# GST and Debt Sustainability: The Indian Experience

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## Abstract

In the context of a perceptible rise in the share of sub-national debt in India's total public debt and the predominant role of GST in the state's revenue source, this study attempts to analyse the sustainability of debt policies adopted by sub-national governments, in the context of GST. It employs the 22 major Indian states, the fiscal policy response function, two alternative specifications, and panel data methodology to analyse the issue at aggregate and disaggregate levels during 2012-13 to 2019-20. The results indicate that the debt policy is sustainable at the aggregate level, but only in six states at the disaggregate level during the GST regime. However, when GST compensation is excluded from the model, the test results do not indicate that Indian states pursued sustainable debt policies. The observed results are then amplified and corroborated using an indicator-based approach, and it is concluded that the GST remains an undermining factor of debt sustainability. Overall, the study draws attention to the state's poor revenue performance after GST and the challenges to the sustainability of their debt position. Policy intervention should be sought to improve the debt situation through an effective GST mechanism in states where the debt is unsustainable.

**Key words**: Public debt; primary balance; GST; debt sustainability; fiscal reaction function; Indian states, panel data.

***JEL*: E62, H71, H72, H74**

## i. Introduction

Inadequate revenue generation and high borrowing persistence are the two major policy concerns often confronted by national and subnational governments worldwide. In the aftermath of the growing tendency towards decentralization, these governments heavily depend on borrowed resources to meet their expenditure commitments. Consequently, borrowing has become an increasingly important source of finance in many countries with a federal system, which in turn leads to enormous debt accrual in sub-national budgets (Renjith and Shanmugam, 2019). It is often perceived that the lower the ratio of debt to state domestic product, the sounder is the state economy. When this ratio is large, there is a high chance that the state experiences fiscal stress or falls into a debt trap (Paras, 2017). As there exists a chain of action between various budgetary variables in the higher debt accumulation process, it raises the issue of debt sustainability, which is the ability of a sub-national government to sustain its debt policies in the long-run while remaining solvent (ability to service debt) (Ianachovichna et al., 2006). An unsustainable debt position is shown to be instrumental in insolvency, no-Ponzi condition, re-orientation of priorities, the negative growth-interest rate differential, etc. (Renjith and Shanmugam, 2018).

India provides an ideal federal setting to analyse the sub-national fiscal policies as one-third of its total government debt is owned by the state governments, accompanied by persistent growth in their budget deficits and borrowing requirements (RBI, 2021). Remarkably, India's sub-national debt-deficit position has significantly improved during the initial phase of fiscal consolidation (Kaur et al., 2017)). However, the signs of fiscal stress have re-emerged in the latter phase of fiscal consolidation on the back of poor performance of state public sector enterprises, additional debt liabilities as part of the financial and operational restructuring of state power distribution companies, high cost of borrowings, 7$^{th}$ pay commission implementation and rolling subsidy bills etc. As a result, the debt ratio frequently crossed the prescribed limit in most states.

While on the one hand sub-national debt has shown a gradual rise, India's adoption of GST on the other, which is considered as the most decisive indirect reform since independence, has created intense policy discussion on the revenue generation capacity of the states as they had to surrender their taxing powers.[1] It was expected that the GST implementation would benefit the states in terms of higher revenue collection, enhanced tax compliance, enhanced export competitiveness, bringing down prices, higher interstate trade and increase in economic activities and thereby reduce the horizontal fiscal imbalance among Indian states. It was further

anticipated that under the GST regime, state governments' revenue would increase and be inversely proportional to the debt to GSDP (Gross State Domestic Product) ratio, ensuring a sustainable debt position.[2] However, GST collection has not been as expected, due to its design, compliance and administrative issues and researchers often opine that the revenue shock in GST collection may lead to a fiscal shock to state finances (Mukharjee, 2020; Dash and Kakarlapudi, 2021.).

GST has become the largest source of the state's own tax revenue despite its poor revenue generation capacity. Since the proposed 14 percent growth was far from the reality for many state governments in the initial years after implementation, they had to rely on the GST compensation grants stipulated under the GST Compensation Act, 2017.[3] However, GST compensation assured to the states was delayed due to the revenue shortage faced by the Centre, which further added fuel to the debt position of the states.

The aggregate debt of all the states rose from ₹22103 billion (≈ US $285 billion) in 2011-12 to ₹ 53430 billion (≈ US $689 billion) in 2019-20, and the debt to GSDP ratio reached about 27 percent in 2019-20. Notably, all states remained in a primary deficit position during the period (RBI, 2021). All though the SGST (including the IGST settlement on SGST account)[4] revenue progressed over the years in most states, the growth rate of SGST for the period from 2017-18 to 2019-20 remained lower than the average annual growth rate of taxes subsumed in GST for the period 2014-15 to 2016-17 while their dependence on GST compensation had also gone up during the period (Mukharjee, 2021).

Realizing the mounding debt burden, the persistence of primary negative balance, and poor growth in the state GST connection, it is imperative to study the public debt situation of the state governments during the GST period in a comprehensive manner. More specifically, it is important to examine the following questions: (i) Has the regime shift from VAT to GST aggravated the debt position? (ii) Do state governments in India hold a sustainable debt position under the GST regime? (iii) Does GST undermine the sustainable debt position? (iv) Is there any significant change in sustainability indicators after GST?

To address these questions, the study first assesses the sustainable debt policies of the states during the GST regime through the fiscal policy response function (FPRF) proposed by Henning Bohn in 1998. It empirically tests whether the primary surplus-GDP ratio is positive and, at least, a linearly rising function of the debt-GDP ratio. If so, the initial stock of debt equals the sum of the present discounted values of the primary surpluses. Thus, the

intertemporal budget constraint (IBC) is satisfied, ensuring debt sustainability (Bohn, 1998).[5] This study utilizes the panel data version of the FPRF to test the sustainability of public debt of 22 Major Indian states during the GST regime. The study further extends the fiscal policy response function by adjusting the GST components in the primary balance to check whether the regime shift from VAT to GST weakened the sustainable debt position. Accordingly, some changes are made in the baseline equation. The estimated results are then supplemented using the indicator approach to capture the spillover effects. The empirical analysis is first done at the aggregate level and then at the disaggregated level.

The remainder of the paper proceeds as follows: Section 2 presents a short review of the literature. Then, while the methodology is discussed in section 3, the empirical results are presented and discussed in section 4. Finally, section 5 concludes the study.

## ii. Review of literature

Public debt sustainability has always been a paramount area of research in public finance, both from cross-country and within a country from a sub-national perspective. However, the broad interpretation of sustainability does not reveal a comprehensive and true picture of actual fiscal stance of federal systems. While the level of debt reflects the cumulative effect of government borrowings due to the expenditure-revenue mismatch, a set of other fiscal indicators are involved in its size and composition. It is more like a chain of action between various policy variables whose end result is debt sustainability (Renjith and Shanmugam, 2020).

According to Bohn (2007), a fiscal policy satisfies ad hoc sustainability if it is on a trajectory such that the expected present value of future primary surpluses equals the initial debt. The hypothesis of fiscal policy sustainability is related to the condition that the trajectory of the main macroeconomic variables is not affected by the choice between debt issuance and an increase in taxation (Afonso, 2005). Comprehensively, sub-national fiscal sustainability is the ability of the sub-national government to sustain its fiscal policies in the long-run while remaining solvent (ability to service debt).

However, the sub-national governments have less incentive than the national governments in the sustainability and macroeconomic impact of fiscal policies. A few earlier studies held the view that fiscal decentralization can enhance the overall fiscal sustainability as the sub-national spending also boosts infrastructure development and productive environment (Fukasaku & De

Mello, 1998). Moreover, borrowing has become an important source of financing of sub-national governments in the wake of more decentralization practices.

The proponents of sub-national borrowing have cited the following potential benefits: (i) increased fiscal space for infrastructure funding locally (ii) competent and beneficial outcomes for future generation due to deficit spending on infrastructure, (iii) transparency and good governance, and (iv) expansion of financial markets (Freire & Petersen, 2004). On the other hand, Mikesell (2007) argues that sub-national borrowing could contrast national policy. The sub-national borrowing may lead to a crisis and an unstable fiscal and macroeconomic environment if taken up without an effective regulatory framework. Further, borrowings for operating deficit may lead to long-term fiscal sustainability problems, unmanageable debt burden and growth of the public sector beyond its optimal size (Dafflon, 2002).

Some argue that carefully synchronized sub-national borrowing is the key factor in ensuring the decentralized system's fiscal sustainability (Ter-Minassian, 2015). Therefore, a coordinated sub-national borrowing is a prerequisite for maintaining a sound fiscal policy of the sub-national governments. Many studies have quoted that lack of coordination between fiscal variables in the back of huge public debt accumulation as the root cause for insolvency and fiscal stress of many sub-national governments (Ianchovichina et al., 2006; Ghosh et al., 2013). Further, the debt discharged by insolvency mechanisms lead to financial distress of sub-national governments (Liu and Weiber, 2008).

The coordination issue of public debt with other fiscal indicators is often cited as a cause for many federal debt crises like the Brazilian crisis in 1991, the Argentina crisis in 2001 and the Eurozone crisis of, 2011 (Potrafke and Reischmann, 2015). Experience from these events points out the weakness of addressing sustainability issues in a uniform manner as this may lead to misleading conclusions especially in countries with a federal system due to their institutional settings, domestic demands and resource disabilities. Therefore, realizing the need to extend the sustainability issues from a sub-national level perspective, a few studies have attempted this issue on some developed economies (Claeys et al. (2008) for US, and Fincke and Greiner (2011a) for Germany).

Potrafke and Reischmann (2015) is the first exclusive study, which extended the sustainability issues at the sub-national level (US states and German Länders) with fiscal coordination. It explicitly takes into account fiscal transfers when assessing fiscal sustainability. It draws attention to the fact that some sub-national governments are sustainable only because of fiscal

transfers from the central government and not because of their adopted fiscal measures. Mahdavi and Westerlund (2011) employed a panel unit root and cointegration test to investigate fiscal policies of US state and local governments and concluded that without federal grants, state and local governments are unable to fund their current operational expenditures.

The empirical framework used by Potrafke and Reischmann (2015) is an extension of the fiscal policy response function (FPRF) developed by Bohn (1998). The approach received popularity among the economists when Inter-temporal Budget Constraint (IBC) was added to the sustainability analysis.[6] It implies that the outstanding debt today must be equal to the present value of future primary surpluses of the government. In other words, as long as a government generates the debt stabilizing primary balance to cover its debt in future, its current debt level is sustainable. The conventional sustainability equation is thus linked to the IBC through a dynamic debt equation.

The conventional debt accumulation equation can be written in a compact form as:

$$\frac{D_t}{Y_t} = \frac{\mathrm{P_t}}{Y_t} + \frac{1+i_t}{1+g_t}.\frac{D_{t-1}}{Y_t} \qquad (1)$$

where $D_t$ is the stock of debt at the $t^{th}$ period, $\mathrm{P_t}$ is the primary deficit at the $t^{th}$ period, $i$ is the real interest rate on debt, and $g$ is the real rate of growth of GDP (or $Y$). The equation (1) can be written more compactly as:

$$\mathrm{d_t} = \mathrm{p_t} + \mathrm{d_{t-1}}[\,(1+\mathrm{i_t})/(1+\mathrm{g_t})] \qquad (2)$$

$d_t = D_t/Y_t$ is the debt to GDP ratio in period t; and $\mathrm{p_t}$ is the primary deficit relative to GDP in period t. Further equation (2) can be re-written as:

$$d_t = (1+r_t)\,d_{t-1} - s_t \qquad (3)$$

where, $\mathrm{r}_t = (\,1+i_t)/(1+g_t)$, $s_t = -(P_t/\,Y_t)$ primary surplus to GDP ratio. Also note that, $\mathrm{r}_t = (\,1+i_t)/(1+g_t) - 1 \;\cong i_t - g_t$ is the gross return on public debt. The present value of borrowing constraint derived from equation (3) is:

$$d_t^* = \sum_{j=1}^{\infty} \frac{1}{(1+r)^j}\, E_t\left[\mathrm{s}_{t+j}\right] + \lim_{n\to\infty} \frac{1}{(1+r)^n} E_t\left[\mathrm{d}_{t+n}\right] \qquad (4)$$

where $d_t^* = (1+ r_t)$. $d_{t-1}$ is the stock of debt-output ratio at the beginning of period t and $E_t\,[.]$ denotes the expectation operator conditional on the information available at time t. The debt policy is sustainable if the outstanding debt of the initial period is equal to the present value of the future primary surpluses (i.e., in line with IBC). The IBC, $d_t^* =$

$\sum_{j=1}^{\infty} \frac{1}{(1+r)^j} E_t \left[s_{t+j}\right]$, is satisfied if and only if the sum of end-period debt converges to zero, i.e., $\lim_{n\to\infty} \frac{1}{(1+r)^n} E_t \left[d_{t+n}\right] = 0$. Further, it satisfies two supplementary conditions too: (i) the no-Ponzi game condition (NPC) and (ii) the transversality condition (TC). The required condition in the NPC is that the debt growth rate has to be lower than the real interest rate. TC [$\lim_{n\to\infty} \frac{1}{(1+r)^n} E_t \left[d_{t+n}\right] = 0$] requires that the real public debt growth rate must be lower than the real GDP growth (Azizi et al., 2012).

Bohn (1995) viewed that the convergence (TC and IBC) portrayed in the above two empirical or time-series approaches is not necessary for sustainability in a stochastic economy. Therefore, he constructs a general equilibrium framework with a stochastic version of TC and IBC (assuming infinitely lived agents, complete financial markets and optimizing behaviour of lenders under uncertainty). Following this stochastic framework, he proposed a model-based approach in 1998 to test empirically whether the primary surplus-GDP ratio ($s_t$) is positive and, at least, a linearly rising function of the debt-GDP ratio ($d_t$):

$$s_t = \alpha + \psi\, d_t + \varepsilon_t \qquad (5)$$

where ε is the random error and $\alpha$ and $\psi$ are the parameters to be estimated. If $\psi > 0$ and statistically significant, the debt is sustainable, which means that the initial stock of debt is equal to the sum of the present discounted values of the primary surpluses. The IBC is satisfied if the discounted sum of the end period debt converges to zero. Thus, the positive reaction coefficient $\psi$ ensures this convergence.

In fact, Bohn (1998) utilizes the Barro's (1979) tax-smoothening hypothesis according to which the public deficit should be used in order to keep tax rates constant, which in turn minimizes the excess burden of taxation. Hence, the normal expenditure can be financed by regular revenues and unexpected spending could be financed by deficits. Based on this, Bohn (1998) derived the following fiscal policy response reaction function[7] from equation 5 for testing fiscal sustainability:

$$s_t = \alpha + \psi\, d_{t-1} + \phi_1 yvar_t + \phi_2 gvar_t + \varepsilon_t \qquad (6)$$

where the debt to GDP ratio is substituted with $d_{t-1}$, a lagged debt ratio, since budget plans are usually made one fiscal year ahead and also to take account of the endogeneity problem of the public debt to GDP ratio. $yvar$ and $gvar$ are business cycle indicators. $yvar$ accounts for fluctuations in revenues and reflects the deviation of real GDP from its trend, computed using

the Hodrick-Prescott (HP) filter. Positive values for $yvar$ indicate booms and negative values indicate recessions. The $gvar$ reflect the deviation of real primary spending from its normal value (computed again using the HP Filter) with positive values indicating the expenditures above the normal level and vice versa (Greiner and Fincke, 2015).

This approach has received great attention in the literature because of its intuitiveness (*i.e.,* if governments run into debt today, they would have to take corrective actions in the future by increasing the primary surplus) and robust statistical properties (the positive response of primary surplus to the government debt implies a mean-reverting process).[8] Accordingly, it has later been extended by many researchers (Abiad and Ostry, 2005; Haber and Neck, 2006; Greiner and Kaurmann, 2008; Fincke and Greiner, 2011; Mahdavi, 2014) by (i) adding other determinants of primary balance, (ii) incorporating unobserved heterogeneity factors using the panel data structures, and (iii) using other estimation techniques (p-spline), specifying non-linearity and time-varying coefficients in the model etc.

The latest extension in this regard is the exclusion of various components in the left-hand side variable i.e., primary balance. This will map which component is the driving force of fiscal unsustainability. Potrafke and Reischmann (2015) excludes the federal transfers to the states from the revenue side in calculating new primary balance to evaluate the government's discretionary fiscal policy. This study concludes that the central transfers implicitly subsidize the state government's debt in Germany and the US. It was further extended by analysing the primary deficit gap and the tax gap (Uryszek, 2016). However, no studies exclusively attempted to capture the dismal effects of debt sustainability, despite of few observation of its relevance (Nguyan, 2013; Bhatt and Scorromossino, 2016). Therefore, it is imperative to account the undermining factors of debt sustainability analysis of Indian states.

### iii. Methodology

In order to test the debt sustainability of the Indian states during GST regime, the study first specifies the following panel form of fiscal policy response function from eq (6):

$$S_{it} = \phi_0 + \psi\, d_{\text{it-1}} + \phi_1 yvar_{\text{it}} + \phi_2 gvar_{\text{it}} + \lambda_{\text{i}} + \mu_{\text{t}} + \epsilon_{\text{it}} \qquad (7)$$

where, $S_{it}$ is the primary surplus-GSDP ratio for i$^{\text{th}}$ state in the t$^{\text{th}}$ time period, $d_{\text{it-1}}$ is the debt-GSDP ratio for i$^{\text{th}}$ state in t-1$^{\text{th}}$ period, $yvar_{\text{it}}$ and $gvar_{\text{it}}$ are business cycle variables to account for fluctuations in GSDP and primary public spending respectively. $\lambda_{\text{i}}$ and $\mu_{\text{t}}$ are individual (states) effects and time effects (year), respectively. It is noticed that the lagged debt ratio is

used to take into account the endogeneity issue. If $\psi > 0$ and statistically significant, debt policy is sustainable.

Equation (7) can be estimated using the standard panel data techniques: fixed effects (FEs) and random effects (REs). The former posits that the unobserved heterogeneity factors, $\lambda_{i,}$ and time effects, $\mu_t$, is correlated with other X variables included in the equation ($yvar$ and $gvar$), while the latter assumes that they are not correlated. The choice of a relevant model depends on the Hausman statistics. If it supports the FEs model, then OLS (i.e., LSDV) can be used to estimate the equation (4.1) i.e., incorporating $\lambda_i$ and $\mu_t$ in the form of state and year dummies.

Further, to examine whether GST is a weakening factor for debt sustainability, two adjustments are made in the primary balance calculation of each state: (i) Exclusion of GST compensation in the primary balance calculation and (ii) exclusion of non-SGST (including IGST settlement) components in the revenue side of primary balance calculation. This newly adjusted variables are called the "Adjusted Primary Balance1"or "GST Compensation Adjusted Primary Balance" and "Adjusted Primary Balance2" or "Non-GST Components Adjusted Primary Balance" respectively. The link between the adjusted dependent variables and the baseline dependent variable is expressed below.

*Primary Balance (baseline model) = [state's own tax+ states' own non-tax + state's share in union taxes and duties + grants in aid from government of India including GST compensation grants+ non-debt capital receipts] – [(revenue expenditure-interest payment) + capital expenditure + disbursement of loans and advances]*[9]

*Adjusted primary balance1 = [state's own tax+ states' own non-tax + state's share in union taxes and duties + grants in aid excluding GST compensation grants+ non-debt capital receipts + Central Transfers]- [Primary Expenditure]*

*Adjusted primary balance2 = [SGST including IGST Settlement]- [Primary Expenditure]*

The rationale behind the Adjustments is (i) many states have realized the 14 percent revenue, and the gap is mainly dealt with by compensation. So it is essential to see a sustainable debt position in the absence of GST compensation, which will be the reality after June 2022; (ii) since the GST compensation starts after 2017, the model adjustments can capture the regime shift effect. Thus, in the baseline model (equation 7), the actual primary balance is replaced with Adjusted Primary Balances as:

$$S1_{it}/S2_{it} = \phi_0 + \psi\, d_{\text{it-1}} + \phi_1 yvar_{\text{it}} + \phi_2 gvar_{\text{it}} + \lambda_i + \mu_t + \epsilon_{\text{it}} \qquad (8)$$

This maps the reaction of adjusted primary balances to the changes in debt. It indirectly discloses whether or not GST is a strong factor in sustainable debt position of a state.[10]

Further, to test whether the debt is sustainable in each of the major Indian states, the debt-GSDP variable is allowed to interact with the state-specific dummies. The equation (8) can be modified as:

$$S_{it}/S1_{it}/S2_{it} = \phi_0 + \phi_1 yvar_{it} + \phi_2 gvar_{it} + \lambda_i + \mu_t + \sum_i \psi_i K_i * d_{it-1} + \epsilon_{it} \qquad (9)$$

where $K_i$'s are state-specific dummies, $K_i = 1$ if $i^{th}$ state and 0 otherwise. When $\psi_i$ (which is interacted with $K_i * d_{it-1}) > 0$ and statistically significant, the debt is sustainable in state $i$. It is noticed that the regular fixed effects model assumes that intercept varies across states and time while the slope parameter is constant. With a dummy interaction term, the slope parameter associated with debt varies across states but is constant for a state.[11]

**Data:** The study uses the secondary data covering 22 major Indian states (which account for more than 90 percent of India's population) during 2012-13 to 2019-20. The Gross State Domestic product (GSDP) data (real and nominal) are compiled from the Central Statistical Organization (CSO), while other fiscal variables from Comptroller and Auditor General (CAG) of India Audit Reports and Finance Accounts of the respective states.[12] We have taken the data of tax revenue subsumed in GST for the years 2012-13 to 2016-17 using data from GST statistics, Department of Revenue, GOI.[13] The GST revenue for the time period 2017-18 to 2019-20 has also been taken from the same source. More importantly, we use SGST and IGST settlement data for our analysis but ignored CGST, as it does not include the tax revenue of states. As stated above, the *yvar* is calculated by subtracting the long-term trend of GSDP, which is computed using the HP Filter to the real GSDP series from its actual values. Similarly, *gvar* is computed as realized value minus the trend value of primary expenditure. [14]

**Table 1:** Descriptive statistics of the study variables (2012-13 to 2019-20)

| Definition | Variables | Mean | Standard Deviation |
|---|---|---|---|
| Primary balance-GSDP ratio (%) | $s_{it}$ | -1.07 | 1.52 |
| Adjusted Primary balance 1 (%) | $s1_{it}$ | -1.24 | 1.52 |
| Adjusted Primary balance 2 (%) | $s2_{it}$ | -15.50 | 5.16 |
| Real GSDP gap (₹ billion) | $yvar_{it}$ | -0.02 | 100.58 |
| Real Primary Expenditure Gap (₹ billion) | $gvar_{it}$ | 0.17 | 58.09 |
| Debt-GSDP ratio (%) | $d_{it}$ | 25.52 | 10.85 |
| Lagged debt-GSDP ratio (%) | $d_{it-1}$ | 24.98 | 7.273 |

### iv. Empirical results

***Estimation Results (aggregate):*** Columns 2 of Table 2 present the estimation results of equation 4.7. In the initial analysis the study found that the Hausman and Breusch Pagan test support the random effects model. Therefore, the RE model results are projected even though FEs model results are more or less similar to REs.. The business cycle variable $yvar$ is positive and statistically significant even at 10 per cent level. As expected, the primary expenditure gap variable $gvar$ has a negative coefficient and is statistically significant at 1 per cent level, implying that the primary spending above its normal value has reduced the primary surplus ratio. The variable of interest is the debt-GSDP ratio, $d_{it-1}$. As predicted, its coefficient is positive but statistically significant only at the 5 per cent level, indicating a debt sustainability in Indian states as a whole. It is noticed that when on average the debt-GDP ratio increases by 1 unit, the primary balance-GDP ratio increases by 0.0380 unit. Column 3 of Table 3 shows the estimation results of GST compensation adjusted primary balance model ($S1_{it}$), where the coefficient of the lagged debt-to-GDP variable is positive but insignificant, implying that GST compensation grants implicitly subsidized the debt. The estimated coefficients of the $yvar$ and $gvar$ variables in Model 2 are as expected but larger than the baseline model (Model 1). Further, the study attempt to estimate equation (8) using "Adjusted Primary Balance" ($S2_{it}$) as the dependent variable. However, the lagged debt-to-GDP variable coefficient is negative and significant, implying a dismal response from adjusted primary balance, which is not surprising. Therefore the estimation results (aggregate and disaggregate) are shown in Appendix 1.

**Table 2:** Panel model estimation results

| | **Primary Balance (RE)** | **GST Compensation Adjusted Primary Balance (RE)** |
|---|---|---|
| **(1)** | **(2)** | **(3)** |
| | **Model 1 Coefficient (t-value)** | **Model 2 Coefficient (t-value)** |
| $d_{it-1}$ | 0. 0380 (2.11) | 0.0218 (1.19) |
| $yvar_{it}$ | 0.00001 (1.09) | 0.00001 (0.70) |
| $gvar_{it}$ | -0.0001 (-8.11) | -0.0002(-7.41) |
| $Constant$ | -2.0213 (-4.28) | -1.7828 (-3.72) |
| *f-stat/ wald chi2* | 73.49 [0.00] | 57.89 [0.00] |
| *Hausman* | 0.01 [0.99] | 0.79 [0.67] |
| *Sample(N)* | 176 (22×8) | 176 (22×8) |

Source: Author's estimation; t statistics in parentheses (); p value in parentheses []

***Estimation Results (disaggregate)***: In order to check whether or not the fiscal policy is sustainable during GST regime in each of the Indian states, Equation (9) is estimated by allowing $d_{it-1}$ variable to interact with the state-specific dummies. The estimated results of the baseline model (primary balance without any adjustment) are shown in Table 3 (Model 1). Among the control variables, *yvar* is not statistically significant and *gvar* has a negative and is statistically significant at 1 percent level. The debt interaction term is positive and statistically significant in the cases of Assam, Goa, Gujarat, Himachal Pradesh, Maharashtra, and West Bengal. For these six states, debt policy is sustainable. In the case of Andhra Pradesh, Bihar, Chhattisgarh, Haryana, Jharkhand, Kerala, Karnataka, Madhya Pradesh, Odisha, Punjab, Rajasthan, Tamil Nadu, Telangana, Tripura, Uttar Pradesh and Uttarakhand, the debt interaction coefficient is positive but not statistically significant even at 10 percent level.

When the GST compensation adjusted primary balance is replaced with the primary balance, the results significantly varied in Model 2 (column 3 of Table 3). Notably, except for Himachal Pradesh, the response parameters of all other states turns insignificant or significant negative, implying that they failed to meet the sustainability condition. The results of the control variables are as expected in both models.

**Table 3:** Panel model estimation results for Indian states

| **Variables** | **Primary Balance** | **GST Compensation Adjusted Primary Balance (RE)** |
|---|---|---|
| (1) | (2) | (3) |
| | **Coefficient (t-value)** | **Coefficient (t-value)** |
| $d_{it-1}$ × *Andhra Pradesh* ($K_1$) | -0.3040 (-0.84) | -0.0636 (-1.70) |
| $d_{it-1}$ × *Assam* ($K_2$) | 0.0595 (1.65) | 0.0164 (0.36) |
| $d_{it-1}$ × *Bihar* ($K_3$) | 0.0223 (0.80) | -0.0099 (-0.34) |
| $d_{it-1}$ × *Chhattisgarh* ($K_4$) | -0.0042 (-0.08) | -0.0716 (-1.31) |
| $d_{it-1}$ × *Goa* ($K_5$) | 0.0592 (2.02) | 0.0245 (0.81) |
| $d_{it-1}$ × *Gujarat* ($K_6$) | 0.0604 (1.67) | 0.0195 (0.49) |
| $d_{it-1}$ × *Haryana* ($K_6$) | -0.0086 (-0.23) | -0.0491 (-1.29) |
| $d_{it-1}$ × *Himachal Pradesh* $K_7$) | 0.0725 (3.20) | 0.0427 (1.82) |
| $d_{it-1}$ × *Jharkhand* ($K_9$) | 0.0050 (0.15) | -0.0333 (-0.94) |
| $d_{it-1}$ × *Karnataka* ($K_{10}$) | 0.0313 0.67) | -0.0252 (-0.52) |
| $d_{it-1}$ × *Kerala* ($K_{11}$) | 0.0061 (0.21) | -0.0260 (-0.85) |
| $d_{it-1}$ × *Madhya Pradesh* ($K_{12}$) | 0.0171 (0.48) | -0.0202 (-0.55) |
| $d_{it-1}$ × *Maharashtra* ($K_{13}$) | 0.0867 (1.87) | 0.0397 (0.83) |
| $d_{it-1}$ × *Odisha* ($K_{14}$) | 0.0423 (0.94) | -0.0117 (-0.25) |
| $d_{it-1}$ × *Punjab* ($K_{15}$) | 0.0111 (0.48) | -0.0250 (-1.04) |
| $d_{it-1}$ × *Rajasthan* ($K_{16}$) | -0.0145 (-0.50) | -0.0447 (-1.71) |
| $d_{it-1}$ × *Tamil Nadu* ($K_{17}$) | 0.0193 (0.45) | -0.0236 (-0.53) |
| $d_{it-1}$ × *Telangana* ($K_{16}$) | -0.0037 (-0.08) | -0.0480 (-0.98) |

| | | |
|---|---|---|
| $d_{it-1}$ × *Tripura* ($K_{17}$) | 0.0253 (0.97) | -0.0010 (-0.04) |
| $d_{it-1}$ × *Uttar Pradesh* ($K_{18}$) | 0.0281 (1.07) | 0.0030 (0.12) |
| $d_{it-1}$ × *Uttarakhand* ($K_{19}$) | 0.0251 (0.65) | -0.0087 (-0.22) |
| $d_{it-1}$ × *West Bengal* ($K_{20}$) | 0.0374 (1.70) | 0.0158 (0.70) |
| $yvar_{it}$ | -0.00001 (1.64) | -0.00001 (0.81) |
| $gvar_{it}$ | -0.0001 (-8.30) | -0.0001 (-7.70) |
| $(intercept)$ | -1.7108 (-2.34) | -0.9735 (-1.29) |
| f-stat/wald Chi2 | 146.60 [0.00] | 127.7 [0.00] |
| *Sample(N)* | 176 (22×8) | 176 (22×8) |

Source: Author's estimation; t statistics in parentheses (); p-value in parentheses []

**Has GST increased the debt burden of Indian states?**

The fiscal responses of the states alone do not provide a conclusive picture of the debt sustainability condition of a state. Therefore, an indicator approach is used as a supplementary tool to assert it. Here, one should not ignore that if states' GST revenue is sufficient to service the state liabilities, other receipts could be utilized for primary spending. Also, since the GST revenue, particularly the SGST revenue, is adequate, there is no need to borrow again to service its existing debt. This will ensure a smooth functioning of the fiscal chain and warrant a successful GST model.

In addition to the fiscal response, sustainable debt position requires another condition to be satisfied i.e., the rate of growth of debt ($\boldsymbol{d}$ ) should be lower than the rate of growth of SGST ($\boldsymbol{\tau}$). In other words, a higher growth in SGST collection and lower debt growth are sufficient conditions for sustainable debt position. If a state meets the condition along with positive responses in FPRFs, its debt is considered strongly sustainable. On the other hand, if it satisfies at least one condition, its debt is considered weakly sustainable.

***Strongly sustainable***: Both FPRFs are positive & significant; $\Delta\boldsymbol{\tau} - \Delta\boldsymbol{d} > \mathbf{0}$

***Weakly Sustainable:***

(i) Only baseline FPRF is positive & significant; $\Delta\boldsymbol{\tau} - \Delta\boldsymbol{d} > \mathbf{0}$
(ii) Baseline FPRF is positive & significant; $\Delta\boldsymbol{\tau} - \Delta\boldsymbol{d} < \mathbf{0}$
(iii) Baseline FPRF is positive but not significant; $\Delta\boldsymbol{\tau} - \Delta\boldsymbol{d} > \mathbf{0}$

***Unsustainable:*** All other conditions.

Table 4 concludes the level of debt sustainability for each state using the above conditions. It is strongly sustainable in the case of only Himachal Pradesh as it satisfies all three sustainability conditions. They are solvent enough to avoid the Ponzi condition. In the case of Assam, Bihar,

Goa , Gujarat, Jharkhand, Madhya Pradesh, Maharashtra, Odisha, Tripura, Uttarakhand and West Bengal, at least one condition is met. Of these, states like Goa, Gujarat, and Maharashtra may face sustainability issues after the GST compensation period ends, as the growth rate of debt is higher than the growth rate of SGST. Notably, states like Andhra Pradesh, Chhattisgarh, Haryana, Karnataka, Kerala, Punjab, Rajasthan, Tamil Nadu, Telangana, and Uttar Pradesh do not meet any sustainability conditions. Overall, the debt policy is not sustainable in 13 (10 unsustainable + 3 sustainable with poor growth in SGST collection) states, and they deserve policy attention.

**Table 4:** Sustainable debt position of Indian states

| **States** | **Fiscal Response** | **GST Compensation Adjusted Fiscal Response** | $\Delta\tau - \Delta d > 0$ | **Sustainability?** |
|---|---|---|---|---|
| Andhra Pradesh | - | -* | -2.61 | Unsustainable |
| Assam | +* | + | 4.46 | Weakly Sustainable |
| Bihar | + | - | 20.22 | Weakly Sustainable |
| Chhattisgarh | - | - | -10.9 | Unsustainable |
| Goa | +** | + | -1.92 | Weakly Sustainable |
| Gujarat | +* | + | -4.18 | Weakly Sustainable |
| Haryana | - | - | -3.51 | Unsustainable |
| Himachal Pradesh | +*** | +* | 10.32 | Strongly Sustainable |
| Jharkhand | + | - | 8.35 | Weakly Sustainable |
| Karnataka | + | - | -2.67 | Unsustainable |
| Kerala | + | - | -5.50 | Unsustainable |
| Madhya Pradesh | + | - | 0.30 | Weakly Sustainable |
| Maharashtra | +* | + | -0.94 | Weakly Sustainable |
| Odisha | + | - | 1.56 | Weakly Sustainable |
| Punjab | + | - | -0.42 | Unsustainable |
| Rajasthan | - | -* | 0.47 | Unsustainable |
| Tamil Nadu | + | - | -4.88 | Unsustainable |
| Telangana | - | - | -5.95 | Unsustainable |
| Tripura | + | - | 4.54 | Weakly Sustainable |
| Uttar Pradesh | + | + | -0.01 | Unsustainable |
| Uttarakhand | + | - | 3.87 | Weakly Sustainable |
| West Bengal | +* | + | 2.36 | Weakly Sustainable |

Source: Author's estimation

## v. Concluding remarks

This study attempted to estimate the fiscal policy responses (with two adjustments in the model), both at the aggregate and the disaggregate level during the GST Period. The estimated responses are then supplemented with a sustainability indicator. The results indicate that the primary balance of the state governments in India reacts positively to high public debt, which implies that fiscal policies are successful in sustaining the debt path of states as a whole.

However, at the state level, debt is sustainable only in 6 out of the 22 states. The test results do not indicate that Indian state governments pursued sustainable debt policies when the GST compensation is not included in the model, which implies that the observed sustainable path in the baseline model is not because of the sound fiscal policies of most states. In other words, GST compensation grants implicitly subsidized the state governments' debt. At the disaggregate level, except one, no states meet the sustainability condition, which suggests that the debt position of many Indian states got aggravated during the GST period. When the study supplements the results with the indictor approach, it is concluded that 13 Indian states face long-run sustainability issues and deserve urgent policy attention.

This finding can be contextualized in the broad argument of poor GST revenue performance of the states, wherein very few states are in a position to register 14 per cent growth rate. In the context wherein the GST compensation period will end in June 2022, the realized poor GST revenue growth in many states is likely to pose severe challenges to their debt sustainability. This study suggests three plausible ways of addressing this issue. First, the states should find ways to increase GST revenue through increased compliance, administrative efficiency, and with necessary policy measures. Second, the centre should rethink on the extention of GST compensation. Third, the centre should allow customized correction packages for individual states instead of a one-size-fits-all approach and should be cognizant of the potential or realized GST collection.

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**Notes**

1. See Rao (2019) for structure, progress, performance and prospects of GST.
2. The rationale behind this is, when the income of an individual increase, his borrowing is set to reduce until and unless he revises his expenditure to increase further. If so, it guarantees your financial sustainability.

3. The states have been enticed to compromise with a constitutional guarantee of 14 per cent growth in their tax revenue under GST. Hence, had there been no GST Compensation through the GST compensation cess levied by the Centre, GST would not have been there (Joseph and Ramalingam, 2020)
4. Hereafter SGST means state GST plus IGST settlement.
5. Since this test maps the response of the primary balance to change in public debt, conditional on the control variables this is often referred as the fiscal reaction function or the fiscal policy response function in most of the literature (D'Erasmo et al. (2016).
6. See Renjith & Shanmugam (2018) and Afonso (2005) for a brief survey of traditional empirical approaches and its criticisms.
7. Bohn model is often referred as Fiscal Reaction Function or fiscal policy response function or feedback rule as it captures the reaction coefficient of the policy (fiscal) variable with respect to the variations in public debt.
8. Because higher debt ratios lead to an increase in the primary surplus relative to GDP, making the debt ratio decline and return to its mean.
9. Revenue expenditure-interest payment + capital expenditure + disbursement of loans and advances= Primary Expenditure
10. The incorporation of lagged debt variable to address the endogeneity issue arising out of the correlation between adjusted primary balances and debt ratio taken from the conventional approaches ( Greiner and Fincke, 2015; Potrafke and Reischmann, 2015)
11. Spatial (state) dummies are in general useful to get state specific coefficients. This procedure is widely accepted in the econometric literature to achieve state specific coefficients.
12. The total outstanding liabilities of the undivided state at time of bifurcation stood at ₹1796.37 billion; which was to be distributed among the two new States (i.e., Andhra Pradesh and Telangana) in the proportion of population (being 58:42). As result, the new State of Andhra Pradesh had inherited an amount of ₹1041.89 billion remaining to Telengana. Similar approach is adopted for calculating the bifurcated data for 2012-13 and 2013-14.
13. Available at https://www.gst.gov.in/downloads/gststatistics. The methodology used by Mukharjee (2020) adopted to fill the gaps in the GST data.
14. The real values of the fiscal variables are computed using the GSDP deflator of the respective states.

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**Appendix - I**

| | **Non-GST Adjusted Primary Balance (RE)** | **GST Adjusted Primary Balance (RE)** |
|---|---|---|
| **(1)** | **(2)** | (3) |
| | **Model 3 Coefficient (t-value)** | **Coefficient (t-value)** |
| $d_{it-1}$ | -0.2805 (-7.70) | |
| $d_{it-1}$ × *Andhra Pradesh* ($K_1$) | | -0.2369 (-5.49) |
| $d_{it-1}$ × *Assam* ($K_2$) | | -0.4764 (-9.10) |
| $d_{it-1}$ × *Bihar* ($K_3$) | | -0.4718 (-14.30) |
| $d_{it-1}$ × *Chhattisgarh* ($K_4$) | | -0.6351 (-10.08) |
| $d_{it-1}$ × *Goa* ($K_5$) | | -0.1793 (0.59) |
| $d_{it-1}$ × *Gujarat* ($K_6$) | | 0.0269 (0.40) |
| $d_{it-1}$ × *Haryana* ($K_6$) | | -0.0628 (-1.43) |
| $d_{it-1}$ × *Himachal Pradesh* $K_7$) | | -0.2955 (-10.93) |
| $d_{it-1}$ × *Jharkhand* ($K_9$) | | -0.3522 (-8.66) |
| $d_{it-1}$ × *Karnataka* ($K_{10}$) | | -0.0527 (-0.94) |
| $d_{it-1}$ × *Kerala* ($K_{11}$) | | -0.1028 (-2.92) |
| $d_{it-1}$ × *Madhya Pradesh* ($K_{12}$) | | -0.3995 (-9.46) |
| $d_{it-1}$ × *Maharashtra* ($K_{13}$) | | 0.0650 (1.18) |
| $d_{it-1}$ × *Odisha* ($K_{14}$) | | -0.4598 (-8.54) |
| $d_{it-1}$ × *Punjab* ($K_{15}$) | | -0.0865 (-3.12) |
| $d_{it-1}$ × *Rajasthan* ($K_{16}$) | | -0.2717 (-7.83) |
| $d_{it-1}$ × *Tamil Nadu* ($K_{17}$) | | -0.1076 (-2.11) |
| $d_{it-1}$ × *Telangana* ($K_{16}$) | | -0.1902 (-3.38) |
| $d_{it-1}$ × *Tripura* ($K_{17}$) | | -0.5756 (-18.40) |
| $d_{it-1}$ × *Uttar Pradesh* ($K_{18}$) | | -0.3210 (-10.29) |
| $d_{it-1}$ × *Uttarakhand* ($K_{19}$) | | -0.1694 (-3.71) |
| $d_{it-1}$ × *West Bengal* ($K_{20}$) | | -0.1107 (-4.23) |
| $yvar_{it}$ | 0.00004 (4.04) | -0.00004 (3.89) |
| $gvar_{it}$ | -0.0002 (-11.39) | -0.0001 (-10.81) |
| $Constant$ | -8.4996 (-6.14) | -9.3058 (-10.69) |
| *f-stat/ wald chi2* | 187.60 [0.00] | 2277.30 [0.00] |
| *Hausman* | 0.04 [0.99] | |
| *Sample(N)* | 176 (22×8) | 176 (22×8) |

Source: Author's estimation