# THE INCOME RESPONSIVENESS OF STATE TAXES IN MAHARASHTRA

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# FOREWORD

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(R J Chelliah)

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Contents

# THE INCOME RESPONSIVENESS OF STATE TAXES IN MAHARASHTRA

## 1. Introduction

The objective of the present study is to analyse the income responsiveness of the State tax revenues in Maharashtra for the period from 1961-62 to 1978-79 and compare it with that of a few other States. More specifically, it attempts to quantify the variations in State tax revenues that occur concurrent with a given change in the State domestic product (SDP) of Maharashtra. Broadly speaking, such a study helps us to know the extent of resource transfer through taxation from the private sector to the government consequent on a given change in the SDP. Moreover, to the extent the relationship between tax revenues and SDP remains stable over time and given the future course of SDP, a knowledge of the quantitative magnitude of such a relationship can be fruitfully utilised to forecast tax revenues.

Two statistical measures are generally used to judge the relationship between growth of income and that of taxes. They are: (i) the buoyancy coefficient and (ii) the elasticity coefficient. The former is defined as the percentage change in the actual tax revenue (revenue from a single tax or from a group of taxes, as the case may be) concurrent with a 1 per cent change in income and the latter as the percentage change in the tax revenue under a given tax structure concurrent with a 1 per cent change in income. Thus the basic difference between the two measures is that the elasticity reflects the responsiveness of the tax system to changes in income whereas the buoyancy captures the responsive-

ness of the tax system to changes in income and changes in the tax structure taken together. It follows that the elasticity is equal to the buoyancy if the tax rate structure does not undergo any change during the period under consideration.

In the present study, we analyse the income responsiveness of State tax revenues in terms of both these measures. Analytically, given the policy-determined tax rate structure of individual taxes, the income responsiveness of revenue from a tax system is a product of the responsiveness of the tax revenue to the aggregate tax base and the responsiveness of the aggregate tax base to income. The aggregate tax base is made up of several individual tax-bases. Thus, the composition of the tax system in terms of the relative importance of the individual taxes is of crucial importance in determining the income responsiveness of a tax system. For example, a tax system which consists mainly of those taxes the bases of which are highly income inelastic could be expected to exhibit lower income responsiveness than one which is made up of taxes having highly income elastic bases. Accordingly, in Section 2, we present the trends in the composition of the tax system in Maharashtra for the period from 1961-62 to 1980-81. In Section 3 we present the estimates of buoyancy coefficient for the major State taxes in Maharashtra and compare them with buoyancy coefficients of State taxes in a few other States. In Section 4 we present the corresponding estimates of elasticity. In Section 5 we summarize the major conclusions of the study. The detailed regression results and a discussion of the sources of data used for the regressions are given in the Annexure.

## 2. The Composition of State Tax Revenue in Maharashtra

Table 2.1 presents the composition of State tax revenue in Maharashtra. It is noticeable from the table that the general sales tax has been the most important single source of tax revenue in Maharashtra. On an average, it has accounted for around 40 per cent of the yearly State tax revenue during the period from 1961-62 to 1980-81. Next to the general sales tax, the Central sales tax has been the important source of tax revenue. Whereas the proportion of tax revenue accounted for by the general sales tax has remained more or less stable around 40 per cent, that accounted for by the Central Sales Tax has approximately doubled from around 8 per cent in 1961-62 to around 17 per cent in 1980-81.

Put together, these two taxes contributed around 50 per cent and 60 per cent of the total tax revenue in the '60s and '70s, respectively. Except in a few years, the rest of the tax revenue has been almost evenly distributed among the following taxes: the State excise duty, the motor spirit tax, the motor vehicles tax, the purchase tax, the passenger and goods tax, the entertainment tax, the electricity duty, stamps and registration fees and land revenue. These figures speak in no uncertain words of the very high concentration of the sources of tax revenue in Maharashtra.

The general sales tax in Maharashtra, the most important single source of tax revenue, is basically a tax on the sales within the State of almost all types of industrial and several agricultural goods. The Central sales tax is a tax on the exports of goods from Maharashtra to

TABLE 2.1

Composition of State Tax Revenue in Maharashtra

(Per cent of total)

| Year | General sales tax | Central sales tax | Motor spirit tax | State excise duty | Elec-tricity duty | Motor vehicles tax | Enter-tain-ment tax | Stamps and regis-tration fees | Passen-ger and goods tax | Pur-chase tax | Land revenue |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) |
| 1961-62 | 39.31 | 8.64 | 4.49 | 1.89 | 5.86 | 8.78 | 4.22 | 9.06 | 2.62 | - | 2.26 |
| 1962-63 | 38.20 | 8.52 | 5.25 | 1.88 | 6.62 | 7.71 | 5.18 | 9.17 | 2.96 | 1.73 | 9.34 |
| 1963-64 | 38.43 | 11.41 | 4.85 | 1.71 | 7.17 | 6.45 | 4.87 | 8.40 | 4.31 | 1.52 | 8.10 |
| 1964-65 | 38.18 | 12.54 | 4.69 | 2.71 | 6.96 | 6.55 | 4.42 | 7.71 | 4.37 | 1.63 | 6.46 |
| 1965-66 | 40.20 | 12.53 | 4.93 | 2.66 | 7.25 | 6.34 | 5.01 | 7.42 | 4.51 | 1.87 | 4.56 |
| 1966-67 | 40.58 | 12.76 | 4.08 | 2.48 | 7.48 | 6.29 | 5.16 | 6.49 | 4.32 | 2.26 | 4.77 |
| 1967-68 | 38.68 | 14.37 | 4.05 | 2.47 | 6.86 | 6.19 | 4.58 | 6.69 | 5.55 | 1.52 | 5.20 |
| 1968-69 | 39.09 | 13.56 | 4.08 | 2.93 | 6.56 | 6.31 | 4.79 | 6.31 | 5.53 | 1.75 | 4.70 |
| 1969-70 | 40.12 | 14.04 | 3.72 | 3.35 | 5.97 | 6.03 | 5.08 | 6.12 | 5.29 | 1.92 | 3.68 |
| 1970-71 | 42.62 | 14.65 | 3.61 | 2.67 | 6.60 | 5.45 | 5.06 | 5.23 | 4.77 | 1.73 | 3.87 |
| 1971-72 | 38.72 | 14.41 | 4.05 | 2.87 | 6.23 | 5.61 | 5.32 | 5.58 | 6.13 | 1.89 | 4.38 |
| 1972-73 | 38.75 | 14.78 | 4.15 | 3.34 | 6.77 | 5.39 | 5.80 | 5.88 | 5.91 | 2.53 | 3.39 |
| 1973-74 | 39.44 | 14.63 | 4.46 | 6.58 | 5.26 | 5.16 | 5.96 | 4.68 | 5.64 | 1.94 | 4.01 |
| 1974-75 | 41.67 | 14.26 | 4.43 | 5.89 | 6.02 | 4.09 | 5.35 | 3.82 | 5.96 | 1.64 | 4.28 |
| 1975-76 | 41.48 | 14.67 | 3.80 | 5.96 | 4.74 | 3.96 | 5.36 | 3.45 | 5.19 | 3.20 | 2.87 |
| 1976-77 | 41.78 | 16.49 | 3.68 | 6.03 | 4.70 | 3.80 | 5.10 | 3.30 | 4.28 | 2.61 | 2.73 |
| 1977-78 | 42.36 | 15.62 | 3.86 | 6.72 | 4.87 | 3.74 | 4.99 | 3.88 | 4.40 | 2.81 | 1.99 |
| 1978-79 | 41.81 | 16.27 | 3.41 | 6.32 | 5.41 | 3.68 | 4.98 | 4.40 | 4.29 | 1.65 | 2.45 |
| 1979-80 | 41.78 | 16.11 | 3.68 | 7.16 | 5.62 | 3.88 | 4.59 | 3.49 | 4.26 | 2.26 | 2.00 |
| 1980-81 | 43.66 | 16.87 | 4.22 | 7.58 | 5.48 | 4.45 | 4.41 | 3.79 | 1.54 | 1.35 | 1.85 |

the other States. As such, it stands to reason that the sales tax base forms a sizeable proportion of the domestic product of Maharashtra and moves very closely with it.

It is difficult to make similar a priori judgements about the relationship between the bases of the other taxes and SDP since each of these is basically a tax on a particular type of commodity or service or transaction. However, a fairly obvious point could be made and that is with respect to land revenue. A priori, there is no strong reason why land revenue, which is basically a tax on 'land holdings' should have a stable and significant correlation with the domestic income of the State. Thus, it would be reasonable to expect a rather insignificant income responsiveness of land revenue. The overall income responsiveness of the tax system atleast in terms of buoyancy could, however, be expected to be fairly high since the ratio of State tax revenue to SDP shows a rising trend as is shown in Graph 2.1. The rates of growth of State tax revenue presented in Table 2.2 lend further support to the above observation. Except in a few years, the period under the present study has witnessed a steep upward trend in the ratio of State tax revenue to SDP. In terms of magnitude, the ratio has more than doubled from around 4 per cent in 1961-62 to slightly less than 9 per cent in 1979-80.

From Table 2.2 it can be seen that among the individual taxes, the State excise revenue and the purchase tax revenue have grown at more than twice the rate of growth of SDP during the period under consideration. Hence, the buoyancy of revenue from these taxes can be expected to be substantially higher than that of revenues from the other taxes.

The compound rate of growth in sales tax revenue at around 17 per cent is also fairly high compared to the growth rate of SDP. Among the components of the sales tax, revenue from the Central sales tax has grown faster than the revenues from the general sales tax and the sales tax on motor spirit. Thus, it is reasonable to expect that the buoyancy of the sales tax revenue in general and that of the Central sales tax in particular would be relatively high.

TABLE 2.2

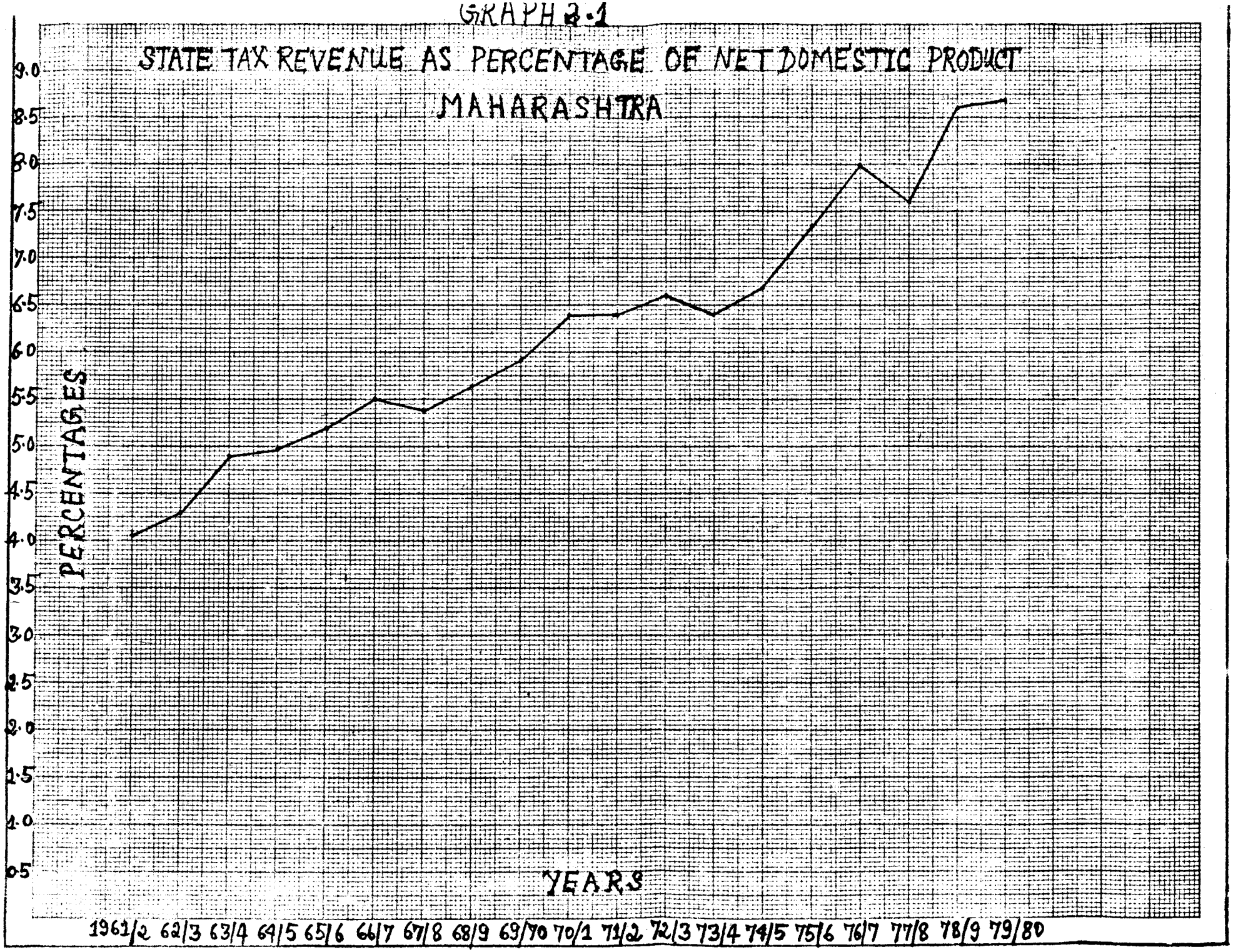
Rates of Growth of Tax Revenue and SDP in Maharashtra
(1961-62 to 1980-81)

(Per cent)

| | Item | Compound growth rate | Average annual growth rate |
|---|---|---|---|
| 1. | SDP* | 11.5 | 11.5 |
| 2. | State tax revenue | 15.9 | 15.5 |
| 3. | Sales tax (total) | 17.0 | 17.2 |
| 4. | General sales tax | 16.5 | 16.4 |
| 5. | Central sales tax | 19.1 | 20.8 |
| 6. | Motor spirit tax | 14.8 | 15.6 |
| 7. | State excise duty | 25.6 | 24.3 |
| 8. | Motor vehicle tax | 11.2 | 10.5 |
| 9. | Electricity duty | 13.6 | 16.2 |
| 10. | Entertainment tax | 16.2 | 16.1 |
| 11. | Stamps and registration fees | 9.8 | 10.8 |
| 12. | Passenger and goods tax | 15.7 | 16.6 |
| 13. | Purchase tax | 24.3 | 19.4 |
| 14. | Land revenue | 7.2 | 7.1 |

* For the period 1961-62 to 1979-80.

GRAPH 2.1


STATE TAX REVENUE AS PERCENTAGE OF NET DOMESTIC PRODUCT
MAHARASHTRA
PERCENTAGES
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
YEARS
1961/2 62/3 63/4 64/5 65/6 66/7 67/8 68/9 69/70 70/1 71/2 72/3 73/4 74/5 75/6 76/7 77/8 78/9 79/80

Among the other taxes, revenue from the entertainment tax, the passenger and goods tax and the electricity duty have grown faster than SDP, revenue from the motor vehicles tax has grown at almost the same rate as SDP and revenue from stamps and registration fees and land revenue have grown at a lower rate than SDP.

Thus, the profile of the composition of State tax revenue and the growth of individual tax revenues relative to that of SDP seem to suggest that the overall income responsiveness of the tax revenue in terms of buoyancy and perhaps in terms of elasticity as well could be expected to be fairly high in Maharashtra. In terms of the income responsiveness of individual tax revenues, the State excise and the purchase tax could be expected to be at the top of the list with stamps and registration fees and land revenue at the bottom, the sales tax, the electricity duty and the motor vehicles tax figuring in between.

## 3. Estimates of Buoyancy

Buoyancy has already been defined as a measure of the percentage change in the tax revenue concurrent with a percentage change in income. The exact formula in discrete terms for buoyancy is,

$$\frac{\Delta T}{T} \Big/ \frac{\Delta Y}{Y}$$

where

T refers to the revenue from the tax and

Y refers to the income variable (specified as State Domestic Product in the context of a State tax).

Assuming a continuous tax-income relationship, the above formula can easily be put in a differential form as,

$$\frac{dT}{T} / \frac{dy}{y}$$

The function that is assumed to exist between revenue from a tax (or taxes) and income is:

$$T = Ay^b$$

Where A is a constant and b is generally hypothesised to be a positive constant.

The log-linear form of the above equation reduces to:

$$\text{Log } T = \text{Log } A + b \text{ Log } Y.$$

It can easily be checked that b in the above equation is the buoyancy coefficient since;

$$b = \frac{dT}{T} / \frac{dY}{Y}$$

The function being log-linear, b can easily be estimated through a regression of log T on log Y using the well known ordinary least squares (OLS) method. The buoyancy coefficients so estimated for the major State taxes in Maharashtra are given in Table 3.1.

However, before we discuss these results it would be worth mentioning here that the SDP figures that we have used for computing the buoyancies presented in Table 3.1 are in nominal terms. As is well known, it is a product of two

components, namely, a kind of general price index and real State Domestic Product. Hence, using nominal SDP in the tax revenue function involves the assumption that the response of tax revenues to changes in real SDP and the general price index are the same. In our preliminary exercises, we dropped this assumption and estimated the tax revenue equations by using the two components of nominal SDP as separate explanatory variables. Except for minor differences, the coefficients of the two components were not significantly different from the buoyancy estimates obtained by using nominal SDP. Thus, it was decided that the experiment does not yield any additional insight worth reporting.

We have seen that in the structure of State taxation, the sales tax occupies the pride of place in terms of revenue. Naturally, its buoyancy should be the most important. According to our estimates, the buoyancy of the general sales tax works out to be fairly high at 1.39, and that of sales tax (total)* works out to be still higher at 1.43. The other important taxes in the recent years have been the State excise, the electricity duty, the motor vehicles tax, the entertainment tax, and stamps and registration fees. The respective buoyancies are 2.11, 1.01, 0.91, 1.42 and 0.8. Obviously, the first is very high; in fact, the State excise has been the most buoyant source of revenue for Maharashtra. Since three taxes accounting for more than 75 per cent of the total tax revenue (the total of sales taxes, the State excise and the electricity duty) have a buoyancy coefficient above unity, it comes as no surprise that the total tax revenue in Maharashtra has a buoyancy of 1.34.

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* Comprising the general sales tax, the Central Sales Tax, and the sales tax on motor spirit.

TABLE 3.1

Buoyancy of Major Taxes in Maharashtra
(1961-62 to 1978-79)

| | Item | Estimate of buoyancy |
|---|---|---|
| 1. | General sales tax | 1.3903 |
| 2. | Central sales tax | 1.4832[@] |
| 3. | Sales tax on motor spirit | 1.2027[@] |
| 4. | Sales tax (total 1+2+3) | 1.4331 |
| 5. | State excise duty | 2.1110 |
| 6. | Electricity duty | 1.0095[@] |
| 7. | Motor vehicles tax | 0.9129[@] |
| 8. | Entertainment tax | 1.4153 |
| 9. | Stamps and registration fees | 0.7987[@] |
| 10. | Passenger and goods tax | 1.2069[@] |
| 11. | Purchase tax | 1.5346 |
| 12. | Land revenue | 0.6662 |
| | Total State tax revenue | 1.3443 |

[@] The regression using OLS in case of these taxes showed significant first-order autocorrelation. The regressions were reestimated using two-step procedure to correct for autocorrelation. The method is explained in Annexure A.I.2.

Among the significant estimates of buoyancy, only three show estimate less than unity - motor vehicles tax, stamps and registration fees and land revenue. The first has a buoyancy not very much less than unity (0.91), whereas the second has a buoyancy of 0.67. With most of the taxes having buoyancy values above one, no wonder land revenue is becoming less and less significant as a source of revenue.

The comparable figures of buoyancy of the major taxes of eight other States are given in Table 3.2. In the case of four States, Andhra Pradesh, Karnataka, Kerala and Madhya Pradesh, general sales tax is defined inclusive of sales tax on motor spirit and therefore not strictly comparable with similar estimates of buoyancy of the other States. This was done because these four States merged the sales tax on motor spirit with the general sales tax at some point within our period of observation. For the other States, namely, Maharashtra, Gujarat, Tamil Nadu, Uttar Pradesh and West Bengal Table 3.2 presents the buoyancy coefficients for the general sales tax and motor spirit tax separately. For these States, we also computed the buoyancy coefficient for the combined tax receipts of general sales tax and motor spirit tax. The relative position of Maharashtra vis-a-vis other States in terms of this buoyancy coefficient, however, remain the same as the one depicted in Table 3.2. Similarly, in two States, Andhra Pradesh and Tamil Nadu, the passenger and goods tax was included in the motor vehicles tax for the same reason.

Comparing the overall buoyancy (i.e., of the total tax revenue) of the eight States with that of Maharashtra, we find that only Gujarat, Karnataka and Tamil Nadu score

TABLE 3.2

Buoyancy Estimates of Major State Taxes
(1961-62 to 1978-79)

| Item | Andhra Pradesh | Gujarat[b] | Karnataka | Kerala[b] | Madhya Pradesh | Maharashtra | Tamil Nadu | Uttar Pradesh | West Bengal |
|---|---|---|---|---|---|---|---|---|---|
| 1. Total state tax revenue | 1.2971[@] | 1.3680 | 1.4779 | 1.1981[@] | 1.3275 | 1.3443 | 1.3714 | 1.3166[@] | 1.1732 |
| 2. Sales tax (total) | 1.5313[@] | 1.5643[@] | 1.6876 | 1.3611[@] | 1.5946 | 1.4331 | 1.6784 | 1.7158 | 1.3887 |
| 3. General sales tax | 1.4313[@] | 1.4884[@] | 1.5818 | 1.3734[@] | 1.5596 | 1.3903 | 1.6596 | 1.8267 | 1.4951 |
| 4. Central sales tax | 2.2090 | 1.8852 | 2.3455 | 1.3217 | 1.5147[@] | 1.4832[@] | 1.8428 | 1.9720 | 1.1546[@] |
| 5. Motor spirit tax | NC | 1.5908 | NC | NC | NC | 1.1588 | 1.6103 | 1.6853 | 1.2053 |
| 6. State excise duty | 1.5993[@] | 1.0049[@] | 2.0393[@] | 1.4092[@] | 1.2178 | 2.1110 | 2.3948[@] | 1.2744 | 0.9142 |
| 7. Electricity duty | 2.0044[@] | 1.3321 | 1.0956 | 2.3139 | 1.3915 | 1.0095[@] | -0.2439[@] | 1.6723 | 0.7654 |
| 8. Motor vehicles tax | 1.3041 | 0.8931 | 0.8714[@] | 0.8617[@] | 1.0257[@] | 0.9129[@] | 1.2384 | 1.1735[@] | 0.7997[@] |
| 9. Entertainment tax | 1.7909 | 1.5470 | 1.7670[@] | 0.7484[@] | 1.3901 | 1.4153 | 1.3540[@] | 1.6762 | 1.4397[@] |
| 10. Stamps and registration fees | 1.0934 | 1.0646 | 1.0346 | 1.0389[@] | 1.1938 | 0.7987[@] | 0.6597[@] | 1.5065[@] | 0.8794[@] |
| 11. Passenger and goods tax | NC | 1.5202 | 1.3434 | 0.1572 | 1.4968[@] | 1.2069[@] | NC | 2.0197 | 2.1148[@] |
| 12. Land revenue | 0.5297 | 0.2073 | -0.0017 | 0.5383 | 0.5689 | 0.6662 | -0.3557 | 0.0021 | 0.2370 |

[@] Corrected for autocorrelation.

b Relate to the years 1961-62 to 1977-78, because SDP figure for 1978-79 is not available.

N.C. Not computed because the tax concerned was not levied throughout the period examined or merged with other tax.

over Maharashtra. The overall buoyancies of Gujarat and Tamil Nadu are only marginally greater whereas that of Karnataka is greater by about 0.105.

The differences are predictably explained by the differences in the buoyancy of the sales tax. In Gujarat, Karnataka and Tamil Nadu, the buoyancies of total sales taxes are 1.56, 1.69 and 1.88 as compared to Maharashtra's 1.43. In fact, among the States considered, only Kerala and West Bengal have buoyancies of total sales taxes lower than that of Maharashtra. The pattern is more or less the same for the major component of the total sales tax, the general sales tax. The difference is that Maharashtra has the lowest buoyancy with respect to the general sales tax among all the States considered except Kerala. For the Central sales tax also, Maharashtra has a very low buoyancy as compared to the other States, the only two States having buoyancies less than Maharashtra being Kerala and West Bengal.

The tax which is next in importance to sales tax with respect to revenue in Maharashtra, however, is far more buoyant. This is the State excise. The buoyancy of State excise in Maharashtra is the highest among all the States considered except for Tamil Nadu. However, that of electricity duty, almost equally important, is less than in most of the States considered, only Tamil Nadu (negative but insignificant) and West Bengal exhibiting lower buoyancies. The motor vehicles tax is a comparatively less buoyant tax in most of the States concerned. Maharashtra comes fifth among the total of nine States in this regard. The four States with buoyancy values less than Maharashtra are Gujarat, Karnataka, Kerala and West Bengal. The highest buoyancy of this tax is in Andhra Pradesh, 1.30 as against 0.91 of Maharashtra, and 0.8 of West Bengal, the lowest.

The buoyancy estimates of the entertainment tax are fairly high for all the States considered except Kerala, where it is a small 0.75. Excluding Kerala, the range of buoyancy estimates is from 1.35 (Tamil Nadu) to 1.79 (Andhra Pradesh) with the value for Maharashtra estimated at 1.42, higher than for Kerala and Madhya Pradesh and Tamil Nadu only.

Stamps and registration fees show a buoyancy coefficient greater than unity in all the States considered except three including Maharashtra, where it is only 0.8. Excluding Maharashtra the range of buoyancy estimated is from 0.66 (Tamil Nadu) to 1.5 (Uttar Pradesh).

Land revenue is obviously a non-starter. Every State considered records a very low buoyancy for land revenue, two States showing even negative buoyancy. However, just for the record, Maharashtra exhibits the highest buoyancy with respect to this tax.

The passenger and goods tax was not in operation throughout the period considered in two States, Andhra Pradesh and Tamil Nadu, and so the buoyancy of this tax for the two States has not been separately computed. Among the rest only Kerala, exhibiting a woeful buoyancy of 0.16 has a buoyancy value less than Maharashtra, which has a buoyancy estimate of 1.21. Two States, Uttar Pradesh and West Bengal record buoyancy estimates of a little above 2.

To sum up, the overall buoyancy of the State taxes in Maharashtra is fairly high compared to the other States. Among the States that we have considered only Karnataka, Tamil Nadu and Gujarat have marginally more buoyant tax systems than that of Maharashtra. Coming to individual taxes, we find that the buoyancies of

State excise revenue and land revenue are substantially higher in Maharashtra than in almost all the other States. Among the remaining taxes, revenue from the sales tax, the entertainment tax and the passenger and goods tax are fairly buoyant in Maharashtra compared to the other States. The taxes which had substantially lower buoyancy as compared to the other States are the motor vehicles tax, the electricity duty and stamps and registration fees.

## 4. Estimates of Elasticity

The estimates of buoyancy indicate the percentage change in the actual tax revenue that has accompanied a one per cent change in income during the period under observation. It, however, does not show the automatic response of the tax revenue to variations in income. In other words, it does not give us the percentage change in tax revenue that would have accompanied a percentage change in income had there been no discretionary variations in the tax rate structure. To know the automatic income responsiveness of the tax revenue, we need to adjust the tax revenue-income relationship for variations in the tax rate structure. The elasticity coefficient provides such an adjusted measure of income responsiveness.

For empirical work, the methods of adjusting the income responsiveness of tax revenue to variations in the tax rate structure fall into three broad categories:[1/]

i) The Divisia Index Method
ii) The Dummy Variable Method
iii) The Data Adjustment Method

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1/ For a detailed discussion of the various methods see Rao (1979) and Sarma (1980).

Among the three methods, the divisia index method is of comparatively recent origin. Essentially, this method views the effects of variations in the tax rate structure on tax revenue as being analogous to the effects of technological changes on production function. Accordingly, it employs a 'divisia index' - a familiar mathematical tool - for quantifying the effects of variations in the tax rate structure on tax revenue. The dummy variable method views the effects of tax rate variations on tax revenue as a shift in the relationship between tax revenue and income and hence proposes to use dummy variables as proxies for discretionary tax rate variations in the tax revenue function. Hence, the coefficient of income estimated from such a function would be independent of the tax rate structure. The data adjustment method has two variants: the constant rate structure method and the proportional adjustment method. Under the former method, the tax base is decomposed and reclassified to correspond to the tax rate structure existing in a reference year and then by applying the tax rate structure of the reference year to the reconstructed base hypothetical revenue series are generated. The income elasticity of this hypothetical series is independent of the rate structure variations. The proportional adjustment method involves eliminating the estimated revenue effects of a given year's discretionary variations in the tax rate structure from the actual tax revenue and further adjusting the tax revenue so obtained for the cumulative revenue effects of the tax rate variations made in the years since the reference year. The revenue series so adjusted are then regressed on income to obtain the income elasticity of tax revenue.

In selecting one among these methods for computing the income elasticity of tax revenue, one has to keep in mind the analytical assumptions underlying these methods and their data requirements. From the point of view of data requirements, the divisia index method and the dummy variable method are certainly the most preferable since they require no more than data on tax revenues and income. The divisia index method, however, is based on quite a restrictive assumption that the revenue effects of the rate structure changes are continuous through time and small in size. Should either of these assumptions not be satisfied in practice, the method fails to separate the revenue effects of discretionary tax policy measures from the automatic income responsiveness of tax revenue. When the discretionary variations in the tax rate structure are made only in a few years during the period under consideration, the dummy variable method can be fruitfully employed to estimate the income elasticity of tax revenue with a fair degree of accuracy. However, the method fails when the discretionary tax rate changes are frequent. Relative to the divisia index method and the dummy variable method, the data requirements of the data adjustment method are formidable. This is more so in the case of the constant rate structure variant. Besides the implicit assumption that the tax revenue is unitary elastic with respect to the tax rate, it demands highly disaggregated data on the legal bases and the rate structures of individual taxes over the reference period. Though the proportional adjustment method does not require such disaggregated data, it requires fairly reliable estimates of the revenue effects of the discretionary tax policies of the government.

For the present study, the application of the constant rate structure method is completely ruled out since the type of disaggregated data on the rates and bases of individual taxes are not available. Since the revenue effects of most of the discretionary tax rate structure changes during the period of the present study were found to be discontinuous through time and quite large in size we have not employed the divisia index method too. On a balance of considerations, we have used (except in very few cases) the proportional adjustment method to compute the income elasticity of tax revenues.

Table 4.1 presents the elasticity estimates for the major State taxes in Maharashtra. The overall elasticity of the tax system works out to be well above unity at 1.19. A noticeable feature of the elasticities presented in the table is that, as in the case of buoyancy, the elasticities of individual taxes vary a great deal among themselves. Revenue from the State excise has the highest elasticity of 1.83 and land revenue has the lowest of 0.46. Besides land revenue, four other taxes, namely, the motor vehicles tax, the electricity duty, the purchase tax and stamps and registration fees show elasticities below unity.

Another feature worth mentioning is that like the buoyancy coefficient, the income elasticity of total tax revenue in Maharashtra is very close to the income elasticity of the sales tax revenue. Given that the revenue from the sales tax has accounted for around 60 per cent of the yearly tax revenue in Maharashtra, it follows that the sales tax accounts for approximately 60 per cent of the overall income elasticity of the tax system. Hence, all the other

TABLE 4.1

Income Elasticity of Major Taxes in Maharashtra
(1961-62 to 1978-79)

| | Item | Estimate of elasticity |
|---|---|---|
| 1. | General sales tax | 1.3118 |
| 2. | Motor spirit tax | 1.1589 |
| 3. | State excise duty | 1.8326@ |
| 4. | Electricity duty | 0.8565@ |
| 5. | Motor vehicles tax | 0.8447 |
| 6. | Entertainment tax | 1.3207 |
| 7. | Stamps and registration fees | 0.6901@ |
| 8. | Passenger and goods tax | 1.1393 |
| 9. | Purchase tax | 0.9653@ |
| 10. | Land revenue | 0.4579 |
| 11. | Total state tax revenue (excluding central sales tax revenue) | 1.1905 |

@ Corrected for autocorrelation.

taxes put together account for the remaining 40 per cent of the overall income elasticity of the tax system.

For a comparative picture of the elasticities of major State taxes in Maharashtra on the one hand and in some of the other States on the other, let us turn to Table 4.2.

TABLE 4.2

Elasticity Estimates of Major State Taxes
(1961-62 to 1978-79)

| | Andhra Pradesh | Gujarat[d] | Karnataka[b] | Kerala[d] | Madhya Pradesh | Maharashtra | Uttar Pradesh[b] | West Bengal[c] |
|---|---|---|---|---|---|---|---|---|
| 1. Total state tax revenue (excluding central sales tax | 1.2204[@] | 1.1836 | 1.1663 | 0.9911 | 0.7436[@] | 1.1905 | 1.1392 | 0.8440 |
| 2. General sales tax | 1.4552[@] | 1.3721[@] | 1.2789 | 1.2454 | 1.2615 | 1.3118 | 1.7923 | 1.2696 |
| 3. Motor spirit tax | NC | 1.2712 | NC | NC | NC | 1.1589 | 1.7481 | 1.2221 |
| 4. State excise duty | 1.5993 | 1.0049 | 1.8264[@] | 1.3436[@] | 1.1491 | 1.8326[@] | 0.7692 | 0.1762 |
| 5. Electricity duty | 2.0044 | 1.1833 | 0.7195 | 2.2673 | 0.7134[@] | 0.8565[@] | 1.4755 | 0.5441 |
| 6. Motor vehicles tax | 0.8790[@] | 0.7691 | 1.1317[@] | 0.7477[@] | 0.5506[@] | 0.8447 | 1.3506[@] | 0.4938 |
| 7. Entertainment tax | 1.6769[@] | 1.3683 | 1.7715 | 0.5519 | 1.1600 | 1.3207 | 1.5124 | 1.0488 |
| 8. Stamps and registration fees | 0.9227 | 1.0510 | 0.8651 | 0.9644[@] | 0.7473 | 0.6901[@] | 1.4420 | 0.4272 |
| 9. Land revenue | 0.5149 | 0.1417 | -0.2565 | -0.1096 | -0.9002 | 0.4579 | -5.3552 | 0.0535 |

[@] Corrected for autocorrelation.

b The sample period is from 1963-64 to 1978-79.

c The sample period is from 1961-62 to 1976-77.

d The sample period is from 1961-62 to 1977-78.

We have not presented the elasticities of the passenger and goods tax and the purchase tax for States other than Maharashtra since these taxes formed a very small proportion of total tax revenue in many of the States. However, revenue from the passenger and goods tax is added to revenue from the motor vehicles tax in the case of Andhra Pradesh since the former was merged with the latter in the mid-sixties. Similarly, some of the States (namely, Andhra Pradesh, Tamil Nadu, Karnataka, Kerala and Madhya Pradesh) have merged the sales tax on motor spirit with the general sales tax. Accordingly, for these States we have defined the General sales tax as inclusive of the motor spirit tax. For the other States we have computed the elasticities of general sales tax and motor spirit tax separately as well as clubbing them together. In Table 4.2 we, however, report the results of only the former exercise. Also, we have not computed the elasticities of the Central sales tax for any of the States since we could not get data on the revenue effects of the discretionary policy changes for the individual States. Consequently, the elasticities of the total State tax revenue reported here refer to the State tax revenue exclusive of the Central sales tax revenue.

In terms of the elasticity of total tax revenue, Maharashtra tops the list along with Andhra Pradesh and Gujarat, all these three States having elasticities of around 1.21. This is in comparison to a substantially less than unitary elasticity in Madhya Pradesh and West Bengal.

Coming to the elasticities of individual taxes, we find that in terms of the elasticity of the General sales tax - the most important single source of tax revenue in the Indian States - Maharashtra comes fourth with Uttar

Pradesh, Andhra Pradesh, and Gujarat leading it. Thus, Kerala, Karnataka, Madhya Pradesh and West Bengal have sales tax elasticities lower than that in Maharashtra. In terms of the elasticity of motor spirit tax also, Maharashtra figures fourth with Uttar Pradesh, Gujarat and West Bengal leading it.

In terms of the elasticity of revenue from the State excise, the second most important source of tax revenue in many Indian States, Maharashtra tops the list along with Karnataka - both the States having elasticities of around 1.83. In comparison, it is much less than unity in Uttar Pradesh and is not significantly different from zero in West Bengal.

As regards the elasticity of revenue from the entertainment tax, Maharashtra occupies the fifth place, ahead of only three States, namely, Kerala, Madhya Pradesh and West Bengal. It is also interesting to observe that land revenue a tax which is generally considered not to have a significant relationship with SDP - has the highest elasticity of around 0.5 in Maharashtra and Andhra Pradesh. In view of the negative income elasticity of land revenue in many of the States that we have considered, this is an interesting result.

Revenues from the remaining three taxes, namely, the electricity duty, the motor vehicles tax and stamps and registration fees show comparatively low income elasticities in Maharashtra. The elasticity of revenue from the electricity duty in Maharashtra at 0.86 makes a poor comparison with 2.27 in Kerala and 2 in Andhra Pradesh. Only the States of Karnataka, Madhya Pradesh and West Bengal register a lower elasticity of revenue from the electricity duty than

Maharashtra. The relative position of Maharashtra is more or less similar in the case of stamps and registration fees. The elasticity of revenue from stamps and registration fees in Maharashtra at 0.69 is less than half of the corresponding elasticity of 1.44 in Uttar Pradesh. As regards the motor vehicles tax, Maharashtra figures fourth with an elasticity of around 0.85, Uttar Pradesh topping the list with an elasticity of 1.35.

## 5. Conclusions

To sum up the major conclusions of the present study:

i) The overall income responsiveness of the State tax revenue in Maharashtra is found to be fairly high both by itself and when compared to that of the other States that we have considered - a result which was largely suggested by the review of the trends and composition of the State tax revenue in Maharashtra in Section 2. As regards the total State tax revenue, only Karnataka has a noticeably higher buoyancy coefficient than Maharashtra; and as regards the elasticity of total State tax revenue, Maharashtra tops the list along with Andhra Pradesh.

ii) The buoyancy and elasticity of the total State tax revenue in Maharashtra are found to be fairly close to the corresponding buoyancy and elasticity of the sales tax revenue. To a large extent, this near-equality could be attributed to the fairly high proportion of the sales tax revenue in the total State tax revenue of Maharashtra.

iii) Coming to the income responsiveness of the individual tax revenues, we find that the buoyancy and

elasticity of the sales tax revenues in Maharashtra make a reasonably good comparison with those of the other States. Much the same is applicable to the income responsiveness of revenue from the various components of the sales tax. This observation is also true of revenues from the entertainment tax and the passenger and goods tax.

iv) The State excise duty, the second most important source of tax revenue in the Indian States, shows an appreciably higher buoyancy and elasticity in Maharashtra than in almost all other States considered. Only Tamil Nadu has a marginally higher buoyancy coefficient of State excise revenue than Maharashtra.

v) The taxes which show distinctly lower income responsiveness in Maharashtra are stamps and registration fees, the motor vehicles tax and the electricity duty. Both in terms of buoyancy and elasticity, these taxes make a poor comparison with their counterparts in the other States. The elasticities of revenue from all these three taxes in Maharashtra are below unity indicating a very low automatic income responsiveness.

vi) Land revenue, which shows negative income responsiveness in many of the States considered, has a positive and significant income responsiveness in Maharashtra. Although land revenue constitutes a very small proportion of the total State tax revenue in Maharashtra, this is quite an interesting result.

Annexure A.I.1

## A Note on the Sources, Quality and Necessary Adjustments of the Data

The data used in the present analysis relate to three items: the State domestic product (for the States considered), actual revenue (for individual taxes, for each State considered), and estimated change in revenue due to discretionary measures adopted (for individual taxes for each State considered). The first two did not pose any problems, since they were easily available from different sources. The SDP figures are taken from various issues of Indian Economic Statistics (Public Finance), Ministry of Finance, Government of India. The tax revenue (actuals) data are from various State Budgets.

The third, however, posed certain problems, which are important because the elasticity values estimated depend to a considerable extent on the estimated additional revenue due to discretionary measures. There are three possible sources from which data on this item can be obtained - the Planning Commission, the Finance Commission Cell in the Ministry of Finance, and the Reserve Bank of India Bulletin. A fourth, of course, is the State Governments themselves, which could not be resorted to due to the insufficient time at our disposal.

Among the other three, RBI Bulletin reproduces the estimates given in the State budgets. These are comparatively inferior due to two reasons: (i) these estimates do not take into account post-Budget measures except in very few

cases, and (ii) these are prepared within a very short period. Data on the same items submitted by the State governments to the Finance Commissions and the Planning Commission are better on both counts.

However, we were unable to obtain these data for the whole reference period and for all the States considered from the Finance Commission Cell or from the Planning Commission. Of necessity, we had to use the data reported in RBI Bulletins.

Even in the case of RBI Bulletins, the necessary details were not available in some cases. We tried to fill these gaps with the information from the Report on Currency and Finance (Annual), as far as possible. Despite our best efforts, some gaps remained, because of which we had to shorten our reference period for some States and had to drop Tamil Nadu altogether from the list of States for which elasticities of taxes were calculated.

In a few cases, the data on discretionary measures were obviously unreliable, because the estimated increase in revenue in a year due to discretionary measures were greater than the actual revenue in that year. In such cases, we ignored the estimates, but noted the fact that discretionary measures were adopted. This led us to a slightly different method of estimating elasticities in those cases. This is discussed a little later.

The last point to be mentioned here is about the adjustments that were required while calculating elasticity. The proportional adjustment method adopted by us requires the adjustment of the actual tax revenue figures for the cumulative effect of the discretionary measures adopted. For these adjustments, the relevant data are those on the discretionary measures undertaken during each year. However, in some cases the reported data on such measures were not for the whole year but a part of the year, because those measures were effective in the first year of operation for that part only. The hypothetical (constant rate and base) revenue figures for such years were calculated as net of the amount actually reported, but for adjusting the revenue of subsequent years using the proportional adjustment method, the revenue effects of those discretionary measures for the whole year were used. This was done so that the hypothetical revenue figures for those particular years were not underestimated, while avoiding at the same time overestimation of the hypothetical revenue figures for the subsequent years.

Annexure A.I.2

## Estimation Method

The usual method of estimating buoyancy as well as elasticity is that of ordinary least squares (OLS) regressions using the logarithmic values of the variables, as discussed in Section 3. The coefficient of SDP then yields the buoyancy (or elasticity, as the case may be) estimates straightaway.

However, OLS estimation is correct only when certain assumptions about the variables concerned as well as the disturbance (or error) term are fulfilled. In regressions involving time-series data, one of these assumptions may not hold true, viz., that of no autocorrelation.

To test the validity of this particular assumption, the Durbin-Watson statistic was calculated in all cases. Wherever autocorrelation was present, corrective steps were taken.

There are various methods suggested to correct for autocorrelation, of which we chose the two-step procedure. For details of the method reference may be made to Kmenta (1971, pp. 287-289). Without going into details, the method can be outlined very briefly here.

Assuming the first order autoregressive scheme,

$$u_t = \rho u_{t-1} + \epsilon_t$$

where $-1 < \rho < 1$, $\epsilon_t$ satisfies the OLS assumption and $u_t$ stands for the disturbance term in the true equation. $\rho$ can be calculated from the OLS residuals as

$$\hat{\rho} = \frac{\Sigma e_t \, e_{t-1}}{\Sigma e^2_{t-1}}$$ , where $e_t$ refers to OLS residuals.

Using this estimated value, all the variables are transformed as

$$Y'_t = Y_t - \hat{\rho} Y_{t-1}$$

where $Y_t$ stands for the variables used and $Y'_t$ stands for the transformed ones. The transformed values of the variables are then used for reestimating the equation using OLS method. The coefficient of the transformed SDP variable, in our case, will give a more consistent estimate of buoyancy or elasticity.

Besides correcting for autocorrelation, we deviated from the usual loglinear estimation in a few other cases. These were those for which the data reported for additional revenue due to discretionary measures were obviously unreliable, as discussed earlier. In such cases, since the quantitative aspects of the discretionary measure was doubtful but the qualitative aspect was not, we used the dummy variable method instead of the proportional adjustment method for estimating elasticity.[1/]

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1/ The dummy variable method is discussed briefly in Section 4.

Annexure A.I.3

## Estimates of Elasticity Using the Data Supplied by the Government of Maharashtra

As was explained in the text and Annexure A.I.1, the income elasticities of State taxes were estimated through the proportional adjustment method by using the data on the revenue effects of discretionary tax measures published in the *RBI Bulletins*. Alternatively, the Finance Department, Government of Maharashtra, supplied to us a set of data on what they called the normal growth of tax revenues, (i.e., the growth of tax revenue that would have occurred had there been no discretionary tax measures) for the major taxes in Maharashtra for the period from 1961-62 to 1979-80. Using these normal tax revenue series we estimated an alternative set of income elasticities of State taxes in Maharashtra. These estimates are presented in Table A.I.3.1 along with the estimates of income elasticities reported in the text.

The elasticity of State tax revenue (excluding the Central sales tax) estimated by using the normal tax revenue series supplied by the Maharashtra Government works out to be slightly lower than our estimate. However, this is not true of the elasticities of all individual taxes. In the case of general sales tax, motor spirit tax, motor vehicles tax, electricity duty, entertainment tax and stamps and registration fees the elasticities computed by using the Maharashtra Government data are lower than our estimates whereas in the case of State excise duty, passenger and goods tax, purchase tax and land revenue they are higher than our estimates.

TABLE A.I.3.1

Elasticity of State Taxes in Maharashtra Using the Data Supplied by the Maharashtra Government (1961-62 to 1979-80)

| Tax | Our estimates (1961-62 to 1978-79) | Using Maharashtra government data (1961-62 to 1979-80) |
|---|---|---|
| 1. State revenue[a] | 1.1905 | 1.0146 |
| 2. General sales tax | 1.3192 | 1.1678 |
| 3. Central sales tax | NC | 1.0920 |
| 4. Motor spirit tax | 1.589 | 0.9320 |
| 5. State excise duty | 1.8326 | 1.9549 |
| 6. Electricity duty | 0.8565 | 0.7136 |
| 7. Motor vehicles tax | 0.8447 | 0.8063 |
| 8. Entertainment tax | 1.3207 | 1.0675 |
| 9. Stamps and registration fees | 0.6901 | 0.5754 |
| 10. Passenger and goods tax | 1.1393 | 1.1915 |
| 11. Land revenue | 0.4579 | 0.6000 |
| 12. Purchase tax | 0.9653 | 1.2883 |

Note: a Excludes Central Sales Tax.

The differences in the two sets of elasticities could be due to (i) the differences in the data used on the revenue effects of discretionary tax measures and (ii) the differences in the method of adjusting the actual tax revenue series for the discretionary tax measures. It is difficult to comment on the relative superiority of the data on the revenue effects of discretionary tax measures supplied by the Maharashtra Government vis-a-vis the data published in the RBI Bulletins. In terms of the cleaning of the tax revenue series for discretionary tax measures, the method used by the Maharashtra Government is not based on any generally accepted methods in the literature. In that respect, the proportional adjustment method that we have used for adjusting the tax revenue series is certainly better founded than the one used by Maharashtra Government. Moreover, even if it is shown that the data used by the Maharashtra Government are better than the ones used by us, it is difficult to get similar data for the other States that are included in the present study. Consequently, one of the objectives of the present study, namely, comparison of the buoyancy and elasticity of taxes in Maharashtra with those of the other States would be defeated.

ANNEXURE A. II

REGRESSION RESULTS RELATING TJ BUOYANCY ESTIMATES

TABLE A.II.1

Andhra Pradesh
(1961-62 to 1978-79)

| Item | Constant | Coefficient of SDP | $\bar{R}^2$ | F-value | D.W. Statistics |
|---|---|---|---|---|---|
| 1. Total state tax revenue | -2.69232 (-5.4614)*** | 1.2971 (10.7654)*** | 0.8778 | 115.894 | 1.737 |
| 2. Sales tax (total) | -3.50163 (-8.2244)*** | 1.5315 (12.5139)*** | 0.9068 | 156.597 | 1.597 |
| 3. General sales 2/ tax | -3.1422 (-6.9407)*** | 1.4313 (10.7914)*** | 0.8783 | 116.455 | 1.605 |
| 4. Central sales tax | -0.158121 (-16.8875)*** | 2.2090 (18.4594)*** | 0.9523 | 340.749 | 1.477 |
| 5. State excise duty | -3.91832 (-6.5191)*** | 1.5993 (9.1255)*** | 0.8372 | 83.274 | 1.403 |
| 6. Electricity duty | -0.129149 (-7.3176)*** | 2.0044 (6.1955)*** | 0.7003 | 38.385 | 2.157 |
| 7. Motor vehicles 3/ tax | -7.5926 (15.4982)*** | 1.3041 (20.8284)*** | 0.9622 | 433.823 | 1.402 |
| 8. Entertainment tax | -0.124420 (-22.2049)*** | 1.7909 (25.0083)*** | 0.9735 | 625.413 | 1.553 |
| 9. Stamps and registration fees | -6.27188 (-10.3225)*** | 1.0934 (14.0802)*** | 0.9207 | 198.256 | 1.615 |
| 10. Land revenue | -1.14690 (-0.7848)*** | 0.5297 (2.8358)*** | 0.2929 | 8.042 | 2.052 |

1/ In what follows, ***, ** and * indicate that the relevant statistic is significant at the one, five and ten per cent levels, respectively.

2/ Includes sales tax on motor spirit.

3/ Includes passenger and goods tax.

TABLE A.II.2

Gujarat
(1961-62 to 1977-78)

| Item | Constant | Coefficient of SDP | $\bar{R}^2$ | F-value | D.W. statistics |
|---|---|---|---|---|---|
| 1. Total state tax revenue | -5.73067 (-14.4598)*** | 1.3680 (25.9983)*** | 0.9768 | 675.913 | 2.785 |
| 2. Sales tax (total) | -0.11964 (-29.9906)*** | 1.5643 (45.6654)*** | 0.9929 | 2085.326 | 2.733 |
| 3. General sales tax | -0.116663 (31.2705)*** | 1.4884 (17.0190)*** | 0.9933 | 2210.785 | 2.755 |
| 4. Central sales tax | -0.116563 (-15.2605)*** | 1.8852 (18.2867)*** | 0.9542 | 334.405 | 1.659 |
| 5. Motor spirit tax | -0.107800 (-18.0953)*** | 1.5908 (20.1120)*** | 0.9619 | 404.491 | 2.656 |
| 6. State excise duty | -3.38905 (-5.6103)*** | 1.0049 (5.5791)*** | 0.6676 | 31.126 | 1.539 |
| 7. Electricity duty | -8.25023 (-15.4884)*** | 1.3321 (18.8360)*** | 0.9567 | 354.795 | 1.753 |
| 8. Motor vehicles tax | -4.86203 (-10.9195)*** | 0.8931 (15.1081)*** | 0.9342 | 228.255 | 1.805 |
| 9. Entertainment tax | -0.103459 (-19.1659)** | 1.5470 (21.5854)*** | 0.9667 | 465.932 | 2.611 |
| 10. Stamps and registration fees | -6.20760 (-15.7704)*** | 1.0646 (20.3702)*** | 0.9628 | 414.946 | 2.356 |
| 11. Passenger and goods tax (1963-64 to 1977-78) | -9.46816 (-15.4626)*** | 1.5202 (18.9494)*** | 0.9624 | 359.081 | 2.592 |
| 12. Land revenue | 0.44 (0.7305) | 0.2073 (2.6115)*** | 0.2667 | 6.820 | 2.064 |

TABLE A.II.3

Karnataka
(1961-62 to 1978-79)

| Item | Constant | Coefficient of SDP | $\bar{R}^2$ | F-value | D.W. statistics |
|---|---|---|---|---|---|
| 1. Total state tax revenue | -6.55617 (-14.6180)*** | 1.4779 (24.8487)*** | 0.9732 | 617.456 | 1.165 |
| 2. Sales tax (total) | -8.95363 (-20.7913)*** | 1.6876 (29.5517)*** | 0.9809 | 873.306 | 1.323 |
| 3. General sales tax[1/] | -8.3124 (-20.1472)*** | 1.5818 (28.9106)*** | 0.9800 | 835.824 | 1.252 |
| 4. Central sales tax | -0.159264 (-18.8071)*** | 2.3455 (20.8865)*** | 0.9624 | 436.247 | 1.434 |
| 5. State excise duty | -5.41686 (-6.5263)*** | 2.0393 (0.0901)*** | 0.8011 | 65.449 | 1.474 |
| 6. Electricity duty | -6.99374 (-6.6933)*** | 1.0956 (7.9067)*** | 0.7835 | 62.517 | 1.687 |
| 7. Motor vehicles tax | -1.16888 (-6.7195)*** | 0.8714 (2.8007)*** | 0.2996 | 7.844 | 1.329 |
| 8. Entertainment tax | -3.52600 (-6.7523)*** | 1.7670 (7.7785)*** | 0.7881 | 60.505 | 1.657 |
| 9. Stamps and registration fees | -5.90090 (-13.5116)*** | 1.0346 (17.8638)*** | 0.9493 | 319.116 | 2.251 |
| 10. Passenger and goods tax | -9.13048 (-7.7420)*** | 1.3434 (8.6126)*** | 0.8693 | 74.177 | 1.260 |
| 11. Land revenue | 1.746294 (2.2215)** | -0.0017 (-0.0162) | -0.0625 | 0.000 | 1.754 |

1/ Includes sales tax on motor spirit.

TABLE A.II.4

Kerala
(1961-62 to 1977-78)

| Item | Constant | Coefficient of SDP | $\bar{R}^2$ | F-value | D.W. statistics |
|---|---|---|---|---|---|
| 1. Total state tax revenue | -1.18974 (-4.0509)*** | 1.1981 (8.5521)*** | 0.8279 | 73.138 | 1.258 |
| 2. Sales tax (total) | -3.34206 (-10.1243)*** | 1.3611 (16.4876)*** | 0.9475 | 271.846 | 1.539 |
| 3. General sales tax 1/ | -3.4760 (-10.5833) | 1.3734 (16.8534)*** | 0.9497 | 284.037 | 1.543 |
| 4. Central sales tax | -8.05068 (-15.6577)*** | 1.3217 (17.9903)*** | 0.9528 | 323.651 | 1.138 |
| 5. State excise duty | -1.5385 (-2.9689)*** | 1.4092 (4.1115)*** | 0.5146 | 16.9048*** | 1.044 |
| 6. Electricity duty | -16.2056 (-4.7654)*** | 2.3139 (4.7616)*** | 0.5753 | 22.676 | 2.762 |
| 7. Motor vehicles tax | -1.4203 (-2.2167)** | 0.8617 (3.3333)*** | 0.4027 | 11.1112 | 1.043 |
| 8. Entertainment tax | -3.0031 (-1.5024)* | 0.7484 (1.2762) | 0.0402 | 1.6287 | 1.486 |
| 9. Stamps and registration fees | -2.49011 (-11.7114)*** | 1.0389 (16.2892)*** | 0.9463 | 265.340 | 1.236 |
| 10. Passenger and goods tax | -1.08965 (-0.3132) | 0.1572 (0.3209) | -0.0685 | 0.103 | 1.156 |
| 11. Land revenue | -3.04935 (-3.1088)*** | 0.5383 (3.8408)*** | 0.4622 | 14.752 | 1.601 |

1/ Includes sales tax on motor spirit.

TABLE A.II.5

Madhya Pradesh
(1961-62 to 1978-79)

| Item | Constant | Coefficient of SDP | $\bar{R}^2$ | F-value | D.W. statistics |
|---|---|---|---|---|---|
| 1. Total state tax revenue | -5.60805 (-12.0190)*** | 1.3276 (21.6929)*** | 0.9651 | 470.581 | 1.351 |
| 2. Sales tax (total) | -8.47913 (-14.0357)*** | 1.5946 (20.1251)*** | 0.9596 | 405.018 | 1.371 |
| 3. General sales tax 1/ | -8.4878 (-14.2247)*** | 1.5596 (19.9283)*** | 0.9589 | 397.139 | 1.396 |
| 4. Central sales tax | -5.8957 (9.5316)*** | 1.5147 (12.0678)*** | 0.9004 | 145.6312 | 2.007 |
| 5. State excise duty | -6.50835 (17.720)*** | 1.2178 (25.2910)*** | 0.9741 | 639.637 | 1.546 |
| 6. Electricity duty | -9.40378 (20.2573)*** | 1.3915 (22.8553)*** | 0.9684 | 522.365 | 1.978 |
| 7. Motor vehicles tax | -3.9129 (-5.0805)*** | 1.0257 (6.3697)*** | 0.7121 | 40.5725*** | 1.374 |
| 8. Entertainment tax | -9.55123 (-18.3082)*** | 1.3901 (20.3161)*** | 0.9603 | 412.744 | 1.872 |
| 9. Stamps and registration fees | -7.34676 (-18.6273)*** | 1.1938 (23.0777)*** | 0.9690 | 532.58 | 1.858 |
| 10. Passenger and goods tax | -5.8903 (-6.8913)*** | 1.4968 (8.3311)*** | 0.8104 | 69.4076 | 1.514 |
| 11. Land revenue | -2.03655 (-1.9680)** | 0.5689 (4.1914)*** | 0.4936 | 17.568 | 0.676 |

1/ Includes sales tax on motor spirit.

TABLE A.II.6

Maharashtra
(1961-62 to 1978-79)

| Item | Constant | Coefficient of SDP | $\bar{R}^2$ | F-value | D.W. statistics |
|---|---|---|---|---|---|
| 1. Total state tax revenue | 0.0034 (29.91)*** | 1.3443 (58.98)*** | 0.9951 | 3748.03 | 1.494 |
| 2. Sales tax (total) | -6.9235 (-27.08)*** | 1.4331 (46.62)*** | 0.9922 | 2173.27 | 1.240 |
| 3. General sales tax | -6.96717 (-31.72)*** | 1.3903 (52.64)*** | 0.9939 | 2771.37 | 1.611 |
| 4. Central sales tax | -4.4747 (-11.60)*** | 1.4832 (16.5882)*** | 0.9449 | 275.1681 | 2.170 |
| 5. Motor spirit tax | -4.8324 (-21.1105)*** | 1.1588 (28.2493)*** | 0.9803 | 789.0214 | 1.287 |
| 6. State excise duty | -15.4086 (-32.633)*** | 2.110 (37.18)*** | 0.9878 | 1382.44 | 1.827 |
| 7. Electricity duty | -2.9791 (-7.4982)*** | 1.0095 (11.4629)*** | 0.8907 | 131.3992 | 2.430 |
| 8. Motor vehicles tax | -2.6432 (-11.2739)*** | 0.9129 (17.4349)*** | 0.9498 | 303.9763 | 1.807 |
| 9. Entertainment tax | -9.2447 (-27.28)*** | 1.4153 (34.73)*** | 0.9861 | 1205.90 | 1.502 |
| 10. Stamps and registration fees | -2.1780 (-5.8165)*** | 0.7987 (9.8597)*** | 0.8574 | 97.2136 | 1.118 |
| 11. Passenger and goods tax | -2.8849 (-6.7866)*** | 1.2069 (9.3636)*** | 0.8442 | 87.6768 | 2.392 |
| 12. Purchase tax | -11.1832 (18.75)*** | 1.5346 (15.79)*** | 0.9394 | 241.19 | 2.183 |
| 13. Land revenue | 0.0416 (5.72)*** | 0.6662 (9.97)*** | 0.8527 | 99.43 | 1.723 |

TABLE A.II.7

Tamil Nadu
(1961-62 to 1978-79)

| Item | Constant | Coefficient of SDP | $\bar{R}^2$ | F-value | D.W. statistics |
|---|---|---|---|---|---|
| 1. Total state tax revenue | -5.60126 (-18.0337)*** | 1.3714 (34.3399)*** | 0.9858 | 1179.229 | 1.443 |
| 2. Sales tax (total) | -8.63971 (-25.3041)*** | 1.6784 (38.2321)*** | 0.9885 | 1461.690 | 1.459 |
| 3. General sales tax | -8.78873 (-24.9143)*** | 1.6596 (36.5892)*** | 0.9875 | 1338.769 | 1.513 |
| 4. Central sales tax | -11.8078 (-8.3807)*** | 1.8429 (10.1725)*** | 0.8577 | 103.480 | 2.378 |
| 5. Motor spirit tax | -10.4619 (-22.2366)*** | 1.6103 (26.6191)*** | 0.9765 | 708.576 | 1.704 |
| 6. State excise duty | -4.2343 (-1.3482)* | 2.3948 (1.4513)* | 0.0647 | 2.1063 | 1.367 |
| 7. Electricity duty | 2.1231 (0.6866) | -0.2439 (-0.3844) | -0.0563 | 0.1478 | 2.026 |
| 8. Motor vehicles tax[1/] | -6.5109 (-9.8566)*** | 1.2384 (14.5812)*** | 0.9256 | 212.611 | 1.974 |
| 9. Entertainment tax | -4.7708 (-13.4760)*** | 1.3540 (17.3120)*** | 0.9492 | 299.7065 | 1.690 |
| 10. Stamps and registration fees | -1.2077 (-3.1219)*** | 0.6597 (7.3286)*** | 0.7671 | 53.7081 | 1.605 |
| 11. Land revenue | 4.616808 (2.4859)*** | -0.3557 (-1.4897)* | 0.0669 | 2.219 | 2.586 |

1/ Includes passenger and goods tax.

TABLE A.II.8

Uttar Pradesh
(1963-64 to 1978-79)

| Item | Constant | Coefficient of SDP | $R^2$ | F-value | D.W. statistics |
|---|---|---|---|---|---|
| 1. Total state tax revenue | -3.0538 (-4.9092)*** | 1.3166 (9.2743)*** | 0.8414 | 86.0134*** | 1.800 |
| 2. Sales tax (total) | -10.1688 (-14.6121)*** | 1.7158 (20.7162)*** | 0.9618 | 429.160 | 1.176 |
| 3. General sales tax | -11.4276 (-16.9240)*** | 1.8267 (22.7300)*** | 0.9681 | 516.554 | 1.340 |
| 4. Central sales tax | -14.9913 (-16.0570)*** | 1.9720 (17.7471)*** | 0.9486 | 314.951 | 1.386 |
| 5. Motor spirit tax | -12.4636 (-20.3287)*** | 1.6853 (23.0951)*** | 0.9691 | 533.429 | 1.769 |
| 6. State excise duty | -7.48577 (-14.8901)*** | 1.2744 (21.2988)*** | 0.9638 | 453.637 | 1.789 |
| 7. Electricity duty | -13.2907 (-7.2896)*** | 1.6723 (7.7066)*** | 0.7745 | 59.392 | 1.748 |
| 8. Motor vehicles tax | 3.1838 (5.5674)*** | 1.1735 (7.2016)*** | 0.7607 | 51.8629*** | 1.645 |
| 9. Entertainment tax | -12.1485 (-21.3692)*** | 1.6762 (24.7736)*** | 0.9730 | 613.730 | 1.730 |
| 10. Stamps and registration fees | -5.1336 (-7.4535)*** | 1.5065 (9.6224)*** | 0.8513 | 92.5905 | 1.919 |
| 11. Passenger and goods tax | -14.9671 (-11.2726)*** | 2.0197 (12.8518)*** | 0.9112 | 165.168 | 1.380 |
| 12. Land revenue | 14.46689 (2.9972)*** | 0.0021 (2.4008)** | 0.22 | 5.764 | 1.480 |

TABLE A.II.9

West Bengal
(1961-62 to 1976-77)

| Item | Constant | Coefficient of SDP | $\bar{R}^2$ | F-value | D.W. statistics |
|---|---|---|---|---|---|
| 1. Total state tax revenue | -4.51789 (-14.6494)*** | 1.1732 (30.7308)*** | 0.9823 | 944.381 | 1.264 |
| 2. Sales tax (total) | -6.93507 (-21.2371)*** | 1.3887 (34.3541)*** | 0.9858 | 1180.206 | 1.564 |
| 3. General sales tax | -8.32169 (18.0228)*** | 1.4951 (26.1578)*** | 0.9757 | 684.231 | 1.548 |
| 4. Central sales tax | -4.0722 (-7.0568)*** | 1.1556 (10.7921)*** | 0.8783 | 116.4693 | 2.082 |
| 5. Motor spirit tax | -7.80342 (-18.6396)*** | 1.2053 (23.2574)*** | 0.9695 | 540.906 | 2.231 |
| 6. State excise duty | -4.59680 (-15.4057)*** | 0.9142 (24.8950*** | 0.9733 | 619.762 | 1.399 |
| 7. Electricity duty | -3.99777 (-9.9509)*** | 0.7654 (15.3908)*** | 0.9328 | 236.876 | 2.031 |
| 8. Motor vehicles tax | -2.5746 (-5.6118)*** | 0.7997 (8.2219)*** | 0.8063 | 67.6005 | |
| 9. Entertainment tax | -3.9003 (-7.2845)*** | 1.4397 (8.7755)*** | 0.8261 | 77.0088 | 1.730 |
| 10. Stamps and registration fees | -1.8415 (-5.2274)*** | 0.8794 (8.1229)*** | 0.8024 | 65.9816 | 1.696 |
| 11. Passenger and goods tax | -4.6437 (-4.1935)*** | 2.1148 (4.8046)*** | 0.5799 | 23.0841 | 1.118 |
| 12. Land revenue | -0.034025 (-0.0284) | 0.2370 (1.5992)* | 0.0839 | 2.557 | 0.715 |

ANNEXURE A.III

REGRESSION RESULTS RELATING TO ELASTICITY ESTIMATES

TABLE A.III.1

Andhra Pradesh
(1951-62 to 1978-79)

| Item | Constant | Coefficient of SDP | $\bar{R}^2$ | F-value | D.W. statistics |
|---|---|---|---|---|---|
| 1. Total state tax revenue[a] | -1.9767 (-4.0165)*** | 1.2204 (7.9909)*** | 0.7971 | 63.8539 | 1.939 |
| 2. General sales tax[b] | -3.3907 (-7.2052)*** | 1.4552 (11.0206)*** | 0.8827 | 121.4543 | 1.689 |
| 3. Motor vehicles tax[1/] | -2.6192 (-7.1720)*** | 0.8790 (10.8224)*** | 0.8789 | 117.1246 | 1.742 |
| 4. Entertainment tax | -6.4561 (-11.2463)*** | 1.6769 (12.7236)*** | 0.9095 | 161.8902 | 1.944 |
| 5. Stamps and registration fees | -5.0725 (-7.3573)*** | 0.9297 (10.5486)*** | 0.8664 | 111.2722 | 1.315 |
| 6. Land revenue | -1.0702 (-0.7298) | 0.5149 (2.7472)*** | 0.2781 | 7.5474 | 2.033 |

Note : 1/ Includes passenger and goods tax.

a and b. See below Table A.III.8.

TABLE A.III.2

Gujarat
(1961-62 to 1978-79)

| Item | Constant | Coefficient of SDP | $\bar{R}^2$ | F-value | D.W. statistics |
|---|---|---|---|---|---|
| 1. Total state tax revenue[a] | -4.6487 (-14.0496)*** | 1.1836 (26.9421) | 0.9784 | 725.8782 | 2.802 |
| 2. General sales tax[b] | -10.4549 (-29.1823)*** | 1.3853 (45.1405)*** | 0.9927 | 2037.6628 | 2.661 |
| 3. General sales tax (excluding motor spirit tax) | -6.7216 | 1.3721 (26.7593)*** | 0.9781 | 716.0619 | 3.076 |
| 4. Motor spirit tax | -8.6454 | 1.2712 (16.2409)*** | 0.9426 | 263.7692 | 1.514 |
| 5. Electricity duty | -7.4684 (-21.3855)*** | 1.1333 (25.5212)*** | 0.9760 | 651.3317 | 2.354 |
| 6. Motor vehicles tax | -4.0528 (-8.5476)*** | 0.7691 (12.2169)*** | 0.9026 | 149.2523 | 1.493 |
| 7. Entertainment tax | -9.1701 (-18.6156)*** | 1.3683 (20.9209)*** | 0.9647 | 437.6826 | 2.589 |
| 8. Stamps and registration fees | -6.1514 (-15.7663)*** | 1.0510 (20.2891)*** | 0.9625 | 411.6488 | 2.337 |
| 9. Land revenue | 0.7405 (1.2995) | 0.1417 (1.8723)** | 0.1354 | 3.5055 | 2.534 |

a and b : See below Table A.III.8.

TABLE A.III.3

Karnataka
(1963-64 to 1978-79)

| Item | Constant | Coefficient of SDP | $\bar{R}^2$ | F-value | D.W. statistics |
|---|---|---|---|---|---|
| 1. Total state tax revenue[a] | -4.2930<br>(-1.6115)* | 1.663<br>(3.3462)*** | 0.4047 | 11.1973 | 2.210 |
| 2. General sales tax[b] | -6.2076<br>(-13.8920)*** | 1.2787<br>(21.8711)*** | 0.9695 | 478.3467 | 1.320 |
| 3. State excise duty | -4.5788<br>(-4.1135)*** | 1.8264<br>(5.3100)*** | 0.6602 | 28.1964 | 1.259 |
| 4. Electricity duty | -4.4087<br>(-3.9864)*** | 0.7195<br>(4.9724)*** | 0.6126 | 24.7245 | 2.311 |
| 5. Motor vehicles tax | -3.2884<br>(-4.3821)*** | 1.1317<br>(6.0481)*** | 0.7176 | 36.5800 | 1.316 |
| 6. Entertainment tax | -12.1453<br>(-23.3652)*** | 1.7715<br>(26.0467)*** | 0.9783 | 678.4307 | 1.308 |
| 7. Stamps and registration fees | -4.6628<br>(-8.7246)*** | 0.8651<br>(12.3708)*** | 0.9102 | 153.0366 | 2.531 |
| 8. Land revenue | 3.5511<br>(3.6997)*** | -0.2565<br>(-1.9866)*** | 0.1642 | 3.9466 | 1.762 |

a and b : See below Table A.III.8.

TABLE A.III.4

Kerala

(1961-62 to 1977-78)

| Item | Constant | Coefficient of SDP | $\bar{R}^2$ | F-value | D.W. statistics |
|---|---|---|---|---|---|
| 1. Total state tax revenue[a] | -1.0710 (-3.6595)*** | 0.9911 (8.4430)*** | 0.8241 | 71.2836 | 1.662 |
| 2. General sales tax[b] | -5.4114 (-20.1613)*** | 1.2454 (32.4712)*** | 0.9850 | 1054.3819 | 1.363 |
| 3. State excise duty | -1.7359 (-3.5150)*** | 1.3436 (4.8689)*** | 0.6022 | 23.7056 | 1.098 |
| 4. Electricity duty | -16.0049 (-4.2150)*** | 2.2673 (3.7646)*** | 0.5456 | 10.6067 | 2.763 |
| 5. Motor vehicles tax | -1.1953 (-2.1513)** | 0.7477 (3.4138)*** | 0.4153 | 11.6543 | 1.007 |
| 6. Entertainment tax[b] | -6.2176 (-3.5960)*** | 0.5519 (2.0125)** | 0.6391 | 15.1651 | 1.131 |
| 7. Stamps and registration fees | -2.3732 (-8.1443)*** | 0.9644 (11.0213)*** | 0.8893 | 121.4696 | 1.540 |
| 8. Land revenue | 1.1102 (1.0072) | -0.1096 (-0.6959) | -0.0333 | 0.4843 | 1.314 |

Note : D- The regression has been estimated by using a dummy variable.

$D_1$ = 1 for 1963-64 onwards and zero for other years.

a and b: See below Table A.III.8.

TABLE A.III.5

Madhya Pradesh
(1961-62 to 1978-79)

| Item | Constant | Coefficient of SDP | $R^2$ | F-value | D.W. statistics |
|---|---|---|---|---|---|
| 1. Total state tax revenue[a] | -0.6802 (-1.6372)* | 0.7436 (5.1385)*** | 0.6136 | 26.4040 | 1.619 |
| 2. General sales tax[b] | -6.6984 (-12.6064) | 1.2615 (18.1015)*** | 0.9505 | 327.6597 | 1.341 |
| 3. State excise duty | -6.0918 (17.6219)*** | 1.1491 (25.3439)*** | 0.9742 | 642.3136 | 1.644 |
| 4. Electricity duty | -1.5489 (-2.1811)** | 0.7134 (2.4701)** | 0.2418 | 6.1013 | 1.554 |
| 5. Motor vehicles tax | -0.4710 (-1.3023) | 0.5506 (2.0731)** | 0.1709 | 4.2978 | 1.121 |
| 6. Entertainment tax | -8.0538 (-16.7406)*** | 1.1600 (18.3841)*** | 0.9520 | 337.9739 | 1.808 |
| 7. Stamps and registration fees | -4.3823 (-11.6475)*** | -0.7473 (15.1431)*** | 0.9307 | 229.3133*** | 1.213 |
| 8. Land revenue | 8.2566 | -0.9002 | 0.7336 | 47.8935*** | 1.586 |

a and b : See below Table A.III.8.

TABLE A.III.6

Maharashtra
(1961-62 to 1978-79)

| Item | Constant | Coefficient of SDP | $\bar{R}^2$ | F-value | D.W. statistics |
|---|---|---|---|---|---|
| 1. Total state tax revenue[a] | -4.6807 (-28.3731)*** | 1.1905 (60.0133)*** | 0.9953 | 3601.5931 | 1.770 |
| 2. General sales tax[b] | -6.3424 (-31.3017)*** | 1.3192 (54.1478)*** | 0.9942 | 2931.982 | 1.645 |
| 3. General sales tax (excluding motor spirit tax) | -6.4180 | 1.3118 (50.6189)*** | 0.9934 | 2562.2728 | 1.579 |
| 4. Motor spirit tax | -7.5515 | 1.1589 (40.5317)*** | 0.9903 | 1642.8169 | 0.771 |
| 5. State excise duty | -7.7702 (-9.2634)*** | 1.8326 (10.8824)*** | 0.8801 | 118.4261 | 1.692 |
| 6. Electricity duty | -2.0323 (-4.3764)*** | 0.8565 (7.1226)*** | 0.7566 | 50.7309 | 2.277 |
| 7. Motor vehicles tax | -4.5387 (-24.6916)*** | 0.8447 (38.2182) | 0.9885 | 1460.6345 | 1.635 |
| 8. Entertainment tax | -8.6692 (-29.3775)*** | 1.3207 (37.2204)*** | 0.9879 | 1385.355 | 1.855 |
| 9. Stamps and registration fees | -1.4262 (-3.6767)*** | 0.6901 (6.9253)*** | 0.7459 | 47.9598 | 1.050 |
| 10. Land revenue | -1.5748 (-2.1708)** | 0.4579 (5.2496)*** | 0.6097 | 27.5586 | 1.637 |

a and b: See below Table A.III.8.

TABLE A.III.7

Uttar Pradesh
(1963-64 to 1978-79)

| Item | Constant | Coefficient of SDP | $\bar{R}^2$ | F-value | D.W. statistics |
|---|---|---|---|---|---|
| 1. Total state tax revenue[a] | -4.6011 (-7.6870)*** | 1.1392 (16.1746)*** | 0.9456 | 261.6178 | 1.792 |
| 2. General sales tax[b] | -10.2845 (-13.9145)*** | 1.7145 (19.7137)*** | 0.9627 | 388.6304 | 1.818 |
| 3. General sales tax (excluding Motor spirit tax | -11.1899 | 1.7923 (19.6211)*** | 0.9624 | 384.9381 | 1.770 |
| 4. Motor spirit tax | -13.0091 | 1.7481 (19.5656)*** | 0.9622 | 382.8111 | 2.039 |
| 5. State excise duty | -3.3906 (-3.7115)*** | 0.7692 (7.1564)*** | 0.7700 | 51.2140 | 1.387 |
| 6. Electricity duty | -11.8616 (-5.8539)*** | 1.4755 (6.1887)*** | 0.7132 | 38.3006 | 2.344 |
| 7. Motor vehicles tax | -5.6966 (-7.4478)*** | 1.3506 (9.2769)*** | 0.8587 | 86.0601 | 1.597 |
| 8. Entertainment tax | -10.8438 (-15.3955)*** | 1.5124 (18.2489)*** | 0.9568 | 333.0225 | 1.809 |
| 9. Stamps and registration fees | -9.4651 (-11.7048)*** | 1.4420 (15.1551)*** | 0.9384 | 229.6764 | 1.283 |
| 10. Land revenue | 22.0301 (3.7513)*** | -5.3552 (-3.7073)*** | 0.4765 | 13.7440 | 1.597 |

a and b : See below Table A.III.8.

TABLE A.III.8

West Bengal
(1961-62 to 1976-77)

| Item | Constant | Coefficient of SDP | $\bar{R}^2$ | F-value | D.W. statistics |
|---|---|---|---|---|---|
| 1. Total state tax revenue[a] | -2.2672 (-8.2005)*** | 0.8440 (24.3722)** | 0.9753 | 594.0054 | 1.948 |
| 2. General sales tax[b] | -6.5614 (-19.8002)*** | 1.2871 (31.0071)*** | 0.9846 | 961.4428 | 2.037 |
| 3. General sales tax (excluding motor spirit tax) | -6.7137 | 1.2696 (19.2530)*** | 0.9610 | 370.6782 | 1.808 |
| 4. Motor spirit tax | -7.7225 | 1.2221 (18.7597)*** | 0.9590 | 351.9276 | 1.331 |
| 5. State excise duty | 0.3729 (0.9817) | 0.1762 (1.0579) | 0.0084 | 1.1192 | 2.225 |
| 6. Electricity duty | -2.4416 (-4.8681)*** | 0.5441 (8.6611)*** | 0.8315 | 75.0147 | 2.067 |
| 7. Motor vehicles tax | -2.6200 (-12.2966)*** | 0.4938 (18.5014)*** | 0.9579 | 342.3009 | 1.362 |
| 8. Entertainment tax | -6.8939 (-17.1063)*** | 1.0488 (20.7752)*** | 0.9663 | 431.6085 | 1.422 |
| 9. Stamps and registration fees | -1.4377 (-3.2405)*** | 0.4272 (7.6871)*** | 0.7948 | 59.0915 | 1.392 |
| 10. Land revenue D | 2.2882 (0.6591) | -0.0535 (-0.1133) | -0.0279 | 0.8982 | 1.428 |

Note : D: The regression has been estimated by using three dummy variables;
$D_1$ = 1 for 1964-65 onwards and zero for other years;
$D_2$ = 1 for 1972-73 onwards and zero for other years; and
$D_3$ = 1 for 1976-77 and zero for other years.

a: Excludes Central Sales Tax.

b: Includes sales tax on motor spirit.

TABLE A.III.9

Regression Results Relating to Elasticity of State Taxes in Maharashtra Using the Data Supplied by the Maharashtra Government

(1961-62 to 1979-80)

| Item | Constant | Coefficient of SDP | $\bar{R}^2$ | F-value | D.W. statistics |
|---|---|---|---|---|---|
| 1. State revenue | -3.398 | 1.022 (64.166)*** | 0.996 | 4117.272 | 1.502 |
| 2. State revenue[a] | -3.433 | 1.015 (44.575)*** | 0.996 | 4169.995 | 1.486 |
| 3. Sales tax (total) | -4.803 | 1.132 (52.669)*** | 0.994 | 2774.039 | 1.500 |
| 4. General sales tax[b] | -5.371 | 1.168 (45.853)*** | 0.992 | 2102.479 | 1.719 |
| 5. Central sales tax | -6.379 | 1.092 (37.383)*** | 0.987 | 1397.462 | 0.928 |
| 6. Motor spirit tax | -5.935 | 0.932 (30.620)*** | 0.982 | 937.588 | 0.651 |
| 7. State excise duty | -14.777 | 1.955 (28.008)*** | 0.977 | 784.455 | 1.306 |
| 8. Electricity duty | -3.848 | 0.714 (22.590)*** | 0.966 | 510.324 | 1.613 |
| 9. Motor vehicles tax | -4.240 | 0.806 (37.302)*** | 0.987 | 1391.475 | 1.267 |
| 10. Entertainment tax | -6.805 | 1.067 (35.162)*** | 0.986 | 1236.396 | 1.838 |
| 11. Stamps and registration fees | -2.393 | 0.575 (12.871)*** | 0.901 | 165.655 | 1.023 |
| 12. Passenger and goods tax | -8.375 | 1.191 (17.929)*** | 0.947 | 321.452 | 1.412 |
| 13. Land revenue | -2.658 | 0.600 (9.672)*** | 0.837 | 93.547 | 1.789 |
| 14. Purchase tax | -9.782 | 1.288 (3.328)*** | 0.359 | 11.073 | 1.037 |

Note: a. Excludes Central Sales Tax.

b. Excludes Motor Spirit Tax.

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