

Effects of GST on Inflation in India: Some Preliminary Findings

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Outline

- Motivation
- Cross-country evidence from literature
- Objective, Main finding and Contribution
- Inflation Dynamics and Policy regime shifts post 2011
- Estimation Strategy
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- Main takeaways

Motivation

- Indian indirect tax regime shifted from multiple tax regime to a **Uniform rate value added Goods and Services** tax regime in July 2017
- Long standing public debate on probable costs and benefits of GST regime replacing long-existed multiple tax regime
- **Potential benefits:**
 - Promote uniform tax structure across states
 - Remove cascading effects of taxes
 - Increase taxpayer base
 - Provide online procedures to increase ease of doing business
 - Increase efficiency of logistics and distribution system
 - Promote competitive pricing, consumption and growth
- **Potential costs:** Fixed costs for producers and sellers to comply with govt. rules and system
- **Expected impact on price:** Reduce prices via reducing cascading effects of multiple tax layers and increasing efficiency of logistics and distribution system
- **How does GST impact prices in India: CPI, WPI and their major components—food and core?**

How does GST affect inflation?

Mixed cross country evidence

Country	Date of GST adoption	Impact on CPI inflation	Reference
Australia	July 2000	One time transitory increase in prices due to adjustment to government charges and taxes	Dixon and Lim (2004)
Australia: 8 capital cities	2000	One time transitory increase, uniform effect across cities	Valadkhani and Layton (2004)
Australia, New Zealand and Canada	2000; 1986; 1991	Short run reduction in inflation	Bolton and Dollery (2005)
UK	April 1973	No significant effect as GST replaced the existing Purchase Tax	Gelardi (2014)
Canada	January 1991	Inflationary	Gelardi (2014)

How does GST affect inflation?

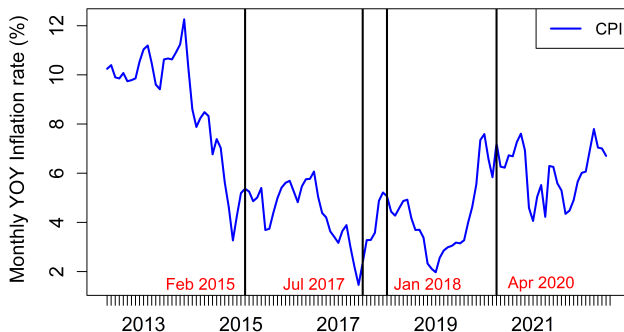
Mixed cross country evidence

Country	Date of GST adoption	Impact on CPI inflation	Reference
Australia, Singapore, Japan, Canada, China, Greece, Portugal, Thailand, New Zealand, Maldives and Vietnam		China: significantly inflationary as pre-GST spending rush caused inflation spiral; Portugal & New Zealand : significant reduction in inflation	Sahoo, Jain and Jain (2017)
India	July 2017	Expected effect: moderate, on average 0.6% rise	Morris et. Al. (2017)
India	July 2017	No significant impact on inflation in non-special category states (treatment group) compared to special category states (control group)	Das (2018)

Present study: Objective, Findings, Contribution

- **Objective:** How does GST implementation in India affect CPI and WPI inflation and their major components like food and core inflation after controlling for macroeconomic developments and other event such as covid-19 pandemic?
- **Findings:** GST implementation is found to have significant negative effect on inflation in India
- **Contribution:**
 - Contributes to limited literature on inflationary consequence of GST implementation in emerging economies
 - Applies intervention method in multivariate framework, controlling for other events
 - Applies structural break test to endogenously identify ex-post intervention date/ major events and duration of impacts

CPI inflation and major policy stances in India post 2011



- Apr 2012-Dec 2013: Sticky double digit headline inflation at 10.4% on account of high and sticky food inflation
- Feb 2015: India to target $4 \pm 2\%$ CPI inflation over medium to long run
- Jan 2014-Jan 2015: Av. inflation at 6.6%

CPI inflation and major policy stances in India post 2011

- July 2017: CGST, IGST, and SGST/UTGST are levied at rates that have been mutually agreed upon by the states and Centre.
- GST implemented under following slabs 0%, 5%, 12%, 18%, 28%
- Mar 2015-June 2017 (pre-GST): Average headline inflation 4.5%
- Jan 2018: Exemption the central tax on intra-state supplies of selected goods, re-structure of categories from under 28% to 18%
- Jul 2017-Dec 2017 (pre rate revision): Average headline inflation at 3.8%
- Jan 2018-Mar 2020 (pre covid): Average headline inflation at 4.2%
- April 2020: Nation-wide lockdown
- Apr 2020-Jul 2022 (Post covid): Average headline inflation at 6.0%

Estimation strategy

- Intervention method where dummy variables capture major events like GST implementation and revision of GST rate
- Effect of policy intervention may not be instantaneous on ex-ante policy implementation date
- Endogenous (ex-post) identification of policy regime shifts using Bi-Perron (1998, 2003) structural break tests on inflation series
- Dummy for a particular event takes value 1 from the identified break date, prior to next break identified; otherwise 0
- Let two break dates identified for a time series spanning periods 1, 2,, T on T_k and T_{k+10} Two dummies D_1 and D_2 associated to break dates T_k and T_{k+10} will be

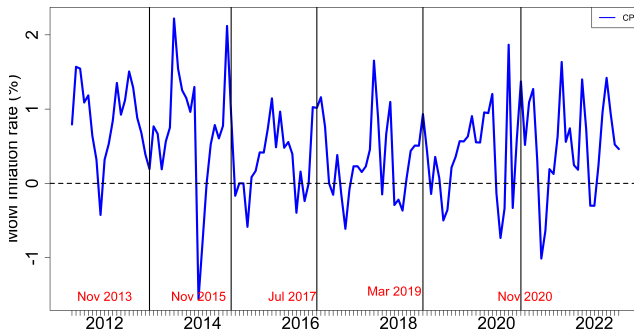
$$D_1 = 1 \text{ for } T_k, T_{k+1}, \dots, T_{k+9}; \text{ otherwise } 0 \quad (1)$$

$$D_2 = 1 \text{ for } T_{k+10}, T_{k+11}, \dots, T; \text{ otherwise } 0 \quad (2)$$

- Multivariate analysis (VAR/VECM) controlling for other macro-developments

- Monthly time series data from April, 2011 to July, 2022
- Impact variables
 - CPI: Headline, Food, Core (net of petrol and diesel for conveyance)
 - WPI: Overall, Manufactured food, Non-food manufacturing
- Controls: Crude oil price, WPI food articles, Inflation expectations, Call money rate, Rupee-dollar exchange rate, Non-food credit
- Seasonality in CPI, WPI and their components are statistically insignificant
- All variables are $I(1)$ even controlling for possibility of structural breaks (Zivot-Andrews, 1992)

Structural break found in CPI inflation in month of GST roll out



Chronology of breaks related to events:

- **Nov 2013:** Easing of food inflation from persistently high rate for 5 years
- **Nov 2015:** India entered formal inflation targeting regime on February 20, 2015
- **Jul 2017:** Roll out of GST regime
- **Mar 2019:** Negative investment shock – GFCF growth 1.6% in 2019-20 vis a vis 11.2 % in 2018-19
- **Nov 2020:** Covid-19 break out in March 2020 leading to lockdown

Structural breaks in CPI inflation since May 2011

Inflation indicator (MoM)	Break date	Break date	Break date	Break date	Break date
CPI	Nov 2013: Easing of food inflation after 5 years (6.3%)	Nov 2015: Shift to inflation targeting (4.4%)	Jul 2017: GST roll out (3.7%)	Mar 2019: Negative investment shock (5.4%)	Nov 2020: Covid, lockdown (5.6%)
CPI food	Nov 2013 (6.8%)	Nov 2015 (3.9%)	Jul 2017 (1.7%)	Mar 2019 (7.5%)	Nov 2020 (4.8%)
CPI core	Oct 2015: Inflation targeting (4.7%)	Jun 2017: GST, forward looking (5.0%)	Oct 2018: GST rate revised (4.9%)	Jan 2020: Covid beginning (4.9%)	Apr 2021: Covid: demand revival in face of supply distortion (5.8%)

Structural breaks in WPI inflation since May 2011

Inflation indicator (MoM)	Break date	Break date	Break date	Break date	Break date
WPI	October 2013: Easing of food inflation (2.8%)	April 2015: Inflation Targeting regime (-2.0%)	December 2016: Demonetisation (3.7%)	October 2018: GST rate revision (2.2%)	May 2020: covid, lockdown (8.7%)
WPI manu- factured food	Nov 2013	Jul 2015: Inflation targeting regime	Jan 2017: GST	Mar 2019	Oct 2020: Covid
WPI non-food manu	Nov 2013	May 2015: Inflation targeting	Dec 2016: Demonetisation	Nov 2018: GST rate revision	August 2020: covid

Findings

Price indicator	Controls	Model	Findings
CPI	Crude oil, WPI food articles, Non-food credit, Rs./Dollar exchange rate, interest rate, household inflation expectation, dummies associated to structural breaks	VECM, No of co-integration relations: 2	<ul style="list-style-type: none"> ● Inflation targeting and GST reduced CPI inflation significantly ● Covid also impacted negatively since November 2020 due to negative demand effect
CPI Food	Crude oil, WPI food articles, Non-food credit, Rs./Dollar exchange rate, interest rate, household inflation expectation, dummies associated to structural breaks	VECM, No of co-integration relations: 2	<ul style="list-style-type: none"> ● Inflation targeting and GST reduced CPI inflation significantly ● Covid also impacted negatively since November 2020 due to negative demand effect

Findings

Price indicator	Controls	Model	Findings
CPI core	Crude oil, Non-food credit, Rs./Dollar exchange rate, interest rate, household inflation expectation, dummies associated to structural breaks	VECM, No of co-integration relations: 1	<ul style="list-style-type: none"> Initially GST roll out increased core inflation, but reduced it with the revision of the rates; however results are not statistically significant During later phase of pandemic, demand revival in the face of supply chain distortion significantly increased core inflation
WPI	Crude oil, WPI food articles, Non-food credit, Rs./Dollar exchange rate, interest rate, dummies associated to structural breaks	VECM, No of co-integration relations: 1	WPI inflation reduced significantly following GST rate revision

Findings

Price indicator	Controls	Model	Findings
WPI manuf. food	Crude oil, WPI food articles, Non-food credit, Rs./Dollar exchange rate, interest rate, dummies associated to structural breaks	VECM, No of co-integration relations: 2	Negative investment shocks seemed to reduce manuf. food inflation
WPI non-food manuf.	Crude oil, Non-food credit, Rs./Dollar exchange rate, interest rate, dummies associated to structural breaks	VAR in first difference	Inflation targeting monetary policy and GST rate revision significantly reduced WPI core inflation

Robustness of findings

- **Univariate intervention method:**

- Effect of GST regime remains for one year and three months from the month of GST implementation
- 15 month dummies capture the effect
- CPI inflation follows a seasonal ARIMA $(p, d, q)(P, D, Q)$ model
- No significant effect of GST found even after 8 months of implementation

- **Multivariate intervention method:**

- VECM model with 15 month dummies
- GST impacted CPI inflation negatively after 6 months
- Impact is transitory

Robustness of findings

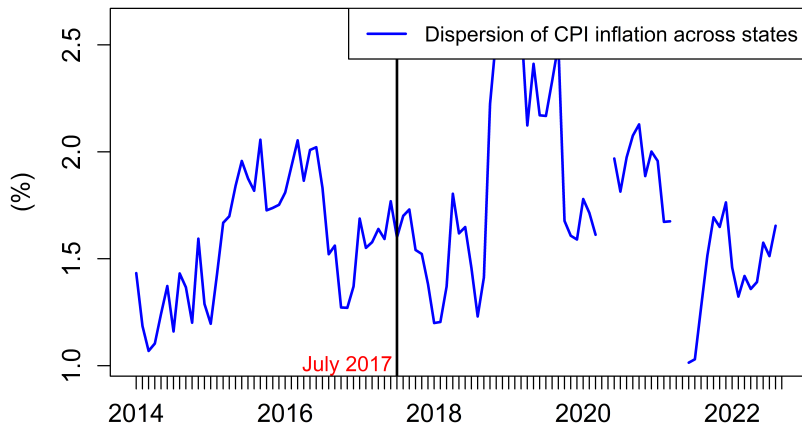
- **Auto Regressive Distributed Lag (ARDL) model**

$$\Delta y_t = c - \alpha(y_{t-1} - \Theta X_{t-1}) + \sum_{i=1}^{p-1} \psi_{yi} \Delta y_{t-i} + \sum_{i=1}^{q-1} \psi_{xi} \Delta X_{t-i} + BD_t + u_t \quad (3)$$

- Inflation targeting and **GST** reduced CPI inflation significantly
- Negative investment demand shock lowered CPI inflation rate
- Covid also impacted negatively since November 2020 due to negative demand effect

How does GST affect inflation rate variations across states?

GST does not seem to reduce inflation rate dispersion across states



Main takeaways

- GST implementation in India affected CPI, WPI and their components heterogeneously
- CPI headline, CPI food and WPI inflation declined following GST implementation in 2017
- CPI core inflation rose initially after GST implementation, but declined after re-structuring of rates, although effects are not significant
- WPI non-food manufacturing inflation declined after GST rate re-structuring
- GST does not seem to reduce cross state dispersion in headline inflation

Thank you