and minor Indian states i.e. Manipur, Mizoram, Meghalaya, Assam, Sikkim and Nagaland. Although, the developed states still have a higher share of total GST revenue in the country, but the adoption of GST will mitigate the inter-state disparity by shifting the revenue streams from the productive states to consumptive and minor states. On the contrary, the stability analysis indicates that the GST adoption has increased the volatility in the revenue of the state governments. The finding of the study has major implications for the state and central governments, policymakers, researchers and the sitting of the fifteen finance commission in India.

1. INTRODUCTION

Tax revenue is a major source of funding for government spending on public goods and services around the world. The revenue from taxation of a government constitutes two parts broadly: direct taxes and indirect taxes. Indirect taxes occupies a major place in the state government's revenue and help the respective governments in the economic development of a state and country by influencing the production and consumption rate of a country (Khan and Shadab, 2013). It builds the government's capability to meet basic needs, provide security to its citizens and fosters economic growth (Musimenta et al., 2017, Ibrahim et al., 2015). The Government of India (GOI) has introduced several fiscal reforms in its indirect tax mechanism to harmonize it with the international taxation system and due to its domestic concerns (Khoja and Khan, 2020). One of the major fiscal reforms in this system is the introduction of Value Added Tax (VAT) in India in 2005. The structure of the VAT is primarily based on the report of Bagchi (1994). However, the government of India was unable to introduce a harmonized taxation system at the sub-national level with the introduction of the VAT in India. The VAT system is encompassed with many inconsistencies i.e. psychological and structural inconsistencies and problems interconnected to the administration of a sound taxation system (Purohit, 1993). Moreover, the major issue of charging tax on already paid taxes (cascading effect) is still found to be prevailing in the Indian taxation system. Cascading implies a system of taxation which include double taxation or incidence of taxes on some previously paid taxes. The VAT system

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has a cascading effect problem as taxpayers are not allowed to input tax credits for CENVAT (Central VAT) and services that are paid by the taxpayers at the consumption and distribution stage. As cascading of taxes implies charging of tax on already paid taxes at some earlier stages of the supply chain, it leads to an increase in inflation by increasing the tax burden on the final consumers in an economy (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, 2013a). 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). However, it was impossible to remove cascading impact even in the case of prevailing of the single-stage taxation system in an economy, but its effect can be mitigated to its lowest level (Adhikari, 2019). Therefore, the government of India introduced the Goods and Service tax (GST) in July 2017 to remove the prevailing weaknesses in the existing taxation system in India. The main purpose of this fiscal reform is the inclusion of services under the ambit of the prevailing tax system and to mitigate the cascading effect and complexities in the existing taxation system by introducing a seamless and IT-based taxation system. However, the introduction of the GST in India has changed the taxation system from an origin-based to a destination or consumptive-based taxation system (Mukherjee, 2020a). This has resulted in the transfer of CST (Central Sales Tax) revenue from production or origin-based states to consumptive states in case of inter-state supply. On the one side, this shifting of the taxation revenue is expected to diminish the horizontal fiscal disparity among states, but on the contrary, it has created an environment of infuriating and anxiety among highly productive state governments, claiming that this reform will transfer their resources to highly consumptive based states resulting in truncating their mobilization of resources. Therefore, the current study tries to examine the impact of GST introduction on revenue efficiency across Indian states.

The rest of the study has been structured as: Section 2 covers the previous studies conducted in this domain; Section 3 covers the theoretical framework and research methodology adopted in the study; Section 4 converses about the empirical result of the study with efficiency, buoyancy and stability of GST revenue across Indian states and Section 5 presents the policy implications of the study followed by the conclusive section of the study.

2. LITERATURE REVIEW

The area of public finance especially taxation has received prime attention from researchers, policymakers and professionals over time. The estimation of taxation system efficiency has long been a burning topic of interest both at cross-country and sub-national levels. Adhikari (2019) assessed the impact of VAT adoption on economic efficiency at the international level. Their result affirms a favorable impact of the VAT adoption on economic efficiency. However, the results are primarily driven by the richer countries only and their study does not confirm any significant impact of the VAT adoption on poorer countries. Hodzic and Celebi (2017) studied the VAT efficiency across EU-28 member states and Turkey with the application of efficiency and C-efficiency ratio for the period ranging from 2009 to 2013. They found that the efficiency ratio of Croatia in 2013 was the highest among the EU-28 member states and Turkey indicating that VAT revenue as a percentage of GDP is very high in Croatia (12.7%) in comparison to Turkey (9.0%) in 2013. Their results further revealed that the existing VAT system in the EU-28 member countries and Turkey is highly involuted and there is a need to improve the efficiency, transparency and simplicity of the existing VAT mechanism to increase the competitiveness, efficiency and growth in the EU member countries. Cevik et al., (2019) studied the impact of increasing the shares of the service sector in output and employment on VAT collection efficiency among developing countries. The results of their study are based on the C-efficiency ratio of 134 countries for the period ranging from 1970 to 2014 and the VAT gap covering 24

countries for the period ranging from 2004 to 2016 based on the IMF Revenue Administration-Gap Analysis Program. The results of their study revealed that a higher proportion of the service sector in output and employment negatively impact the VAT collection efficiency. The main reason for this adverse effect was found to be a rise in non-tradable services which in turn ante up significantly in narrowing down the VAT base. Mohanty et al., (2017) analyzed the impact of VAT efficiency among the sub-national governments in India. They found that the tax collection efficiency has been reduced drastically after the adoption of the Value added tax in India. They contended that there is a need to abolish the existing tax system to adopt a suitable tax system that truncates the problems prevailing in the existing taxation system. Similarly, Jha et al., (2000) analyzed the VAT efficiency in 15 Indian major states. They found that poor Indian states are more efficient in VAT collection and central transfers to the state government work in reducing the tax efficiency of the states. Aizenman and Jinjarak (2007) found that VAT collection efficiency is affected by political economy considerations and structural factors. Similarly, Tagkalakis (2014) contended that the efficiency of the VAT revenue is positively linked with economic activities. They instituted that a one percent increase in real GDP growth results in a 0.63% increase in VAT revenue. Dordevic et al., (2019) revealed that the VAT collection efficiency is sensitive to VAT prevailing rates in a country and any increase in VAT rates negatively impact the VAT C-efficiency ratio. Khan et al., (2013) found that the VAT adoption improves the administrative efficiency and tax compliance; however, there still exist some inconsistencies in the VAT system which needs to be monitored shortly to make it a more efficient system. Dey (2021) found that the indirect tax revenue in India is explicating an increasing trend after the GST implementation except for a few months of administrative complexities and the Covid-19 pandemic. Although, they found that Orissa state is unable to generate revenue as per the expectation under the GST regime and will face difficulty in case of termination of GST compensation by the central government in near future. Similarly, Garg et al., (2022) concluded that the Indian government should make efforts to increase the taxpayer's knowledge and their contentment regarding various aspects of GST with economic and other socio-psychological factors to improve the GST revenue of the country. Mukherjee (2022) found that both the state and central governments are unable to reap the benefit of GST in terms of higher revenue mobilization.

Thus from the above literature, it is clear that the C-efficiency ratio, efficiency ratio, tax stability and buoyancy become the most important determinants of the evolution of tax revenues with time at cross-country and sub-national levels (Keen, 2013b; Ueda, 2017). Moreover, the above-mentioned studies have touched on different areas relating to VAT and GST, but none of these seems to have touched the area like the impact of GST on state revenue, tax ratios and implications of GST on states revenue productivity. The adoption of GST has changed the tax system from the origin-based taxation system to the consumption or destination-based taxation system which has resulted in fear among productive Indian states that this tax transformation will negatively impact their revenue performance. Although the GST has passed the successful implementation journey of 5 years, however, there is a paucity of studies which has assessed the performance of GST revenue state-wise with the help of efficiency ratios, tax buoyancy and tax stability. Therefore, the current study tries to fill up this research gap and contribute significantly to the existing literature in this domain.

3. Research Objective and Methodology

The objective of the study is to examine the implication of the GST on the state government revenue efficiency. To achieve this objective, the study has computed various statistical measures to assess the impact of GST on state revenue efficiency. For this purpose, the data relating to the GST revenue of the state has been collected from the GST portal. To match the state's revenue with the taxes subsumed under GST, the study has taken only the state government's revenue from the SGST and IGST (settlement of IGST to states) without compensation cess. The underlying justification is that, as per the Goods and Services Act 2017 (Compensation

to States), the state governments are anticipated to collect revenue from SGST (consisting of IGST settlement) equivalent to taxes subsumed in GST with a predicted annual growth rate of 14% (Mukherjee, 2020a). Similarly, the data on the state government revenue for the pre-GST period is published by the Department of Revenue (GOI) and GST portal. The revenue of the state governments during the pre-GST regime cover up the revenue only from those taxes which are subsumed in GST as some items are still out of the preview of GST i.e. petroleum, alcohol and electricity. Moreover, the data of the states' Nominal GSDP has been collected from various issues of RBI publications namely "State Finances: A Study of Budgets and Handbooks of statistics on state government and Indian economy". The data on the nominal GDP of India is collected from the economic survey of India 2021-22. Similarly, the data on consumption expenditure is collected from the World Bank database. Ebrill et al., (2001) found that the efficiency and C-efficiency ratios are major indicators of VAT revenue efficiency. Therefore, the study has calculated the Efficiency Ratio and C-Efficiency Ratio to measure the efficiency of the GST revenue in India for pre and post-GST period. As the GST is a consumption-based tax, therefore, the tax base of GST is dependent on the consumption base of a state. However, the consumption expenditure data is not published in India state-wise, therefore, the C-efficiency ratio is calculated at the national level in spite of the sub-national level for India with the help of the following formula:

$$GST_{it}^{Eff.} = \frac{GSTR_{it}}{Y_{it} * GST_{SR}}$$

$$GST_{t}^{C_{Eff.}} = \frac{GSTR_{t}}{FCE_{t} * GST_{SR}}$$

where $GST_{it}^{Eff.}$ stands for the GST revenue efficiency in state i at time t. $GSTR_{it}$ for GST revenue of state i at time t and Y_{it} represent nominal GSDP of the state i at time t. GST_{SR} represents the standard rate of GST in India. Similarly, $GST_{t}^{C_{Eff.}}$ represent GST revenue C-efficiency ratio for India at time t; FCE stands for final consumption expenditure. An increase in the efficiency ratio explicates that revenue collection has become more effective as the gap between potential and actual GST revenue has decreased.

Moreover, the study has also calculated the stability of the GST revenue of the Indian states for the pre and post-GST period. The revenue from taxes that is either generally consistent or adversely associated with the revenue from other taxes is expected to be more beneficial in stabilizing the total revenue resources of the state governments (Haughton, 1998). The stability in the GST revenue is highly desirable at least from the state government perspective, as GST constitutes a major proportion of the state's Own Tax Revenue (OTR) in India. The coefficient of variation of GST revenue is a simple indicator of the stability of GST revenue, which is usually expressed as the standard deviation of the GST revenue (typically expressed as a fraction of state GSDP) divided by its mean value:

$$\frac{\sigma_{VAT/GST}}{X_{VAT/GST}} x100$$

Similarly, the study used the GST buoyancy ratio to assess the responsiveness of the GST revenue of a particular state with respect to changes in the state's GSDP. The state government's capability to mobilize its own tax revenue should enlarge with an increase in the GSDP of the state. The buoyancy of a parameter is determined by dividing its growth rate by the GSDP growth rate as used by Comptroller and Auditor General of India (CGI) 2016-17 (P. No. 19-20):

$$\frac{\frac{VAT/GST_t - VAT/GST_{t-1}}{VAT/GST_{t-1}}}{\frac{GSDPT_t - GSDPT_{t-1}}{GSDPT_{t-1}}}$$

Upon Simplification:

$$\frac{Growthrate\_of\_a\_StateVAT/GST\_Revenue}{Growth\_rate\_of\_state\_GSDP}$$

The buoyancy ratio measures the elasticity or degree of responsiveness of a fiscal variable (herein GST revenue of state) with respect to a given change in the base variable (GSDP). It helps in determining the base of any tax system. This illustrates whether the GST adoption is broadening the tax base of a state or not.

4. Results and Discussion

This section of the study has been categorized into 4 sub-headings. The first sub-section discuss the efficiency of the GST in India at national level by computing the C-efficiency ratio, second sub section deals with the efficiency of GST revenue at sub-national level in India by computing the Efficiency ratio for Indian at sub-national level. The third and forth sub-section deals with the buoyancy ratio and stability of state revenue.

4.1. **The efficiency of GST at the National Level in India.** GST is a consumption-based tax that is highly affected by the consumption expenditure of households. Table 1[1] present the C-efficiency ratio of the VAT and GST revenue for the period ranging from 2012-13 to 2020-21. The result shows that the C-efficiency ratio was highest in 2016-17 before the implementation of GST in India and overall it is highest in 2019-20. Furthermore, the result indicates that the C-efficiency ratio has sharply decreased in the year of the adoption of GST in India.

Table 1: C-Efficiency Ratio of VAT/GST Revenue in India:				
Pre and Post GST				
Year	Consumption	VAT/GST	Standard Rate	C-efficiency Ratio
	Exp. (in Cr.)	Revenue (in Cr.)	of VAT/GST	
2012-13	6537154	286186	0.15	29.186
2013-14	6966808	308734.9	0.15	29.543
2014-15	7514221	331825.8	0.15	29.440
2015-16	8101834	352991.8	0.15	29.046
2016-17	8675571	391930.5	0.15	30.118
2017-18	9285389	322358.2	0.15	23.144
2018-19	9743977	402114.8	0.15	27.512
2019-20	9301337	446336.6	0.15	31.991
2020-21	9967654	400087.1	0.15	26.759
Standard rate is equivalent to the average of standard rates (12% and 18%) of GST				
(as used by RBI in the publication "Goods and Services Tax: A Game Changer").				
Source: Author's Computations				

This sharp decrease in the C-efficiency ratio is due to administrative complexity, public opposition and inadequate return filling efficiency in its inception period. Although, the GST revenue efficiency has geared up after its inception year as indicated by an increase in the C-efficiency ratio, however, it is badly affected by the Covid-19 pandemic in 2020-21 resulting in decreasing the C-efficiency ratio again as indicated in table 1. Dey (2021) also found that the indirect tax revenue in India is showing an increasing trend after the GST implementation except for a few months of administrative complexities and the Covid-19 pandemic. Thus, the result indicates that the efficiency of the GST revenue is increased after its adoption with time except for some abnormal years of the Covid-19 pandemic.

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[1]As GST is implemented in India from July, 2017, therefore, to provide unbiased results the data for 2017-18 has been converted into annually series. In the absence of this conversion, the year 2017-18 will show a contemporaneous shock to efficiency, c-efficiency ratio and make results misleading.

4.2. **The Efficiency of GST Revenue among the Indian States: Pre and Post GST.**
Table 2 present the results of the efficiency ratio of the Indian states for the pre-GST and post-GST regime.

Table 2: Efficiency Ratio of Indian States: Pre and Post GST								
State Name	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21
J&K	24.22	23.96	23.11	27.12	24.93	15.29	18.13	17.86	16.79
Himachal Pradesh	19.35	18.44	19.83	21.21	18.88	10.74	12.69	14.26	14.07
Punjab	32.66	33.13	33.20	24.73	28.79	13.72	14.59	15.69	14.15
Uttarakhand	19.05	19.43	19.80	18.67	20.28	9.67	11.47	12.60	**
Haryana	*	*	*	20.49	*	14.03	15.67	16.10	15.75
Delhi	21.16	21.20	19.36	20.31	17.76	16.90	14.84	15.40	12.50
Rajasthan	16.02	15.79	17.05	16.79	15.50	12.27	14.86	14.43	13.93
Uttar Pradesh	22.68	20.05	20.31	19.56	18.87	15.06	17.32	18.33	16.14
Bihar	18.11	19.96	19.20	22.64	23.08	11.75	16.72	17.17	16.13
Sikkim	10.50	12.18	9.52	9.07	8.49	6.23	8.62	10.21	8.41
Arunachal Pradesh	*	*	*	9.22	*	8.42	14.74	18.83	**
Nagaland	9.23	7.16	7.82	8.74	9.32	6.43	10.75	13.60	**
Manipur	12.79	15.93	15.91	11.85	15.62	9.89	15.27	17.59	**
Mizoram	8.70	8.78	7.35	8.32	8.15	7.42	12.91	13.90	**
Tripura	17.63	16.36	15.08	14.63	14.22	9.04	11.37	11.87	11.13
Meghalaya	11.56	9.01	12.86	16.89	14.27	10.48	14.54	16.96	15.37
Assam	18.99	18.30	17.87	17.50	18.27	11.98	16.01	16.95	**
West Bengal	17.26	17.76	18.15	16.80	17.31	13.04	14.58	14.84	12.43
Jharkhand	19.56	19.79	19.11	20.68	22.75	12.66	15.61	16.92	15.52
Orissa	23.52	22.57	22.82	22.42	21.52	12.39	14.17	15.83	15.62
Chhattisgarh	22.53	20.98	20.62	21.78	20.47	12.80	14.72	14.74	14.01
Madhya Pradesh	21.50	19.72	19.67	18.89	17.82	11.19	13.90	13.35	12.57
Gujarat	*	*	*	18.70	*	13.59	14.31	14.20	**
Maharashtra	25.24	22.89	22.37	20.51	20.46	18.22	19.64	19.62	**
Karnataka	24.35	23.59	24.01	23.05	21.81	15.11	16.56	17.26	15.29
Goa	27.04	33.58	26.70	26.42	25.39	17.54	20.43	21.32	14.35
Kerala	21.29	20.72	20.53	19.95	19.48	14.65	15.51	15.12	**
Tamil Nadu	19.53	17.81	17.27	16.88	16.02	14.32	15.10	14.89	12.27
Puducherry	33.47	27.69	28.25	27.44	26.64	13.03	14.46	13.02	**
Telangana	-	-	-	18.58	19.58	14.66	16.60	16.31	15.16
Andhra Pradesh	43.47	40.69	35.60	15.31	15.52	11.58	14.21	13.58	12.06
Note: * and ** denotes VAT Revenue and GSDP data not available to								
GST portal and RBI from State governments respectively.								
Source: Author's Computations								

The indirect tax system of any country can have two types of taxation system i.e. origin-based or destination-based taxation system. In the case of inter-state supply of goods and services, there may be two unfavorable instances of double taxation and tax avoidance, as some goods and services may be taxed at both places of origin and consumption resulting in double taxation or some goods and services may be skipped at both places of origin and consumption resulting in tax avoidance. The first incidence of double taxation in India is so severe that it is cost-effective to import goods from another country than other Indian state resulting in trade diversion as per Jacob Viner's theory. Therefore, the implementation of GST to avoid such circumstances has adopted the destination-based taxation system. However, repealing of origin-based (VAT) taxation system with a destination-based taxation system has resulted in anxiety and resistance among highly productive state governments, claiming that this reform

will transfer their resources to highly consumptive based states resulting in detracting their mobilization of resources. This is also depicted by the efficiency ratio of the Indian states in table 2 for pre and post-GST regimes. The results depict that the highly productive states i.e. Maharashtra, Gujarat, Tamil Nadu, Kerala, Uttarakhand, Chhattisgarh, Haryana and Jharkhand faced a drastic decrease in their efficiency ratio after the adoption of GST in India.

However, after its inception year, the efficiency ratio tends to be increased for these states but it again tapers off due to revenue loss because of the Covid-19 pandemic and it tends to be low in comparison to pre-GST period for these states. On the contrary, states like Sikkim, Arunachal Pradesh, Nagaland, Mizoram, Manipur and Meghalaya have been blessed with an increase in efficiency ratio with the adoption of GST in India except its inception year. With the implementation of GST, the Central Sales Tax (CST) is transferred to the consumptive state in contrast to the origin or productive states resulting in an increase in mobilization of revenue resources for these small states of India. Although, the developed or highly productive states i.e. Maharashtra, Tamil Nadu, Gujarat and Uttar Pradesh still have higher share in total GST revenue (nearly 40.7% for 2021-22) of the country (Dash et al., 2021), but the adoption of GST will result in increasing the revenue for minor and consumptive states. Moreover, some states i.e. Bihar, Rajasthan, Delhi, Tripura and West Bengal are facing a decrease in efficiency ratio constantly during the VAT regime (from 2012-13 to 2017-18). Although, the GST implementation has also tapered down their efficiency ratio, however, it is massively recovered back up for these states due to their higher consumptive base. Thus, the result indicates that GST implementation reduces the efficiency ratio of productive states on one side and on the contrary, it acts as a blessing for consumptive states.

4.3. **VAT/GST and State Own Tax Revenue Buoyancy of Indian states Pre and Post GST.** VAT/GST buoyancy ratio measures the elasticity or degree of responsiveness of VAT/GST revenue with respect to a given change in the base variable which is the GSDP of the respective state. It helps in determining the base of any tax system. An increase in tax revenue without any increase in the tax rate depicts a tax system to be buoyant. Table 3 presents the results of the VAT/GST revenue buoyancy of the Indian states for the pre and post-GST regime.

The VAT/GST buoyancy ratio shows that the tax buoyancy ratio of states has become negative in the inception year of GST in India. The buoyancy ratio turns out to be negative in its initial year due to the administrative complexities; IT-based taxation system among low educative based taxpayer population and inadequate return filling efficiency in its inception year. Similarly, as per the efficiency ratio, the tax buoyancy ratio indicates that the GST implementation has resulted in a more buoyant tax system among consumptive states i.e. Bihar, Sikkim, Nagaland, Manipur, Mizoram, Tripura, Assam and Meghalaya (refer table 3 for more details). On the contrary, highly productive states (i.e. Gujarat, Tamil Nadu, Maharashtra, Chhattisgarh and Haryana) have also faced an increase in tax buoyancy but not as per the expectation mark for these states due to the transfer of revenues from productive states to consumptive states (Mukherjee, 2020a).

Moreover, table 4 presents the results for the state's own tax revenue buoyancy with respect to state GSDP for the pre and post-GST period. The states own tax revenue buoyancy measures the responsiveness or elasticity of the state's own tax revenue concerning a given change in the GSDP of the respective state. The results are very familiar to the VAT/GST buoyancy ratio for almost the majority of the Indian states. The results indicate that the GST implementation has increased the states own tax revenue buoyancy for the consumptive and minor states i.e. Tripura, Meghalaya, Assam, Sikkim, Goa, Telangana and Andhra Pradesh. However, the productive states (Maharashtra, Tamil Nadu and Gujarat) have also witnessed an increase in state own tax revenue buoyancy, but not as per the expectation of the states. Some productive states i.e. Haryana, Punjab, Orissa, Rajasthan, Delhi and Himachal Pradesh witnessed negative

state own tax revenue buoyancy for short fall in GST revenue in 2019-20 in response to their state GSDP due to the destination based nature of Goods and Service tax in India.

Table 3: VAT/GST Revenue Buoyancy of Indian states: Pre and Post GST								
State Name	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21
Jammu and Kashmir	0.88	-0.28	2.08	-0.31	-2.65	2.43	0.75	-0.80
Himachal Pradesh	0.63	1.87	1.76	-0.21	-3.63	3.48	2.51	1.34
Punjab	1.14	1.03	-1.84	2.90	-4.60	1.79	2.49	6.20
Uttarakhand	1.17	1.25	0.36	1.94	-3.63	3.61	2.48	**
Haryana	*	*	*	*	*	2.37	1.29	2.07
Delhi	1.01	0.16	1.49	-0.19	0.47	-0.25	1.39	5.62
Rajasthan	0.86	1.76	0.84	0.26	-1.54	3.09	0.62	1.81
Uttar Pradesh	0.07	1.18	0.67	0.70	-1.24	2.41	1.95	-10.47
Bihar	1.93	0.49	3.33	1.16	-3.83	4.77	1.24	-0.52
Sikkim	2.45	-1.17	0.67	0.50	-0.31	5.49	3.35	-2.02
Nagaland	-0.50	1.95	3.05	1.65	-1.83	9.34	3.60	**
Manipur	2.63	0.99	-2.56	4.85	-1.11	8.29	2.23	**
Mizoram	1.05	0.31	2.23	0.83	0.21	7.50	1.59	**
Tripura	0.53	0.41	0.83	0.69	-2.76	3.10	1.41	-0.21
Meghalaya	-3.75	34.57	5.17	-0.83	-2.78	5.67	3.27	3.46
Assam	0.69	0.74	0.86	1.42	-2.39	4.98	1.76	**
West Bengal	1.23	1.39	0.25	1.35	-1.35	2.02	1.20	-1.27
Jharkhand	1.16	0.75	-0.43	1.79	-2.56	2.98	2.75	7.43
Orissa	0.65	1.20	0.60	0.76	-2.90	2.24	2.29	3.50
Chhattisgarh	0.52	0.73	4.13	0.58	-4.43	2.33	1.02	-2.23
Madhya Pradesh	0.38	0.97	0.65	0.66	-2.53	3.25	0.70	3.69
Gujarat	*	*	*	*	*	1.49	0.91	**
Maharashtra	0.19	0.68	0.13	0.97	-0.66	1.88	0.99	**
Karnataka	0.79	1.17	0.68	0.60	-2.17	1.92	1.50	-4.21
Goa	-2.94	0.18	0.92	0.69	-2.36	5.73	2.09	-2.99
Kerala	0.77	0.90	0.68	0.79	-1.60	1.52	0.67	**
Tamil Nadu	0.25	0.69	0.74	0.48	0.04	1.54	0.85	-2.17
Puducherry	-0.26	1.64	0.81	0.71	-5.42	2.84	0.01	**
Telangana	-	-	-	1.44	-1.06	2.03	0.83	-1.96
Andhra Pradesh	0.44	-0.08	-3.35	1.12	-0.96	3.34	0.57	-6.17
Notes: * and ** denotes VAT Revenue and GSDP data not available to GST portal and RBI from State governments respectively.								
Source: Author's Computations								

4.4. **Stability of State Revenue in India: Pre and Post GST.** To assess the efficiency and stability of the GST revenue, the study has computed the coefficient of variation of the VAT and GST revenue of the Indian states as a proportion to their respective GSDP. The coefficient of variation is a simple indicator of the stability or efficiency of the GST revenue, which is usually expressed as the standard deviation of the GST revenue divided by its mean value (Khan et al., 2013). Table 5 presents the result of the stability of the state VAT/GST revenue for the pre and post-GST period. The results indicate that the implementation of GST has increased the volatility in the state's revenue (refer to table 5 for more details) except for a few states (Maharashtra, Punjab, Meghalaya and Kerala).

Table 4: State's Own tax Revenue Buoyancy W.R.T. GSDP: Pre and Post GST								
State Name	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21
J&K	0.78	0.34	0.82	1.03	3.21	-0.43	4.99	1.19
Himachal Pradesh	0.74	1.68	1.26	0.51	0.77	0.15	0.47	-3.51
Punjab	0.57	0.90	0.44	0.42	1.31	0.11	1.14	-3.34
Uttarakhand	1.11	1.61	1.28	1.60	-0.01	1.76	0.12	*
Haryana	0.57	0.85	0.89	0.75	1.54	0.23	1.11	-4.41
Delhi	0.79	0.23	1.20	0.26	1.46	0.24	0.75	-2.94
Rajasthan	0.84	1.32	0.98	0.33	2.51	0.63	2.49	-2.31
Uttar Pradesh	1.02	1.50	0.75	0.45	2.78	1.01	1.80	22.79
Bihar	1.85	0.48	2.71	-0.50	2.22	0.31	0.84	0.46
Sikkim	1.68	0.05	0.43	1.03	1.71	0.11	0.46	4.20
Arunachal Pradesh	2.32	0.27	5.16	4.32	11.33	-2.18	-0.14	*
Nagaland	-0.12	1.56	1.60	1.75	7.42	-0.66	0.15	*
Manipur	2.37	0.77	0.88	0.70	5.03	-0.61	0.59	*
Mizoram	0.14	0.51	2.83	1.73	7.39	-0.57	-1.87	*
Tripura	0.38	0.60	0.62	0.69	2.86	0.01	1.58	2.84
Meghalaya	2.44	-0.82	1.55	1.32	7.84	0.02	1.34	-3.72
Assam	0.68	0.50	0.42	1.68	2.48	0.67	3.95	*
West Bengal	0.64	1.64	0.71	0.74	2.30	0.55	0.67	0.98
Jharkhand	1.77	0.65	-2.00	1.11	0.63	0.14	8.25	-5.25
Orissa	0.93	2.90	2.99	0.07	2.94	-0.01	0.82	-27.12
Chhattisgarh	0.61	1.38	4.76	0.66	2.17	-0.04	1.79	2.49
Madhya Pradesh	0.63	0.98	0.78	0.49	1.10	0.36	0.32	5.04
Gujarat	0.40	0.62	0.18	0.21	1.03	0.77	2.24	*
Maharashtra	0.38	0.76	0.95	0.67	3.65	1.01	0.64	*
Karnataka	0.94	1.02	0.53	0.63	0.83	0.69	0.46	4.51
Goa	-3.79	0.26	0.13	0.50	1.69	-0.65	1.98	1.22
Kerala	0.50	0.99	1.11	0.63	1.35	0.47	1.14	*
Tamil Nadu	0.26	0.62	0.24	0.63	0.98	0.89	1.35	1.79
Puducherry	-0.04	1.44	0.75	0.56	0.35	0.79	1.81	*
Telangana	-	-	2.56	1.52	1.45	0.80	0.86	8.08
Andhra Pradesh	0.55	-2.57	-0.42	0.81	1.25	1.11	-0.18	14.54
Notes to Table: * denotes GSDP data not available to RBI by states								
Source: Author's Computations								

The increase in the variability of the revenue stream of the state government after the GST adoption has raised the concern for the stability of revenue among state governments. Dash et al., (2021) also discovered a significant variation in GST revenue collection among Indian states. Mukherjee, (2020b) also found that the compliance rate under GST is not increasing over time which further delays the stabilization of GST. Thus the result indicates that although the GST adoption has increased the GST revenue buoyancy of the states, but VAT system is more stable and efficient from the revenue stability perspective in comparison to GST in India.

Table 5: Stability of VAT/GST Revenue as a fraction to GSDP: Pre and Post GST analysis						
	Pre-GST			Post –GST		
Name of State	Mean	S.D.	C.V.	Mean	S.D.	C.V.
Jammu and Kashmir	0.037	0.002	6.153	0.026	0.002	7.575
Himachal Pradesh	0.029	0.002	5.461	0.019	0.002	12.557
Punjab	0.046	0.006	12.160	0.022	0.001	5.820
Uttarakhand	0.029	0.001	3.225	0.017	0.002	13.126
Haryana	*	*	*	0.023	0.001	5.994
Delhi	0.030	0.002	7.222	0.022	0.003	12.262
Rajasthan	0.024	0.001	4.079	0.021	0.002	8.174
Uttar Pradesh	0.030	0.002	7.109	0.025	0.002	8.490
Bihar	0.031	0.003	10.545	0.023	0.004	16.192
Sikkim	0.015	0.002	14.510	0.013	0.002	19.557
Arunachal Pradesh	*	*	*	0.021	0.008	37.441
Nagaland	0.013	0.001	11.072	0.015	0.005	35.167
Manipur	0.022	0.003	13.528	0.021	0.006	27.742
Mizoram	0.012	0.001	6.928	0.017	0.005	30.612
Tripura	0.023	0.002	8.970	0.016	0.002	11.471
Meghalaya	0.019	0.004	22.805	0.022	0.004	19.250
Assam	0.027	0.001	3.043	0.022	0.004	17.620
West Bengal	0.026	0.001	2.951	0.021	0.002	8.532
Jharkhand	0.031	0.002	7.081	0.023	0.003	11.832
Orissa	0.034	0.001	3.199	0.022	0.002	10.940
Chhattisgarh	0.032	0.001	4.063	0.021	0.001	6.466
Madhya Pradesh	0.029	0.002	6.895	0.019	0.002	9.196
Gujarat	*	*	*	0.021	0.001	2.764
Maharashtra	0.033	0.003	8.857	0.029	0.001	4.242
Karnataka	0.035	0.001	4.256	0.024	0.002	6.399
Goa	0.042	0.005	11.766	0.028	0.005	17.112
Kerala	0.031	0.001	3.439	0.023	0.001	2.838
Tamil Nadu	0.026	0.002	7.473	0.021	0.002	9.123
Puducherry	0.043	0.004	9.514	0.020	0.001	6.144
Telangana	0.029	0.001	3.711	0.024	0.001	5.870
Andhra Pradesh	0.045	0.021	45.544	0.019	0.002	9.656
Notes: * denotes VAT Revenue data not available to GST portal from the respective state governments.						
Source: Author's Computations						

5. Conclusion

Goods and Service Tax is a consumption-based taxation system that has transferred the resources from productive states to consumptive states resulting in the creation of anxiety, worries and shocks among productive state governments. Therefore, the current study tries to examine the implication of GST adoption on the revenue efficiency of the Indian states. The result of the study indicates that the implementation of the GST has increased the C-efficiency ratio of the country. Similarly, at the sub-national level, the implementation of GST has increased the revenue efficiency for the consumptive and minor states i.e. Manipur, Mizoram, Meghalaya, Assam, Tripura, Sikkim, Arunachal Pradesh and Nagaland.

The adoption of GST has resulted in shifting the revenue stream from the highly productive states to consumptive or destination-based states. This shifting of resources by the implementation of GST will result in diminishing the inter-state disparity among the Indian states.

Although, the developed states still have higher share of GST revenue, but the adoption of GST in India will help in increasing the revenue of minor and highly consumptive states. Although, the adoption of GST has also increased the efficiency and buoyancy ratio of the productive states with time, however, this increase is not as per the expectation of the productive states. On the contrary, the results of the stability analysis explicate that the adoption of GST has increased the volatility in the revenue of the state governments except for a few states. Thus the result indicates that the adoption of GST will dampen the intra-state disparity among the Indian states.

6. Managerial and Policy Implications of the study

The finding of the study has major implications for the state and central governments, policymakers, researchers and the sitting of the fifteen finance commission in India. The result of the study indicates that although the implementation of GST may reduce the revenue stream for the productive states, but the shifting of this revenue to consumptive or small Indian states will result in reducing the inter-state disparity among Indian states. Moreover, the current study can be used as a base by the government and policymakers in future policy formation regarding the GST in India i.e. determining the tenure of GST compensation to Indian states, rate of GST compensation to states etc. Furthermore, to increase the efficiency of the GST at the national and sub-national level, 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. This study provides a pathway for conducting a future study in this domain. As Goods and Service Tax is still in infancy stage in India, the current study is based on short span of data which make it difficult to apply any statistical tool to analyze the impact for pre and post GST in India on efficiency, stability and buoyancy of the revenue of the Indian states. Therefore, the current study provides a pathway for conducting future study by applying some statistical tools i.e. t-test, Anova and other statistical measures for studying the difference in efficiency, stability and buoyancy of the revenue of the Indian states for pre and post GST period in India.

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