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Did inflation rise after GST?

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1. Introduction

Before GST, India had a taxation system where both the Union and State governments levy taxes under different tax laws. Its predecessor VAT had multiple taxes and cascading of taxes and was prone to misusing the input tax credit (ITC) without a complete supply chain from producer to consumer. The objective of the implementation of GST was to lessen some of those problems. We look at how prices have changed post the adoption of GST in India.

GST by design excludes half of the commodities in the CPI basket. Further, many goods are taxed at 5% since they are considered essential in our day-to-day lives. If goods taxed at a lower bracket in the VAT era are taxed higher in the GST regime, then prices will increase. Similarly, if a commodity in the GST regime is taxed lower than VAT, its prices should reduce. Thus, it shall increase the prices of some goods while decreasing the price of some goods. Analytically, how these will play out at the aggregate level depends on as 1) how GST rates differ from VAT rates, 2) whether the GST is revenue neutral, 3) number of commodities outside the CPI basket, 4) market power of the companies, and 5) the price behaviour of products excluded from GST, among many other factors.

During GST implementation, it was expected that GST would bring down price levels as it harmonises various indirect tax rates and removes the cascading effect. However, this is a widely contested claim. The Australian Competition and Consumer Commission (2003) study shows that GST has an initial positive impact on inflation. However, there is contrasting evidence as well (Valadkhani, 2005). For India, the sole study by Das (2019) using the difference-in-difference (DID) method shows that there is no significant effect on GST on general price levels at the state level.

However, this finding needs to be re-examined due to the following facts. First, DID is a static regression model since only two-time points exist. However, we need to consider the dynamic effect of the intervention, especially its onset and decay structure. Second, Das (2019) studied the general price levels. While food and fuel items occupy a significant share in the consumption bracket, fuel and the majority of the food items are excluded from GST. Hence, employing the general price levels may not yield correct results. Third, the analysis stops at 2018, showing a lack of data in the post-intervention period. Finally, the model does not have other covariates that could influence price levels, and the inclusion of other controlling factors is relevant in quantifying the impact of any intervention.

Even though GST has completed more than four years, there is hardly any systematic study investigating the impact of GST on prices. Therefore, it is required to understand whether GST would have had any significant impact on prices. Thus, this paper addressed this research gap and examined the impact of GST on prices.

This paper employs a Bayesian causal inference method to address these issues. We use the trend in the control group to forecast the trend in the treated group, which would be the trend if the treatment had not happened, i.e., the counterfactual. Then the causal estimate would be the difference between the actual and the counterfactual trends. We employ the Causal Impact methodology based on Bayesian structural time-series modelling, developed by Brodersen et al. (2015). Here, the model generates counterfactual estimates of the variable using the prior information, and the causal impact is estimated as the difference between the actual and the counterfactual. We estimate the impact of GST on price levels (proxied by CPI) while controlling for the exchange rate, energy prices, and interest rate.

2. Data and Methodology

3.1. Empirical Strategy

Quantifying the impact of GST on prices is a tricky task. We utilise the recently developed casual interference analysis by Brodersen et al. (2015) to estimate the size of the price effect of GST empirically. The Causal Impact method employs Bayesian structural time-series models to explain the temporal evolution of an observed outcome. Here, we model the counterfactual to see how the response variable would have evolved if the intervention did not take place. This methodology is very similar to the synthetic control method (Abadie & Gardeazabal, 2003) to capture the true impact of an intervention. Both the methods employ

the control variables to construct a counterfactual of the treated variable to give us an idea of the trend if the treatment had not happened.

The difference between Synthetic Control and Causal Impact is that Synthetic Control uses only pre-treatment variables for matching. In contrast, Causal Impact uses the entire pre-and post-treatment time series of predictor variables for matching. In the case of CausalImpact, we assume a set control time series that were *themselves not affected by the intervention but nevertheless acted as a predictor of the treatment variable.* Suppose these control variables were affected by the intervention. In that case, we might falsely under- or overestimate the actual effect or falsely conclude that there was an effect even though, in reality, there was not. Further, the model also assumes that the relationship between covariates and treated time series remains stable throughout the pre and post-period intervention.

Using the causal impact model, we estimate nine models, where the corresponding dependent variables are: CPI(Overall), CPI(Core), CPI(Food), CPI(F&B), CPI(Pan, Tobacco, Intoxicants), CPI(Clothing& footwear), CPI(Housing), CPI(Miscellaneous) and CPI(Non-Exempted F&B), and the covariates are Exchange rate, Repo rate and Energy prices.

3.2 Data Sources

We select the monthly CPI growth rate as the treatment variable for modelling purposes. As for the covariates, we select monthly INR/USD bilateral exchange rate, energy price index and the repo rates. These three variables are found to influence inflation, and we assume that the implementation of the GST in no way influences them. The data spans from January 2011 to December 2020. This is our primary price variable of interest since the Central bank has adopted a price target following the adoption of Flexible Inflation Targeting (FIT). The price/inflation is measured using the New CPI data. Importantly, to measure the impact of GST on prices, CPI is the most appropriate since it includes taxes that final consumers pay.

The Central Statistical Office (CSO), Ministry of Statistics and Programme Implementation (MoSPI), has introduced the All-India Consumer Price Index (CPI) since January 2011 on Base 2012=100. It releases data on CPI for Rural (R), Urban (U), and Combined (C). The CSO has revised the Base Year of the CPI from 2010=100 to 2012=100 with effect from

January 2015. This study used monthly CPI inflation data[1]. This study has considered the CPI (Combined) (*henceforth* CPI-C) measure of price indices.

The CPI indices are spliced with the base period 2012=100. The CPI data is available from January 2011 to December 2020. The CausalImpact method requires a more extended time period to train the model (*pre-intervention period*). However, the new CPI series data do not permit us since data is available from January 2011.

3. Results and Discussion

The results provide us with an interesting picture of the impact of GST on price levels. First, we look into the overall price index (CPI). Here, the actual CPI growth in the GST period is 4.61%, whereas the counterfactual is 3.24%. Without the implementation of GST, the CPI growth would have been 3.24%, indicating that, with the implementation of GST, CPI grew by 1.37%. Similarly, we see a statistically significant increase of 1.04% in the Core CPI growth post GST period. GST is found to have a significant positive impact in Pan, Tobacco and Intoxicants, Clothing and Footwear, Housing and Miscellaneous sectors. In the case of Non-exempted food and beverages, implementation of GST is found to have a negative impact of 4.42% on price levels. To summarise, we can see that the implementation of GST has resulted in a decrease in price levels of food items. In contrast, it positively impacts sectors such as Pan, Tobacco and Intoxicants, Clothing and Footwear, Housing and Miscellaneous.

To summarise our results from the analysis of various CPI-based commodity price indices, the implementation of GST has resulted in a decrease in price levels of food items. In contrast, it significantly impacts commodity groups such as headline CPI, Pan, Tobacco and Intoxicants, Clothing and Footwear, Housing, Miscellaneous, and Non-exempted F&B. On the other hand, commodity groups such as Food, Food & Beverage (F&B), and Non-exempted CPI did not experience any significant effect of GST in the post-intervention period

[1] This is computed as: $g = \frac{Y_t - Y_{\{t-12\}}}{Y_{\{t-12\}}} * 100$.

4. Concluding remarks

This paper analysed the impact of GST on price levels (CPI) for India using a causal inference model while controlling for factors such as exchange rate, interest rate, and energy prices. We found that GST implementation has resulted in a decrease in price levels of food items while having a significant positive impact on headline CPI, Pan, Tobacco and Intoxicants, Clothing and Footwear, Housing, Miscellaneous, and Non-exempted F&B. However, commodity groups such as Food, Food & Beverage (F&B), and Non-exempted CPI did not experience any significant effect of GST in the post-GST period.

To conclude, our study found evidence that GST positively impacted the price levels of the non-food sector. In the case of Food, GST reduces the price levels, which is desirable. However, the pertinent question is whether this effect is permanent or transitory. If GST is going to have a permanent impact on price levels, it might be a matter of concern. As the GST was implemented only in the recent past, there is not enough data to analyse the long-run impact of GST on the price levels.

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