

**What explains
interstate variation in GST collection?**

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Abstract

The implementation of GST was expected to raise revenue of both states and the Centre through harmonization of taxes, reducing the cascading effect of taxation, and increasing tax compliance. Against this backdrop, nearly four years after the introduction of GST, this paper attempts to examine why the GST revenue of states vary across states. To this end, this study uses a sample of 18 states using data for the period 2017-18–2020-21. We use both descriptive analyses to draw the patterns of GST collection across states and panel data analysis to find out the determinants of interstate disparity in GST revenue collection. Our analysis shows substantive inter-state variation in GST revenue collection with higher growth in low-income states. It is found that GST revenue can be explained by return filings (a measure of tax compliance), size of the informal sector, and urbanization. We draw important policy implications from these findings.

Keywords. Goods and Service Tax, Tax revenue, Level of development

Introduction

With the introduction of India's Goods and Services Taxation (GST) from July 1, 2017, backed by the 101st Constitutional amendment, India adopted one of the most significant tax reforms since independence by subsuming multiple state and central indirect taxes to create a simpler national tax. It was described as "one country-one tax", "a game-changer", and "a reform of the century" (Rao, 2019). The new indirect tax regime encompasses various taxes from the union and state indirect tax bases. It is a dual VAT system with concurrent taxation power to the Union (federal) and state (provincial or sub-national) governments. The shift from origin-based VAT system to destination-based GST is an attempt at economic integration of the country by removing different taxation regimes, easing the mobility of goods and services, and removing state boundaries. It is divided into Central GST (CGST), State GST (SGST) and Interstate GST (IGST). The revenue from IGST is put in a separate account and adjusted against the input tax credit, and final settlements are done based on the final consumption through a clearing house mechanism (Rao, 2019). High hopes have been pegged on to this reform by enhanced tax compliance, increased revenue mobilization, and above all stimulation of economic activities inter-alia through increased scale and scope and the IT-enabled business activities.

The scholars highlighted various issues pertaining to GST post its implementation. A major limitation is the loss of autonomy of states in revenue collection and fiscal consolidation after GST. The GST Council, established for efficient implementation of the reform, also provides veto power to the Union government while the states merely follow the rules (Prasanna, 2016). Another major issue that received substantial attention is the fixation of revenue-neutral rates (RNR). It was argued that a reduction in rates could increase the GST collection through an increase in compliance and reduce tax evasion (Das, 2017). Since the present rate of effective taxation is lower than RNR, it could adversely affect some states. At the time of GST implementation, there were stark differences between the rates for the producing states and the consumption-oriented states. This could de-incentivize the new investments in producing states (Morris et al., 2019). In addition, the multi-tiered rates could deter the objective of increasing tax compliance and could increase tax evasion and corruption. The third issue concerns the potential coverage of the unorganized sector through GST. Since nearly 80% of the economic activity is in the informal sector, often outside the purview of taxes, GST collection may not improve significantly. At the same time, bringing the informal sector under the purview of GST could be associated with high administrative costs given the nature of business transactions which are often based on partnership (Banerjee and Prasad, 2017).

Irrespective of the stage of development, any tax reform is considered to be successful when it increases the tax revenue which is central for fostering economic and social development. Since a significant part of India's indirect tax base is subsumed in GST, state's own capacity in GST collection is crucial for the revenue management of the states and could have wider ramifications. Unlike the Union government, states have limited revenue sources (or taxation power) to compensate for substantial revenue loss on account of GST implementation. Data on GST collection suggests that many states have not been able to collect the protected GST revenue even after four years of implementation while some states have been able to achieve the targeted growth. It is found that states have been divided even with respect to demand for GST compensation. Some states are demanding GST compensation period extension beyond 2022 while some states are silent on the compensation. In the face of revenue shortfall on account of GST, states not only face direct revenue shock on account of state GST (SGST) collection but also indirectly in terms of lower receipts of tax devolution from the union government.

India's GST system is still evolving even after four years of its implementation and has been subjected to various changes as the GST council deemed fit from time to time. However, India, a country with a quasi-

federal structure where it is more challenging to implement such a unified tax system, is not an exception. Many other countries, such as Canada and Brazil, are still stabilizing their GST system even after many years of its implementation (Rao, 2019). Nevertheless, it is important to take stock of the performance across Indian states. Against this backdrop, this paper seeks to explain such variation in GST collection at the subnational level. The moot question here relates to the actual experience in GST collection and the factors underlying the observed trend.

This study utilizes panel data analysis to explain the interstate disparity in GST revenue collection. The econometric analysis suggests that returns filing (a measure of compliance) positively affect the share of GST in GSDP. We find that structural factors which are crucial for GST revenue collection, such as higher urbanization and lower size of the informal sector, have statistically significant and positive effects on the share of GST in GSDP. This study contributes to the literature in the following ways. First, this is perhaps the first study to attempt to estimate the determinants of GST revenue at the subnational level. Second, it contributes to the broad literature on determinants of tax revenue at the sub-national level. This paper goes beyond the conventional literature on the determinants of tax revenue by incorporating additional variables intrinsic to GST revenue collection and adds further insights relevant for devising policies to enhance the GST revenue.

The rest of the paper is organized as follows. Section 1 briefly documents the related literature. Drawing from the literature, we present the analytical framework in Section 2. Empirical strategy, data sources, and variable construction are discussed in Section 3. Section 4 presents estimation results and a discussion of them. Finally, Section 5 concludes the paper with a discussion on policy implications.

1. Related literature

1.1 Determinants of tax revenue: Empirical evidence

As the tax revenues provide space for prudent fiscal policies, the factors that contribute to higher tax revenue collection have been a prominent subject of inquiry in the area of taxation for several decades now. The research on determinants of tax revenue began in the mid-1960s by a team of economists at the IMF (Williamson, 1961; Hinrichs, 1966; Thorn, 1967, Lotz & Morss, 1967; Shin, 1969; Musgrave, 1969; Bahl, 1971; Chelliah et al., 1975; Ansari, 1982 among others). The literature on the determinants of tax revenue mainly focuses on tax effort and other structural, political, and institutional factors. In the Indian context, the determinants of tax revenue performance have been analyzed through tax effort and the efficiency of tax collection. Taking four South Indian states, Rao (1979) analyzed the role of economic and political factors in determining tax revenues and found that increase in tax revenues is on account of changes in prices, shifting in demand and supply conditions rather than an increase in income levels. He further finds that while political factors matter in increasing the taxes on agricultural land, political-ideological factors did not show any significant impact on tax revenue collection.

The recent literature on tax revenue performance at the sub-national level estimated tax effort and tax revenues using the Stochastic Frontier Analysis (SFA) approach (Jha et al., 2000; Karnik & Raju 2015; Garg et al., 2017; Mukherjee, 2017; Mukherjee, 2020b among others). The broad findings of the research are as follows. First, high tax performance was attributed to high tax effort in higher and middle-income states in contrast to the previous studies by Reddy (1975) and Sen and Tulasidhar (1988), where they found poor states have shown higher tax effort. Second, factors such as state domestic product, the share of agriculture in Gross Domestic Product (GDP), literacy rate, labour force, road density, and inequality have shown a positive and significant effect on states' tax revenues. However, the square of per-capita income and agriculture GDP share negatively impacted tax revenue (Mukherjee, 2017). Third, mining-rich states have shown higher tax efficiency (Mukherjee, 2017). While many studies focused on aggregate tax efficiency,

Mohanty et al. (2017) analyzed the efficiency of Value Added Tax (VAT) revenue across Indian states. They found that the urbanization ratio, billing and collection efficiency, bank credit ratio, and share of the agriculture sector are found to have a favorable effect on VAT efficiency. In contrast, the share of the unregistered manufacturing sector and the share of the services sector hurt VAT efficiency.

The empirical literature on the performance of states with respect to GST collection is limited. Comparing the revenue performance of states under VAT and GST, Anithakumary and Mathew (2019) showed that the ranking of the states under the two regimes is not uniform. Especially notable was Kerala, which was among the top during the VAT regime, has shown a decline in rank during the GST regime. Mukherjee (2020a) analyzed the GST compliance at the state level and GST revenue collection and estimated the compliance gap measured by all filers (by and after the due date) as a percentage of taxpayers eligible to file GSTR-3B. Analyzing the differences in GST revenue performance, he argues that the GST regime has led to revenue loss, especially for mineral-rich states like Jharkhand, Odisha, Chhattisgarh, and Madhya Pradesh. In these states, value addition from manufacturing activities is not fully appropriated within the state's boundary. Further, using the GSTN (Goods and Services Tax Network) data, Mukherjee (2020b) estimated tax capacity and tax efficiency (tax effort) by using the SFA. He finds that Delhi and Goa report high efficiency in GST revenue collection while the special category states show low efficiency. Among the factors contributing to GST revenue, the structure of the economy measured in terms of the ratio of shares of mining, manufacturing, industry, and services in GSVA (Gross State Value Added) vis-à-vis share of agriculture in GSVA is found positive and significant. With respect to per-capita income, he finds a nonlinear U-curved relationship with GST efficiency.

2. Analytical framework

Drawing from earlier studies on determinants of tax revenue and the literature on GST, we could identify two main factors that contribute to GST revenue collection across. First, the extent of GST administration and governance; second is the structural factors. The details of each variable and the hypotheses are discussed below.

2.1 GST related factors

Compliance rate: Many scholars have argued that a uniform tax like GST would increase tax compliance. It is defined as the number of dealers filing returns out of total registered dealers. It can be defined in two ways. First, the number of dealers filing returns *in time* out of total registered dealers, called *timely filers*. This means these taxpayers pay tax before the *due date*. Second, the number of dealers filing the return *after the due date* out of total registered dealers, called *late filers*. It is expected that higher revenue collection, in general, will be associated with a higher compliance rate. One limitation of this crude measure of compliance is that it is a 'noisy' indicator for the following reasons; (1) registered dealers filing *nil* returns¹, (2) most of the registered dealers file returns, but they get the refund, (3) higher returns filing may not necessarily increase the revenue since they may be contributing meagrely. Evidence suggests that while 80.7% of GST revenue comes from 7% of the dealers, 22% of the taxpayers recorded nil tax liability, and 28% of the taxpayers having an annual turnover of up to Rs 20 lakh accounted for 1-2% of the revenue (Sharma, 2020).

2.2 Level of economic development

¹ These are dealers who are either *marginally* above the registration threshold or below the threshold of GST registration, yet register and file *nil* returns with a purpose to get the input tax credit.

Per-capita income: The tax revenue of a country or state depends significantly on the higher level of economic development. Almost all the studies analyzing the determinants of tax revenue found a positive and significant effect of per capita income as it is a proxy for taxable activities. Accordingly, a high purchasing power corresponds to higher consumer demand and a greater revenue base. Therefore, it is assumed that the relationship between per capita income and tax potential would be positive (Musgrave, 1969). Studies analyzing the determinants of sub-national tax revenue in the Indian context also found the positive effect of per capita income on tax revenue (Purohit, 2006; Karnik & Raju, 2015; Garg et al., 2017; Mukherjee, 2017). However, Mukherjee (2017, 2020b) finds a nonlinear relationship between per capita income and tax revenue. He shows the relationship is a U-shaped curve. Initially, a per capita income increase would contribute to a decline in tax revenues, but after the states reach a threshold level of income, an increase in per-capita income would contribute to higher taxes. However, in our study, the variable of importance is GST which is a consumption-based tax. Hence, the conventional relationship is less likely to hold in the case of GST.

Structure of the economy: Studies have considered many structural factors like the share of agriculture, mining, manufacturing, and services depending on the nature of the dataset and the dependent variable and highlighted the importance of the economic composition of the state in tax revenue collection (Jha et al., 2000; Agarwal, 2012; Mohanty et al., 2017; Mukherjee, 2017 and 2020a). The modern economy has higher tax collection potential than traditional agrarian economies. While industrial and service sectors can be taxed with relative ease, the same does not hold in the case of the agricultural sector. Thus, the share of agriculture is expected to have a negative association with tax potential. Conventionally the structure of the economy is measured through the share of manufacturing and services in a state's domestic product. However, in this study, we include the share of services in GSVA since manufacturing and mining produced in a particular state need not remain in the same state for final consumption.

Size of the informal sector: Informality and tax have been an issue of concern for several decades. There are theoretical models on the informal sector and its impact on VAT revenue collection (for example, see Emran & Stiglitz, 2005; Kanbur & Keen, 2014, among others). Like many developing countries, India has a large presence in the informal sector. Most micro and small entrepreneurs are unregistered dealers without any tax registration number and carry out their business transactions within the unorganized sector that do not come under the tax net (Sen, 2015; Mohanty et al., 2017; Mukherjee & Rao, 2019). While firms and enterprises in the organized sector are part of the integrated network of GST, those in the unorganized sector may not be as well integrated. This poses a problem both for the units and the tax administration (Mukherjee & Rao, 2019). Therefore, it is plausible to argue that the larger the share of the informal sector, the lower the GST revenue.

Urbanization: Higher urbanization indicates higher income levels. High average income is associated with higher consumption which increases the tax revenue of consumption-based taxes like VAT and GST. Studies analyzing the performance of tax revenue have shown that higher urbanization leads to higher tax efficiency (Nambiar & Rao, 1972; Sen, 1997; Sen-Gupta, 2007; Nepram, 2011; Sen, 2015). The logic behind higher efficiency is as follows. Unlike in rural areas, the proportion of commercial transactions with the invoice is higher, which will induce the seller to declare the output tax liability and add to the tax yield. Since registered dealers cannot get an input tax credit (ITC) if the input is not purchased from another registered dealer, the unregistered dealers have an incentive to come under the tax network, thus raising tax compliance. Therefore, in this paper, we consider urbanization one of the important determinants of GST revenue.

Composition of consumption: Since GST is a consumption tax, the consumption basket could determine the extent of GST revenue collection. Since select essential items of daily consumption such as vegetables,

cereals, meat and fish are excluded from GST, the states with a large share of food in their consumption basket could have lower GST revenue than states with higher non-food consumption.

Consumer state vs producer state: While some states are net exporters (Gujarat and Tamil Nadu), others are net importers (Delhi, Kerala, and Bihar). In this regard, the GST revenue depends on whether a state is primarily a consumption state or producer state. The research shows that producing states were the losers after the GST implementation as it does not encourage regions to vigorously promote manufacturing and tradable services industries (Morris et al., 2019). Their study estimated revenue neutrality rate (RNR) after adjusting for the consumption expenditure at the state level and found that the differences in RNR across states are significantly different compared to the common RNR rate of 15.3%. Hence, the present GST compensation mechanism is likely to affect the producing states adversely. However, classifying states as producer and consuming states has been a challenge. It may happen that a state such as Maharashtra may have both higher production and consumption. It may be not easy to classify Maharashtra as a consumer or producer state. We compare the state's IGST settlement revenue against IGST revenue collection, and if settlement revenue received is more than IGST collection, it is considered a consumer state.

3. Methodology and data

3.1 Empirical strategy

Our panel data is characterized by small T - the number of time-series observations, and relatively large N , the number of states. Given the nature of data, it is quite common in the literature to use the fixed effects (FE) regression techniques. Two-way fixed effects (2FE) regression or linear regression with unit and time fixed effects are increasingly used to adjust for unobserved unit-specific and time-specific confounders at the same time. We consider the following fixed effects model:

$$Y_{it} = \alpha_i + \gamma_t + \beta X_{it} + \varepsilon_{it} \quad (1)$$

for $i = 1, 2, \dots, N$ and $t = 1, 2, \dots, T$ where α_i and γ_t represent state fixed effects and time fixed effects and ε_{it} is the error term.

Including time unit and time fixed effects control for both unit-specific and time-specific unobserved confounders in a flexible manner (Imai & Kim, 2020). In Eq (1), α_i estimates the common change in the GST share in state i relative to a benchmark state, controlling for year-specific characteristics common to all states. In other words, the intercept term varies across individuals but is constant across time for each individual. γ_t estimates the common change in the GST share in year t relative to the benchmark year 2017-18, controlling for state-specific time-invariant characteristics. We estimate the following model:

$$tgst_r_{it} = \alpha_i + \gamma_t + \beta_1 timely_filer_{it} + \beta_2 ser_shr_{it} + \beta_3 \ln_pci_{it} + \beta_4 prod_dum_{it} + \beta_5 urb_dum_{it} + \beta_6 infrml_dum_{it} + \beta_7 food_dum_{it} + \mu_{it} \quad (2)$$

Variable notations are given in Table 1.

3.2 Data

This paper draws data from various sources. First, the GST revenue and return filing rate data are obtained from the GST portal. The data on real economy variables such as State Domestic Product (SDP), per-capita

income, sectoral composition, and population are gathered from EPWRF India Time Series. We have used the Primary Census Abstract of Census 2011 to collect rural and urban population data to build an urbanization indicator. The 68th round of NSS household consumption and expenditure survey unit-level data are used to construct the share of food in total consumption expenditure. Similarly, Periodic Labor Force Surveys (PLFS) 2018-19-unit level data is used to obtain data on the share of informal sector employment as a proxy of informalization.

Table 1. Data - variables, definition, and sources

variable code	Variable name	Description	Source
tgst_r	tgst ratio	Total GST revenue as a per cent of GSDP. Total GST is SGST plus IGST settlement amount	GST Portal ²
timely_filer	timely filer	GST Compliance The proportion of dealers filing <i>in</i> due date	GST Portal
ser_shr	Service share	Service sector GDP/Total GVA*100	Calculated from EPWRF India Time Series data
ln_pci	log of PCI	A measure of per capita income Log of real per capita GDP	Calculated from EPWRF India Time Series data
prod_dum	Producer dummy	A measure of Producer state dummy Dummy takes value 1 if IGST settlement rate is higher than IGST collection or 0 otherwise; 0: Producing state; 1: Consuming state	GST Portal
infml_dum	Informalisation dummy	Proportion of informal sector employment in total; Dummy takes value 0 for the bottom 7 states; 1 for middle 7 states; 2 for top 7 states	Calculated from unit-level data of PLFS data 2018-19 published by NSS
urb_dum	Urbanization dummy	Proportion of population in total; Dummy takes value 0 for the bottom 7 states; 1 for middle 7 states; 2 for top 7 states	Calculated from Census 2011; Primary Census Abstract
Non-food share	Share of Non-Food consumption	Per cent share of non-food consumption in total consumption basket	NSS Consumer Expenditure Survey

Our empirical analysis is based on 18 major states that account for more than 80% of the total GDP and population in the country. They are Andhra Pradesh (AP), Bihar (BR), Chhattisgarh (CT), Gujarat (GJ), Haryana (HR), Jharkhand (JH), Karnataka (KA), Kerala (KL), Madhya Pradesh (MP), Maharashtra (MH), Odisha (OD), Punjab (PB), Rajasthan (RJ), Tamil Nadu (TN), Telangana (TS), Uttar Pradesh (UP), Uttarakhand (UK), and West Bengal (WB). The study uses annual data spanning 2017-18 to 2020-21. Since GST data was not implemented at the start of the financial year in 2017-18, it has been annualized. Based on the analytical framework discussed in Section 2, predictors are chosen. A rationale of choice and description of independent variables are discussed in detail below. Table 1 presents the definition, description, sources of variables in a capsule form.

4. Results and discussion

4.1 Descriptive analysis

Right from the implementation of GST, there was a lot of academic and political debate on the effect of GST on a state's tax revenue since states have surrendered more tax powers. Some have expressed concerns over states not meeting the GST revenue targets. The other concerns included the gainers and losers due to GST. Some states such as Maharashtra, Gujarat, and Tamil Nadu that produce significant output for other states could be the losers since GST is a destination-based consumption tax (Morris et al., 2019). However, there is no comprehensive analysis of the GST revenue performance of states except Mukherjee (Mukherjee, 2020a). We find significant variation in GST revenue (measured in terms of GST as a share of GSDP) across states (see **Figure A1 of Appendix**). Apart from the level difference, there is a considerable variation in the trend in GST revenue.

² <https://www.gst.gov.in/download/gststatistics>

Table 2 presents the share of GST revenue in GSDP of states along with their ranking. In 2017-18, Maharashtra, Karnataka, Uttar Pradesh, Telangana, and Kerala were among the top five states, while Uttarakhand, Madhya Pradesh, Andhra Pradesh, Bihar, and Rajasthan were among the bottom five in terms of GST revenue collection. However, we find significant changes in the ranking of states in the terminal year (2021-21). The top 5 states were Odisha, Uttarakhand, Haryana, Karnataka, and Telangana. The most significant rank changes happened in the case of Maharashtra, Uttar Pradesh, Uttarakhand, Madhya Pradesh, and Odisha. Except for Karnataka, all the southern states show a declining curve in GST revenue even before the pandemic year. The calculated rank correlation is -0.26, suggesting that rank in 2021-22 is negatively correlated with rank in 2017-18. Anithakumary and Mathew (2019), in a detailed study, have shown that the leading states in tax revenue during the VAT regime are no longer the top performers in the GST regime.

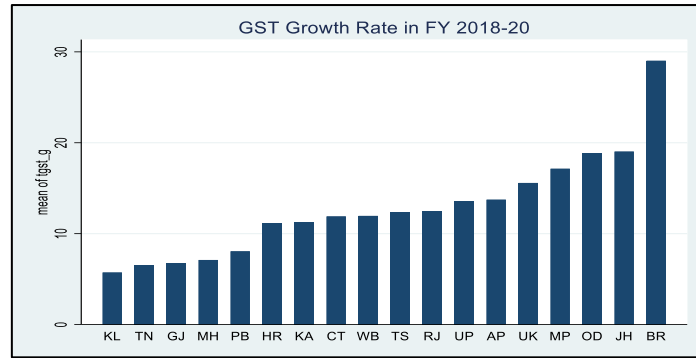
Table 2. Tax-GSDP ratio and ranking of states

State code	TGST/GSDP Ratio		Rank	
	2017-18	2020-21	2017-18	2020-21
MH	3.08	1.89	1	12
KA	2.55	2.29	2	4
UP	2.54	1.52	3	18
TS	2.474	2.28	4	5
KL	2.473	1.86	5	13
TN	2.42	1.80	6	14
HR	2.37	2.36	7	3
PB	2.32	2.08	8	10
GJ	2.29	1.64	9	16
WB	2.20	1.73	10	15
CT	2.16	2.01	11	8
JH	2.14	2.04	12	11
OD	2.09	2.51	13	1
RJ	2.07	2.09	14	9
BR	1.98	2.18	15	7
AP	1.95	1.63	16	17
MP	1.89	2.28	17	5
UK	1.63	2.42	18	2

Source: Authors own calculations

The GST growth rates during 2018-19 and 2019-20 - two normal years - show a very interesting pattern (Figure 1). Despite having a low share in GST-to-GSDP share and per-capita GST revenue, Bihar, Jharkhand, Odisha, and Madhya Pradesh show the highest growth rates compared to other states. The growth pattern indicates that poor states, on average, show a relatively high GST growth rate compared to the rich states. Kerala has the lowest GST growth among others, followed by Tamil Nadu, Gujarat, and Maharashtra. In fact, only 6 out of 18 states have managed to register a growth rate of over 14%, while two-thirds of the states fall behind the protected growth rate in 2019-20. It may be because poorer states have a high consumption to production, and the other way for richer states. The growth rates during the pandemic year indicate a negative growth with considerable inter-state variation (Figure 2). While the developed states experienced a steep decline in GST growth, relatively less developed states like Odisha, Jharkhand, and Madhya Pradesh showed a lower decline. While the reasons for such an observed trend could be attributed to many factors, such as the stringency and duration of lockdown, one plausible inference could be the extent of urbanization.

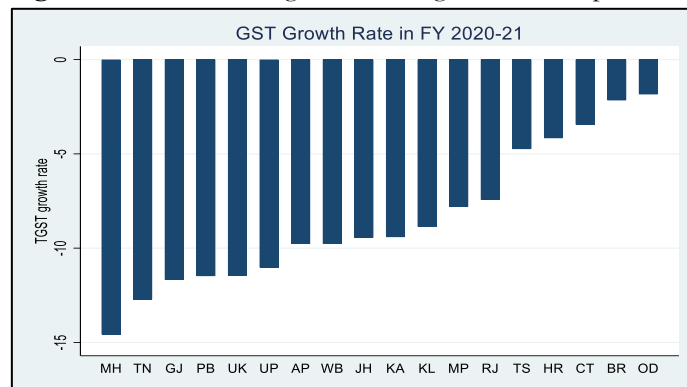
Figure 1. GST revenue growth during 2018-20



Source: Authors own calculations

It is evident that the COVID-19 pandemic impacted urban areas more severely than rural areas in the first wave of the COVID-19. Hence, consumption in poor states remained more or less stable, thus explaining the relative stability in the GST growth rate. However, rich states experience a dip in consumption. Consequently, it is evident from the figure that states with high urbanization, like Kerala, showed the highest decline in GST revenue.

Figure 2. GST revenue growth during COVID-19 pandemic



Source: Authors own calculations

4.2 Regression results and discussion

Before we discuss the estimation results, it is pertinent to mention here that the sample period was marred by a turbulent period. First, the GST system took time to stabilize (Rao, 2019; Mukherjee, 2019). Second, the COVID-19 pandemic hit the states, and the collections went haywire. Third, more importantly, GST is still evolving in India in terms of technological infrastructure, administration, and legal aspects. Thus, the first four years were marked by volatility, implementation issues, fake ITC-related frauds, and GST IT network issues. This has affected revenue collection. Our empirical results have to be seen in light of the above points.

After the confirmation of the suitability of the FE model (results not reported here) over the random effects model, we proceed to estimate the one-way FE model. Since year dummies are found to be insignificant, they were dropped. Since FE does not allow to capture the time-invariant characteristics, we have used one-way FE model. Results are reported in Table 3. While the model in Column 1 does not consider the share of non-food expenditure, the results reported in Column 2 takes care of it. Our model has categorical variables that do not vary over time. Thus, we are constrained to estimate the panel FE model.

While *timely_filer* and *ser_sbr* have positive signs, only *timely_filer* is statistically significant. As explained earlier, higher compliance leads to higher GST revenue as a per cent of GSDP of states. This is because compliance is likely to improve under GST. It is found that a one percentage point increase in timely filers leads to a rise of 2 basis points in the GST share of states.

The insignificance of *ser_sbr* is surprising. Since services are consumed in the state where they are produced, it is expected to contribute to GST revenue collection positively. However, major service sectors are exempted from taxes, such as health and education. Excluding a few dominant states such as Maharashtra, Delhi, Tamil Nadu, and Karnataka, the contribution of the service sector to GST revenue is very less. Thomas (2015) made a detailed examination of the contribution of service tax towards the Centre's tax revenue using service taxation data from 1994-95 to 2011-12. She finds that the contribution of service tax was not commensurate with the high share of services in India's GDP. This can perhaps explain our finding of service sector insignificance. Further, her estimate suggests that the income elasticity of service tax revenue collection is less than 1. Some studies have used the share of agriculture (see Garg et al., 2016) and found that the agricultural sector negatively affects the tax-GDP revenue. We considered both agricultural sector and non-agricultural sector shares but found them insignificant statistically.

Table 3. Determinants of GST revenue

VARIABLES	tgst_r Col (1)	tgst_r Col (2)
timely_filer	0.02*** [0.00]	0.02*** [0.01]
ln_pci	-1.69*** [0.37]	-1.71*** [0.39]
ser_sbr	0.02 [0.02]	0.02 [0.02]
<i>Informal Dummy</i>		
informal_medium	-1.35** [0.55]	-1.41** [0.64]
informal_high	-0.41** [0.20]	-0.44* [0.24]
<i>Urban Dummy</i>		
urban_medium	0.57*** [0.19]	0.59*** [0.21]
urban_high	1.98*** [0.48]	2.03*** [0.55]
non_food_share		-0.00 [0.01]
prod_dummy	-0.61** [0.30]	-0.65* [0.35]
Constant	19.31*** [3.90]	19.62*** [4.20]
Observations	72	72
R-squared	0.87	0.87
State FE	YES	YES
Year FE	NO	NO
Adj. R-Sqr	0.817	0.813

Notes: Standard errors in brackets, *** p<0.01, ** p<0.05, * p<0.1

The sign of the coefficient of log of per capita income is negative and significant, in contrast to the previous studies (Garg et al., 2016). This is surprising since the correlation between GST share, *tgst_r*, and per capita income, *ln_pci*, is found to be small, negative, but insignificant at a 10% level of significance (See **Table A2 of Appendix**). Although the *a priori* hypothesis is that higher per capita income would translate into higher GST revenue for a state, it is not borne out from the correlation and econometric analysis. The contrasting result compared to previous studies could be due to the following reasons. First, many of the previous studies in the Indian context have used total tax revenue, which includes direct taxes and all the indirect taxes where the overall level of economic development matters. However, some studies noted that per-capita income has a nonlinear relationship with tax revenue, implying that per-capita income is negatively associated with tax revenue in the initial stage, but the relationship would change after a threshold level of

income (Mukherjee, 2017; 2020b). Third, GST being a consumption tax, per-capita income may not influence as much as overall consumption expenditure.

GST being a destination-based tax, it is assumed that consuming states (mainly poor) would benefit more than producing states since GST is a destination-based tax. Econometric analysis lends support to this hypothesis. We find that the GST share in GSDP of consuming states is 0.65 percentage points higher than producing states. This finding supports the predictions of Morris et al. (2019), who demonstrated that GST would be very hurtful to producing states.

As discussed in Section 2, a large informal base is associated with a lower tax base, implying that GST revenue is negatively associated with the size of the informal sector. Our results suggest that compared to states with a lower informal sector, the share of GST in GSDP is 1.41 percentage points less for states with medium size of the informal sector and further 0.44 percentage points lower for states with a larger size of the informal sector. A similar finding is reported in Mohanty et al. (2017) in the case of VAT revenue collection in India. Some cross-country studies on the determinants of tax revenue also reported the negative relationship between the informal sector and tax revenues (Bird et al., 2008; Drummond et al., 2012; Le et al., 2012). The negative effect of the informal sector is that dealers in the informal sector may not have a GSTIN number and also carry out their business transactions with similar dealers (Mohanty et al., 2017). Lack of integration of activities in the informal sector poses the problem for tax administration to trace the activities and is often associated with high monitoring costs (Rao & Mukherjee, 2019).

Urban areas generate their own consumption, which constitutes a sound tax base for a state. Thus, urbanization should contribute more to the state exchequer. We have categorized states into low, medium, and high urban states depending upon the degree of urbanization. Table 3 reveals that while states with medium urban shares contribute approximately 0.59 percentage points revenue compared to states with low urban states, high urban states collect two percentage points more revenue than the low urban states. This could be due to the following reasons. First, higher urbanization is associated with a higher average consumption share. Second, the proportion of commercial transactions carried out against the tax invoice is high (Mohanty et al., 2017). This induces the trader to declare the output tax liability and adds to the tax yield. Further, the registered dealers can use the input tax credit if they purchase input from other registered dealers. Hence, higher urbanization could result in higher GST collection.

Since GST is a consumption tax, the composition of consumption can also affect the quantum of tax revenue accrued to a state. If food groups dominate the consumption basket, it will contribute less tax revenue compared to a consumption basket with a higher non-food share as many of the food products are exempted from GST. However, the coefficient is statistically insignificant.

5. Conclusion and policy implications

Among the many promises expected from the implementation of GST, one major promise was that GST would be a boon to the state exchequer. The idea is that compliance, tax administration, and tax efficiency would improve by simplifying the indirect tax system. This would increase the tax revenue of states. As this major indirect tax reform is about to complete four years of implementation, this paper makes a systematic attempt to understand why there is interstate variation in GST revenue. To this end, we employ both descriptive analysis and panel data analysis to understand what factors explain the varied pattern of GST collection at the subnational level.

The choice of the variables is guided by the need for policy implications. Variables are selected which can be immediately addressed by the policymakers concerned with raising the tax revenue. We call them short-term policy variables, which are of immediate help to policymakers. On the other hand, structural factors are long-term in nature but important. Structural factors may not give immediate policy insights to the tax

administrators. They are important from a long-run perspective for the Union Finance Commission (UFC) in awarding tax devolution to states. It may help the UFC assess which states will do well in GST revenue collection and states that are unlikely to do well due to structural factors. Accordingly, the UFC can compensate the structurally weak states. Further, as per the estimate of Morris et al. (2019), RNR would be very high for producing states. For example, their estimates suggest that it should be 30% for Chhattisgarh and Gujarat and 12.4 for Bihar and 16.4% for West Bengal. Our findings show that producing states where most of the production activities happen have lost revenue to consuming states. Thus, the UFC should take into account this while determining the devolution share for each state.

Against this backdrop, our econometric analysis suggests that tax compliance, the structure of the economy, such as the size of the informal sector, and urbanization help explain the interstate variation in GST revenue. From the perspective of policymakers, timely tax compliance can be identified as a short-term policy variable. Therefore, one policy implication of our finding is that states can improve compliance by taking measures such as improving tax administration, the better information technology infrastructure that will smoothen tax credit mechanisms, and so on.

From the structural factors point of view, we find that informalization of the economy and degree of urbanization help explain the disparity in GST collection across states. It was anticipated that after GST implementation, there would be a shift of business from small, unorganized firms in some sectors to organized ones. An unregistered firm, a large proportion of which are in the informal sector, dealing with a registered firm, are deprived of availing the benefit of ITC. Similarly, the provision of a Reverse Charge Mechanism is expected to push the MSMEs to shift to formalization. Thus, the regulatory structure should be made hassle-free for the smooth graduation of MSMEs in the informal sector to the formal sector. Finally, another structural variable is urbanization. The states should expedite faster urbanization through industrialization to reap the benefits of more production and consumption activities which would contribute more to the state exchequer.

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Appendix

Table A1. Summary statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
tgst_r	84	2.259762	0.326869	1.52	3.08
timely_filer	84	61.35631	7.369561	41.9	77.83
ser_shr	84	49.26214	12.17391	26.77549	83.93034
ln_p_gstr_n	84	8.191107	0.601069	6.677354	9.64657

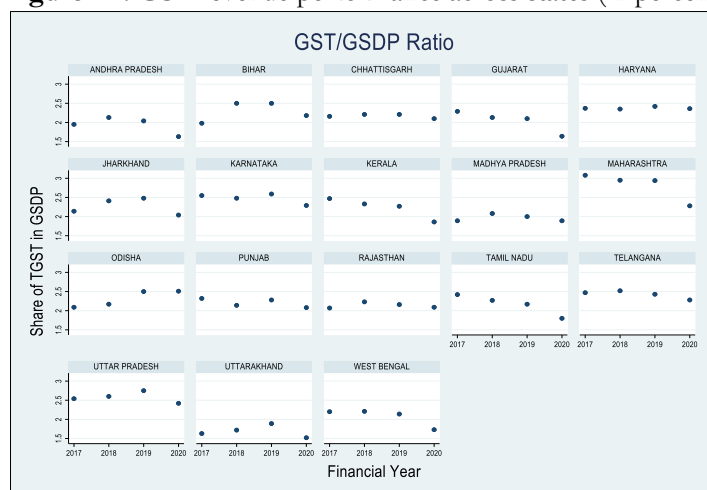
Note: Author's own calculations

Table A2. Correlation of key variables

Stats	tgst_r	ln_pci_n	timely filer	ser_shr
N	72	72	72	72
Mean	2.23	11.58	62.14	48.84
Median	2.21	11.75	62.32	48.97
SD	0.3	0.51	7.07	9.24
Min	1.52	10.29	47.4	34.22
Max	3.08	12.2	77.83	64.5

Note: Author's own calculations; Note: ** p<5%, * p<10%.

Figure A1. GST revenue performance across states (in percent)



Source: Authors own calculations.