



ANALYSIS OF INTER-STATE TAX BUOYANCY IN INDIA

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ABSTRACT:

Tax buoyancy measures the proportion response of tax revenue to a one percent change in the tax base, usually proxied by gross domestic product. A positive tax buoyancy coefficient indicates that tax revenues rise with the rise in tax base. It indicates the success of the system in raising the tax revenues in the situation of rising tax base and vice versa. This paper attempts to analyze the interstate tax buoyancy by using Ordinary Least Squares method for 27 states of India with respect to their own tax revenues for the period, 2005 to 2016. The buoyancy coefficients of SOTR of all of the states are found statistically significant and noticeably high. However, the buoyancy coefficient varies from state to state. Buoyancy estimates for tax revenues of states are estimated with respect to the domestic product at state-level, called the GSDP.

KEYWORDS : *gross domestic product , domestic product.*

1 INTRODUCTION

Every country in the process of formulating its budget undertakes revenue projections. When the revenues turn out to be smaller than the budget expenditures, countries end up with deficit financing. Since underdeveloped countries have few possibilities for prolonged external financing of budget deficits, without causing too much disruption in the macroeconomic environment, each country must decide how best to increase its internal tax revenues to meet its expenditure needs. One way that countries raise additional revenue is by making discretionary tax measure changes. The best outcome expected from such changes is that the tax system will automatically yield corresponding tax revenues as income or GDP grows, on a sustainable basis. The response of tax revenues to changes in the GDP is measured by tax elasticity and tax buoyancy. These concepts help to explain the overall structure of a tax system and serve as valuable analytical tools for designing tax policy.

Tax buoyancy estimates, which measure the percentage response of tax revenue to a one percent change in the tax base, usually proxied by gross domestic product, are a routine requirement for fiscal projection purposes. The elasticity of tax revenue is more stringently defined, as the underlying revenue response holding constant all parameters of tax policy. In developing countries, where tax policy parameters are changed every year and sometimes in the course of the year, the elasticity of tax revenue is virtually impossible to estimate with any appreciable degree of accuracy. In such a fiscal context, where tax policy parameters are in a state of constant flux, the buoyancy coefficient may provide the only feasible alternative to estimate the underlying revenue-generating properties of the system. If estimated over a sufficiently long period of time, the buoyancy coefficient essentially estimates the revenue response with indigenized tax policy. This paper estimates buoyancies for Indian states with respect to their own tax revenues for the period, 2005 to 2016. Buoyancy estimates for tax revenues of states are estimated with



respect to the domestic product at state-level, called the GSDP. GSDP estimates for states in India are available only at factor cost, not at market prices.

The rest of the paper is divided into following sections: Section 2 cogitates over the review of the work done in this area earlier. Section 3 highlights the methodological aspects for estimating the inter-state tax buoyancy. Section 4 presents the inter-state analysis of tax buoyancies at aggregate and disaggregate level. At disaggregate level; we have estimated the tax buoyancies of the various components of state's own tax revenues (SOTR) in order to explain the inter-state variations in tax buoyancy of SOTR. Finally, section 5 concludes the overall findings of this paper.

2 REVIEW OF LITERATURE

Rajaraman et al (2005) attempted to provide such a base, with buoyancies estimated over a twenty-three-year span starting in 1980-81. If estimated over a sufficiently long period of time, the buoyancy coefficient essentially estimates the underlying revenue-generating properties of the system with indigenized tax policy. For all but one state, Assam, serial correlation in the residuals is eliminated with the introduction of structural breaks. A third specification including the log of the percent share of industry in the domestic product eliminates serial correlation for Assam and improves the goodness-of-fit for some other states. In all but six states, the sign of the change in the buoyancy coefficient at the break is positive. Upender (2008) made an attempt to provide an empirical content to differential coefficient of tax [revenue] buoyancy during post tax reform period in India by fitting a double-log regression model with an interaction variable to the stationary time series data based on Augmented - Dicky Fuller (ADF) and Phillips-Parron (PP) Tests. The period after 1992 is considered as post tax reform period to look at the prognostications of tax reforms that had been initiated by the government of India. The regression results illustrate that the estimate of constant gross tax buoyancy is positively significant and more than unity during pre-tax reform period illuminating that gross tax is moderately elastic. Acharya (2011) used a time series approach to empirically estimate tax elasticities for India for the period 1991-2010. Tax elasticities are computed for income, turnover, excise, import and total taxes for the post-reform period. The elasticity coefficients reveal a low responsiveness of taxes to income growth and the value being less than unity in most of the cases. Sharma (2015) by using the time series data of non-tax revenue data of India for the period of 2000-01 to 2010-10, attempted to investigate the buoyancies of non-tax revenue's different unit of the country. Buoyancy coefficient is an indicator to measures the total response of non-tax revenue (NTR) to change in income; the effects of change in inflation are included in the calculation of buoyancy. The buoyancy coefficient of total non-tax revenue receipts has exhibited 0.48 in this sense that the buoyancy value of non-tax revenue is less than one indicating that non-tax revenue is an insignificant source of generating revenue capacity. Based upon a multiplicity of suitable time series analytical techniques, the Sethi and Teja (2015) measured tax buoyancy in respect of seventeen major Indian states, as also at making an examination of differentials, if any, among the buoyancy values during pre- and post-reforms period. As per the main findings, the buoyancy coefficients were generally less than unity, thus implying the prevalence of rather low responsiveness of taxes to income. It is also found that the buoyancy coefficients in respect of each of Total Revenue, Tax Revenue and Non-Tax Revenue had a tendency to be relatively lower during post reforms period vis-à-vis the pre-reforms period, thus pointing towards a non-favourable impact of the LPG policy measures towards revenue generation. Naqvi (2016) analyzed the performance of the state governments in raising taxes and also estimated buoyancies for Indian States with respect to their tax revenues for the period since 2004-2014. An analysis has been done to know the comparative position of states in the inter-state ladder of Tax-GDP ratio. It has been found that the Tax-GDP ratio increased considering the period-averages over 2004-05 to 2006-07 and 2011-12 to 2013-14. State with a buoyancy which is more than one will experience over time an increase in the own Tax-GSDP ratio as tax revenues grow at a faster rate than the GSDP growth. Analysis has also been done at an aggregate level of all states.

3 METHODOLOGY

In order to estimate the tax buoyancy of states own tax revenues (SOTR) and its various components, we have used ordinary least square method (OLS). OLS is applied on the following double log specification of the type given in equation (1) to equation (5):

$$\log(TTR_t) = \beta_0 + \beta_1 \log(GSDP_t) + u_t \quad (1)$$

$$\log(SOTR_t) = \beta_0 + \beta_1 \log(GSDP_t) + u_t \quad (2)$$

$$\log(TOI_t) = \beta_0 + \beta_1 \log(GSDP_t) + u_t \quad (3)$$

$$\log(TPCT_t) = \beta_0 + \beta_1 \log(GSDP_t) + u_t \quad (4)$$

$$\log(TCS_t) = \beta_0 + \beta_1 \log(GSDP_t) + u_t \quad (5)$$

Where B_2 = buoyancy coefficients, GSDP= gross state domestic product, TTR=total tax revenues, SOTR=state's own tax revenues, TOI=taxes on income, TPCT= taxes on property & capital transaction, TCS= taxes on commodities and services.

4 ANALYSIS OF INTER-STATE TAX BUOYANCY

Table 5.1 shows the inter-state tax buoyancy measured in terms of total tax revenues of the state governments. Total tax revenues of the state government of India includes states own tax revenues and share in central taxes. Therefore, tax buoyancy in terms of total tax revenues is a gross approximation of state tax revenues to the changes in tax base i.e. gross state domestic product (GSDP).

Table 1: State-wise Buoyancy of Total Tax revenues, 2005 to 2016

State	Rank	Buoyancy coefficient
Arunachal Pradesh	1	6.736***
Manipur	2	5.909***
Jammu & Kashmir	3	4.736***
Assam	4	3.540***
Uttar Pradesh	5	3.497***
Chhattisgarh	6	3.064***
Orissa	7	3.015***
Himachal Pradesh	8	2.992***
Meghalaya	9	2.926***
Punjab	10	2.840***
West Bengal	11	2.827***
Rajasthan	12	2.673***
Karnataka	13	2.620***
Kerala	14	2.436***
Maharashtra	15	2.399***
Madhya Pradesh	16	2.395***
Goa	17	2.298***
Jharkhand	18	2.295***
Haryana	19	2.279***
Nagaland	20	2.234***
Gujarat	21	2.220***
Tripura	22	2.140***
Bihar	23	1.969***
Tamil Nadu	24	1.939***
Uttrakhand	25	1.816***
AP	26	1.548***
Sikkim	27	1.246***

Source: Author's calculation based on RBI data

***, ** and * statistically significant at 1%, 5% and 10% level respectively.

As demonstrated by Table 1, Arunachal Pradesh has received the highest rank in terms of tax buoyancy based on total tax revenues. The buoyancy coefficient of Arunachal Pradesh is 6.736 which is found

statistically significant at 1% level. It means that if the GSDP of Arunachal Pradesh rises by one percent, its total tax revenues will rise by 6.736 percent. Sikkim is reported with minimum tax buoyancy coefficient. (1.246) which is greater than unity and it reflects the high responsiveness of the total tax revenues of Sikkim to the changes in its GSDP. It is evident from table 1 that for all of 27 states, the tax buoyancy coefficient greater than unity as far as total tax revenues are concerned. (The tax buoyancy coefficients of all 27 states listed in table 1 are found statistically significant at 1% level of significance.) It implies that the tax system of all of the states under consideration is highly buoyant, that is, a small increase in the tax base will cause a relatively large increase in the tax revenues. In other words, it reflects the underlying revenue generating properties of the system with indigenized tax policy.

One serious drawback associated with the buoyancy estimate based on total tax revenue is that it includes the revenues from states share in central taxes. This part of total tax revenues of Indian states does not depend on state's own tax efforts rather it depends on the recommendations of the Finance Commission of India. In distributing the tax revenues from the central taxes among the states, more weight has been given to poor states (i.e. less weight has been given to the rich states) in order to achieve the horizontal equity and to bridge the gaps in the economic development of various states. Therefore, it is possible that the revenues from the central taxes may decrease with increase in the per capita income of the state. Therefore, in order to calculate the precise estimate of tax buoyancy of the state governments, we have estimated the tax buoyancy coefficient based on state's own tax revenues. The buoyancy coefficient of state's own tax revenues is an accurate measure of the revenue-generating ability of the tax system of the state. The results of tax buoyancy (based on SOTR) are almost similar to that of the results demonstrated in table 1. Arunachal Pradesh is again ranked first with 5.839 percent tax buoyancy and Sikkim is ranked last with 1.027 percent tax buoyancy as far as state's own tax revenues are concerned. The buoyancy coefficients (based on SOTR) of all states are greater than unity and also found statistically significant.

Table 2: State-wise Buoyancy of State's Own Tax revenues, 2005 to 2016

State	Rank	Buoyancy coefficient
Arunachal Pradesh	1	5.839***
Manipur	2	5.434***
Jammu & Kashmir	3	4.601***
Uttar Pradesh	4	3.437***
Assam	5	3.215***
Orissa	6	3.030***
Chhattisgarh	7	2.957***
West Bengal	8	2.746***
Himachal Pradesh	9	2.724***
Punjab	10	2.680***
Rajasthan	11	2.672***
Karnataka	12	2.531***
Kerala	13	2.430***
Bihar	14	2.414***
Meghalaya	15	2.409***
Maharashtra	16	2.330***
Jharkhand	17	2.328***
Madhya Pradesh	18	2.274***
Haryana	19	2.249***
Gujarat	20	2.224***
Goa	21	2.156***
Tamil Nadu	22	1.943***
Uttarakhand	23	1.806***

Tripura	24	1.799***
Nagaland	25	1.720***
Ap	26	1.437***
Sikkim	27	1.027***

Source: Author's calculation based on RBI data

***, ** and * statistically significant at 1%, 5% and 10% level respectively.

State's own tax revenues can be further decomposed into three components: Taxes on income (TOI), taxes on property & capital transaction (TPCT), and taxes on commodities & services (TCS). Therefore, it is worthy to measure the tax buoyancy of these three components of SOTR separately. The task has been accomplished in table 3 to table 5.

Table 3: State-wise Buoyancy of Tax revenues from Taxes on Income, 2005 to 2016

State	Rank	Buoyancy coefficient
Jharkhand	1	16.387***
Bihar	2	12.223***
Uttar Pradesh	3	4.233***
Meghalaya	4	3.997*
Assam	5	2.403***
Manipur	6	2.231***
Uttrakhand	7	2.141***
Orissa	8	1.936***
Karnataka	9	1.862***
West Bengal	10	1.362***
Maharashtra	11	1.169***
Madhya Pradesh	12	1.155***
Gujarat	13	1.132***
Nagaland	14	1.051***
Tripura	15	0.644***
AP	16	0.492**
Kerala	17	1.261
Arunachal Pradesh	18	0
Goa	18	0
Haryana	18	0
Himachal Pradesh	18	0
Jammu & Kashmir	18	0
Punjab	18	0
Rajasthan	19	-0.376
Sikkim	20	-0.952
Tamil Nadu	21	-1.579*
Chhattisgarh	22	-2.214***

Source: Author's calculation based on RBI data

***, ** and * statistically significant at 1%, 5% and 10% level respectively.

Table 3 shows the tax-buoyancy of various states (based on TOI) for the period from 2005 to 2016. As per table 3, Jharkhand is reported with highest tax buoyancy (16.387) followed by Bihar (12.223), Uttar Pradesh (4.233) and Meghalaya (3.997). Further 10 states viz. Assam (2.403), Manipur (2.231), Uttarakhand (2.141), Orissa (1.936), Karnataka (1.86), West Bengal (1.362), Maharashtra (1.169), Madhya Pradesh (1.155), Gujarat (1.132), and Nagaland (1.051) are reported highly buoyant in terms of TOI. The tax buoyancy

coefficients of all of these states are greater than unity and found statistically significant. There are two states (viz. Tripura and Madhya Pradesh) which have the value of buoyancy coefficient less than unity. Therefore, tax system of these two states show relatively low tax revenue generating capacity from the income tax on agriculture. Further, there are 9 states (viz. Kerala, Arunachal Pradesh, Goa, Haryana, Himachal Pradesh, Jammu & Kashmir, Punjab, Rajasthan, and Sikkim) which have either zero tax buoyancy (based on TOI) or their tax buoyancy coefficients are found statistically insignificant. It implies that in all of these states, the revenue generating capacity of the system from the income tax on agriculture is zero. There are two possible reasons which are responsible for the occurrence of the above-mentioned phenomenon. First, in most of these states agriculture income is tax exempted. Second, it may due to the high degree of tax evasion in the agriculture sector. In the agriculture sector-tax evasion is easier as compared to that in other sectors of the economy. Further, Tamil Nadu and Chhattisgarh are the states which are reported with negative and also statistically significant buoyancy coefficient. It indicates that with the increase in GSDP, revenues from income tax have been falling over the period of time in these two states. It may be due to the fact that with the increase in GSDP the share of agriculture sector in GSDP has declined significantly which further accompanied with tax exemption and tax evasion has reduced the revenues from TOI over the period of time. The second important component of SOTR is revenue from taxes on property & capital transaction (TPCT). Table 4 presents tax buoyancy estimates of the various states of India based on TPCT. Jammu & Kashmir (6.362), Arunachal Pradesh (5.92), Goa (3.874), Orissa (3.317), Manipur (3.230), and Chhattisgarh (3.075) are observed with highest tax buoyancy in terms of TPCT. As the GSDP of these states rises, the tax revenues from TPCT rise greater than proportionately. The tax coefficients of Gujarat, Jharkhand, Assam, Maharashtra, Madhya Pradesh, Bihar, Rajasthan, Karnataka, and Tamil Nadu vary between 3 and 2. The tax system of these states is also highly buoyant as far as TPCT is concerned. Further Himachal Pradesh, Kerala, Haryana, Meghalaya, Tripura, Andhra Pradesh, Sikkim, Punjab and Uttarakhand are the states whose tax buoyancy coefficient (based on TPCT) varies between 2 and 1. Therefore, the tax system of these states exhibits a considerable flexibility. It indicates that as the GSDP of these states rises, the revenues from TPCT either rises proportionately or greater than proportionately.

Table 4: State-wise Buoyancy of Tax revenues from Taxes on Property & Capital Transaction, 2005 to 2016

State	Rank	Buoyancy coefficient
Jammu & Kashmir	1	6.362***
Arunachal Pradesh	2	5.920***
Goa	3	3.874***
Orissa	4	3.317***
Manipur	5	3.230***
Chhattisgarh	6	3.075***
Gujarat	7	2.879***
Jharkhand	8	2.830***
Assam	9	2.649***
Maharashtra	10	2.456***
Madhya Pradesh	11	2.359***
Bihar	12	2.288***
Rajasthan	13	2.232***
Karnataka	14	2.097***
Tamil Nadu	15	2.096***
Himachal Pradesh	16	1.873***
Kerala	17	1.824***
Haryana	18	1.758***
Meghalaya	19	1.750***
Tripura	20	1.476***

AP	21	1.217***
Sikkim	22	1.206***
Punjab	23	1.091***
Uttrakhand	24	1.042***
Nagaland	25	0.826***
West Bengal	26	-4.53
Uttar Pradesh	27	-7.604

Source: Author's calculation based on RBI data

***, ** and * statistically significant at 1%, 5% and 10% level respectively.

In case of Nagaland, the buoyancy estimate is found less than unity (0.826) which indicates that the revenues from TPCT increases less proportionately with the increase in tax base. In case of west Bengal and Uttar Pradesh, the tax buoyancy estimates are negative. However, they are statistically insignificant. A negative tax buoyancy coefficient indicates that tax revenues fall with the rise in tax base. It indicates the failure of the system in raising the tax revenues even in the situation of rising tax base.

The third and most important part of the SOTR is the revenues from taxes on commodities & services (TCS) which accounts for approximately 70 percent share or above of the state's own tax revenues. Therefore, it is important to study the revenues from TCS separately. Table 5 shows the tax buoyancy estimates of various states based on TCS for the period of time. Five states viz. Manipur (5.766), Jammu & Kashmir (4.535), Arunachal Pradesh (4.160), Assam (3.267), and Orissa (3.013) are reported with highest tax buoyancy among the sampled states over the period of time. The revenues from TCS are highly responsive to the changes in tax base in these five states. The tax buoyancy coefficients of the rest of the states vary between 3 and 1.26 which reflect a considerably high degree of responsiveness of the tax system to the changes in GSDP. Therefore, in terms of size and buoyancy, TCS is the important source of the states own tax revenues. However, in case of West Bengal and Uttar Pradesh, the tax buoyancy coefficient is found negative though statistically insignificant. It indicates that there is a strong need to improve the tax system of these two states in order to make the tax revenues highly responsive to the changes in tax base so that the tax revenues of these states can automatically rise with increasing GSDP at the given tax rates or policy.

Since TCS constitutes a major part of the SOTR, It is important to study the buoyancy of the different components TCS. Revenues from TCS can be decomposed in to six parts. Further, by measuring the tax buoyancy of the different components, we can identify the areas of weakness and strength in order to formulate the appropriate policy measure. For this purpose, we have estimated the tax buoyancy of the different components of TCS.

Table 5: State-wise Buoyancy of Tax revenues from Taxes on Commodities & Services, 2005 to 2016

State	Rank	Buoyancy coefficient
Manipur	1	5.766***
Jammu & Kashmir	2	4.535***
Arunachal Pradesh	3	4.160***
Assam	4	3.267***
Orissa	5	3.013***
Chhattisgarh	6	2.956***
Punjab	7	2.944***
Himachal Pradesh	8	2.764***
Rajasthan	9	2.722***
Karnataka	10	2.607***
Kerala	11	2.499***
Bihar	12	2.433***
Meghalaya	13	2.414***
Maharashtra	14	2.338***

Haryana	15	2.315***
Jharkhand	16	2.285***
Madhya Pradesh	17	2.275***
Gujarat	18	2.149***
Uttrakhand	19	1.922***
Goa	20	1.947***
Tamil Nadu	21	1.925***
Tripura	22	1.876***
Nagaland	23	1.804***
AP	24	1.471***
Sikkim	25	1.265***
West Bengal	26	-4.146
Uttar Pradesh	27	-8.953

Source: Author's calculation based on RBI data

***, ** and * statistically significant at 1%, 5% and 10% level respectively.

5. CONCLUSIONS

In this paper, the inter-state tax buoyancy of states own tax revenues at aggregate and disaggregate level for the period from 2005 to 2016 are analyzed. Ordinary Least Square (OLS) method is used to estimate the buoyancy coefficient. The buoyancy coefficients basically give the approximations regarding the revenue generating properties of the system with native tax policy. The tax buoyancy of SOTR is estimated for the 27 states of India (at the aggregate level). The buoyancy coefficients of SOTR of all of the states are found statistically significant and considerably high. However, the buoyancy coefficient varies from state to state. For example, Arunachal Pradesh has the highest tax buoyancy in terms of SOTR (5.389) and Sikkim has lowest tax buoyancy (1.027). In order to explain the inter-state variations in the tax buoyancy of SOTR, we have decomposed the SOTR in to its various sources: Taxes on Income (TOI), Taxes on Property & Capital Transaction (TPCT), and Taxes on Commodities & Services (TCS). The tax buoyancy of SOTR is the weighted sum of the tax buoyancies of TOI, TPCT and TCS. Therefore, at the disaggregate level; the tax buoyancies of the different components of SOTR have been estimated. The analysis of tax buoyancy at disaggregate level may help the policy makers to identify the inflexibility or irresponsiveness of the various taxes levied by the state governments in order to formulate appropriate tax policy.

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