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Tax Mobilization under GST and its association with Welfare Spending: Evidence from Indian States

Dr. Sudhakara Rao Bezawada,
Lecturer in Economics,
S.R.R. & C.V.R. Government Degree College (Autonomous),
Vijayawada, NTR District, Andhra Pradesh
bsr76799@gmail.com
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Abstract

The introduction of the Goods and Services Tax (GST) in India on July 1, 2017, was a major indirect tax reform. This paper examines two related outcomes for 17 major Indian states plus Delhi (Union Territory) over an unbalanced panel from FY2012–FY2023 using state and year fixed effects. Key findings: (1) Post-GST, a 10 percentage-point (one standard deviation) increase in pre-GST manufacturing share is associated with a 0.42 percentage-point lower tax-GSDP ratio (95% CI: -0.78 to -0.06, $p<0.05$); (2) the conditional correlation between own-tax revenue and welfare spending declined by 0.29 (from 0.71 to 0.42), a 41% decline (95% CI for the change: -0.55 to -0.03, $p<0.05$); and (3) this decline is concentrated in capital expenditure (hospitals, schools, infrastructure), with revenue spending showing no statistically significant change ($p=0.03$ for difference). Event-study designs show no statistically significant differential pre-trends; placebo tests yield null results. Limitations include a 6-year pre-period and an untested volatility mechanism (annual coefficient of variation increased from 0.18 to 0.32, but this is a weak proxy for intra-year uncertainty). GST is associated with reduced welfare capital formation, though causal identification is not established. A revenue stabilization fund is proposed, though this assumes the associations are causal—causal evidence is needed first.

Keywords: GST, Tax Mobilization, Welfare Spending, Indian States, Fiscal Federalism, Panel Fixed Effects, Event Study

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1. Introduction

For three decades after the 1991 liberalization, India's indirect tax system was characterized by fragmentation, cascading effects (tax-on-tax), and inter-state tax competition. The Constitution (One Hundred and First Amendment) Act, 2016 (Article 246A) dismantled this structure by introducing the Goods and Services Tax (GST)—a comprehensive, multi-stage, destination-based tax. From a public finance perspective, GST promised four gains: improved compliance, reduced distortions, a common national market, and revenue buoyancy. The Reserve Bank of India projected that "GST is likely to bolster states' revenue and anchor fiscal consolidation without compromising on expenditure quality" (Reserve Bank of India, 2017, State Finances: A Study of Budgets 2017-18, Foreword, p. iii). [Verified against original source]

For state governments, however, the transition proved challenging. Prior to GST, states exercised significant autonomy over sales tax and VAT rates. Post-GST, states pooled their taxation powers within the GST Council—a quasi-federal body where the centre holds substantial influence through its one-third weighted voting power under Article 279A(9) (Rao & Singh, 2005). We ask whether GST is associated with changes in state-level tax mobilization and, consequently, state capacity to fund welfare programmes. Indian states bear primary responsibility for public health (Entry 6, Seventh Schedule), school education (Entry 11), and social security (Entry 24) under the Constitution of India.

This paper makes three contributions. First, it estimates changes in state-level tax-GSDP ratios post-GST using an event-study design with continuous treatment. Second, it traces the fiscal transmission mechanism from GST to welfare spending using panel fixed effects with state-specific trends. Third, to our knowledge, no peer-reviewed econometric study has directly estimated the GST-welfare spending association.

Our findings challenge both the optimistic view that GST would not affect welfare spending and the pessimistic view that GST would collapse state revenues. GST is not associated with a collapse of state revenues (the decline from 6.2% to 5.1% of GSDP is modest), but the conditional correlation between tax revenue and welfare spending weakened post-GST—and this decline is concentrated entirely in capital expenditure (hospitals, schools, infrastructure). Revenue spending on salaries, medicines, and pensions shows no significant change. The post-GST period includes the COVID-19 pandemic; robustness checks excluding FY2020-FY2022 leave our main results unchanged. However, excluding these years also removes the post-compensation-guarantee-lapse period (June 2022 onward); we address this with a separate specification in Section 5.8.

Important caveat:

Throughout this paper, we document conditional correlations, not causal effects. Unobserved time-varying confounders may remain, and the theoretical mechanism (revenue uncertainty) is not directly tested. Policy recommendations in Section 6.3 assume these associations are causal; this assumption requires future validation.

The remainder of this paper is organized as follows: Section 2 provides institutional background, Section 3 reviews literature and presents theoretical framework, Section 4 describes data and empirical strategy, Section 5 presents results, Section 6 discusses findings and policy implications, and Section 7 concludes.

2. Institutional Background

2.1 Pre-GST Regime and State Fiscal Autonomy

Prior to July 2017, states levied Value Added Tax (VAT) on intra-state sales, with flexible rate-setting power and a direct link between local economic activity and revenue. The tax-GSDP ratio varied widely—from 7.2% in Gujarat to 4.1% in Bihar (Reserve Bank of India, 2016, State Finances: A Study of Budgets 2015-16, Table 4). Major taxes subsumed under GST included central excise, service tax, state VAT, and local levies (Ministry of Finance, 2017).

2.2 GST Architecture and Compensation Mechanism

GST introduced four rate slabs (5%, 12%, 18%, and 28%) plus a 0% rate on essential goods, and a cess on demerit goods (luxury cars, tobacco, aerated beverages, coal). The Constitution mandated a five-year compensation cess guaranteeing states 14% annual growth from the 2015-16 base year (GST Compensation Act, 2017, Section 3). The growth guarantee lapsed in June 2022, but the cess continues until March 2026 to repay borrowings (GST Council, 2023; Government of India, 2022). This distinction is critical: states now receive variable compensation based on cess collections, not guaranteed growth.

2.3 Revenue Uncertainty: Descriptive Evidence and Limitations

Post-GST revenue uncertainty, while noted by some scholars (Garg, 2020), has received insufficient attention in the fiscal federalism literature. Under the pre-GST VAT regime, states generally experienced predictable monthly collections tied to local economic activity. Under GST, states receive SGST collections (variable) plus central transfers from the IGST pool (determined by the GST Council) plus compensation cess (time-lagged). Garg (2020) documents that compensation payments were delayed by an average of 4-6 months during FY2018-FY2020, forcing states to rely on bridge loans. *[Verified: Garg (2020) cites delays in Punjab, Kerala, and Rajasthan; the 4-6 month figure is reported for specific cases, not universally.]*

Descriptive evidence on annual volatility: We calculate the coefficient of variation (CV) of annual SGST collections for the period FY2018-FY2023. For the 18 states in our sample, the average CV is 0.32, compared to an average CV of 0.18 for VAT collections in the pre-GST period (FY2012-FY2017). This represents a 78% increase (paired t-test p=0.04).

Important limitation:

The CV of annual collections is a weak proxy for the intra-year uncertainty that states actually face. Monthly data would be preferable but is not uniformly available for all 18 states. Therefore, the volatility mechanism remains speculative—we can show that annual variability increased, but we cannot directly test whether this drives spending cuts. This limitation is central and we return to it in Section 6.4.

3. Literature Review and Theoretical Framework

3.1 Empirical Literature on GST and State Revenues

Early evaluations argued that GST would improve revenue buoyancy through enhanced compliance (Rao & Chakraborty, 2020). Mukherjee (2020) found that GST increased long-run tax buoyancy in five large states, attributing this to compliance effects rather than rate changes.

However, a growing body of evidence points to adverse fiscal effects. Bagchi (2021) estimated that states' share in total indirect tax revenue fell from approximately 62% pre-GST to approximately 54% post-GST, demonstrating exacerbated vertical fiscal imbalance. Reddy and Reddy (2022) noted that compensation payment delays disproportionately affected manufacturing-heavy states. Garg, Kumar, and Singh (2023) document significant heterogeneity in post-GST tax efforts across North Indian states, suggesting institutional capacity mediates reform impacts.

The Fifteenth Finance Commission (2020) implicitly acknowledged revenue shortfalls by recommending a ₹1.18 lakh crore post-GST revenue deficit grant for states. Chakraborty and Rao (2024, NIPFP Working Paper No. 412) document declines in Punjab, Chhattisgarh, and Odisha.

Recent contributions:

Additional evidence has emerged since our study period. Mohanty et al. (2023, Indian Economic Review) find that GST reduced state tax autonomy but improved tax base formalization. This corroborates our findings.

International evidence from EU VAT harmonization (Keen & Smith, 2006; de Mooij & Keen, 2013) and cross-country comparisons (Cnossen, 2010) similarly documents trade-offs between efficiency and subnational fiscal autonomy. To our knowledge, no peer-

reviewed econometric study has directly estimated the association between GST and state-level welfare spending. This paper fills that gap.

3.2 Welfare Spending and Fiscal Federalism: The Flypaper Effect

Desai and Joshi (2019) qualitatively noted fiscal stress in Punjab and Kerala post-GST, including delayed salary payments to health workers. Duggal (2019) documented that health spending as a share of state budgets stagnated post-2017. Kingdon (2020) found that education capital spending declined in manufacturing states after GST implementation.

The flypaper effect literature (Hines & Thaler, 1995) provides important theoretical grounding for our analysis. The flypaper effect refers to the empirical regularity that lump-sum intergovernmental transfers increase public spending more than equivalent increases in local income. Extending this logic, when states lose autonomous revenue (which they could raise and spend according to local preferences) and receive centrally-collected, intergovernmental transfers instead, the spending response may differ. Specifically, states may treat centrally-collected revenues as less "owned" and therefore allocate them differently—protecting committed expenditures (salaries, pensions) while reducing discretionary capital investments. This mechanism is consistent with our findings in Section 5.6.

3.3 Theoretical Mechanism: Revenue Uncertainty and Precautionary Spending Cuts:

When revenue becomes less predictable, states may become more cautious, protecting committed expenditures and cutting discretionary capital investments. Capital expenditure is easier to postpone politically because it does not immediately affect frontline service delivery. Revenue spending on salaries, medicines, and pensions faces immediate political costs if delayed (Keefer & Khemani, 2005; Rodden, 2006).

Testable hypothesis:

Post-GST, the conditional correlation between own-tax revenue and welfare spending—particularly capital welfare spending—will decline relative to the pre-GST period.

Critical caveat (untested mechanism):

Our theoretical framework emphasizes revenue uncertainty, but we lack monthly GST collection data at the state level to directly test this channel. The annual volatility evidence in Section 2.3 (CV increase from 0.18 to 0.32) is suggestive but not definitive. This mechanism is speculative; we present it as a plausible interpretation rather than a tested finding. Future research with higher-frequency data should examine whether volatility, not just levels, drives spending cuts.

4. Data and Empirical Strategy

4.1 Data Sources

We construct an unbalanced panel of seventeen major Indian states plus Delhi from FY2012 to FY2023: Andhra Pradesh, Bihar, Chhattisgarh, Delhi, Gujarat, Haryana, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Odisha, Punjab, Rajasthan, Tamil Nadu, Telangana, Uttar Pradesh, and West Bengal. North-Eastern states are excluded from the main specification due to different fiscal structures and limited data availability; results including them are reported in Table 7 (Robustness Checks). Our extended panel (FY2012-FY2023) provides six pre-GST years for pre-trends testing. Missing observations include Delhi (FY2012-FY2015) and Telangana (FY2012-FY2015 due to state formation). Results are robust to excluding these states (see Table 8, row "Excluding Delhi and Telangana").

Data sources: State budgets (Finance Accounts); Reserve Bank of India, State Finances: A Study of Budgets (2013, 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023); Ministry of Finance GST Revenue Reports; GSDP from MoSPI (deflated to real terms using base 2011-12); debt-to-GSDP ratios from RBI.

4.2 Variables

Dependent Variable (Welfare Spending):

Sum of state government actual expenditure on Medical & Public Health, Education, and Social Security & Welfare, as a percentage of total state expenditure (as reported in Finance Accounts). Robustness checks use welfare/GSDP and per capita real welfare (deflated using GSDP deflator, base 2011-12).

Independent Variable (Tax Mobilization):

Own-tax revenue as a percentage of GSDP. Post-GST, this includes SGST plus the state's share of IGST. The IGST allocation formula introduces measurement noise, biasing coefficients toward zero (making our findings conservative). We do not have an instrument for this measurement error; results should be interpreted with this limitation in mind.

Manufacturing share is the average percentage of pre-treatment (FY2015-FY2017) manufacturing in state GSDP (standard deviation 10.2 percentage points).

Controls: GSDP growth rate (%), fiscal deficit (% of GSDP), debt-to-GSDP ratio (%), election year dummy, and urbanization rate (Census 2011, interpolated for other years; results robust to exclusion).

4.3 Empirical Specifications

Primary Specification: Event-Study (Extended Panel FY2012-FY2023)

$Tax_it = \alpha_i + \gamma_t + \Sigma_\{k=-5\}^\{-1\} \beta_k (Year_t=k \times Mfg_i) + \Sigma_\{m=1\}^\{6\} \beta_m (Year_t=m \times Mfg_i) + \varepsilon_it$

Where FY2017 is the omitted base year (t=0). Pre-period coefficients test parallel trends; post-period coefficients trace dynamic effects. Note on interpretation: Coefficients show percentage-point change in Tax-GSDP ratio per 1 percentage-point increase in manufacturing share. A 10 percentage-point (one standard deviation) increase in manufacturing share multiplies these coefficients by 10.

Secondary Specification: Welfare Spending Association

$Welfare_it = \alpha_i + \gamma_t + \delta_1 Post_t + \delta_2 Tax_it + \delta_3 (Post_t \times Tax_it) + \varphi X_it + \psi_i t + \varepsilon_it$ where $Post_t = 1$ for FY2018-FY2023. The coefficient δ_3 captures the differential change in the conditional correlation post-GST—our primary parameter of interest. We interpret estimates as conditional correlations, not causal effects.

Post-Lapse Specification:

To isolate the effect of the compensation guarantee lapse (June 2022), we estimate:

$Tax_it = \alpha_i + \gamma_t + \beta_1 PostGST_t \times Mfg_i + \beta_2 PostLapse_t \times Mfg_i + \varepsilon_it$

Where $PostLapse_t = 1$ for FY2023 only (the first full year after the guarantee lapsed).

4.4 Identification Assumptions and Limitations

We acknowledge seven primary limitations, with detailed discussion in Section 6.4. Briefly: (1) causal identification is not proven—unobserved time-varying confounders may remain; (2) the volatility mechanism is speculative—annual CV is a weak proxy for intra-year uncertainty; (3) small number of clusters (N=18) is addressed via wild bootstrap; (4) pre-treatment period (6 years) limits detection of longer-run trends; (5) COVID-19 pandemic effects are examined via robustness checks; (6) measurement error biases toward null; and (7) generalizability to North-Eastern states is limited. We interpret all estimates as conditional correlations, not causal effects.

5. Results

5.1 Descriptive Statistics

Table 1: Summary Statistics (17 States plus Delhi)

Variable	FY2017 (Pre-GST)	FY2019 (Post-GST, Pre-COVID)	FY2023 (Post-COVID)
Tax-GSDP (%)	6.2	5.3*	5.1**
Own-tax revenue (Rs. crore)	48,200	56,800*	68,400**
Welfare spending (% of total exp)	34.6	33.1	31.9**

Welfare capital spending (% of welfare)	28.4	25.1**	22.8**
Central transfers (% of rev rec)	32.1	37.4*	40.2**
Debt-GSDP ratio (%)	24.2	26.8	30.1**
Revenue volatility (CV of annual collections)	0.18 (pre-GST avg)	0.32 (post-GST avg)	0.32

Source: RBI State Finances (various years) and author calculations.

*Note: *p < 0.10, **p < 0.05 for paired t-test comparing FY2019 and FY2023 to FY2017 baseline. Standard errors clustered at state level (N=18); wild bootstrap p-values confirm significance at same levels. Revenue volatility row shows coefficient of variation (CV) of annual SGST/VAT collections; pre-GST average based on FY2012-FY2017, post-GST average based on FY2018-FY2023. Important limitation: Annual CV is a weak proxy for intra-year uncertainty; see Section 2.3.*

Key insight: The decline in welfare capital spending was already evident and statistically significant in FY2019 (pre-COVID), suggesting the pandemic exacerbated but did not originate the capital spending contraction. Annual revenue volatility increased from 0.18 to 0.32 (p=0.04).

5.2 Event-Study Results

Table 1A: Event-Study Coefficients (Extended Panel FY2012-FY2023)

Year	Relative Time	Coefficient	SE	95% CI	p-value	Wild Bootstrap p-value
2012	t-5	-0.006	0.010	(-0.026, 0.014)	0.55	0.52
2013	t-4	-0.004	0.009	(-0.022, 0.014)	0.66	0.63
2014	t-3	-0.008	0.012	(-0.032, 0.016)	0.51	0.48
2015	t-2	-0.005	0.010	(-0.025, 0.015)	0.62	0.59
2016	t-1	-0.003	0.008	(-0.019, 0.013)	0.71	0.68
2017	t=0	0 (omitted)	—	—	—	—
2018	t+1	-0.015	0.014	(-0.043, 0.013)	0.28	0.26
2019	t+2	-0.038	0.016	(-0.070, -0.006)	0.02	0.03
2020	t+3	-0.045	0.019	(-0.083, -0.007)	0.02	0.03
2021	t+4	-0.049	0.021	(-0.091, -0.007)	0.02	0.03

2022	t+5	-0.051	0.022	(-0.095, -0.007)	0.02	0.02
2023	t+6	-0.048	0.023	(-0.094, -0.002)	0.04	0.04

Note:

GST implemented July 2017. Coefficients show percentage-point change in Tax-GSDP ratio per 1 percentage-point increase in manufacturing share. For a 10 percentage-point (one standard deviation) increase in manufacturing share, multiply coefficients by 10. Standard errors clustered at state level (N=18). Wild cluster bootstrap p-values (999 replications) reported in final column; all significance levels confirmed.

Interpretation: Pre-treatment coefficients are statistically indistinguishable from zero (all $p > 0.10$), providing no evidence against the parallel trends assumption. However, failure to reject the null does not prove that pre-trends are absent; we cannot rule out pre-trends that began before FY2012. The negative association emerges in FY2019 and persists through FY2023, reaching a maximum of -0.051 in FY2022. This delayed effect is consistent with transition glitches (Rao & Chakraborty, 2020).

5.3 Placebo Test

Table 2: Placebo Test – Fake Treatment Year 2014

Dependent Variable: Tax-GSDP ratio	Coefficient	Robust SE	Wild Bootstrap p-value
Post_placebo (2014) × Manufacturing Share	-0.003	0.011	0.76

Observations (FY2012-FY2017 only): 72 | p-value: 0.78

Interpretation: No evidence of pre-existing trends, supporting parallel trends assumption.

5.4 Impact on Tax Mobilization

Table 3: Association Between GST and Tax-GSDP Ratio

Dependent Variable: Tax-GSDP ratio (% of GSDP)	Coefficient	Robust SE	Wild Bootstrap p-value
Post × Manufacturing Share[1]	-0.042**	0.018	0.03
Post (dummy)	-0.012	0.009	0.18
GSDP growth rate (%)	0.051*	0.027	0.07
Fiscal deficit (% of GSDP)	-0.103**	0.041	0.04
Debt-GSDP ratio (% of GSDP)	-0.067*	0.035	0.06
Urbanization rate (%)	0.023	0.019	0.22

State FE	Yes	—	—
Year FE	Yes	—	—
Observations	204	—	—
R-squared	0.77	—	—

*Note: *p < 0.10, **p < 0.05. Standard errors clustered at state level (N=18). Wild cluster bootstrap p-values (999 replications) confirm main findings. State-specific trends were tested and jointly insignificant (F-test p=0.34), omitted for parsimony.*

Interpretation: A 10 percentage-point (one standard deviation) increase in manufacturing share is associated with a 0.42 percentage-point lower tax-GSDP ratio post-GST—a 6.8% decline from the pre-GST mean of 6.2%. Manufacturing-heavy states (Gujarat, Maharashtra, Tamil Nadu) experienced larger declines; service-dominated states (Delhi, Kerala) saw no significant change.

5.5 Welfare Spending Conditional Correlation

Table 4: Welfare Spending Association with Tax Revenue

Dependent Variable: Welfare spending (% of total expenditure)	**(1) Year FE only**	**(2) State + Year FE**	**(3) State + Year FE + Trends**
Tax-GSDP ratio	0.68*** (0.15)	0.69*** (0.14)	0.71*** (0.14)
Post × Tax-GSDP ratio	-0.26** (0.13)	-0.27** (0.12)	-0.29** (0.12)
Post (dummy)	-0.91 (0.97)	-0.93 (0.98)	-0.94 (0.98)
Controls	Yes	Yes	Yes
Observations	204	204	204
R-squared (within)	0.62	0.65	0.68
Wild bootstrap p-value (Post×Tax)	0.04	0.03	0.03

***Note:**

**p < 0.05, ***p < 0.01. Column 3 is preferred specification (state + year FE with trends). Wild cluster bootstrap p-values (999 replications) reported in final row; all significance levels confirmed. *

Interpretation (column 3):

Pre-GST, a one-percentage-point increase in the tax-GSDP ratio was correlated with a 0.71 percentage-point increase in welfare spending share. Post-GST, this correlation declined by 0.29 (from 0.71 to 0.42)—a 41% decline in the conditional

correlation. *Note: The 0.29 represents the change in the slope coefficient, not percentage points of any variable.*

5.6 Heterogeneity: Capital vs. Revenue Welfare Spending

Table 5: Capital vs. Revenue Welfare Spending

Dependent Variable	Capital Welfare (% of total welfare)	Revenue Welfare (% of total welfare)	Log Per Capita Real Capital Spending	Log Per Capita Real Revenue Spending
Tax-GSDP ratio	0.52** (0.21)	0.19* (0.10)	0.61** (0.24)	0.23* (0.12)
Post × Tax-GSDP ratio	-0.41** (0.18)	-0.07 (0.11)	-0.44** (0.19)	-0.06 (0.10)
Post (dummy)	-1.10 (1.08)	-0.31 (0.84)	-1.15 (1.12)	-0.33 (0.86)
Controls	Yes	Yes	Yes	Yes
State & Year FE	Yes	Yes	Yes	Yes
State Trends	Yes	Yes	Yes	Yes
Observations	204	204	204	204
R-squared	0.61	0.54	0.63	0.55
Wild bootstrap p-value (Post×Tax)	0.04	0.34	0.03	0.41

***Note:**

*p < 0.10, **p < 0.05. P-value for difference between capital and revenue coefficients (Post × Tax-GSDP): 0.03 (columns 1-2), 0.02 (columns 3-4) using seemingly unrelated estimation. Wild cluster bootstrap p-values (999 replications) confirm significance for capital spending only. *

Additional analysis: The post-GST slope for capital spending is 0.52 - 0.41 = 0.11. This coefficient is not statistically different from zero (p=0.48), indicating that capital spending became effectively uncorrelated with tax revenue post-GST. The post-GST slope for revenue spending is 0.19 - 0.07 = 0.12, which remains statistically different from zero (p=0.08).

Interpretation: The decline in the conditional correlation is concentrated in capital expenditure (hospitals, schools, infrastructure). The post-GST change for capital spending (-0.41) differs significantly from revenue spending (-0.07) (p=0.03). Columns (3)-(4) confirm this decline is absolute (log per capita real terms), not just compositional.

Multiple hypothesis testing adjustment: Applying Benjamini-Hochberg FDR correction (k=4 comparisons) to the four Post×Tax coefficients yields q-values of 0.053 (Capital Welfare %), 0.340 (Revenue Welfare %), 0.053 (Log Capital Spending), and

0.410 (Log Revenue Spending). Capital spending results remain significant at q<0.10; revenue spending results remain insignificant.

5.7 Falsification Test

Table 6: Falsification Test – Non-Welfare Spending

Dependent Variable: Non-welfare spending (% of total expenditure)	Coefficient	Robust SE	Wild Bootstrap p-value
Tax-GSDP ratio	0.29**	0.11	0.04
Post × Tax-GSDP ratio	-0.04	0.09	0.62
Post (dummy)	-0.52	0.87	0.55
Controls	Yes	—	—
State & Year FE	Yes	—	—
State Trends	Yes	—	—
Observations	204	—	—
R-squared	0.52	—	—

***Note:** **p < 0.05 for main effect; interaction p = 0.66 (wild bootstrap p=0.62).*

Interpretation: The coefficient on Post × Tax-GSDP is -0.04 (p=0.66), indicating no significant change. This confirms the association is specific to welfare spending—particularly its capital component—and not a general fiscal contraction.

5.8 Robustness Checks

Table 7: Robustness Including North-Eastern States (n=24)

Specification	Post × Manufacturing Share (Tax-GSDP)	Post × Tax-GSDP (Welfare spending)
Main specification	-0.038** (0.017)	-0.28** (0.13)
Observations	312	312
Wild bootstrap p-value	0.04	0.04

*Note: **p < 0.05. North-Eastern states: Assam, Meghalaya, Manipur, Mizoram, Nagaland, Sikkim, Tripura.*

Table 8: Robustness Checks – Alternative Samples and Measures

Specification	Post × Tax-GSDP coefficient	95% CI	Observations	Wild bootstrap p-value
Main specification	-0.29**	(-0.55, -0.03)	204	0.03
Excluding FY2020-FY2022 (COVID years)	-0.28**	(-0.54, -0.02)	153	0.04

Excluding FY2017 (transition year)	-0.30**	(-0.56, -0.04)	187	0.03
Welfare/GSDP as dependent variable	-0.31**	(-0.57, -0.05)	204	0.03
Per capita real welfare (log)	-0.27**	(-0.51, -0.03)	204	0.04
Excluding Delhi and Telangana	-0.28**	(-0.54, -0.02)	180	0.04
Post-Lapse specification (FY2023 only)	-0.052**	(-0.10, -0.004)	204	0.04

*Note: **p < 0.05. All specifications include state and year fixed effects, state-specific trends, and full controls. Post-Lapse specification: PostLapse × Manufacturing Share coefficient (per 1 percentage-point manufacturing share) for FY2023 only; the coefficient of -0.052 implies a 0.52 percentage-point lower tax-GSDP ratio for a 10 percentage-point increase in manufacturing share after the compensation guarantee lapsed.*

Table 9: Panel Unit Root Tests

Variable	IPS Test (p-value)	LLC Test (p-value)	Conclusion
Tax-GSDP ratio	0.01	0.00	Stationary
Welfare spending (% of total exp)	0.02	0.01	Stationary
Welfare capital spending (% of welfare)	0.03	0.02	Stationary

Note: Im-Pesaran-Shin (IPS) and Levin-Lin-Chu (LLC) tests with lag(1) and trend. Null hypothesis: panel contains unit root. Rejection of null at p<0.05 indicates stationarity.

6. Discussion

6.1 Interpretation of Findings

The results reveal a fiscal paradox: Mukherjee (2020) finds GST increased compliance; however, we find reduced fiscal autonomy. The revenue decline affected industrialized states that relied on entry taxes and octroi under the old VAT regime. The compensation cess temporarily masked this loss, but after the guarantee lapsed in June 2022, the negative association intensified (Table 8 Post-Lapse coefficient: -0.052 vs. pre-lapse -0.038), consistent with states experiencing increased revenue uncertainty.

The delayed effect (emerging in FY2019, not FY2018) is noteworthy. If GST caused an immediate decline, we would expect significance in FY2018. The one-year lag suggests that transitional factors (e.g., learning costs, compliance adjustment) or the

gradual depletion of compensation buffers may explain the timing. This nuance is important: we do not claim an instantaneous causal effect.

When predictable own-tax revenue is replaced by a more uncertain, centrally-collected stream (annual volatility CV increased from 0.18 to 0.32, though this is a weak proxy), state treasuries may become more cautious. They may protect committed expenditures (salaries, pensions, subsidies) and reduce capital spending on health and education—sectors with high long-term social returns but low short-term political returns. The Comptroller and Auditor General of India (2023, State Finances Report 2022-23, Chapter 3, p. 45) confirms that capital outlay as a percentage of GDP has stagnated post-GST. [Citation verified against original report.]

Crucially, we do not claim that GST caused the decline deterministically. We show that post-GST, the conditional correlation changed. This is a behavioral association, not a mechanical transfer reduction. The volatility mechanism is speculative (see Section 6.4).

6.2 Reconciliation with Existing Literature

Mukherjee (2020) found increased tax buoyancy; Bagchi (2021) found exacerbated vertical fiscal imbalance; Reddy and Reddy (2022) documented compensation delays. Our results are not contradictory. Buoyancy measures total revenue response to GSDP growth; we measure autonomous revenue and its allocation. These findings co-exist: higher buoyancy, lower autonomy, and reduced conditional correlation for welfare capital spending. Chakraborty and Rao (2024, NIPFP Working Paper No. 412) provide preliminary corroboration of our state-level findings. Garg, Kumar, and Singh (2023) provide complementary evidence on heterogeneous tax efforts across states.

6.3 Policy Implications

Important Disclaimer:

The following policy recommendations assume that the associations documented in this paper reflect causal relationships. Causal evidence is needed before policy action. These proposals are offered as considerations for future research and policy discussion, not as immediate recommendations.

Proposed Revenue Stabilization Fund for States (Speculative Proposal)

Building on the existing GST Compensation Fund (which expires March 2026), we propose a permanent State Revenue Stabilization Fund (SRSF) as a subject for further research and debate:

Parameter	Proposed Design	Rationale / Empirical Justification
Trigger	State's quarterly SGST	Based on historical data (FY2018-FY2023), the

	collections fall below 95% of 4-quarter moving average	5th percentile of quarterly declines is 94.7% of 4-quarter MA. Rounding to 95% provides a reasonable threshold that smooths temporary shocks without triggering on normal variation.
Withdrawal cap	Maximum 10% of state's average annual SGST collections	Prevents depletion; encourages fiscal discipline. Based on historical shocks: the median quarterly decline is 8% of annual collections.
Deposit rule	States deposit 2% of quarterly SGST collections when nominal growth exceeds 15% year-on-year	Based on historical distribution: the 85th percentile of quarterly SGST growth (nominal) is 14.8% during FY2018-FY2023. The 15% threshold captures exceptional growth periods (e.g., post-COVID rebound in FY2022).
Governance	GST Council with 75% majority (states and centre)	75% majority ensures neither centre (33% weight) nor states can act unilaterally; requires coalition-building.
Target corpus	5% of annual national SGST collections (~₹1.5 lakh crore)	During COVID, SGST collections fell by approximately 20% in Q1 FY2021. A 5% corpus (₹1.5 lakh crore) would cover 0.05/0.20 = 25% of that shock for one quarter, or a smaller shock fully. This is adequate for major but not catastrophic shocks; can be expanded over time.

Legal note: Article 279A(4)(h) provides a possible legal basis (GST Council may recommend "any other matter relating to GST"), though formal legal opinion is recommended before implementation. Implementation would require consensus among states, particularly manufacturing states that experience higher volatility.

Caveat reiteration: These proposals are speculative. They assume that the associations we document are causal and that a stabilization fund would address the underlying mechanism. Both assumptions require validation through future research.

6.4 Limitations

We acknowledge seven primary limitations, with particular emphasis on #1 and #2:

1. **Causal identification not proven (PRIMARY LIMITATION):**
   Unobserved time-varying confounders may remain. We interpret estimates as conditional correlations throughout. Policy recommendations in Section 6.3 assume causality; this assumption is untested. Readers should treat our findings as descriptive associations, not causal evidence.
2. **Untested volatility mechanism (Speculative):**

Our theoretical framework emphasizes revenue uncertainty. Section 2.3 provides descriptive evidence that the coefficient of variation of annual collections increased from 0.18 to 0.32 (p=0.04). However, annual CV is a weak proxy for intra-year uncertainty. Monthly data would be preferable but is not uniformly available for all 18 states. Therefore, the volatility mechanism remains speculative—we present it as a plausible interpretation, not a tested finding. Future research with monthly SGST data should examine this channel directly.

3. **Small number of clusters (N=18):**

Standard errors are clustered at state level. With fewer than 30 clusters, cluster-robust standard errors may be biased downward. We report wild cluster bootstrap p-values for all main coefficients, which confirm our significance levels. However, this remains a limitation for generalizability to top-tier journals.

4. **Pre-treatment period (6 years):**

Limits detection of longer-run pre-existing trends, though event-study and placebo tests partially address this.

5. **COVID-19 pandemic:**

Excluding FY2020-FY2022 did not change results, but the pandemic may have affected fiscal behavior in ways not fully captured. However, excluding these years also removes the post-compensation-guarantee-lapse period (June 2022 onward); we address this with the PostLapse specification in Section 5.8.

6. **Measurement error:**

Classification of capital vs. revenue spending and IGST allocation likely bias toward null, so significant results are conservative. No instrument is available to correct this.

7. **Generalizability:**

The sample excludes most small and North-Eastern states (except robustness check); results may not generalize to those states. Additionally, our findings apply to the period FY2012-FY2023; future GST reforms may alter the associations documented here.

7. Conclusion

The Goods and Services Tax was a major structural reform for India's internal market. This paper documents conditional correlations between GST implementation and changes in state-level tax mobilization and welfare spending.

Summary of findings (conditional correlations, not causal):

A 10 percentage-point (one standard deviation) increase in pre-GST manufacturing share is associated with a 0.42 percentage-point lower tax-GSDP ratio post-GST.

1. The conditional correlation between own-tax revenue and welfare spending declined by 0.29 (from 0.71 to 0.42), a 41% decline in the conditional correlation.
2. This decline is concentrated entirely in capital expenditure (hospitals, schools, infrastructure), with revenue spending showing no statistically significant change (p=0.03). Non-welfare spending remained unchanged, confirming the association is specific to welfare capital. The post-GST slope for capital spending (0.11) is not statistically different from zero, indicating that capital spending became effectively uncorrelated with tax revenue post-GST.

Policy relevance with caveat:

As India aspires to achieve universal health coverage and reach 6% of GDP on education (National Education Policy 2020), understanding the fiscal implications of GST is important. If the associations documented here reflect causal relationships (a proposition that requires future validation), then the GST framework may warrant reconsideration to empower state-level welfare financing. Without causal evidence, however, policy action would be premature. A revenue stabilization fund (proposed speculatively in Section 6.3) merits further research and debate.

Future research priorities:

1. Whether revenue stabilization mechanisms adopted in other federal systems (e.g., Canada's Stabilization Fund, Germany's VAT equalization) could be adapted to India, with careful causal evaluation.
2. Whether capital spending reductions documented here persist or reverse with longer-term data and stronger identification strategies.
3. Whether revenue volatility directly drives spending cuts, using monthly SGST data (this is the most important priority, as our mechanism is currently speculative).
4. The impact of future GST reforms on state fiscal health and welfare spending once data become available, using quasi-experimental designs where possible.

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