Impact of GST on Indian Inflation

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Abstracts

In this study we have tried to estimate the impact of GST on Indian inflation measured through the CPI. We have used multiple structural break point analysis and regression analysis (ARDL) with dummy variable to find the impact of GST. Our study find out that there is no impact of GST on Indian inflation at all.

**Key words: GST, CPI-Inflation, Structural Break analysis, ARDL, Dummy**

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I. Introduction

Goods and Services Tax (GST) is a unifying tax structure formally introduced in India in July 2017. Under this regime, the Centre and States levy taxes at the same rate they agreed upon at the GST council. It subsumed many indirect taxes like State VAT, excise duty, Luxury tax, Purchase tax, Service tax etc. Under GST, only three types of taxes are there, CGST (central GST), SGST (state GST) and IGST (Integrated GST) that would be levied on inter-state supply. Due to the very nature of GST with the simplification of tax structure and input tax credit, it was expected to bring down the prices of goods and services. In this regime, due to factors like mandatory registration, networking, and uniformity throughout the country, the firms are also expected to experience improved supply chain, efficiency gain etc., which will make their product more competitive in the global market. So, there was an expectation of more competitive prices for goods and services throughout the economy. Again, the Anti-Profiteering Measures were set to ensure the just price.

However, surprisingly, we observe an upsurge in inflation, measured by the Consumer Price Index (CPI)-Combined, immediately after implementing the GST (see Chart 1 below). The inflationary pressure started to cool down in early 2018, only to have an upswing again in 2019. Also, it is true that after the implementation of GST in July 2017, it got substantially rationalised again in November of the same year. So, some may relate the falling inflation rates in 2018 with this rationalisation. However, whether the regime of GST is inflationary or not remains moot.

Chart 1: Y-o-Y Inflation of CPI-C (All India)_General Index: 2014M01-2022M08
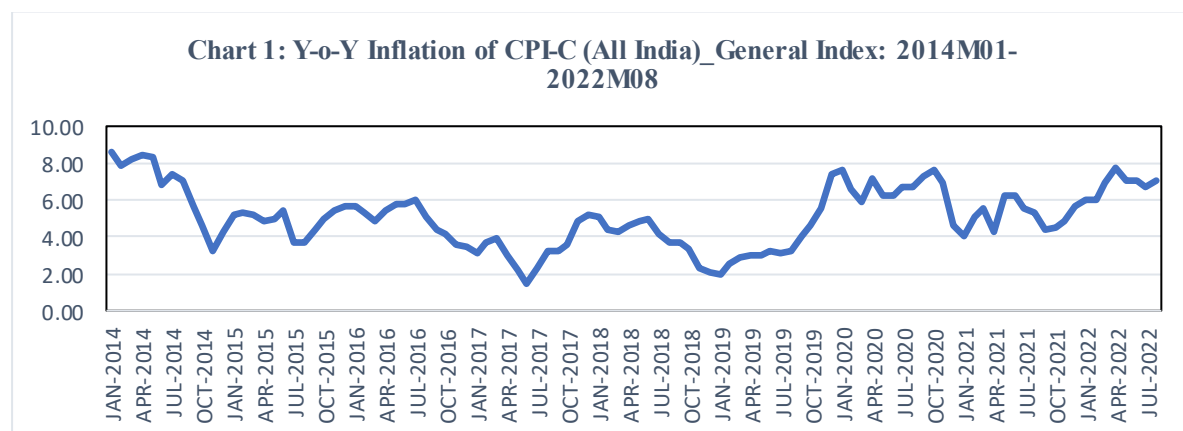
Source: RBI's database on Indian Economy.

In this regard, international experiences are also mixed. The country like UK did not feel any significant impact on inflation after the introduction of GST in the way back in 1973.

However, Canada, which implemented GST in 1991 with an initial rate of 7 per cent, only felt inflationary pressure (RBI, 2017).

So, our present study wants to analyse this particular phenomenon in the context of the Indian economy. Here, we will try to examine whether GST has any impact on India's inflationary dynamics or not. Subsequently, we will explore the kind of impact, i.e., if it exists, it is positive or negative.

So, in the following section II, we will first analyse the details of India's inflation dynamics and the macroeconomic condition during the period of GST implementation. A brief literature review and research gap is presented in section III. Section IV is devoted to econometric analysis and discussion. The final section concludes.

II. India's inflation and macro dynamics: pre- and post-GST

Inflationary Conditions

According to RBI (2017), 50 per cent of the items under CPI are exempted from GST. So, its impact on CPI-inflation must be minimal. In CPI, the maximum weight is given to the food items (45.83), and it is the group from which most of the exempted items come. However, from the following figure 2, we can observe that food group inflation also started to rise along with the general index of CPI from August 2017.

However, clothing and footwear inflation was calm during the second half of 2017. Following the path of food and general indices, it started to decline from September, 2018. Once again, food and general indices rose from early 2019 onwards, while clothing and footwear joined the path from November 2019. So, whether the transition of the tax structure to GST does have a real impact on CPI inflation or not is becoming a blur. It has its

dynamics. We must look into the other sub-groups to form a conjecture on this issue.

Chart 2: Y-o-Y Inflation of CPI-C and its subgroups (1): 2016 M01 to 2022M08
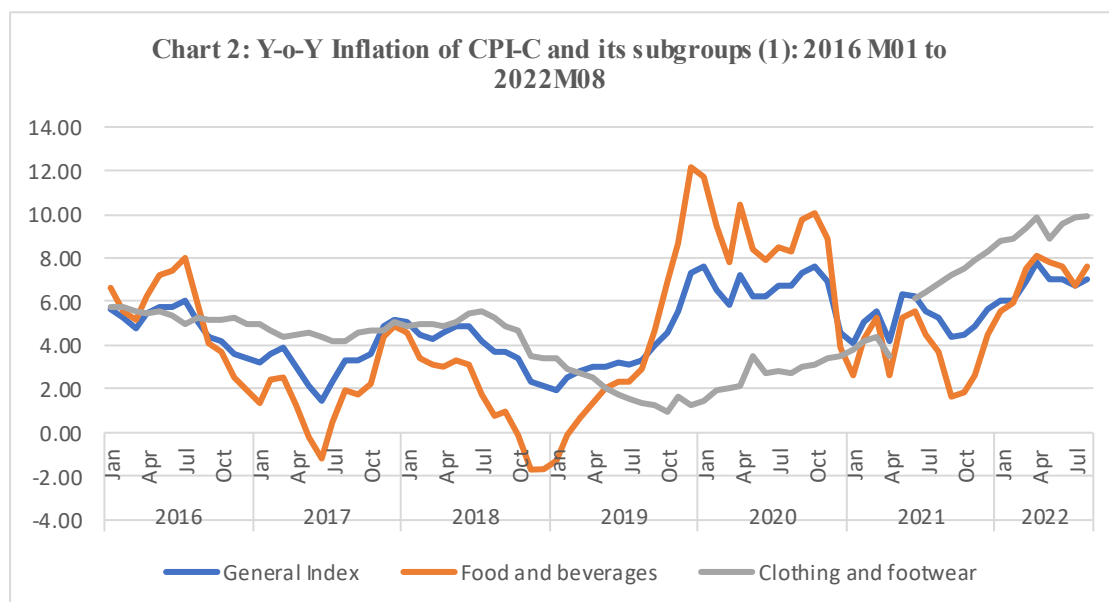
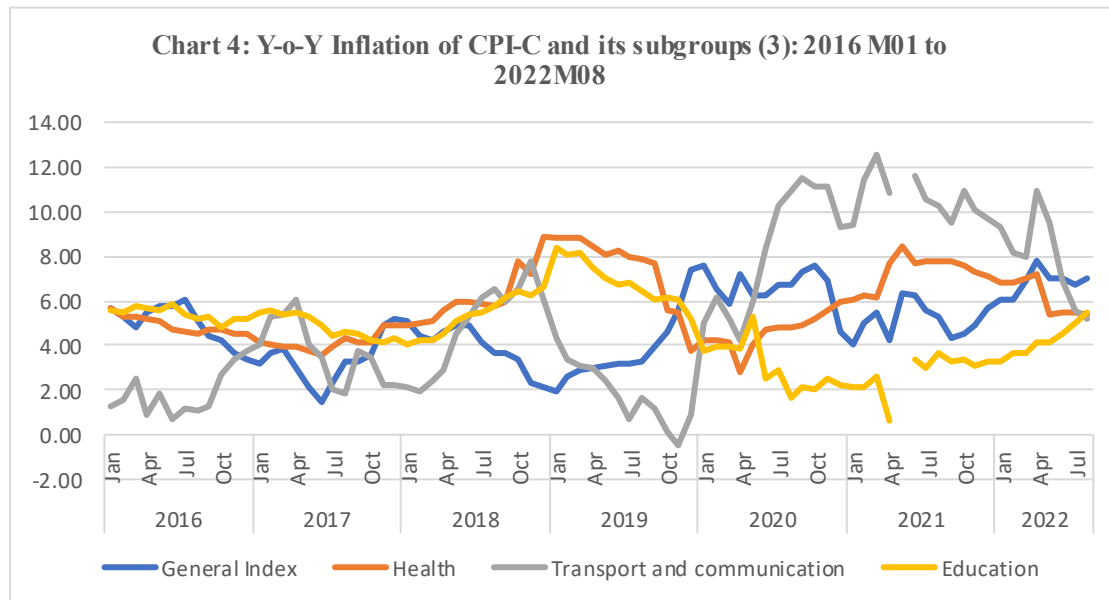Source: RBI's database on Indian Economy.

Figures 3 and 4 show the inflation dynamics of housing and fuel and lights and the items of miscellaneous groups (attracts second highest weights, 28.32), respectively. Data for housing are missing for some months in between, but from chart 3 its upswing after the implementation of GST can be easily observed. The fuel and light up to 2018 also follow more or less the same pattern as the CPI-general index with its own fluctuations. The weight for fuel and lights in the general index is only 6.84, while that of housing is 10.07.

Chart 3: Y-o-Y Inflation of CPI-C and its subgroups (2): 2016 M01 to 2022M08
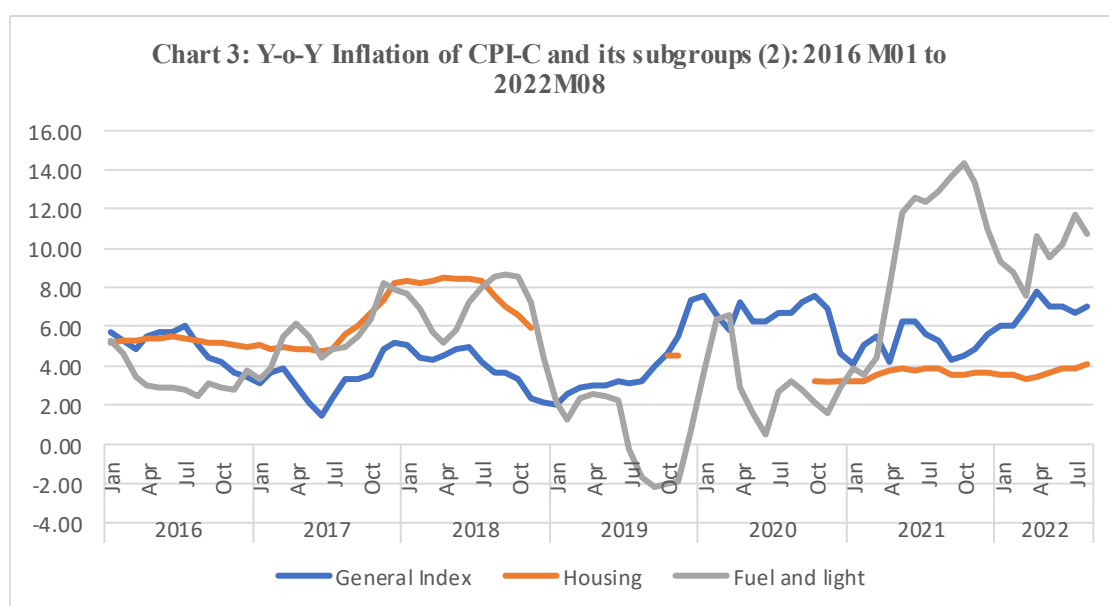
Source: RBI's database on Indian Economy.

Chart 4 in the following shows that after the implementation of GST, education and health services became dearer. However, contrary to the general index, these indies, after a prolonged rise, started to fall only from early 2019. After a year of soothing, health care became dearer from April, 2020.

The interesting is the transport and communication, which includes petrol and diesel expenditures; thus, this group attracts the least of GST. But it is also following more or less the same path like fuel and lights up to 2020-21 and then departed from each other.

Chart 4: Y-o-Y Inflation of CPI-C and its subgroups (3): 2016 M01 to 2022M08

Source: RBI's database on Indian Economy.

From the above discussion it is very much difficult to conclude anything about the effect of GST implementation on the CPI inflation of India. For this purpose we would like to apply some econometric tools. The details is given in the section IV .

Macroeconomic situation

Now, for the purpose of our analysis we must take a brief note on the macroeconomic situation prevailed at that time: if we look at table 1 where growth of GDP at market price and its components are shown, we can see that the year 2017-18, when GST was implemented was a moderate year. Government expenditure was high in 2017-18 but investment growth became higher only in the next financial year, 2018-19. During the year

growth of import was substantially high but not export[1]. Again, growth of changes in stock was significantly positive which is not an indicator of buoyant demand pressure. Overall the GDP had started to slow down since the very 2017-18 from its relative peak of 8.3 per cent growth achieved in 2016-17. So, overall during 2017-18 inflation rose due to demand pressure may be ruled out safely.

Table 1: GDP at market price and Its Components: 2015-16 to 2019-20								
							Y-o-Y % growth rate at constant prices	
		PFCE	GFCE	GFCF	Change in Stock	Export of goods & Services	Import of goods & Services	GDP at market prices
2015-16	Q1	7.1	4.8	3.7	-14.8	-6.4	-5.8	7.6
	Q2	7.1	9.0	3.5	-13.9	-4.7	-3.6	8.0
	Q3	8.6	8.3	10.2	-10.9	-8.9	-9.7	7.2
	Q4	8.8	7.8	8.6	-11.5	-2.5	-4.2	9.1
2016-17	Q1	7.0	2.4	13.7	-47.9	3.5	0.4	8.7
	Q2	9.6	2.3	8.2	-48.9	2.5	-0.1	9.7
	Q3	11.2	6.2	6.7	-48.6	6.9	10.6	8.6
	Q4	4.9	15.8	5.6	-49.6	7.0	7.0	6.3
2017-18	Q1	8.6	21.5	1.1	56.5	3.9	21.7	6.1
	Q2	4.9	7.3	6.4	70.2	4.7	10.6	5.3
	Q3	4.2	10.4	9.3	72.6	4.5	14.1	6.7
	Q4	7.5	8.7	14.2	73.8	5.1	23.6	8.9
2018-19	Q1	6.3	6.6	14.4	33.3	9.1	5.3	7.5
	Q2	8.6	8.1	12.9	27.2	12.1	18.1	6.5
	Q3	7.5	3.5	12.8	26.6	15.2	12.1	6.2
	Q4	6.1	8.5	5.6	22.8	11.2	0.8	5.7
2019-20	Q1	7.2	-2.4	8.6	-57.5	2.8	9.2	4.9
	Q2	6.2	5.1	-0.4	-59.0	-1.7	-2.2	4.2
	Q3	6.1	4.4	-1.4	-59.0	-5.1	-7.1	3.2
	Q4	1.7	7.5	-0.4	-59.5	-8.8	-2.6	2.8

PFCE : Private Final Consumption Expenditure
GFCE : Government Final Consumption Expenditure
GFCF : Gross Fixed Capital Formation
Source : National Statistical Office (NSO).

From the supply side we can say that in industry group only the Mining & Quarrying and in service sector the Financial, Real Estate and Professional Services were performing bad during the year 2017-18 and onwards.

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[1] Here we must note that if we look at the data for the import deflator we can observe that it has only increased from the year 2018-19. So, grossly the possibility of imported inflation can also be ruled out.

So, in finding out the cause of inflation during 2017-18 we are left with two major likely factors of inflation: one is money supply and another is crude oil price (or domestic petroleum price). We have also checked whether there was any surge in world food or fertilizer prices at that time. However, as we find out in case of import deflator (see footnote 1) these prices were not the cause of surge in inflation during 2017-18. Only the inflation for industrial input was higher (see chart 5). Exchange rate was at that time continuously appreciated from February, 2017 to March, 2018. Only from 2018-19 it started to depreciate. So, these external factors may be important in explaining the second round hike in inflation in post-GST period, but for 2017-18 inflation global factors' role cannot be substantial.

Chart 5: World Inflations pre- and post-GST Implementation
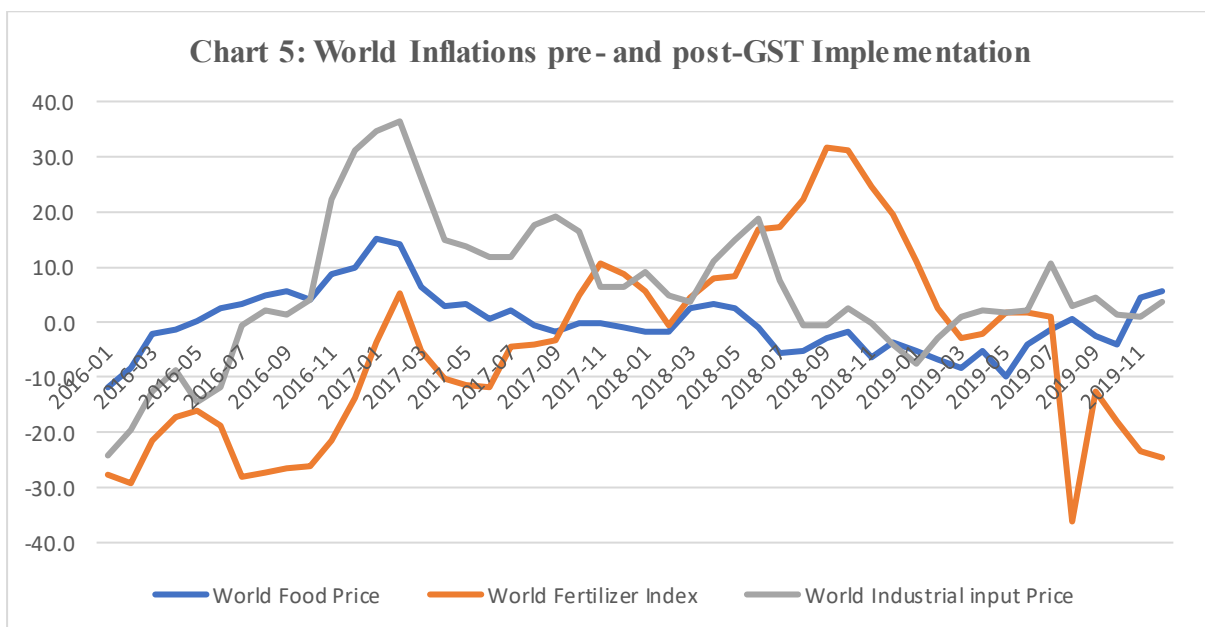
Source: Calculated from data sourced from IMF website.

Coming to the domestic factors we can definitely find that money supply and domestic diesel price as a possible cause of inflation surge in the GST implementation year, 2017-18 as the following chart 6 indicates:

Chart 6: Inflation in Domestic Diesel price, Growth in Money Supply (2016M01 to 2019M12)
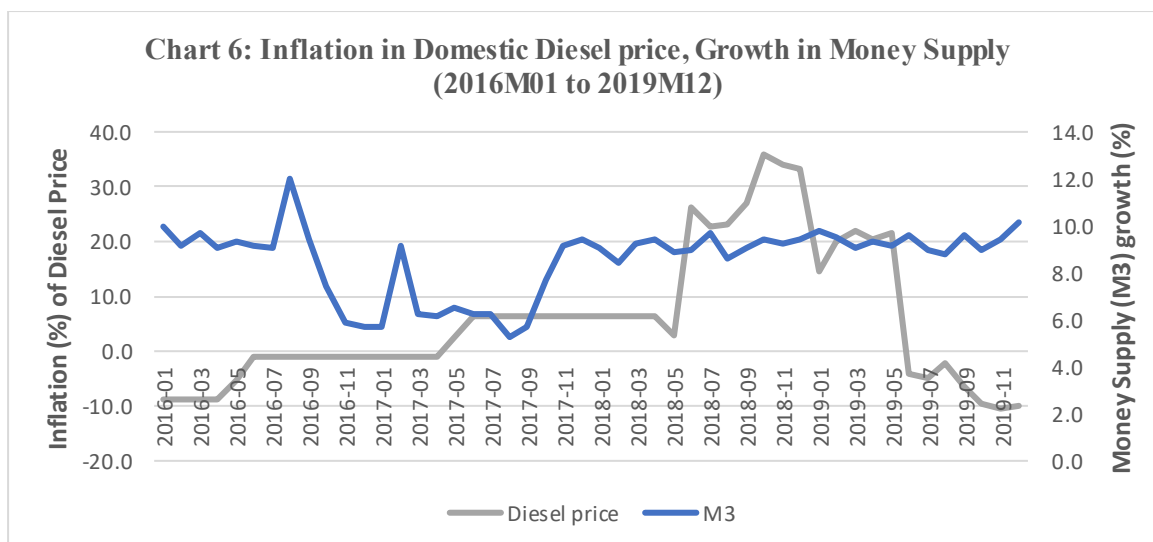
Source: Calculated from RBI and Petroleum Planning & Analysis Cell, GOI data.

However, till now we only have concentrated on the immediate effect of a variable on inflation. But we should mind the lagged effect of a change in one causal variable on another when we are dealing with time series data particularly a variable like inflation, which is always sticky in nature.

III. Literature review and research gap

We find few national and international research studies on the impact of GST on inflation. Among the studies, most of the articles are descriptive, like Mishra (2018), Dani (2016), Dash (2017) etc. These studies provide an overview of the GST.

Studies like Gupta (2018), and Agrawal (2019) offer the sector-wise impact of GST on output and prices respectively in India. However, these are also descriptive research.

In India, we find studies like Kumar and Dash (2021) where intervention analysis was used, and authors found a positive impact of GST on the non-food sector, while for food sector, the effect was negative. However, they also mentioned that determining whether this effect is transitory or permanent is challenging.

Das (2017) gives theoretical arguments to establish a causal link between GST and the rise in prices in the Indian context.

In the international arena, Layton and Valadkhani (2004), and Valadkhani (2005), using intervention analysis, found only the transitory effect of GST on some of the items of CPI inflation.

Sahoo et al. (2017) formulated an intervention model with a sample of eleven developing and developed countries to gauge the impact of GST on inflation in both the short and long run. They found no significant increase in inflation after the introduction of GST in a one-year and three-year span. Only countries like Portugal and New Zealand experienced a fall in inflation, and China experienced an increase in inflation after the introduction of GST.

We find a lacuna in this area of research from the brief survey of the literature. The foremost cause must be the time span. However, with the limited data availability, we would like to provide empirical research to gauge the effect of GST on inflation in India. We found few empirical works on this issue, but most of them relied on intervention analysis. However, we would not like to follow the same econometric tool based on our idea that GST is a regime, not a sudden one-shot change in the economy. So, we would like to find out from the inflation series itself whether, under the new regime of GST, its dynamics have changed or not. We want to find breaks in the inflation series endogenously and then try to understand whether GST implementation has been able to create any break in inflation or not. To confirm the break analysis result, we will apply a dummy variable to the regression analysis (ARDL) of inflation in India.

IV. Econometric Analysis

To gauge the effect of GST on inflation we have used monthly CPI-General series from 1992M01 to 2022M06. We have taken y-o-y growth of the series as the CPI-inflation. First we have checked whether the series is stationary or not. We have used ADF, PP and KPSS tests to confirm that the series is stationary. The ADF and PP were showing contradictory results, so as a confirmatory test we have used KPSS. The results are shown in the following table 2.

Table 2: Unit root test results of CPI-G inflation: 1992M01 to 2022M06				
		ADF (t-Statistic)	PP (Adj. t-Stat)	KPSS (LM Stat.)*
Model	Intercept	-2.209542	-3.578636	0.347049
		0.2	0.01	0.01
P-values are given in the last row.				
*In this case we accept the null hypothesis that the series is stationary.				
Source: Own calculation.				

Structural Break Analysis

After confirming that the series is stationary, we have used the Bai-Perron (1998, 2003) methodology of multiple unknown structural breaks. In the following tables 3 and 4 we have given the estimated results. First using Bai-Perron tests of 'L+1 vs. L sequentially determined breaks' we have determined whether in the series breaks exists or not. From the test using 15% trimming, we find that there are optimally 3 breaks in the series.

Table 3: Bai-Perron tests of L+1 vs. L sequentially determined breaks			
Sequential F-statistic determined breaks:			3
Break Test	F-statistic	Scaled F-statistic	Critical Value**
0 vs. 1 *	26.88044	26.88044	8.58
1 vs. 2 *	31.68587	31.68587	10.13
2 vs. 3 *	47.45459	47.45459	11.14
3 vs. 4	0	0	11.83
* Significant at the 0.05 level. ** Bai-Perron (Econometric Journal, 2003) critical values.			

Source: Own calculation.

Then to have the optimal break dates, we have used Bai-Perron tests of "1 to M globally determined breaks". We find 2 and 4 numbers of optimal breaks based on UDMAX and WDMAX statistics: the results presented in the following table 4 are also obtained using 15% trimming. But we have checked whether changing the trimming level, alters the results significantly or not. Using 10% trimming we have found 4 number of optimal breaks and the break dates are also more or less similar to what we have found in table 4. Even when we have tried 5% trimming, we do not find any break date near to 2017M06, when the GST was implemented. In case of 5% trimming we found a break in 2020M09. But with 30 years of data, 5% trimming is not a intuitively acceptable also. So we are not relying and thus presenting those results here.

Table 4: Bai-Perron tests of 1 to M globally determined breaks				
UDmax determined breaks:	2	UDMax statistic*	59.11	
WDmax determined breaks:	4	WDMax statistic*	95.92	
* Significant at the 0.05 level.				

Estimated break dates:
1: 1999M05
2: 1999M06, 2006M06
3: 1999M06, 2008M03, 2014M01
4: 1999M06, 2004M01, 2008M07, 2014M01
5: 1999M06, 2004M01, 2008M07, 2013M07, 2018M01

Source: Own calculation.

So, from the break analysis we fail to find any break in the CPI inflation corresponding to GST implementation. So, from this analysis we can conclude that GST do not have any significant impact on CPI-inflation dynamics of India.

Regression Analysis with Dummy variable

Now, to confirm the above results we have estimated an ARDL model with CPI-inflation as a dependent variable. We have taken changes in domestic diesel price, changes in money supply (M3), growth of IIP-general/manufacturing, world food/industrial input prices inflation, depreciation of dollar-rupee exchange rate as our exogeneous variables. All these variables are found to be stationary. Then, we have used a dummy variable of GST implementation at 2017M06. In the following we have presented the regression result for the sample 1995 to 2022M04 to 2022M06. The model is selected based on AIC information criterion. All the explanatory variables are not found to be significantly affecting the CPI inflation. However, the dummy variable also found to be insignificant.

Table 5: Regression Result (adjusted sample: 1995M04 2022M06)				
Dependent Variable: G_CPI_IW_G	**Model with Dummy**		**Model without dummy**	
	Coefficient	*Prob.*	*Coefficient*	*Prob.*
G_CPI_IW_G(-1)	1.12	0.00	1.12	0.00
G_CPI_IW_G(-2)	-0.20	0.00	-0.20	0.01
G_DIESEL_PRICE	0.00	1.00	0.00	0.99
G_DIESEL_PRICE(-1)	0.02	0.11	0.02	0.15
G_DIESEL_PRICE(-2)	-0.03	0.01	-0.03	0.02
G_DIESEL_PRICE(-3)	0.01	0.10	0.01	0.08
G_EXCH_RATE	0.02	0.44	0.02	0.31
G_EXCH_RATE(-1)	0.04	0.27	0.04	0.21
G_EXCH_RATE(-2)	-0.11	0.00	-0.11	0.01
G_EXCH_RATE(-3)	0.07	0.00	0.07	0.00
G_IIP_MANUFACTURING	0.00	0.54	0.00	0.58
G_M3	0.02	0.33	0.03	0.10
G_WORLD_FOOD_PR	0.01	0.01	0.01	0.01
D1	-0.07	0.66		

C	0.14	0.61	0.07	0.76
R-squared	0.91	DW stat	0.91	DW stat
F-statistic	230.6		248.9	
Prob(F-statistic)	0	1.94	0	1.94
Source: Own calculation.				

We have also experimented with the growth of IIP-general index, world industrial input prices inflation. But these variables are not found to be significant at all.

Also based on the breaks we have found, we have estimated truncated regressions. But in neither cases, the dummy variable has become significant. Also, with the loss of degrees of freedom the models were deteriorating in terms of R-square values, F-statistics etc. Those models are not shown here.

V. Conclusion

From the above break and regression analysis we can conclude that GST has no impact at all on the domestic inflation measured through the CPI-IW or CPI-C. the surge in inflation from the very month of GST implementation is purely coincidental. Probably that is why the CPI-inflation of India thereafter followed so many ups and downs depending on the other major factors influencing the inflation. Finding out those factors in a much more comprehensive way is our future research agenda.

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