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Impact Assessment of First Wave of Covid-19 Pandemic on Goods and Services Tax (GST) Revenue Collection & Distribution in India*

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Abstract

Purpose: The restrictions posed by the COVID-19 pandemic have affected the normal functioning of the economy. A country like India is facing a lot of concerns in all its sectors especially, in its fiscal system. This paper makes an attempt to examine the impact of COVID-19 first wave on Goods and Service Tax revenue collection and distribution in India and also studies the impact of COVID-19 first wave on the state wise GST revenue of the country. **Research Design, Data and Methodology:** Our study is based on published GST revenue data. Tools such as Paired Sample t-test, Wilcoxon signed rank test are employed to analyze the data. **Results:** Our results provide evidence that there is a sharp decline in the GST revenue in the months after the lockdown announcement. The large states show no significance impact of COVID-19 pandemic on GST collection. Whereas, small states like Manipur and Goa show significant difference in GST revenue collection & distribution between the pre and post lockdown period. **Conclusion:** The outcome of this study will help the policymakers to analyze the extent of the GST revenue loss to the government treasury and will allow them to take appropriate measures in the future.

Keywords : COVID-19, Distribution, First Wave, Lockdown, GST Revenue collection ,GST Revenue distribution , Fiscal Impact

JEL Classification Code : H25, H70, I15, I18

1. Introduction^a

The global economy came to a sudden halt with the COVID-19 pandemic causing blows to demand and supply situation worldwide. With its origin in Chinese City of Wuhan in December 2019, the new virus has affected country after country with deadly economic and financial consequences. According to the WHO till June 2021, the virus has so far infected more than 186 million people across different countries and has distributed globally. The pandemic poses two kinds of major risks to a country. Being a health catastrophe, it causes a health threat which in turn inflicts an economic risk on a country. The highly contagious nature of the virus makes it absolutely essential to resort to measures like self-isolation, social distancing,

restrictions on national and international travel, closure of public facilities and initial nationwide lockdown. These restrictions affect the normal functioning of an economy and have led to terrible consequences on the monetary situation in countries around the world. So much so, that the year 2020 is considered as the worst year in the global economic history after the great depression in 1930s. Forecasts of IMF and World Bank indicate that the GDP per capita will be lower than Dec 2019 in most countries. The pandemic has also sent the process of globalization in reverse laying greater emphasis on domestic economy of a country with the collapse of international supply chains.

The pandemic has had very deep setting and highly disruptive impact on the Indian economy as well. In India the first covid 19 case was reported in the month of March

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2020 since than lockdown was announced in March 2020, even though lockdown was imposed there was surge in the daily covid cases in India and it marked the beginning of first wave of Covid 19 pandemic in the country which lasted till February 2021. During economic downturns, the budgets of state and local governments come under stress due to contractions in revenues and increases in expenditure needs (Clemens & Veuger, 2020). In India, GST is the tax levied on all goods and services sold internally within its boundaries. It is a major source of revenue to the Central and State government through its CGST, SGST and IGST components. In this paper, we have made an attempt to study the impact of the Covid-19 first wave on the fiscal state of affairs of the India by exploring the impact of the pandemic on the Goods and Service Tax revenue collection and distribution in India. Further, the pre-lockdown and post-lockdown GST revenue collection distribution & pattern for individually all the states are also examined.

2. Literature Review

Numerous studies have been undertaken to analyze the impact of this novel corona virus on the economic growth of countries and economies worldwide. Scholars globally, attempt to understand the size and nature of destruction caused by the deadly virus. They have suggested measures to limit the damage caused by the pandemic and speed up the post-pandemic recovery process. (Baldwin & Mauro, 2020) discuss the magnitude and the speed with which the virus is going to cause damage to global economy. They uncover the economic contagion mechanism and suggest that G7 and China are the most hit nations with the manufacturing sector being the most affected globally. (Canuto, 2020) believes that the emerging and developing economies will face maximum threat. He confirms that post coronavirus era is going to be one with less globalization, acceleration in digitalization and higher levels of public and private debt. These results are further confirmed by (Siddiqui, 2020) in his study. He studied the policy response of major global economies to curb the pandemic. He places importance on domestic markets, national economy and sovereignty. He suggests adoption of Keynesian policies, with services and utilities managed by the state, which helps in meeting the basic needs of the society. (Choi & Jun, 2020) tried to explore the impact of covid 19 on new down development paradigm. The results of the research revealed that covid 19 had a strong impact on urban development and regional economies. (Mishra, 2020) suggests adoption of bold policy measures for sustained economic growth and stability. He foresees a drop in FDI flow, Investments and far-reaching repercussions on local business and MNCs. (AÇIKGÖZ & GÜNAY, 2020) reveal that the pandemic has

had adverse effects on employees, customers, supply chain, financial markets and others. They believe that the pandemic will lead to a permanent shift in the world of policies, health, trade and security. Scholars also study the impact of pandemic on the global financial markets. (Senol & Zeren, 2020) Confirm the existence of a long-term relationship between global markets and COVID-19 outbreak by running the Fourier Co-integration Test. They establish that the ongoing crises have severe implications on human health as well as on the operations and risk perception of financial markets. According to (Morales & Callaghan, 2020) the global markets awoke to the global threat posed by the novel virus after the European Sub-continent registered its first case in Italy. The reaction of international market indices to volatility levels exhibited by the Shanghai Stock Exchange is fairly mild. (Zhang, Hu, & Ji, 2020) Imply that global disintegration has been a bigger threat to financial stability than the pandemic. The country specific stock market risk depends on the severity of the outbreak in the country and policy intervention by authorities has heightened the risk perception in the market. (Yousef, 2020) suggest that there exist systematic risks in the global markets. His GARCH, TGARCH and GJR GARCH results offers evidence of increased volatility in the returns of S&P500, Dow Jones and NASDAQ index post detection of the virus. Further (Aljawaheri, Ojah, Machi, & Almagtome, 2021) studied the impact of covid 19 lockdown on stock market in Iraq concluded that lockdown had negative impact on the value of firms stocks in Iraq stock market. In Indonesia (Utomo & Hanggraeni, 2021) also evaluated the impact of covid 19 performance of stock market. The authors tried to study the impact of different sectors. As per the finding, sectors like trade, service, property and investment had significant negative performance whereas basic industry sectors had a better performance. Authors concluded that Covid 19 pandemic and lockdown policies had a mix impact on stock market returns in Indonesia. (Khan, Zhao, Zhang, Yang, Shah, & Jahanger, 2020) tried to study the impact of covid 19 pandemic on major stock market indices across the globe. They revealed that during the early stages of covid 19 pandemic the investors did not react much but once the human-to-human transmission took place all the stock market started to negatively react to the pandemic news. In India, several studies have been conducted to evaluate the impact of the pandemic on the economy. (Dev & Sengupta, 2020) assess the potential impact of the Covid-19 shock on the sectoral front. They evaluate the central government and the RBI response to the pandemic. They emphasize on the importance of balanced response from state government and local bodies to the situation. The preparedness of the policy makers to scale up their response with minimum impact on the formal and informal sector is crucial. (Alam, Alam, & Chavali, 2020) studied the response of stock market during

covid 19 lockdown period in India. The authors tried to examine the impact of lockdown on Indian stock market by understanding the pre and post lockdown implication. Similarly, (Chaudhary, Sodani, & Das, 2020) examine the sectoral impact of the pandemic in India. They review the opportunity available to India to participate in global supply chain and replace China. They also evaluate the reforms and policy changes essential to engulf this opportunity. (Singh, 2020) highlights the plight of migrant workers amidst the pandemic and the impact it has had on rural economy of India. His work suggests that 400 million workers will face a risk of falling deeper into poverty during these crises. The migration will also lead to a pressure on the rural economy and agriculture. He suggests provision of cash incentive and wage subsidy to these workers to reverse their condition. (Bhat, Khan, Manzoor, Niyaz, Tak, & Anees, 2020) through a primary survey, examine the impact of the pandemic on psychological health, economy and social life of the people in Kashmir Valley. The survey reveals the emotional damage caused by the pandemic with rise in cases of depression and anxiety together with the economic damage caused.

Many researchers have also examined the fiscal situation in their country. At the time of a pandemic, studying a nation's financial position allows us to assess the ability of the government to provide essential services, programs and restart the process of economic recovery. (Heald & Hodges, 2020) reveal that the pandemic has had far reaching impact on the government finances of UK. The receipts see a sharp drop by 12% whereas, the expenditure increased by 36% in the initial three months of the crises. They claim that the government debt is the highest since March 2016. They expect the pressure on UK government finances to extend beyond 2020-21. (Clemens & Veuger, 2020; Bruce D. McDonald & Larson, 2020) study the impact of the pandemic on the tax revenues. They observe that the pandemic will lead to a shortfall of roughly 106 billion dollars in the sales and Income tax revenue of state governments in the United States for the fiscal year 2020-21. (Bruce D. McDonald & Larson, 2020) conclude that the reduction in sales tax revenues threatens the state governments to remain solvent and respond to the virus. A similar study was conducted by (Rephann, 2020) by employing standard commercial regional economic model to forecast the tax revenue impact of covid-19 on the common wealth of Virginia and its localities. In the India Context, (Patnaik & Sengupta, 2020) assume that the government fiscal deficit will be 6.2% of GDP assuming a 5% decline in real GDP and 14.4% in net tax revenue. (Balajee, Tomar, & Udupa, 2020) in their work, estimate the fiscal deficit of India to range between 3.7% to 8.4% amidst this pandemic. They further estimate a spending of 2.2% - 4.8% of the GDP towards the pandemic. (Roy, Patnaika, & Satpathy, 2020) review the economic health of MSME's in

meeting the GST compliance. The authors see a need to exempt penalties, re-structuring of GST filing patterns from monthly to quarterly, computing ITC and GST charges through an automated system and resetting the rate of interest to reduce the burden of MSME's amidst this volatile situation.

2.1. Objectives of the study

The overall objective of this paper is examining the impact of Covid-19 first wave on GST revenue collection and distribution in India and also to examine impact of Covid-19 first wave on GST revenue collection of each state of India.

2.2. Hypotheses of the study

Based on the Review of literature and objectives, the present study attempts to study the impact of first wave of covid 19 on GST revenue and distribution in India and of its states by formulating the following hypotheses

- Ho1:** There is no significant impact on GST revenue collection of India before and after covid 19 lockdown announcement in India.
- Ho2:** There is no significant impact on GST revenue collection of small states of India before and after Covid 19 lockdown announcement in India.
- Ho3:** There is no significant impact on GST revenue collection of large states of India before and after Covid 19 lockdown announcement in India.

3. Research Methods and Materials

3.1. Study design

The research design is based on already published GST revenue data. Paired sample t-test, Wilcoxon signed rank test and descriptive analysis has been employed using Jamovi statistical software. This paper tries to study impact of covid-19 first wave on GST revenue on all 28 states (excluding the union territories) of India along with the impact on overall GST revenue collection and distribution of the country before announcement of lockdown and after announcement of the lockdown due to Covid-19 pandemic in India. Goods and services tax (GST) in India is consumption-based tax which basically means that the state which are having high population distribution will have higher GST collection as compared to small states, therefore all the 28 states of India are divided into small states and large states on the basis of Population in order to get in in dept detail picture of impact of 1st wave of covid 19

pandemic. The small states comprise of Sikkim, Mizoram, Arunachal Pradesh, Goa, Nagaland, Manipur, Meghalaya and Tripura and the large states comprise of Himachal Pradesh, Punjab, Uttarakhand, Haryana, Rajasthan, Uttar Pradesh, Bihar, Assam, West Bengal, Jharkhand, Odisha, Chhattisgarh, Madhya Pradesh, Gujarat, Maharashtra, Karnataka, Kerala, Tamil Nadu, Telangana and Andhra Pradesh.

3.4. Sources of Data collection

The study is based on secondary data compiled by authors which is obtained from www.gstcouncil.gov.in/gst-revenue, www.gst.gov.in/download/gststatistics, Press information bureau Government of India and Ministry of health & family welfare. Firstly, the raw data of GST revenue collection of India and each 28 states of each month starting from March 2019 to February 2021 (i.e., two years) was collected and subsequently bifurcated using Microsoft excel to finetune the data for analyzing it into Jamovi statistical software. The start of first wave of Covid-19 in India is considered from the month of March 2020 when first case was reported and subsequently lockdown was announced in India and the end of first wave was considered in February 2021 when cases in India were the minimum and subsequent reversal started in the month of March 2021 i.e., start of second Covid-19 wave in India. To study the impact of covid 19 first wave on GST revenue collection and distribution in India, the period covered in this study is from March 2019 to February 2021 which is divided into Pre-lockdown announcement period starting from March 2019 to February 2020 (one year) and post-lockdown announcement period starting from March 2020 to February 2021 (one Year).

4. Results and Discussion

4.1. Following Analysis Have Been Undertaken to Study the Impact of Covid-19 First Wave on Total GST Revenue of India

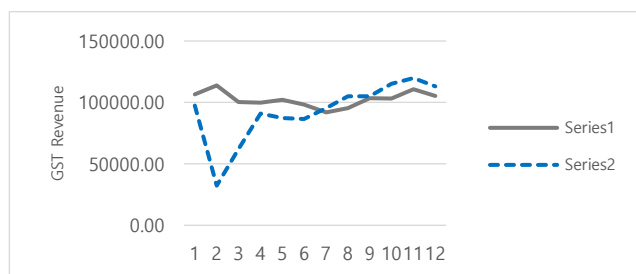


Figure 1: Total GST revenue of India pre-lockdown announcement period (series 1) vs post-lockdown announcement period (series 2)

Table 1: Total GST Revenue of India Before and After Announcement of Lockdown Due to Covid-19 in India and Monthly Covid Cases in India During First Wave of Pandemic. (Rs.in Crore)

Total GST Revenue collection of India			
Pre-lockdown announcement period (Mar. 19 - Feb. 20)	Post-lockdown announcement period (Mar. 20 - Feb. 21)	Monthly estimated GST revenue loss (Pre-lockdown period – Post-lockdown period)	Monthly covid 19 cases in India from March 20 to February 2021 i.e., 1 st Covid wave in India
1,06,577	97,597	8,999 (Estimated loss)	1,397
1,13,865	32,294	81,571 (Estimated loss)	32,213
1,00,289	62,009	38,280 (Estimated loss)	1,48,533
99,938	90,917	9,635 (Estimated loss)	3,84,697
1,02,083	87,422	14,661 (Estimated loss)	10,72,030
98,203	86,449	11,754 (Estimated loss)	19,82,375
91,917	95,480	496 (Estimated loss)	26,04,518
95,380	1,05,155	-9,775	19,11,356
1,03,491	1,04,963	2,007 (Estimated loss)	12,94,572
1,03,184	1,15,174	-11,990	8,35,555
1,10,818	1,19,847	15 (Estimated loss)	4,79,509
1,05,366	1,13,143	75 (Estimated loss)	3,50,548
Total estimated GST revenue loss for India due to Covid 19 first wave.		Rs. 1,67,493	

Source: Author's compilation

In figure 1, series 1 represents pre-lockdown announcement period and series 2 represents post-lockdown announcement period which clearly indicates that starting when lockdown was announced in March 2020 there was a sharp fall and uneven distribution in Monthly GST revenue of India as compared to pre-lockdown period, this was mainly because there was no movement of people taking place which affected the economic activities but after the month of September 2020 when majority of lockdown restrictions were uplifted and economic activities started to fall back in place as a result GST revenue started to rise. Table 1 shows that due to covid 19 lockdown majority of the month there was shortfall of collection of GST revenue as compared to pre lockdown period, by adding all month's shortfall of GST revenue, the total estimated GST revenue loss which India has suffered due to the covid 19 first wave is estimated to be around Rs. 1,67,493crores as compared to pre-lockdown announcement period. Further table 1 also put light on the number of Covid-19 infected cases during the first wave in India, it is clear from data that there is no established relation between Covid-19 cases and GST revenue collection and distribution, for example when lockdown was going on cases in India were less because people were not moving out which has resulted into low GST revenue but in subsequent months when lockdown restriction were relaxed the number of cases started rising and also GST revenue collection started going up which

basically means that the number of cases did not have so much impact of GST collection but lockdown definitely had lot of impact on GST collection and distribution in India during the first wave of pandemic.

Table 2: Analysis to Measure GST Revenue Performance of India in Pre-Lockdown Announcement Period and Post-Lockdown Announcement Period

Pre-lockdown announcement period (Mar. 19- Feb. 20) - post-lockdown announcement period (Mar. 20 - Feb. 21)	P value
Normality Test (Shapiro wilk test)	0.004
Wilcoxon signed- Rank Test	0.424

Source: Author's calculation using Jamovi software.

Shapiro wilk test is the test to measure the normality of data when sample size is less than 50 (Shapiro & Wilk, 1965). As per the Shapiro wilk test (Table 2) the assumption of normality of data is not met ($p=0.004$) as a result non parametric Wilcoxon signed- Rank Test has been applied. When data is not normal Wilcoxon signed rank test is used to study the significant before and after happening of a event in a single group (Erdem, 2012). As per the Wilcoxon signed rank test (Table 2) there is no significant difference between total GST revenue of India before and after lockdown announcement due to Covid 19 pandemic as $p>0.05$ ($p=0.424$) hence we fail to reject H_0 .

4.2. Following Analysis Have Been Undertaken to Study the Impact of Covid-19 First Wave on Small States GST Revenue of India

Table 3: Small States GST Revenue Before and After Announcement of Lockdown Due to Covid-19 in India (Rs. in Crore)

Sikkim			Mizoram		
Pre-lockdown announcement period (Mar. 19 - Feb. 20)	Post-lockdown announcement period (Mar. 20 - Feb. 21)	Monthly estimated GST revenue loss (Pre-lockdown period - Post-lockdown Period)	Pre-lockdown announcement period (Mar. 19 - Feb. 20)	Post-lockdown announcement period (Mar. 20 - Feb. 21)	Monthly estimated GST revenue loss (Pre-lockdown period - Post-lockdown Period)
159.59	189.33	-29.74	49.75	33.19	16.56
165.59	81.03	84.56	35.07	9.25	25.83
193.08	94.50	98.58	22.14	10.64	11.50
193.00	346.00	-153.00	24.00	24.00	0.00
200.69	186.43	14.26	19.03	16.02	3.02
163.00	147.00	16.00	28.00	12.00	16.00
209.00	106.00	103.00	29.00	17.00	12.00
186.00	177.00	9.00	18.00	32.00	-14.00
157.00	223.00	-66.00	17.00	17.00	0.00
214.00	225.00	-11.00	21.00	25.00	-4.00
194.00	243.87	-49.87	24.00	37.61	-13.61
182.65	222.35	-39.70	24.84	21.06	3.78
Total estimated GST Revenue Loss of Sikkim due to Covid 19 first wave		325.40	Total estimated GST Revenue Loss of Mizoram due to Covid 19 first wave		88.69
Arunachal Pradesh			Goa		
Pre-lockdown announcement period (Mar. 19 - Feb. 20)	Post-lockdown announcement period (Mar. 20 - Feb. 21)	Monthly estimated GST revenue loss (Pre-lockdown period - Post-lockdown Period)	Pre-lockdown announcement period (Mar. 19 - Feb. 20)	Post-lockdown announcement period (Mar. 20 - Feb. 21)	Monthly estimated GST revenue loss (Pre-lockdown period - Post-lockdown Period)
85.34	66.71	18.63	389.18	316.47	72.71
56.70	42.67	14.04	415.22	67.25	347.98
36.53	38.70	-2.17	348.74	150.85	197.89
48.00	49.00	-1.00	338.00	324.00	14.00
48.71	32.60	16.12	361.27	256.77	104.50
45.00	35.00	10.00	325.00	213.00	112.00
44.00	35.00	9.00	311.00	240.00	71.00
41.00	98.00	-57.00	311.00	310.00	1.00
36.00	60.00	-24.00	342.00	300.00	42.00
58.00	46.00	12.00	363.00	342.00	21.00
52.00	60.01	-8.01	437.00	377.76	59.24
48.36	61.36	-13.00	410.61	343.80	66.81
Total estimated GST Revenue Loss of Arunachal Pradesh due to Covid 19 first wave		79.79	Total estimated GST Revenue Loss of Goa due to Covid 19 first wave		1110.12

Nagaland			Manipur		
Pre-lockdown announcement period (Mar. 19 - Feb. 20)	Post-lockdown announcement period (Mar. 20 - Feb. 21)	Monthly estimated GST revenue loss (Pre-Lockdown period – Post-lockdown Period)	Pre-lockdown announcement period (Mar. 19 - Feb. 20)	Post-lockdown announcement period (Mar. 20 - Feb. 21)	Monthly estimated GST revenue loss (Pre-lockdown period – Post-lockdown Period)
45.89	38.75	7.13	46.12	35.89	10.23
28.92	14.38	14.55	37.24	21.51	15.73
23.62	32.73	-9.11	29.38	18.52	10.86
20.00	32.00	-12.00	25.00	29.00	-4.00
22.87	25.33	-2.46	33.57	25.33	8.24
27.00	31.00	-4.00	37.00	26.00	11.00
21.00	29.00	-8.00	42.00	34.00	8.00
25.00	30.00	-5.00	43.00	43.00	0.00
23.00	30.00	-7.00	35.00	32.00	3.00
31.00	38.00	-7.00	44.00	41.00	3.00
32.00	45.35	-13.35	35.00	39.67	-4.67
24.93	34.83	-9.90	37.36	32.34	5.02
Total estimated GST revenue Loss of Nagaland due to Covid 19 first wave		21.68	Total estimated GST revenue Loss of Manipur due to Covid 19 first wave		75.08
Meghalaya			Tripura		
Pre-lockdown announcement period (Mar. 19 - Feb. 20)	Post-lockdown announcement period (Mar. 20 - Feb. 21)	Monthly estimated GST revenue loss (Pre-lockdown period – Post-lockdown Period)	Pre-lockdown announcement period (Mar. 19 - Feb. 20)	Post-lockdown announcement period (Mar. 20 - Feb. 21)	Monthly estimated GST revenue loss (Pre-lockdown period – Post-lockdown Period)
126.79	132.72	-5.93	63.89	67.10	-68.83
168.41	20.70	147.70	61.02	19.66	41.36
130.94	93.33	37.62	50.28	95.05	-44.77
124.00	116.00	8.00	58.00	65.00	-7.00
104.38	120.43	-16.05	48.66	47.99	0.67
117.00	108.00	9.00	58.00	43.00	15.00
106.00	100.00	6.00	52.00	50.00	2.00
113.00	117.00	-4.00	54.00	57.00	-3.00
117.00	120.00	-3.00	51.00	58.00	-7.00
123.00	106.00	17.00	59.00	74.00	-15.00
128.00	137.02	-9.02	56.00	70.47	-14.47
156.57	146.50	10.07	63.26	63.25	0.01
Total estimated GST revenue Loss of Meghalaya due to Covid 19 first wave		235.39	Total estimated GST revenue Loss of Tripura due to Covid 19 first wave		59.04

Source: Author's compilation

Table 4: Analysis to Measure GST Revenue Performance of Small States of India in Pre-Lockdown Announcement Period and Post-Lockdown Announcement Period

Pre - lockdown announcement period (Mar. 19 - Feb. 20) – Post-lockdown announcement period (Mar. 20 - Feb. 21)	P value
Normality Test (Shapiro wilk test)	Sikkim-<.001, Mizoram-0.818, Arunachal Pradesh-0.027, Goa-0.008, Nagaland 0.028, Manipur-0.727, Meghalaya-<.001, Tripura-0.223.
Paired Samples T-Test	Mizoram-0.202, Manipur-0.011, Tripura-0.311.
Wilcoxon signed- Rank Test	Sikkim-1.000, Arunachal Pradesh-0.850, Goa-<.001., Nagaland 0.108, Meghalaya-0.204.

Source: Author's calculation using Jamovi software.

Table 3 shows that in almost all the small states there was fall in GST revenue due to lockdown announcement as compared to pre lockdown period but after few months the GST collection started rising in all the small states and there was stable GST revenue distribution. Table 3 also show the total shortfall of GST revenue of each small states of India.

By adding GST revenue shortfall of all the months, the total estimated GST revenue loss for the state of Sikkim is Rs. 325.40 Crores, for Mizoram is Rs. 88.69 crores, for Arunachal Pradesh is Rs. 79.79 crores, for Goa is Rs. 1110.12 crores, for Nagaland is Rs. 21.68 crores, for Manipur is Rs. 75.08 crores, for Meghalaya is Rs. 235.39

crores and for Tripura is Rs. 59.04 crores. The total combined estimated GST revenue loss which small states of India has suffered due to Covid 19 first wave as compared to pre-lockdown announcement period is Rs. 1,995.19 crores.

As per the Shapiro wilk test (Table 4) assumption of normality is not met for the states of Sikkim, Arunachal Pradesh, Goa, Nagaland and Meghalaya as a result non parametric Wilcoxon signed- Rank Test has been applied for these states and for the states of Mizoram, Manipur and Tripura Parametric Paired sample t- test have been applied. In normal data Paired sample t-test is used to measure if significant difference is their between one single group before or after a particular event (Junco, 2013). As per the

paired sample t test (table 4) there is significant difference in GST revenue before and after announcement of lockdown for the state of Manipur as $p < 0.05$ ($p = 0.011$) and there is no significant difference in GST revenue before and after lockdown announcement for the state of Mizoram ($p = 0.202$) & Tripura ($p = 0.311$) as $p > 0.05$. As per the Wilcoxon signed rank test (Table 4) there is significant difference in GST revenue before and after lockdown announcement for the state of Goa as $p < .001$ and there is no significant difference in GST revenue before and after lockdown announcement for the state Sikkim ($p = 1.000$), Arunachal Pradesh ($p = 0.850$), Nagaland ($p = 0.108$) & Meghalaya ($p = 0.204$) as p value > 0.05 .

4.3. Following Analysis Have Been Undertaken to Study the Impact of Covid-19 First Wave on Large States GST Revenue of India

Table 5: Large States GST Revenue Before and After Announcement of Lockdown Due to Covid-19 in India (Rs. in Crore)

Himachal Pradesh			Punjab		
Pre-lockdown announcement period (Mar. 19 - Feb. 20)	Post-lockdown announcement period (Mar. 20 - Feb. 21)	Difference in GST revenue (Pre-lockdown period – Post-lockdown Period)	Pre-lockdown announcement period (Mar. 19 - Feb. 20)	Post- lockdown announcement period (Mar. 20 - Feb. 21)	Difference in GST revenue (Pre-lockdown period – Post -lockdown Period)
660.25	595.89	64.36	1166.02	1180.81	-14.79
700.12	126.90	573.22	1374.29	273.56	1100.73
639.90	272.04	367.86	1347.86	656.86	691.00
697.00	619.00	78.00	1248.00	1323.00	-75.00
677.22	605.08	72.14	1271.39	1187.74	83.65
676.00	597.00	79.00	1255.00	1139.00	116.00
609.00	653.00	-44.00	1133.00	1194.00	-61.00
669.00	691.00	-22.00	1189.00	1376.00	-187.00
701.00	758.00	-57.00	1375.00	1396.00	-21.00
699.00	670.00	29.00	1290.00	1353.00	-63.00
675.00	713.28	-38.28	1340.00	1351.95	-11.95
620.69	663.12	-42.43	1228.94	1299.37	-70.43
Total estimated GST revenue loss of Himachal Pradesh due to Covid 19 first wave		1263.59	Total estimated GST revenue loss of Punjab due to Covid 19 first wave		1991.37
Uttarakhand			Haryana		
Pre-lockdown announcement period (Mar. 19 - Feb. 20)	Post-lockdown announcement period (Mar. 20 - Feb. 21)	Difference in GST revenue (Pre-lockdown period – Post-lockdown Period)	Pre-lockdown announcement period (Mar. 19 - Feb. 20)	Post-lockdown announcement period (Mar. 20 - Feb. 21)	Difference in GST revenue (Pre-lockdown period – Post -lockdown Period)
1451.09	1194.74	256.35	4561.05	4874.29	-313.25
1617.28	256.63	1360.66	5372.05	1706.63	3665.42
1247.73	613.85	633.88	4624.01	2608.55	2015.47
1232.00	895.00	337.00	4889.00	3697.00	1192.00
1288.90	987.80	301.10	4616.74	3482.68	1134.06
941.00	1006.00	-65.00	4474.00	4373.00	101.00
1017.00	1065.00	-48.00	4110.00	4712.00	-602.00
1153.00	1272.00	-119.00	4578.00	5433.00	-855.00
1280.00	1286.00	-6.00	5904.00	5928.00	-24.00
1213.00	1246.00	-33.00	5365.00	5747.00	-382.00
1257.00	1226.05	30.95	5487.00	5901.98	-414.98
1280.93	1181.13	99.80	5266.43	5589.81	-323.38
Total estimated GST revenue loss of Uttarakhand due to Covid 19 first wave		3019.75	Total estimated GST revenue loss of Haryana due to Covid 19 first wave		8107.96

Rajasthan			Uttar Pradesh		
Pre-lockdown announcement period (Mar. 19 - Feb. 20)	Post-lockdown announcement period (Mar. 20 - Feb. 21)	Difference in GST revenue (Pre-lockdown period – Post-lockdown Period)	Pre-Lockdown announcement period (Mar. 19 - Feb. 20)	Post-Lockdown announcement period (Mar. 20 - Feb. 21)	Difference in GST revenue (Pre-lockdown period – Post-lockdown Period)
3132.42	2820.43	311.99	5547.75	5293.72	254.03
2896.07	496.86	2399.22	6309.83	990.18	5319.64
2747.97	1414.99	1332.98	5096.19	3182.44	1913.75
2683.00	2774.00	-91.00	5366.00	5194.00	172.00
2698.57	2796.65	-98.08	5421.95	5098.93	323.02
2550.00	2582.00	-32.00	4975.00	5098.00	-123.00
2253.00	2647.00	-394.00	5073.00	5075.00	-2.00
2425.00	2966.00	-541.00	5103.00	5471.00	-368.00
3071.00	3130.00	-59.00	5678.00	5528.00	150.00
2713.00	3135.00	-422.00	5489.00	5937.00	-448.00
3030.00	3277.60	-247.60	5698.00	5885.71	-187.71
2932.09	3223.70	-291.61	5775.91	5996.62	-220.71
Total estimated GST revenue loss of Rajasthan due to Covid 19 first wave		4044.18	Total estimated GST revenue loss of Uttar Pradesh due to Covid 19 first wave		8132.44
Bihar			Assam		
Pre-lockdown announcement period (Mar. 19 - Feb. 20)	Post-lockdown announcement period (Mar. 20 - Feb. 21)	Difference in GST revenue (Pre-lockdown period – Post-lockdown Period)	Pre-lockdown announcement period (Mar. 19 - Feb. 20)	Post-lockdown announcement period (Mar. 20 - Feb. 21)	Difference in GST revenue (Pre-lockdown period – Post-lockdown Period)
1176.99	1055.94	121.06	955.73	931.72	24.01
1166.81	282.58	884.23	932.36	264.47	667.88
981.61	608.10	373.52	769.62	507.99	261.63
1003.00	1162.00	-159.00	798.00	966.00	-168.00
1160.44	1060.79	99.65	794.65	722.82	71.83
981.00	967.00	14.00	768.00	709.00	59.00
986.00	996.00	-10.00	848.00	912.00	-64.00
940.00	1010.00	-70.00	888.00	1017.00	-129.00
1107.00	970.00	137.00	958.00	946.00	12.00
1016.00	1067.00	-51.00	991.00	984.00	7.00
1122.00	1190.09	-68.09	820.00	1050.23	-230.23
1120.50	1127.99	-7.49	923.87	945.84	-21.97
Total estimated GST revenue loss of Bihar due to Covid 19 first wave		1629.45	Total estimated GST revenue loss of Assam due to Covid 19 first wave		1103.35
West Bengal			Jharkhand		
Pre-lockdown announcement period (Mar. 19 - Feb. 20)	Post-lockdown announcement period (Mar. 20 - Feb. 21)	Difference in GST revenue (Pre-lockdown period – Post-lockdown Period)	Pre-lockdown announcement period (Mar. 19 - Feb. 20)	Post-lockdown announcement period (Mar. 20 - Feb. 21)	Difference in GST revenue (Pre-lockdown period – Post-lockdown Period)
3840.82	3582.26	258.56	2149.44	2049.43	100.01
4209.56	633.46	3576.10	2766.67	243.70	2522.96
3576.86	1956.44	1620.43	1887.79	1241.92	645.87
3514.00	3128.00	386.00	1811.00	1643.00	168.00
3585.69	3009.54	576.15	1855.49	1339.57	515.92
3503.00	3053.00	450.00	1770.00	1498.00	272.00
3255.00	3393.00	-138.00	1509.00	1656.00	-147.00
3263.00	3738.00	-475.00	1437.00	1771.00	-334.00
3460.00	3747.00	-287.00	1720.00	1907.00	-187.00
3748.00	4114.00	-366.00	1943.00	2150.00	-207.00
3747.00	4198.86	-451.86	2027.00	2294.23	-267.23
3941.54	4334.98	-393.44	2070.87	2321.03	-250.16
Total estimated GST revenue loss of West Bengal due to Covid 19 first wave		6867.24	Total estimated GST revenue loss of Jharkhand due to Covid 19 first wave		4224.76

Odisha			Chhattisgarh		
Pre-lockdown announcement period (Mar. 19 - Feb. 20)	Post-lockdown announcement period (Mar. 20 - Feb. 21)	Difference in GST revenue (Pre-lockdown period – Post-lockdown Period)	Pre-lockdown announcement period (Mar. 19 - Feb. 20)	Post-lockdown announcement period (Mar. 20 - Feb. 21)	Difference in GST revenue (Pre-lockdown period – Post-lockdown Period)
2625.91	2632.88	-6.97	2143.01	2093.17	49.84
2955.70	774.30	2181.41	2298.92	350.85	1948.07
2140.40	1724.16	416.23	1998.93	1822.91	176.03
2923.00	2694.00	229.00	2093.00	2549.00	-456.00
2494.37	2348.41	145.96	2002.37	1832.32	170.05
2497.00	2348.00	149.00	1873.00	1994.00	-121.00
2015.00	2384.00	-369.00	1490.00	1841.00	-351.00
1994.00	2419.00	-425.00	1570.00	1974.00	-404.00
2347.00	2528.00	-181.00	2176.00	2181.00	-5.00
2383.00	2860.00	-477.00	2136.00	2349.00	-213.00
2504.00	3137.45	-633.45	2155.00	2527.10	-372.10
2790.16	3340.57	-550.41	2274.41	2453.10	-178.69
Total estimated GST revenue loss of Odisha due to Covid 19 first wave		3121.60	Total estimated GST revenue loss of Chhattisgarh due to Covid 19 first wave		2343.99
Madhya Pradesh			Gujarat		
Pre-lockdown announcement period (Mar. 19 - Feb. 20)	Post-lockdown announcement period (Mar. 20 - Feb. 21)	Difference in GST revenue (Pre-lockdown period – Post-lockdown Period)	Pre-lockdown announcement period (Mar. 19 - Feb. 20)	Post-lockdown announcement period (Mar. 20 - Feb. 21)	Difference in GST revenue (Pre-lockdown period – Post-lockdown Period)
2623.76	2407.40	216.36	6521.11	6820.46	-299.35
2625.71	462.93	2162.78	6874.66	1296.11	5578.55
2251.29	1339.10	912.20	6608.83	3077.44	3531.39
2212.00	2742.00	-530.00	6424.00	6025.00	399.00
2281.68	2288.85	-7.17	6411.37	5620.67	790.70
2255.00	2209.00	46.00	6185.00	6030.00	155.00
2087.00	2176.00	-89.00	5741.00	6090.00	-349.00
2053.00	2403.00	-350.00	5888.00	6787.00	-899.00
2453.00	2493.00	-40.00	6805.00	7566.00	-761.00
2434.00	2615.00	-181.00	6621.00	7469.00	-848.00
2674.00	2756.30	-82.30	7330.00	7966.90	-636.90
2621.03	2791.57	-170.54	7215.54	8221.23	-1005.69
Total estimated GST revenue loss of Madhya Pradesh due to Covid 19 first wave		3337.34	Total estimated GST revenue loss of Gujarat due to Covid 19 first wave		10454.64
Maharashtra			Karnataka		
Pre-lockdown announcement period (Mar. 19 - Feb. 20)	Post-lockdown announcement period (Mar. 20 - Feb. 21)	Difference in GST revenue (Pre-lockdown period – Post-lockdown Period)	Pre-lockdown announcement period (Mar. 19 - Feb. 20)	Post-lockdown announcement period (Mar. 20 - Feb. 21)	Difference in GST revenue (Pre-lockdown period – Post-lockdown Period)
15595.78	15002.11	593.67	6982.64	7144.30	-161.66
18124.60	4586.72	13537.87	8005.75	2028.54	5976.54
14134.15	8470.88	5663.27	6408.73	4508.01	1900.72
15143.00	14987.00	156.00	6659.00	6710.00	-51.00
15101.82	12507.53	2594.29	7088.49	6013.77	1074.72
13407.00	11602.00	1805.00	6201.00	5502.00	699.00
13579.00	13546.00	33.00	6350.00	6050.00	300.00
15109.00	15799.00	-690.00	6675.00	6998.00	-323.00
15968.00	15001.00	967.00	6972.00	6915.00	57.00
16530.00	17699.00	-1169.00	6886.00	7459.00	-573.00
18085.00	17967.43	117.57	7605.00	7977.38	-372.38
15734.66	16103.50	-368.84	7413.83	7581.45	-167.62
Total estimated GST revenue loss of Maharashtra due to Covid 19 first wave		25467.68	Total estimated GST revenue loss of Karnataka due to Covid 19 first wave		10007.99

Kerala			Tamil Nadu		
Pre-lockdown announcement period (Mar. 19 - Feb. 20)	Post-lockdown announcement period (Mar. 20 - Feb. 21)	Difference in GST revenue (Pre-lockdown period – Post-lockdown Period)	Pre-lockdown announcement period (Mar. 19 - Feb. 20)	Post-lockdown announcement period (Mar. 20 - Feb. 21)	Difference in GST revenue (Pre-lockdown period – Post-lockdown Period)
1635.43	1475.25	160.19	6941.10	6177.82	763.28
1766.19	280.18	1486.01	6771.19	1420.06	5351.13
1433.36	862.13	571.23	5818.30	3522.77	2295.53
1568.00	1530.00	38.00	5881.00	4976.00	905.00
1512.38	1318.28	194.10	6084.15	4634.73	1449.42
1582.00	1229.00	353.00	5973.00	5243.00	730.00
1393.00	1552.00	-159.00	5616.00	6454.00	-838.00
1549.00	1665.00	-116.00	6109.00	6901.00	-792.00
1691.00	1568.00	123.00	6449.00	7084.00	-635.00
1651.00	1776.00	-125.00	6422.00	6905.00	-483.00
1859.00	1933.62	-74.62	6703.00	7393.23	-690.23
1754.12	1806.10	-51.98	6426.49	7008.21	-581.72
Total estimated GST revenue loss of Kerala due to Covid 19 first wave		2925.52	Total estimated GST revenue loss of Tamil Nadu due to Covid 19 first wave		11494.36
Telangana			Andhra Pradesh		
Pre-lockdown announcement period (Mar. 19 - Feb. 20)	Post-lockdown announcement period (Mar. 20 - Feb. 21)	Difference in GST revenue (Pre-lockdown period Post-lockdown Period)	Pre-lockdown announcement period (Mar. 19 - Feb. 20)	Post-lockdown announcement period (Mar. 20 - Feb. 21)	Difference in GST revenue (Pre-lockdown period – Post-lockdown Period)
3896.62	3562.56	334.06	2589.34	2548.13	41.21
3510.17	928.14	2582.03	2559.21	548.76	2010.45
3051.35	1888.40	1162.95	2142.38	1227.85	914.53
3166.00	3276.00	-110.00	2232.00	2367.00	-135.00
3163.10	2875.98	287.11	2138.41	2138.16	0.25
3059.00	2793.00	266.00	2115.00	1955.00	160.00
2854.00	2796.00	58.00	1985.00	2141.00	-156.00
3230.00	3383.00	-153.00	1975.00	2480.00	-505.00
3349.00	3175.00	174.00	2230.00	2507.00	-277.00
3420.00	3543.00	-123.00	2265.00	2581.00	-316.00
3787.00	3883.48	-96.48	2356.00	2879.91	-523.91
3667.13	3636.44	30.69	2563.33	2652.57	-89.24
Total estimated GST revenue loss of Telangana due to Covid 19 first wave		4894.84	Total estimated GST revenue loss of Andhra Pradesh due to Covid 19 first wave		3126.44

Source: Author's compilation

Table 5 shows that in almost all the large states there was fall in GST revenue due to lockdown as compared to pre lockdown period but after few months the GST collection started rising in all the large states and there was stable GST revenue distribution. Table 8 show the total shortfall of GST revenue of each large states of India. By adding GST revenue shortfall of all the months, the total estimated GST revenue loss for the state of Himachal Pradesh is Rs. 1263.59 Crores, for Punjab is Rs. 1991.37 crores, for Uttarakhand is Rs. 3019.75 crores, for Haryana is Rs. 8107.96 crores, for Rajasthan is Rs. 4044.18 crores, for Uttar Pradesh is Rs. 8132.44 crores, for Bihar is Rs. 1629.45

crores, for Assam is Rs. 1103.35 crores, for west Bengal Rs. 6867.24 crores, for Jharkhand Rs. 4224.76 crores, for Odisha Rs. 3121.60 crores, for Chhattisgarh Rs. 2343.99 crores, for Madhya Pradesh Rs. 3337.34 crores, for Gujarat Rs. 10,454.64 crores, for Maharashtra Rs.25,467.68 crores, for Karnataka Rs. 10,007.99 crores, for Kerala Rs. 2925.52 crores, for Tamil Nadu Rs. 11,494.36 crores, for Telangana Rs. 4894.84 crores and for Andhra Pradesh Rs.3126.44 crores. The total combined estimated GST revenue loss which large states of India has suffered due to Covid 19 first wave as compared to pre lockdown announcement period is Rs. 1,14,432 crores.

Table 6: Analysis to Measure GST Revenue Performance of Large States of India in Pre-Lockdown Announcement Period and Post-Lockdown Announcement Period

Pre-lockdown announcement period (Mar. 19 - Feb. 20)– Post-lockdown announcement period (Mar. 20 - Feb. 21)	P value
Normality Test (Shapiro wilk test)	Himachal Pradesh- 0.001 , Punjab-< 0.001 , Uttarakhand- 0.004 , Haryana- 0.017 , Rajasthan- 0.001 , Uttar Pradesh-< 0.001 , Bihar- 0.002 , Assam- 0.016 , West Bengal- 0.002 , Jharkhand-< 0.001 , Odisha- 0.003 , Chhattisgarh-< 0.001 , Madhya Pradesh- 0.001 , Gujarat- 0.001 , Maharashtra-< 0.001 , Karnataka-< 0.001 , Kerala- 0.002 , Tamil Nadu- 0.006 , Telangana-< 0.001 and Andhra Pradesh- 0.002
Wilcoxon signed- Rank Test	Himachal Pradesh-0.129, Punjab-0.970, Uttarakhand-0.151, Haryana-0.733, Rajasthan-0.519, Uttar Pradesh-0.677, Bihar-0.424, Assam-0.850, West Bengal-0.569, Jharkhand-0.677, Odisha-0.470, Chhattisgarh-0.233, Madhya Pradesh-0.733, Gujarat-0.791, Maharashtra-0.110, Karnataka-0.470, Kerala-0.204, Tamil Nadu-0.301, Telangana-0.110 and Andhra Pradesh-0.622

Source: Author's calculation using Jamovi software

As per the Shapiro wilk test (Table 6) assumption of normality is not met for data of all the large states of India, as a result non parametric Wilcoxon signed- Rank Test has been applied for these states. As per the Wilcoxon signed rank test (Table 6) for all the large states of India there is no significant difference in GST revenue before and after lockdown announcement as p value is > 0.05.

5. Conclusions

The Covid-19 pandemic has led to an erosion of revenue collection for governments across the globe. Through this paper we study the impact of the Covid-19 first wave on the GST revenue collection and distribution in India as well as on the revenue collection of individual states of India.

Our results provide evidence that there is a sharp decline and uneven distribution in the GST revenue in the months after the lockdown announcement. The months of April 2020 and May 2020 recorded the lowest GST revenue collection with a shortfall of Rs. 81,571 crores and Rs. 38,280 crores compared to pre-lockdown announcement period. Post September 2020, a rise in the revenue collection and stable GST revenue distribution is noted with the relaxation of lockdown measures and restarting of economic activity. The results of Wilcoxon signed- Rank Test signified that even after lockdown in India was introduced during the first wave, the impact of Covid-19 first wave on GST revenue collection of India was not so significant as compared to last one year (i.e. March 2019 to February 2020) before the pandemic, but after combining the monthly GST revenue shortfall for the period after announcement of lockdown i.e., from March 2020 to February 2021 as compare to the period from March 2019 to February 2020 we found out that Indian economy has suffered an estimated GST revenue loss to the tune of Rs. 1,67,493 crores due to the first Covid-19 wave. When we analyzed the results of

Paired Samples T-Test and Wilcoxon signed- Rank Test for individual small states, it is evident that small states like Manipur and Goa shows major setback in GST revenue collection between the pre and post lockdown period announcement as compared to the other small states. A total estimated GST revenue loss of Rs. 1,995.19 crores is suffered by all the small states taken together. Amidst the large states, as per Paired Samples T-Test there was no huge impact of covid 19 first wave on GST revenue collection one year before the pandemic and one year of pandemic but after taking into consideration the combined loss suffered by large states due to Covid-19 first wave was Rs. 1,14,432 crores. To conclude, the first covid 19 wave in India did not have a huge significant impact on GST revenue collection and distribution of the country, but the first wave have definitely put a big hole in government treasury which will take time to fill in future. Further the Government with the view of bringing the economy back on the path of recovery and to ease of the compliance burden of small and large tax payers during the 1st wave of pandemic announced the some relief measures like postponement of deadlines for filing of goods and services tax (GST) returns and related payments of GST, the interest rate for delay in payment of tax has been rationalized and a conditional wavering of late-filing penalties for delay in filing of GST returns in certain cases and extension of the date for certain tax procedural actions like filing objection with dispute resolution panel and appeals to commissioner, generally was postponed.

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