Relative Tax Effort by Indian States

Tapas K. Sen

No. 5 May 1997

Relative Tax Effort by Indian States

Tapas K. Sen*

Introduction

The tax performance of units of government at the same level (countries, provinces or States within the same country or local bodies) has been traditionally assessed in terms of the actual performance relative to some concept of taxable capacity. The simplest and most used of these measures is the tax-GDP ratio or, in the case of States, tax-SDP ratio. The implicit assumption involved in using such ratios for the purpose of comparing tax performance is that GDP (or SDP) is an indicator of taxable capacity and thus suitable for normalising the tax collections for comparisons across governmental units. Two sets of problems with such simple measures have been pointed out since long. The first relates to the GDP, SDP or any other broad indicator being an imperfect proxy for the tax base, especially when the tax structure consists of a combination of a number of different taxes falling on distinct tax bases. The second problem relates to the implicit assumption involved in any simple ratio -- that the relationship between the broad tax base adopted and tax revenue is linear and proportional, which is not necessarily the case.

To meet these objections, a more elaborate estimation of tax effort was devised. Refinement of the basic concept could be carried out in either or both of two directions: (a) using better proxies of the tax base and (b) using more appropriate estimation procedures to allow for relationships other than a simple proportional one. Examples in the literature now

---

* An earlier version of this paper was prepared for the information of the Planning Commission. This was subsequently presented at a conference on "Fifty Years of Indian Economic Devlopment and Regional Imbalances" held at Jadavpur University, Calcutta on March 21-22, 1997.

Research assistance by H.K. Amarnath is gratefully acknowledged. The author also thanks Partho Shome and the conference participants for their suggestions for improvement. The author, however, remains responsible for all errors in this paper.

include disaggregated estimates of tax effort using representative tax system (RTS) approach popularised by the American Commission of Intergovernmental Relations as well as similar estimates using multiple regressions (used in a number of earlier studies of inter-country tax effort at the IMF and, closer home, by the Ninth Finance Commission. The former essentially involves computing average effective rates of tax over the entire sample (or sub-samples, if behavioural differences within sample are expected *a priori*) after defining an appropriate proxy base for each of the (components of) taxes being considered, and using these average rates to estimate tax potential on the basis of each State's tax base. In the latter case, either the aggregate tax revenue or the individual tax collections are explained by a set of regressors judged to be representing the taxable capacity through one or more regressions. The regression estimates of the dependent variable(s) are then used as indicators of tax potential. Comparing the actual tax collections with the tax potential yields a measure of tax effort.

Methodology

Due to the large data requirements for the RTS approach (detailed data on every type of tax base or a close proxy for each, and on collection of tax by different tax base categories are required) we have adopted the regression approach in our estimates that follow. However, we do use a disaggregated approach and estimate separate cross-section regressions for each of the taxes, or more accurately, groups of taxes. We carry out our exercise for a sample of 15 non-special category States (Andhra Pradesh, Bihar, Goa, Gujarat, Haryana, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Orissa, Punjab, Rajasthan, Tamil Nadu, Uttar Pradesh and West Bengal), and we use averages of the data for the 3-year period 1991-92 to 1993-94, to reduce the degree of fortuitous fluctuations.

The tax effort of each of the States is computed on a disaggregated basis for the following groups of taxes. These groups were formed due to some degree of interchangeability of the taxes within each group and also because of an identical set of tax base proxies.

1. Agricultural taxes: Land Revenue and Agricultural Income tax;
2. Stamp Duty and Registration Fees;
3. Sales tax;
4. State Excise;

5. Motor Vehicle tax: Road tax or Motor Vehicle tax, Passenger and Goods tax;

6. Electricity Duty; and,

7. Other taxes.

The basic equations postulated for each of the (groups of) taxes are as follows:

AGR = f(PSDP),

SDRF = g(PCSDP, URBAN, DENS),

ST = h(PCSDP, SHAGR, URBAN, BANK),

EXC = j(PCSDP),

MVT = k(TSDP, VPOP),

ED = l(ECON, DOCON, AGCON), and

OT = m(PCSDP),

where

AGR = revenue from agricultural taxes,

PSDP = SDP from the primary sector,

SDRF = revenue from stamp duty and registration fees,

PCSDP = per capita Net State Domestic Product (SDP),

URBAN = urbanisation as per 1991 Census,

DENS = density of population per sq. km. (as per 1991 Census),

ST = revenue from sales tax (including Central sales tax),

SHAGR = share of agriculture in total SDP,

BANK = number of scheduled commercial bank branches,

EXC = revenue from State excise duty,

MVT = revenue from motor vehicle taxes,

TSDP = SDP from the transport sector excluding railways,

VPOP = number of registered motor vehicles in the State,

ED = revenue from electricity duty,

ECON = total sale of electricity,

DOCON = share of domestic sector in total sale of electricity,

AGCON = share of agriculture sector in total sale of electricity, and

OT = revenue from other taxes including entertainment tax(es).

The postulated functions are as much dictated by the availability of data as theoretical considerations, and could be improved upon if required data were available. The agricultural taxes are simply taken to be a function of SDP from agriculture in the State, while per capita SDP alone is expected to explain excise duty collections. In the former case, the part of agricultural income arising from organised plantations should also be important (particularly for agricultural income tax) while consumption of various types of liquor ought to explain excise duty collections better than PCSDP. In the case of stamp duty and registration fees (the bulk of revenue comes from stamp duty), the problem with the available data on taxable transactions is that the reported values are notoriously underestimated and hardly reflect taxable capacity. Moreover, the degree of underestimation may not be uniform across States; using *reported* values of transactions would thus ignore a part of the tax effort -- that of bringing reported values of properties transacted more in line with the market values. Hence, we have to choose independent variables that ought to influence market values rather than the unobservable market values themselves. Similarly, in the sales tax equation, direct observations on tax base, i.e., taxable sales are available but cannot be used as they would be net of evasion, controlling which is a legitimate part of tax effort. Indirect proxies are therefore used, with PCSDP reflecting general consumption levels[1], urbanisation proxying marketisation and number of bank offices expected to proxy monetisation. The share of agriculture in SDP is used as an explanatory variable mainly because with predominantly first point taxation, sales tax has acquired the hues of another excise duty. The other two specifications (motor vehicle taxes and electricity duty) are self-explanatory, while the category of 'other taxes' being of the miscellaneous type, only a general capacity variable like PCSDP can be used.

Results

Variations of these basic functions were tried in the process of estimation. Apart from trying formats other than the simple linear, we also experimented with the alternatives of using scale variables [SDP or population(POP)] as explanatory variables and normalisation of the tax revenue with the same ones, where felt necessary. The preferred estimates are reported below (t-values in parentheses):

---

[1] In the case of some States -- specifically those where remittances from outside the State form a substantial part of the disposable income -- PCSDP underestimates consumption correspondingly.

log(AGR) = -5.7112 + 0.9668log(PSDP) R^2 = 0.4174 F = 9.3156
(-2.91) (3.05)

log (SDRF/POP) = -5.2656 + 0.6250log(PCSDP) + 0.6403log(URBAN)
(-2.19) (1.73) (1.51)
+ 0.2317log(DENS) R^2 = 0.7345 F = 10.1414
(1.53)

log (ST/SDP) = 2.7781 - 0.2879 log(PCSDP) - 0.3078log(SHAGR)
(1.36) (-1.03) (-1.38)
+ 0.7285 log (URBAN) R^2 = 0.5881 F = 5.2344
(1.97)

EXC/POP = -38.4632 + 0.0210PCSDP R^2 = 0.5987 F = 17.9047
(-1.05) (4.23)

log (MVT) = 4.7167 + 0.2112log(TSDP) + 0.9995log(VPOP)
(3.86) (1.34) (5.09)
R^2 = 0.8643 F = 38.2213

log (ED) = -3.3818 + 1.2711log(ECON) - 0.8572log(DOCON)
(0.8213) (3.00) (-1.29)
- 0.5979log(AGCON) R^2 = 0.5348 F = 3.8327
(-1.59)

OT/POP = -9.5271 + 0.00385PCSDP R^2 = 0.3745 F = 7.7825
(-0.93) (2.79)

While most of the reported estimates were computed using all the 15 observations, there were two exceptions. In the case of excise duty, Gujarat was excluded due to the long-standing prohibition policy of the State. Similarly, in the case of electricity duty, the observations on Goa were not considered as the tax revenue reported was nil.

The tax potential was estimated using the estimated values of the dependent variables derived on the basis of these preferred equations. The ratio of the actual tax revenue to the estimated tax potential (in percentage terms), equating the average for all 15 States to 100, yielded the relative tax effort index. The actual tax revenue, tax potential estimated and tax effort indices are given in Tables 1-8. The aggregate tax potential is derived as a sum of the disaggregated tax potential, and the aggregate tax effort derived as a ratio of aggregate tax revenue to the aggregate tax potential.

In the case of agricultural taxes, the tax effort index has a wide range; from a low of 4 in Haryana and 8 in Punjab, it has a high of 423 in West Bengal. Ignoring West Bengal as a special case, the next highest index is observed for Kerala at 154. It may be mentioned that in Haryana and Punjab (as well as Uttar Pradesh to a smaller degree), a substantial amount of revenue from the agricultural sector is raised through *mandi* (market) fees on sales in organised markets by surplus farmers. These revenues, however, are not classified as taxes. In the case of West Bengal, the soaring tax effort index is probably due to the cesses on tea plantations and coal mines included in the land revenue and unique to the State, which garner a large amount of revenue.

In the case of stamp duty and registration fees, the system of the levy is less diverse and this is reflected in the much smaller range of the tax effort indices (53 in West Bengal to 142 in Kerala).

The bulk of the own tax revenue in almost all States are raised through sales tax and therefore the tax effort in this area practically determines the overall tax effort. Here again the range of tax effort indices is not so wide, from a low of 76 in Madhya Pradesh to a high of 161 in Kerala. An interesting feature of the results in this case is that the tax effort of all middle income States -- Andhra Pradesh, Karnataka, Kerala, Tamil Nadu and West Bengal -- are above average barring that of West Bengal. This can be traced to the relatively high tax effort indices of the four Southern States. Also, despite allowing for a lower ST/SDP with rise in per capita SDP, Maharashtra, generally considered to be efficient and innovative, exhibits a low tax effort of 83.

In the case of State excise, the variation in tax effort is greater, ranging from 37 in West Bengal to 158 in Punjab. This could partly be a result of a somewhat misspecified equation resulting from the lack of all relevant data. The misspecification could have arisen from our inability to capture the degree of prohibition applicable in the States (partial prohibition is not uncommon) and the social habits with respect to drinking liquor from which most of the revenue of this tax is raised.

Table 1
Tax Effort of Selected States: Agricultural Taxes

State	Actual Tax Revenue (Rs. Crore)	Estimated Tax Potential (Rs. Crore)	Tax Effort Index
Andhra Pradesh	53	39	86
Bihar	19	32	37
Goa	1	1	73
Gujarat	47	25	119
Haryana	1	18	4
Karnataka	26	29	58
Kerala	37	15	154
Madhya Pradesh	30	36	53
Maharashtra	64	41	99
Orissa	28	15	115
Punjab	3	27	8
Rajasthan	28	25	71
Tamil Nadu	46	22	127
Uttar Pradesh	50	63	50
West Bengal	241	36	423
All 15 States	**674**	**424**	**100**

Table 2
Tax Effort of Selected States: Stamp Duty and Registration Fees

State	Actual Tax Revenue (Rs. Crore)	Estimated Tax Potential (Rs. Crore)	Tax Effort Index
Andhra Pradesh	191	240	76
Bihar	168	154	104
Goa	7	9	68
Gujarat	187	197	92
Haryana	107	83	125
Karnataka	224	183	118
Kerala	190	129	142
Madhya Pradesh	170	190	86
Maharashtra	489	434	108
Orissa	41	56	71
Punjab	146	129	108
Rajasthan	126	110	111
Tamil Nadu	324	285	109
Uttar Pradesh	479	395	117
West Bengal	175	316	53
All 15 States	**3024**	**2910**	**100**

Table 3 Tax Effort of Selected States: Sales Tax			
State	Actual Tax Revenue (Rs. Crore)	Estimated Tax Potential (Rs. Crore)	Tax Effort Index
Andhra Pradesh	1949	2009	101
Bihar	1037	923	117
Goa	107	111	100
Gujarat	2361	1948	126
Haryana	688	594	120
Karnataka	1902	1552	127
Kerala	1320	850	161
Madhya Pradesh	1071	1463	76
Maharashtra	4230	5292	83
Orissa	453	448	105
Punjab	841	934	93
Rajasthan	0	970	100
Tamil Nadu	2798	2500	116
Uttar Pradesh	2023	2544	83
West Bengal	1617	2088	80
All 15 States	**23333**	**24226**	**100**

Table 4
Tax Effort of Selected States: State Excise

State	Actual Tax Revenue (Rs. Crore)	Estimated Tax Potential (Rs. Crore)	Tax Effort Index
Andhra Pradesh	831	608	145
Bihar	134	238	60
Goa	18	28	71
Haryana	389	273	152
Karnataka	555	446	132
Kerala	254	242	112
Madhya Pradesh	440	417	112
Maharashtra	731	1352	58
Orissa	65	162	42
Punjab	613	414	158
Rajasthan	411	296	147
Tamil Nadu	539	593	97
Uttar Pradesh	852	769	118
West Bengal	202	581	37
All 15 States	**6034**	**6419**	**100**

Table 5
Tax Effort of Selected States: Motor Vehicle Taxes

State	Actual Tax Revenue (Rs. Crore)	Estimated Tax Potential (Rs. Crore)	Tax Effort Index
Andhra Pradesh	242	298	83
Bihar	139	137	103
Goa	9	16	58
Gujarat	249	406	62
Haryana	205	99	210
Karnataka	344	256	137
Kerala	119	111	110
Madhya Pradesh	348	228	155
Maharashtra	466	583	82
Orissa	74	69	111
Punjab	142	189	76
Rajasthan	163	152	109
Tamil Nadu	332	349	97
Uttar Pradesh	282	357	81
West Bengal	242	168	147
All 15 States	**3356**	**3418**	**100**

Table 6
Tax Effort of Selected States: Electricity Duty

State	Actual Tax Revenue (Rs. Crore)	Estimated Tax Potential (Rs. Crore)	Tax Effort Index
Andhra Pradesh	56	107	42
Bihar	26	50	42
Gujarat	462	155	242
Haryana	40	26	124
Karnataka	78	60	104
Kerala	36	47	62
Madhya Pradesh	288	115	204
Maharashtra	303	336	73
Orissa	98	44	183
Punjab	67	78	69
Rajasthan	54	73	60
Tamil Nadu	77	124	50
Uttar Pradesh	59	99	48
West Bengal	36	52	57
All 15 States	**1680**	**1366**	**100**

Table 7
Tax Effort of Selected States: Other Own Taxes

State	Actual Tax Revenue (Rs. Crore)	Estimated Tax Potential (Rs. Crore)	Tax Effort Index
Andhra Pradesh	104	95	92
Bihar	17	22	67
Goa	6	5	111
Gujarat	109	86	107
Haryana	14	46	26
Karnataka	141	71	169
Kerala	11	37	24
Madhya Pradesh	28	60	40
Maharashtra	453	229	168
Orissa	5	22	19
Punjab	6	71	7
Rajasthan	27	43	53
Tamil Nadu	117	95	104
Uttar Pradesh	93	106	74
West Bengal	144	90	135
All 15 States	**1275**	**1078**	**100**

Table 8
Tax Effort of Selected States: Total Own Taxes

State	Actual Tax Revenue (Rs. Crore)	Estimated Tax Potential (Rs. Crore)	Tax Effort Index
Andhra Pradesh	3426	3396	102
Bihar	1540	1556	100
Goa	148	170	88
Gujarat	3415	2817	123
Haryana	1444	1139	128
Karnataka	3270	2597	127
Kerala	1967	1431	139
Madhya Pradesh	2375	2509	96
Maharashtra	6736	8267	82
Orissa	764	816	95
Punjab	1818	1842	100
Rajasthan	1745	1669	106
Tamil Nadu	4233	3968	108
Uttar Pradesh	3838	4333	90
West Bengal	2657	3331	81
All 15 States	**39376**	**39841**	**100**

In the case of motor vehicle taxes, the tax effort indices should be better indicators of actual tax effort in terms of effective tax rates and administrative effort. While the best tax effort is exhibited by Haryana with a tax effort index of 210, Goa exhibits the lowest tax effort index of only 58. Other States with relatively high tax effort include Madhya Pradesh and West Bengal, while the laggards include Gujarat, Punjab and Uttar Pradesh.

The tax effort index in the case of electricity duty is a reflection of tax effort as well as the timeliness of the remittance of revenue collected by the State Electricity Boards (SEBs) to their respective governments. The duty is collected along with tariff by the SEBs, but they are often tardy in remitting the same to the government. Also, bunching of such remittances can throw tax effort estimates off the track. In any case, three States stand out in terms of tax effort with respect to this tax -- Gujarat(242), Madhya Pradesh(204) and Orissa(183). The worst performers are Bihar(42), Andhra Pradesh(42) and Uttar Pradesh(58).

In terms of aggregate tax effort, Kerala performs the best with an index of 139. Many earlier studies have also come up with a similar result. Other States that seem to have done well are Haryana(128), Karnataka(127), and Gujarat(123). In the case of Gujarat, the tax effort index may be a little overestimated as both tax revenue and tax potential for State excise are excluded. However, it may be argued that the tax potential of other taxes ought to be higher in Gujarat due to prohibition, and some adjustment should be made to account for this. We have not carried out any such adjustment in the tax potential estimated. States that exhibit low tax effort include West Bengal(81) and Maharashtra(82). It is not surprising to note that the range of tax effort indices is the narrowest for aggregate own taxes. This is primarily because various States have differing emphasis on the various tax handles available to them, partly due to political reasons and also due to administrative expertise developed over a number of years.

Table 9 summarises our results by ranking the States by their aggregate tax effort and indicating areas where tax effort appears to be weak. The ranks given are up to 14 only as two States -- Bihar and Punjab -- get the same rank due to identical aggregate tax effort. The Table shows that there is no apparent correlation between level of development and tax effort.

It confirms that aggregate tax effort is largely determined by sales tax effort due to its high weightage in own tax revenue. The States among the best four and the worst three in terms of sales tax effort occupy similar ranks in terms of total tax effort also. However, Madhya Pradesh (as also Punjab) makes up for low tax effort in sales tax considerably with high tax effort in other areas.

The Table also shows that even the States with relatively high tax effort have some weak areas regarding exploitation of available tax base. Agricultural taxation is one such area in most of the States. The States which appear to have exploited most of the available taxes to at least an average extent are Gujarat (barring motor vehicle taxes and, of course, State excise) and Karnataka (barring agricultural taxes). Punjab and Uttar Pradesh have a low tax effort in as many as five out of seven categories of taxes, which does not reflect favourably on their tax administration.

Before concluding, a brief discussion on some limitations of relative tax effort estimation such as the present one may be in order. Apart from the obvious limitations of data (other than the limitations already mentioned, doubts are often raised regarding the comparability of the estimates of SDP made by the State Statistical Bureaux) and heavy dependence on the robustness of the econometric estimation, it has two major limitations. First, it fails to take into account factors that may cause either loss of or addition to normal tax bases. For example, it does not take into account the loss of tax base through consignment or branch transfers; nor does it take into account tax exportation. Second, it reflects the relative tax effort in absolute terms rather than the marginal effort; if a particular government inherits a very low tax effort which remains low despite significant improvement, this is not clearly reflected in the indices computed. Further, an inherent limitation of the methodology is that random errrors get mixed up with tax effort; they are generally assumed to be small enough not to vitiate the comparisons. With all these limitations, it is probably better to accept the results as indicative rather than precise estimates. Their best use probably lies in assessing the tax performance of individual States in a general fashion and locate areas to concentrate on.

Table 9
Tax Effort of Selected States: Summary Results

State	Tax Effort Rank	Area of Weak Tax Effort
Andhra Pradesh	7	Agricultural taxes, Stamp Duty and Registration Fees, Motor Vehicle Taxes, Electricity Duty
Bihar	8	Agricultural Taxes, State Excise, Electricity Duty, Other Taxes
Goa	12	Agricultural taxes, Stamp Duty and Registration Fees, State Excise, Motor Vehicle Taxes
Gujarat	4	Motor Vehicle Taxes
Haryana	2	Agricultural Taxes, Other Taxes
Karnataka	3	Agricultural Taxes
Kerala	1	Electricity Duty, Other Taxes
Madhya Pradesh	9	Agricultural Taxes, Stamp Duty and Registration Fees, Sales Tax, Other Taxes
Maharashtra	13	Sales Tax, State Excise, Motor Vehicle Tax, Electricity Duty
Orissa	10	Stamp Duty and Registration Fees, State Excise, Other Taxes
Punjab	8	Agricultural Taxes, Sales Tax, Motor Vehicle Taxes, Electricity Duty, Other Taxes
Rajasthan	6	Agricultural Taxes, Electricity Duty, Other Taxes
Tamil Nadu	5	Motor Vehicle Taxes, Electricity Duty
Uttar Pradesh	11	Agricultural Taxes, Sales Tax, Motor Vehicle Taxes, Electricity Duty, Other Taxes
West Bengal	14	Stamp Duty and Registration Fees, Sales Tax, State Excise, Electricity Duty