**3. Data and methods**

**3.1. Data sources and variables**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Variables** | **Description** | **Mean** | **Maximum** | **Minimum** | **Correlation** | **Std. Dev.** |
| **PHE** | **Public health expenditure as a percent of GSDP** | **0.865** | **2.343** | **0.378** | **1** | **0.302** |
| **Per capita GSDP** | **Per capita Gross State Domestic Product (INR)** | **33,538.130** | **150,413.600** | **6204.665** | **−0.154** | **23,303.370** |
| **Revenue** | **State’s own revenue as a percent of GSDP** | **9.194** | **21.701** | **4.199** | **0.265** | **2.931** |
| **Tax Revenue** | **State’s tax revenue as a percent of GSDP** | **6.938** | **14.709** | **3.447** | **0.138** | **1.914** |
| **Non-Tax Revenue** | **State’s non-tax revenue as a percent of GSDP** | **2.255** | **14.456** | **0.253** | **0.260** | **1.965** |
| **Direct Tax** | **Direct tax as a percent of GSDP** | **0.829** | **1.972** | **0.295** | **−0.132** | **0.320** |
| **Indirect Tax** | **Indirect tax as a percent of GSDP** | **6.109** | **13.267** | **3.129** | **0.174** | **1.761** |
| **Domestic Debt** | **Total outstanding liabilities as a percent of GSDP** | **32.042** | **64.901** | **15.128** | **0.518** | **10.881** |
| **Fiscal Balance** | **Gross fiscal deficit/surplus as a percent of GSDP** | **3.641** | **11.527** | **−1.023** | **0.460** | **1.722** |
| **Tax Devolution** | **Central tax share to states (Crores)** | **4959.072** | **38,035.490** | **135.0335** | **0.153** | **5198.402** |
| **Central Grants** | **Central grant-in aid to states (Crores)** | **2930.936** | **25,034.630** | **57.0344** | **0.040** | **2860.301** |

Considering major states of India, such as Andhra Pradesh, Bihar, Goa, Gujarat, Haryana, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Odisha, Punjab, Rajasthan, Tamil Nadu, Uttar Pradesh, and West Bengal, for the period of 1990–2014. The table given below shows the statistics of variables that have been used in the empirical estimation.

Source: State finance budget report ([2015](https://www.tandfonline.com/doi/full/10.1080/23322039.2018.1435443))- Reserve Bank of India.

Here the mean of PHE is 0.86% while the mean of tax revenue is 6.93%. There is a huge difference in the maximum and minimum value of tax revenue and PHE, respectively. It shows that most of the tax revenue of states is derived from the low contribution of direct taxes to the state’s own domestic revenue. Table 1 also exhibits the correlation of PHE with other explanatory variables. It shows that PHE is positively correlated with the fiscal balance, domestic debt, state’s revenue, and central government transfer (tax devolution and central grants), while PHE is adversely affected by per capita Gross State Domestic Product (GSDP) and direct taxes. The data have been collected from the state finance budget report published by Reserve Bank of India (RBI) in 2015. All the

According to the table the mean of the PHE is 0.86% and the mean of the tax income(revenue) is 9.93%.The difference of maximum and minimum values of tax revenue and the PHE has a huge difference ,so that it implies that , most of the tax revenue of states earned by giving low contribution of the direct taxes to the state’s own domestic revenue.\*\*\*\*\*\*\*\*<from here edit>Table 1 also exhibits the correlation of PHE with other explanatory variables. It shows that PHE is positively correlated with the fiscal balance, domestic debt, state’s revenue, and central government transfer (tax devolution and central grants), while PHE is adversely affected by per capita Gross State Domestic Product (GSDP) and direct taxes. The data have been collected from the state finance budget report published by Reserve Bank of India (RBI) in 2015. All the variables are constant prices (INR) in the 2004–2005 base year. The definition of the variables is described in Table [A1](https://www.tandfonline.com/doi/full/10.1080/23322039.2018.1435443#APP0001) (Appendix).

**3.2. Empirical methods**

This study examines the impact of macroeconomic factors on the growth of PHE in 15 major states of India using panel dynamic bias-corrected-least-squared-dummy-variable (LSDVC) model proposed by Bruno ([2005](https://www.tandfonline.com/doi/full/10.1080/23322039.2018.1435443)). This model is more robust when T is moderately large compared to more traditional models such as generalized method of moment (GMM) estimates in which N only moderately large. The traditional models with moderately large N are severely biased with moderately large T samples. This biased corrected LSDVC model provides the bootstrap standard errors that are robust toward heteroscedasticity and autocorrelation. We used Blundell and Bond ([1998](https://www.tandfonline.com/doi/full/10.1080/23322039.2018.1435443)) estimator to initialize the bias correction. We undertake 100 repetitions of the procedure to bootstrap the estimated standard errors. The baseline estimation model is as follows:

Yit=γYi, t−1+x′itβ+μi+λ(t)+εitYit=γYi, t-1+xit′β+μi+λ(t)+εit

where yityit is the dependent variables; xitxitis the ((*k* − 1) × 1) vector of strictly exogenous explanatory variables; μiμiis the time-invariant state-specific effects; εitεitis an unobserved white noise disturbance. Also, we added time-specific effects λ(t)λ(t)in order to examine the effects of macroeconomic policies on health expenditure at the state level since 1990’s.