

Economic Reforms and the tax structure: A look into special category states

Ishfaq Ahmad and Aadil Ahmad

Research Scholars, School of Economics, Central University of Hyderabad (500046), Telangana Hyderabad, India.

Abstract: *The Indian economy experienced dramatic economic reforms during the 1990s to boost up its severely ailing economy. The impact of these reforms has been evaluated along different dimensions like growth, foreign reserves, debt, tax structure etc. Although these studies mainly concentrated on the national level statistics there are strong reasons and incentives for such studies to be carried out for regional units. In a federal structure like India, where states are bestowed with more duties and fewer resources, the tax structures of the states assume considerable importance. Further, when it comes to the special category states the imbalance gets more aggravated. So in this study, we have tried to evaluate the impact of reforms on the tax structure of the special category states using six states as our sample of analysis. Following the reforms, the growth of tax revenue and per-capita tax ratios has experienced a stagnating trend. However, the impact of reforms on the buoyancy parameter was found to be positive and significant. With a bit of exception, the buoyancy of direct taxes was found higher than those of indirect taxes during the post-reform period. Meanwhile, the overall tax structures were found to be unstable but the magnitude was found more in post-reform period than the pre-reform period. The interstate variability among the selected indicators was not found statistically significant.*

Keywords: *Buoyancy, Elasticity, GSDP, Tax.*

I. Introduction

The Indian economic reforms and its impact on the Indian tax structure as a whole have dominated the intellectual screen in the country especially the post 2000-01. The debate has either been skewed towards the total tax structure of the economy or in favour of some specific taxes like corporation or income¹. Not much attention was paid to the state level studies in general and special category states in particular. However, there are quite strong reasons and special interests to focus on such studies. In a federal structure like India, where states are bestowed with more duties and fewer resources, the tax structures of the states assume considerable importance. A better tax structure implies more revenue, more public investment leading to more healthy growth. This, in turn, entails a comprehensive and adequate strength for the provision of public utilities like education, health etc. Moreover, more flexible the tax structure of a state, healthier could be the fiscal performance with prospectus for achieving higher growth targets.

When it comes to the case of special category states, the area of tax structure assumes further significance. It is a group of states exhibiting peculiar economic, political and the geographic character, hence a peculiar tax structure². The group is mainly dependent on the primary sector both for employment and income, but unfortunately, the sector is ridden with hysteresis of backwardness. The secondary sector is not only absent, but its introduction is not quite feasible due to many peculiarities like hilly terrain, social instability etc. The tertiary sector has the potential for sustained growth for these states, but due to political instability, the potential is almost unutilized. Addin to that, the tertiary sector does not have strong employment elasticity to absorb the growing unemployment in these states. So in this backdrop, these states mainly depend on the public exchequer for their developmental needs. The heavy dependence gets revealed from the fact that the public expenditure as a proportion of state GDP for these states is around 40% while as for the general category states it is less than 20%.

The capacity and performance of the public exchequer is dependent on the underlying tax structure of the government. Thus the authorities concerned usually undertake different reforms with an aim to infuse stability and dynamism in the taxation sphere. However, the intellectuals and academicians at stake differ in so far as the expectation and realization of such reforms are concerned. The need and desirability of tax reforms have come under severe questioning. There are studies both at national and international levels confirming the

¹ See the study of Khan and Sureh (2011), Upender (2008).

² For further information see "A Study on Debt Problem of the Special Category States" by thirteenth finance commission.

deviation in the anticipation. Some authors found in their studies that the reforms have negatively influenced the tax structure of the economies at times. Kibiwot et al. (2012) found that the reforms programme of 1986 failed to bring the anticipated stability in the tax structure of the Kenyan economy. The similar results were confirmed by Neelam [2007] for Nepalian economy and Gillani [1986] for the federal tax structure of Pakistan.

The other façade has been of the opinion that the reforms do infuse dynamism and stability in the tax structure over the time. Choudhry [1979] found that the reforms have positive impacts for the Malaysian and Kenyan economies, however, the impacts on US and UK were not significant. Zubair [1973] sketched that for reforms to play their role the dimensions of extent and manner of reforms should receive emphasis. Similarly in case of the Indian economy; Suresh et al. [2011] are of the opinion that the post-reform tax buoyancy has experienced a significant increase. Rao et al. [2005] confirming the already established literature give a tremendous role to the reforms in over-coming the ailing fiscal scenario of the economy. Following the herd Acharya [2005] found that the tax reforms have contributed to the positive performance of the tax structure of the country.

Apart from the above authors who showed that the reforms contributed to the growth of tax structure towards the positive end, there were others who do not agree with this line of reasoning. They strongly hold that either we have empirical evidence against the reforms or the evidence highlighting the neutrality of reforms on the Indian tax structure. Upender [2008] empirically sketched down that the buoyancy coefficient has shown a downward trend in the post-reform period as compared to pre-reform period. Purohit [1982] in one of his review studies has found that the reforms have brought some drastic and undesirable changes in the tax structure of the economy. The tax structure had experienced a shift from being equity and justice-oriented towards neutrality and efficiency oriented. The reforms attached more importance to evasatory policies rather than the redistributional policies. Going through the same line of reasoning Bagchi [1994] for a short period sketched that the tax ratios along with the GDP experienced the decline owing to many reasons.

Although of acute importance, no serious and comprehensive study has been taken to highlight the impact of reforms on the tax structure general category states in the Indian economy. The same is the case with special category states of the union. So in light of the above diversity of views regarding the impact of the tax reforms on the tax structure of an economy, the present study has been carried out to highlight the impact of reforms on the tax structure of the special category states³. The study will highlight the growth of the tax revenue of the concerned states in the bifurcated periods of pre and post-reforms. The evaluation will be carried out on the parameters of growth rate, buoyancy, and stability of the tax structure. The study will also try to explore the reasons for the differences, if any, in the growth of tax revenue, its buoyancy, and stability over the time across the states.

The study will try to identify the sensitive policy issues in order to address the problems of imbalance among the states. However, before we proceed to our basic analysis, it should be admitted that in the case of special category states data deficiency assumes considerable importance⁴. The data for state domestic products and states own tax revenue has been taken from many sources like RBI, State Digest, and EPW. Further, in the present analysis, we are using only the states own tax revenue excluding both grants and the central transfers. This is because they come under the preview of the union government and the states do not have much discretion in their distribution. For the estimation and accounting purposes the excel and E-views will be mainly put to use.

The section II will be dealing with the variable description and methodology. The section III will deal with the estimation and will be finally followed by the section IV citing the conclusion of the study.

II. Variables and the Methodology

The main variables to be used in the study will be the state domestic product of the concerned states along with the tax revenue of the state. Under the tax revenue, we will be including only the own tax revenues of the states⁵. Though the share from the central pool belongs the same category, there exists a certain degree of discretion with the union government to alter the allocation. That is why we will be excluding the share of states from the central tax pool devised by the finance commission. The data for both the variables will be taken at their constant prices and will be adjusted for the latest base year. These data figures will be utilized to calculate the tax growth rates, the buoyancy of the tax structure along with the stability analysis of the tax structure for the cited states over the reference period.

³ Six special category states namely Assam, HP, JK, Manipur, Meghalaya, and Nagaland have been taken as a sample.

⁴ For data related issues and the problems posed thereupon see "State Level Performance under Economic Reforms in India" by Montek S. Ahluwalia.

⁵ Though the central share to states constitutes a part of states own income but will be kept out for some discretionary purposes.

There are multiple methods to calculate the above-referred parameters of a tax structure. The growth rates of the tax revenue will be calculated by compound annual growth rate model⁶. To see the progress of tax revenue in terms of population growth, per capita tax growth will also be estimated and analyzed. So far as the methods used to calculate the buoyancy is concerned, the double log regression model will be estimated to calculate the buoyancy coefficient of the tax structure⁷. The general specification of the model is as:

$$\log T = \log \beta_1 + \beta_2 \log Y + \eta \quad (1)$$

Here;

log T = log of Tax revenue

log Y = log of GSDP

η = error term.

However, this is the general model used to calculate the buoyancy over the period. Since we have to capture the effect of reforms too, we will modify the above model to serve the desired purposes. Following Upender⁸ [2008] we will employ the following model to estimate both the pre and post-reform buoyancy coefficients:

$$\log Tax_t = \log \lambda_{1t} + \lambda_{2t} \log GSDP_t + \beta_{3t}D + \beta_{4t}(D * \log GSDP) + \eta_t \quad (2)$$

Here;

Log Tax = logarithm of tax revenue (in Lakhs)

Log GSDP = logarithm of tax revenue

λ_{2t} = it will yield the tax buoyancy in the pre-reform period.

D = dummy [0 for pre-reform period and 1 for post reform period]

λ_{1t} = intercept during the pre-reform period [D=0]

β_{4t} = Magnitude of differential tax buoyancy during post tax reform period [D=1]

$(\lambda_{2t} + \beta_{4t})$ = Magnitude of tax buoyancy during post reform period.

The buoyancy estimates, besides for pre and post-reform period, have also been estimated for the direct and indirect taxes. This analysis has been carried to capture the extent of financial burden financed by common masses in these states.

The model specifications for both direct and indirect taxes will be as:

$$\log dtax_t = \log \alpha_{1t} + \alpha_{2t} \log GSDP_t + \alpha_{3t}D + \alpha_{4t}(D * \log GSDP) + \eta_t \quad (3)$$

$$\log itax_t = \log \gamma_{1t} + \gamma_{2t} \log GSDP_t + \gamma_{3t}D + \gamma_{4t}(D * \log GSDP) + \varepsilon_t \quad (4)$$

The model specification will be used to estimate the impact of reforms on both direct and indirect taxes. As in equation 2, the coefficients before dummy will represent pre-reform impacts and the coefficients after dummy will give us the post-reform scenario. For sustainability and stability, the coefficient of variation of the tax revenue series will be calculated. Following Jonathan⁹ [1998] we have calculated the coefficient of variation of different series of tax revenue to know the stability. The stability analysis will be a relative phenomenon of taxes within each other. A series with a value more than unity implies comparatively unstable series and the one with less than unity implies more stable. The analysis has been carried out to have a glimpse of the impact of reforms on the stability of the tax revenue of the states. This analysis is done keeping in mind the fiscal sustainability concern of the reference states.

III. Empirical analysis

The study is employing the time series data related to the reference states (i.e. J&K, Assam, HP, Manipur, Meghalaya, and Nagaland) for the period of 1972 to 2016. The variables of the analysis will be stated GDP and the state own tax revenue. As regression analysis will be spurious if the data is non-stationary, so we have used the unit root tests to detect the same. We took aid from the augmented Dickey-fuller and Phillips Perron tests to guard our estimation against the problem of unit root¹⁰. The test found that almost all of the data series are exhibiting stationarity at levels. They were found to be log-level stationary. For the sake of simplicity, we will not be displaying the basic econometric tests and results of the estimation in the main paper. However the same will be placed in the appendix.

⁶ There are mainly three methods used to calculate the growth rate i.e. Annual average method, CAGR and the trend model.

⁷ There are a bunch of other methods to calculate the buoyancy of a tax structure. For further insights see Jonathan Haugton [1998].

⁸ For further deliberations and understanding on the model see the work by M. Upender [2008] titled "Degree of tax buoyancy in Indian; an empirical study"

⁹ For more detailed account of the role and importance of revenue stability and its various methods to calculate see Jonathan [1998] titled the topic "Estimating tax buoyancy, elasticity, and stability"

¹⁰ Unit root, non-stationarity are the terms used to refer the data possessing the time-varying mean, variance, and covariance. For more see Damodar N Gujarati.

3.1 Growth Performance

Starting with the growth performance of the tax revenue of the concerned states, we calculated the compound annual growth rate both in the pre and post-reform periods¹¹. As can be seen from the table below all the six states have experienced a decrease in the growth rate of tax revenue in the post-reform period. However, the extent and the magnitude of decline have been different across the states. The highest decline is found in Jammu and Kashmir with least decline in the Himachal Pradesh. Although there has been an all-round decline in the growth rate of tax revenue in the states in the post-reform period, it should not be taken as the absolute amount of tax revenue experienced a decline. However, during the past few years, states like Himachal, Nagaland, and Manipur have started reversing the declining trend¹².

This bi-dimensional trend of reduced tax revenue growth rates in the post-reform period along with increased interstate variability may be attributed to a multitude of causes. Some of the causes are state specific yet others are general to this groups which are our cause of concern in the study. Except for Himachal Pradesh, all other states share the common menace of terrorism and political separatism. These instabilities aggravated further during the post-reform period leading to the lesser development and accordingly more dependence. Moreover, the lagging performance in the post-reform period may be ascribed to the political and administrative instability that engulfed these states following the reforms. On the other hand, the outlier performance of the cited states along with J&K during the pre-reforms period may be attributed to the agrarian and other administrative reforms carried out by the state governments. Furthermore, there are both interstates and inter time variation in the growth rates of tax revenue in the reference states as is evident from the table. However, the variability in the relative tax revenue generation has decreased from 0.14 in pre-reform period to 0.06 in the post-reform period for the over-all taxes¹³. This can be an indication of improving convergence among the states post-reforms.

Table 3.1 : Growth rates of tax revenue.

States	GSDP Growth			Tax per-capita		
	Over-all	Pre-reform	Post-reform	Over-all	Pre-reform	Post-reform
Assam	14.02	15.37	13.70	13.00	12.95	12.50
Himachal	15.96	16.77	16.05	15.00	14.47	14.12
J&K	17.62	22.68	14.35	15.00	19.50	11.11
Manipur	15.29	17.33	15.04	14.00	14.25	13.21
Meghalaya	16.64	20.11	15.32	14.00	16.81	12.52
Nagaland	14.65	17.50	13.41	12.00	12.64	11.42
Average	15.70	18.29	14.65	13.00	12.95	12.50

The per-capita tax ratios do exhibit the same trend as exhibited by the growth rate of tax receipts over the reference period. This implies that the tax revenue was not able to keep pace with the population growth in the group of special category states. The more severe decline in the ratios has been observed for Jammu and Kashmir followed by Meghalaya with rest of the states experiencing a mild decline. Though the post-reform period has seen a consistent decline in the per-capita tax revenue of these states the reforms alone should not be blamed for the whole. The dwindling scenario may be partly explained by a skyrocketed population growth rate among these states and partly by the exogenous factor like instability, corruption, the absence of fiscal vision. During the last decade, the highest population growth rate was recorded in Meghalaya (27.8%) followed by J&K (23.7%) and the least was experienced in Nagaland (-0.5%).

3.2 Buoyancy

After testing for the required stationarity diagnostics of the variables under consideration, we proceed for estimation of the models. The estimation was carried out along twin dimensions of time (i.e. pre and post-reform period) and type (i.e. direct as well as indirect taxes). However, due to voluminous nature of models and their estimation, we have avoided the formal model interpretations and have quoted the figures of estimates only. All the six states over the reference period were found to have a highly buoyant tax structure as is evident from the absolute magnitude of the buoyancy coefficients. The post-reforms estimates show a better and encouraging picture of the states as the buoyancy estimates have experienced a dramatic increase. This signifies the positive over-all impact of reforms on the tax structure of these states. The best performance in terms of improved buoyancy has been experienced by Jammu and Kashmir followed by Manipur and Assam. However, the visual inspection of these figures can be deceptive. As already sketched down in the model specification

¹¹ The CAGR method of calculating growth rate has the advantage that it gives the smooth movement of the series over time and ignores the outlier observations if they are not the endpoints.

¹² These states generated more than 20 percent of total tax revenue from their own sources as against others states like Jammu and Kashmir. For further clarification refer to Economic surveys of the concerned states for fiscal 2015-16.

¹³ The average variability as captured by the coefficient of variation has experienced a decline.

section that the buoyancy estimate will be the combination of two parameters ($\lambda_{2t} + \beta_{4t}$). λ_{2t} will be representing the growth in the tax revenue following the growth of income in the pre-reform period. On the other hand, β_{4t} will represent the growth rate of tax revenue following the reforms.

Table 3.2: Estimates of buoyancy

States	Buoyancy			Direct Taxes		Indirect Taxes	
	Over-all	Pre-reform	Post-reform	Pre-reform	Post-reform	Pre-reform	Post-reform
J & K	1.58* (0.14)	0.85* (.084)	2.81* (.281)	0.44* (.10)	3.94* (.35)	.63* (.08)	3.53* (.30)
Assam	1.35* (0.14)	0.30* (.035)	1.49* (0.15)	.50* (.09)	1.92* (.34)	.66* (.09)	3.76* (.37)
HP	1.38* (.008)	0.42* (.025)	1.21* (.055)	.40* (.06)	2.11* (.14)	.78* (.09)	2.26* (.22)
Manipur	1.25* (0.10)	0.44* (0.044)	1.69* (.16)	.36* (.06)	1.58* (.19)	.75* (.08)	3.45 (.29)
Meghalaya	1.25* (0.07)	0.53* (0.03)	1.24* (0.079)	.51* (.08)	1.89* (.20)	.74* (.11)	2.17 (.28)
Nagaland	1.07* (0.05)	0.50* (0.035)	1.30* (.083)	0.37* (0.06)	1.45* (0.15)	.69* (.07)	1.89* (.19)

*Indicates the coefficient is significant at 1 percent level of significance.
 Figures in the brackets are the standard errors of the coefficients.

Thus the increase in any one of the components may give us a statistically significant magnitude of the tax buoyancy. The actual performance of the reforms may be captured by the sign possessed by the parameter β_{3t} . A positive sign will mean that the reforms have made positive contributions and the negative implies vice versa. Although as can be inferred from the table 1.2 the buoyancy estimates in the post-reform period seem pretty smart they are the result of the interaction of two coefficients as already highlighted. The dummy term from the estimation has been found to be negative for almost all the states showing a downward slump of the reforms.

The similar trends have been exhibited by the direct and indirect taxes whose overall buoyancy has experienced dramatic increase over the years. However, the buoyancy of indirect taxes has increased more than those of direct taxes. The possible explanation for such a trend can be an ever increasing middle class in these states with better inequality scenarios. These results of buoyancy are found to exhibit a contrast with those found when we analyzed the growth rates of tax revenue over the varioustime period.

However, the figures quoted here are the overall buoyancy which is itself an interaction of state gross domestic product and tax policies. When it comes to the individual impact of tax policies (i.e. Reforms) on tax revenue the results were found to be negative and significant. Almost in all the models, the coefficient of the dummy term turned out to be negative and statistically significant. So it was the strong and positive effect of the growth in the state GSDP that helped to reverse the declining trend of the tax revenues in these states. In other words, one can also say that the reforms enhanced the growth trajectory of these states which in turn contributed positively to the tax structure of these economies. So the reforms contributed negatively via the direct channel of tax policies but positively via the indirect channel of income growth. This fact can also be validated from the dissection of direct and indirect taxes; where the indirect taxes showed a dramatic growth as compared to their counter partners.

3.3 Stability Analysis

To further analyze the tax structure of the states from the sustainability and stability point of view in the post-reform period we have estimated the variance coefficients of the revenue series. The lesser the coefficient of variation of a series implies more stability and hence more sustainability¹⁴. All the states under consideration were found to have an unstable tax structure over the entire period of study. However, the element of instability has aggravated much in the post-reform period.

Table 3.3: variability Analysis

States	Coefficient of Variation								
	Total taxes			Direct taxes			Indirect taxes		
	Over-all	Pre-reform	Post-reform	Over-all	Pre-reform	Post-reform	Over-all	Pre-reform	Post-reform
J & K	1.38	0.56	0.87	1.84	1.35	1.29	1.60	0.74	1.06
Assam	1.50	0.57	0.95	0.99	0.88	0.57	1.56	0.86	1.03

¹⁴ The insights for this analysis has been taken from the work of Jonathan Haughton, "Estimating tax buoyancy, elasticity, and stability" (1998).it is a relative analysis of the series with each other.

HP	1.48	0.84	0.93	1.37	0.57	0.81	1.54	0.88	1.00
Manipur	1.51	0.56	1.00	1.04	0.59	0.54	1.68	0.86	1.13
Meghalaya	1.47	0.58	0.95	1.41	0.71	0.89	1.54	1.08	1.01
Nagaland	1.40	0.57	0.92	1.19	0.53	0.63	1.53	0.80	1.03

Note: Coefficient of variability has been taken as the ratio between deviations to mean.

However, when it comes to the case of direct and indirect taxes the revelations are mixed. Some states like J&K, Assam, and Manipur have acquired better stability of direct taxes in the post-reform period as compared to the other states. Regarding indirect taxes, except Meghalaya, all others have experienced an increased instability of their indirect taxes. Many possible explanations can be put for such a time-varying scenario like this. Apart from the geographical and other social constraints, one of the dominant disturbances in all these states was the internal instability. This instability both political and economic led to the breeding of other problems like rampant corruption, excessive evasion, the absence of audit, reduced compliance and much more. This all led to what we can call as the fiscal trap where lower fiscal prudence undermines growth which in turn perpetuate lower fiscal capacity.

IV. Conclusion

The study tried to highlight the impact of tax reforms initiated in the Indian economy during the 1990s on the tax structure of the group of special category states. Under the tax structure heading, we mainly dealt with the states own tax revenue excluding the central share of taxes. The tax revenue of the special category states exhibited a decelerating trend in the post-reform period as compared to pre-reform. Similarly, the per-capita tax ratios also revealed a downward tendency in the post-reform period. The overall buoyancy estimates for all the states over the time were found to be significantly high. However, the results showed a dramatic change once the models were adjusted for the impact of reforms. The coefficient of dummy term, used to capture the impact of reforms, was found significantly negative showing the poor performance of the tax revenue after the reforms. Meanwhile, the interaction term (combined effect of reform policies and GSDP growth on tax revenue) was found to be significantly high. This implies that the positive impact of income growth has been strong enough to overcome the adverse impacts of the post-reform period.

Thus we can conclude that unlike other general category states the economic reforms have not yielded the desired outcomes in case of special category states. As already pointed out for such a state of affairs we can have many reasons. Over and above those state-specific and region-specific forces, the reforms for these states did not contain a much accommodative power to absorb the peculiarities of these states. This implies that a modified version of reforms should have been applied to this group of states keeping in view their political, geographic and administrative scenarios. No concrete effort from the central government was made to explore the niche areas of these hysteresis ridden states.

The whole responsibility of these local units is entrusted with the native governments who in face of external shocks don't know the remedy to respond with. These states possess certain absolute advantages over other states in the form of peculiar climate for tourism, better conditions for horticulture and cash crops but yet the progress on these fronts is pretty scarce. Although the services sector in these states has started to accelerate the performance is yet under par. Moreover, the services sector has the dual problems of volatility and less employment elasticity. The excessive dependence on these sectors may mean the complete breakdown of the financial viability in face of external or internal shocks. The local institutions need to explore their areas of strength and try to institutionalize their development efforts. Such steps may help these governments to have double dividends of reduced unemployment and an increased fiscal capacity to grow.

References

- [1]. Ahluwalia, Montek S. "State-level performance under economic reforms in India." *Economic policy reforms and the Indian economy* (2002): 91-125.
- [2]. Upender, Mulakala. "Degree of Tax Buoyancy In India: An Empirical Study". *International Journal of Applied Econometrics and Quantitative Studies* 5, no. 2 (2008): 59-70.
- [3]. Suresh, M., and N. A. Khan. "Trends and Tax Buoyancy in Corporation Tax in Pre-and Post-Liberalization Periods in India." *IUP Journal of Public Finance* 9, no. 2 (2011): 44.
- [4]. Samwel, Kotut Cheruiyot, and Menjo Kibiwoth Isaac. "Elasticity and Buoyancy of Tax Components and Tax Systems in Kenya." (2012).
- [5]. Timsina, Neelam. "Tax Elasticity and Buoyancy in Nepal: A Revisit." *NBR Economic Review* 12 (2007): 9-21.
- [6]. Gillani, Syeda Fizza. "Elasticity and buoyancy of federal taxes in Pakistan." *The Pakistan Development Review* (1986): 163-174.
- [7]. Choudhry, Nurun N. "Measuring the elasticity of tax revenue: A division index approach." *Staff papers* 26, no. 1 (1979): 87-122.
- [8]. Khan, Mohammad Zubair. "The responsiveness of tax yield to increases in national income." *The Pakistan Development Review* 12, no. 4 (1973): 416-432.
- [9]. Rao, M. Govinda. "Tax system reform in India: Achievements and challenges ahead." *Journal of Asian Economics* 16, no. 6 (2005): 993-1011.
- [10]. Acharya, Shankar. "Thirty years of tax reform in India." *Economic and Political Weekly* (2005): 2061-2070.

- [11]. Purohit, Mahesh C. "Buoyancy and Income Elasticity of State Taxes in India." *ArthaVijnana* 20, no. 3 (1978): 244-269.
- [12]. Bagchi, Amaresh. "India's tax reform: a progress report." *Economic and Political Weekly* (1994): 2809-2815.
- [13]. Haughton, Jonathan. "Estimating tax buoyancy, elasticity, and stability" (1998).
- [14]. Mansfield, Charles Y. "Elasticity and buoyancy of a tax system: A method applied to Paraguay." *Staff Papers* 19, no. 2 (1972): 425-446.
- [15]. Bhanumurthy, N. R., Sukanya Bose, and Parma Devi Adhikari. *Targeting Debt and Deficits in India: A Structural Macroeconometric Approach*. No. 15/148. 2015.
- [16]. Ansari, M. M. "Determinants of tax ratio: a cross-country analysis." *Economic and Political weekly* (1982): 1035-1042.
- [17]. Dwivedi, D. N. "A Buoyancy Approach to the Evaluation of Excise Taxation in India." *Indian Economic Review* 11, no. 2 (1976): 181-192.
- [18]. Chelliah, Raja J., Hessel J. Baas, and Margaret R. Kelly. "Tax ratios and tax effort in developing countries, 1969-71." *Staff papers* 22, no. 1 (1975): 187-205.
- [19]. Jain, M. M. "Income Elasticity of Indian Tax Structure 1955-56 to 1965-66." *Economic and Political Weekly* (1969): 769-772.
- [20]. Chakraborty, P. and Rao, M Govinda., "Finances of Karnataka: Fiscal Implications of Salary Hike", National Institute of Public Finance and Policy, November 2006.

Appendix

The table below sketched down the Stationarity diagnoses of the time series under consideration. We have employed the alternative tests of Augmented Dickey-fuller and Phillips pheron test.

Table A.1: Unit root Analysis

		Augmented Dickey-fuller statistic					Phillips perron				
		1%	5%	10%	Critical	P.val	1%	5%	10%	Critical	P.val
Assam	GSDP	4.19	3.52	3.19	25.74	0.00	4.19	3.52	3.19	19.89	0.00
	Tax	4.19	3.52	3.19	3.62	0.03	4.19	3.52	3.19	3.69	0.03
J&K	GSDP	4.19	3.52	3.19	29.33	0.00	4.19	3.52	3.19	24.25	0.00
	Tax	4.19	3.52	3.19	5.06	0.00	4.19	3.52	3.19	5.76	0.00
HP	GSDP	4.19	3.52	3.19	30.04	0.00	4.19	3.52	3.19	24.67	0.00
	Tax	4.19	3.52	3.19	4.03	0.01	4.19	3.52	3.19	3.91	0.02
Manipur	GSDP	4.19	3.52	3.19	27.76	0.00	4.19	3.52	3.19	25.51	0.00
	Tax	4.19	3.52	3.19	3.65	0.03	4.19	3.52	3.19	3.54	0.04
Meghal ya	GSDP	4.19	3.52	3.19	31.50	0.00	4.19	3.52	3.19	27.65	0.00
	Tax	4.19	3.52	3.19	6.76	0.00	4.19	3.52	3.19	5.11	0.00
Nagalan d	GSDP	4.19	3.52	3.19	5.85	0.00	4.19	3.52	3.19	21.46	0.00
	Tax	4.19	3.52	3.19	4.69	0.00	4.19	3.52	3.19	4.10	0.01

Table A2: Showing over-all buoyancy estimates for all the states over the entire period ranging from 1972-2016.

	Assam	Himachal Pradesh	J&K	Manipur	Meghalia	Nagaland
Coefficient	1.35	1.38	1.58	1.25	1.25	1.07
Standard Error	0.13	0.08	0.13	0.10	0.07	0.05
t-statistic	9.77	15.91	11.38	12.41	16.84	19.25
P-value	0.00	0.00	0.00	0.00	0.00	0.00
R-square	0.69	0.86	0.75	0.79	0.87	0.90
S.Error of Regression	0.36	0.27	0.39	0.29	0.24	0.19
F-statistic	95.49	253	129.5	154.2	283.0	370.6
Durbin-Watson	0.18	0.28	0.34	0.24	0.33	0.24

Table A3: Table showing the disaggregated pre and post-reform buoyancy estimates for Assam, HP, and JK

	Assam			HP			J&K		
	λ_2	β_3	β_4	λ_2	β_3	β_4	λ_2	β_3	β_4
Coefficient	0.29	-8.09	1.18	0.41	-4.86	0.78	0.85	-12.17	1.96
Standard Error	0.03	1.00	0.15	0.02	0.34	0.05	0.084	1.85	0.28
t-statistic	8.58	-8.02	7.91	16.52	-14.18	14.04	10.11	-6.56	6.97
P-value	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R-square	0.99			0.99			0.95		
S. E of regression	0.04			0.02			1.17		
D-W Statistic	0.93			1.07			0.63		

Table A3: Table showing the disaggregated pre and post-reform buoyancy estimates for Manipur, Meghalaya, and Nagaland

	Manipur			Meghalaya			Nagaland		
	λ_2	β_3	β_4	λ_2	β_3	β_4	λ_2	β_3	β_4
Coefficient	0.43	-7.27	1.25	0.52	-4.12	0.70	0.50	-4.40	0.80
Standard Error	0.04	0.91	0.16	0.03	0.44	0.07	0.03	0.44	0.08
t-statistic	9.66	-7.94	7.64	17.43	-9.28	8.91	14.05	-10.15	9.65
P-value	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R-square	0.99			0.99			0.99		
S. E of regression	0.05			0.04			0.04		
D-W Statistic	1.11			0.88			1.08		

Table A5: Table showing the disaggregated pre and post-reform buoyancy estimates of direct taxes for Assam, HP, and JK

	Assam			HP			J&K		
	α_2	α_3	α_4	α_2	α_3	α_4	α_2	α_3	α_4
Coefficient	0.50	-9.26	1.42	0.40	-10.27	1.71	0.44	-22.84	3.55
Standard Error	0.09	2.39	0.34	0.06	0.93	0.14	0.10	2.36	0.35
t-statistic	5.55	-3.86	4.12	6.38	10.97	11.79	4.18	-9.65	9.90
P-value	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R-square	0.89			0.97			0.90		
S. E of regression	0.18			0.12			0.22		
D-W Statistic	0.83			0.94			1.24		

Table A6: Table showing the disaggregated pre and post-reform buoyancy estimates of direct taxes for Manipur, Meghalaya, and Nagaland.

	Manipur			Meghalaya			Nagaland		
	α_2	α_3	α_4	α_2	α_3	α_4	α_2	α_3	α_4
Coefficient	0.36	-6.42	1.22	0.51	-7.50	1.38	0.37	-5.30	1.08
Standard Error	0.06	1.16	0.19	0.08	1.21	0.20	0.06	0.88	0.15
t-statistic	6.07	-5.15	6.14	6.43	-6.17	6.70	5.80	5.96	6.90
P-value	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R-square	0.95			0.93			0.96		
S. E of regression	0.12			0.17			0.13		
D-W Statistic	1.72			0.93			1.25		

Table A7: Table showing the disaggregated pre and post-reform buoyancy estimates of indirect taxes for Assam, HP, and JK

	Assam			HP			J&K		
	γ_2	γ_3	γ_4	γ_2	γ_3	γ_4	γ_2	γ_3	γ_4
Coefficient	0.66	-20.70	3.12	0.74	-8.81	1.48	0.63	-18.44	2.93
Standard Error	0.09	2.57	0.37	0.09	1.41	0.22	0.08	1.98	0.30
t-statistic	6.76	-8.05	8.42	7.81	-6.22	6.75	7.09	-9.31	9.77
P-value	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R-square	0.94			0.95			0.95		
S. E of regression	0.19			0.18			0.18		
D-W Statistic	0.59			0.51			0.59		

Table A8: Table showing the disaggregated pre and post-reform buoyancy estimates of indirect taxes for Manipur, Meghalaya, and Nagaland.

	Manipur			Meghalaya			Nagaland		
	γ_2	γ_3	γ_4	γ_2	γ_3	γ_4	γ_2	γ_3	γ_4
Coefficient	0.75	-15.02	2.69	0.74	-7.64	1.43	0.69	-6.54	1.23
Standard Error	0.08	1.73	0.29	0.11	1.67	0.28	0.07	1.09	0.19

Economic Reforms and the tax structure: A look into special category states

t-statistic	8.36	-8.67	9.09	6.64	4.55	5.02	8.86	-5.98	6.38
P-value	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R-square	0.95			0.92			0.94		
S. E of regression	0.18			0.24			0.16		
D-W Statistic	0.69			0.44			0.71		