The tax effort of a Government can be expressed as a relationship (ratio) between the actual amount of its tax collection and some measure of taxable capacity. It is well recognised by economists that taxable capacity cannot be measured in its absolute sense. However, it is possible to judge the tax effort of a State in relation to those of other States; or more specifically in relation to the average performance of all the States in a country. The ratio of the tax revenue to the total income of a State (Tax-ratio) is commonly taken as the indicator or measure of relative tax effort. For example, the tax ratio was used in the application of the Gadgil formula for the allocation of Plan assistance among the State Governments which gave a 10% weightage to tax-effort. The use of the tax ratio as a measure of tax effort, however, involves the implicit assumption that total income, irrespective of other circumstances is the appropriate indicator of relative taxable capacity. Such an assumption is simplistic for it can be readily seen that the capacity to pay as well as to collect taxes will be affected by the size of the population in relation to income, the availability of tax handles, the degree of monetisation, etc. An allowance will be made for all such major factors. This can be done either by adjusting the actual tax ratios for variations in the tax capacity factors or by estimating the amounts of taxes that could be collected through the use of the potential bases available to the States. In the former approach,
regression analysis is used to estimate or measure the influence of objective (capacity) factors on the tax ratio; in the latter approach a model or representative tax system is applied to potential bases to estimate the relative taxable capacity. 1

It may be hypothesised that the actual tax ratio depends on (i) the ability of the people to pay taxes, (ii) the ability of the administration to collect taxes, (iii) the willingness on the part of the leaders of the Government to tax i.e., their decision regarding the extent of the taxable capacity to be utilised. Factors affecting (i) and (ii) may be termed tax capacity factors and those relating (iii) may be grouped under tax effort factors.

To measure the tax performance of Andhra Pradesh during the VII Plan, the tax effort ratios of 15 major States were calculated and presented in Table 5.1. The accuracy of measurement of tax effort of the State would depend to a great extent on the quality of the data used. The data for tax revenue were collected from R.B.I. Bulletins on Finances of State Governments. Tax revenue was taken as the average of the first 3 years of the Seventh Plan for which accounts figures were available for all States. The data for Net State Domestic Product were also taken as the average of the same 3 years of the Seventh Plan and the data were collected from the 'Economic Survey - 1990-91', Government of India.

<table>
<thead>
<tr>
<th>S.No.</th>
<th>State</th>
<th>Tax-Ratio TR/SDP</th>
<th>Net State Domestic Product at Current Prices (Rs. in crores)</th>
<th>Index of Tax effort of ER/AER States (as of 4)</th>
<th>Index of Ranks of Tax effort for all the 15 States</th>
<th>Average effective rate for all the 15 States</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Andhra Pradesh</td>
<td>1505.6</td>
<td>14730.2</td>
<td>1.30</td>
<td>1.00</td>
<td>1557.5</td>
</tr>
<tr>
<td>2</td>
<td>Assam</td>
<td>243.3</td>
<td>5531.7</td>
<td>5.39</td>
<td>0.55</td>
<td>1263.7</td>
</tr>
<tr>
<td></td>
<td>Bihar</td>
<td>645.1</td>
<td>13966.6</td>
<td>4.77</td>
<td>0.57</td>
<td>1797.4</td>
</tr>
<tr>
<td>4</td>
<td>Gujrat</td>
<td>1288.3</td>
<td>12038.5</td>
<td>9.88</td>
<td>1.18</td>
<td>982.5</td>
</tr>
<tr>
<td></td>
<td>Karnataka</td>
<td>577.3</td>
<td>6051.6</td>
<td>9.54</td>
<td>1.14</td>
<td>1215.8</td>
</tr>
<tr>
<td>6</td>
<td>Haryana</td>
<td>1231.1</td>
<td>12113.8</td>
<td>10.13</td>
<td>1.21</td>
<td>12410.1</td>
</tr>
<tr>
<td>7</td>
<td>Kerala</td>
<td>823.2</td>
<td>7050.8</td>
<td>11.48</td>
<td>1.36</td>
<td>1706.1</td>
</tr>
<tr>
<td></td>
<td>Madhya Pradesh</td>
<td>973.4</td>
<td>28996.9</td>
<td>9.68</td>
<td>1.16</td>
<td>1649.6</td>
</tr>
<tr>
<td>8</td>
<td>Maharashtra</td>
<td>3796.0</td>
<td>6220.9</td>
<td>5.41</td>
<td>0.65</td>
<td>15830.1</td>
</tr>
<tr>
<td>9</td>
<td>Orissa</td>
<td>336.8</td>
<td>8300.1</td>
<td>8.32</td>
<td>1.00</td>
<td>1588.8</td>
</tr>
<tr>
<td></td>
<td>Punjab</td>
<td>759.4</td>
<td>3573.4</td>
<td>5.41</td>
<td>0.65</td>
<td>15830.1</td>
</tr>
<tr>
<td></td>
<td>Rajasthan</td>
<td>664.8</td>
<td>8300.1</td>
<td>8.01</td>
<td>0.96</td>
<td>15830.1</td>
</tr>
<tr>
<td></td>
<td>Tamil Nadu</td>
<td>1086.8</td>
<td>13530.1</td>
<td>10.67</td>
<td>1.28</td>
<td>17312.9</td>
</tr>
<tr>
<td></td>
<td>Uttar Pradesh</td>
<td>1022.9</td>
<td>27142.9</td>
<td>5.91</td>
<td>0.71</td>
<td>17297.8</td>
</tr>
<tr>
<td></td>
<td>West Bengal</td>
<td>1263.7</td>
<td>17297.8</td>
<td>7.31</td>
<td>0.88</td>
<td></td>
</tr>
</tbody>
</table>

2. The figures for Tax Revenue are taken from R.S.I. Bulletin on the Finances of State Governments.
It is obvious from the Table that the ratio of tax-revenue to State Net Domestic Product was the highest at 11.68 per cent in Kerala followed by Andhra Pradesh (10.89 per cent), Tamil Nadu (10.67 per cent) and Karnataka (10.13 per cent). This clearly indicates that all the four southern States among the 15 major States had high tax ratios and States that the southern States made sufficiently high effort in mobilising resources from the taxation.

It is also obvious from the table that the four southern States namely Kerala, Andhra Pradesh, Tamil Nadu and Karnataka had indices of tax effort distinctly above the average and 3 States namely Gujarat, Maharashtra, Haryana - had indices of tax effort just above the average; and Punjab State has index of tax effort equal to the average. Next comes Rajasthan, Madhya Pradesh and West Bengal which had indices of tax effort above 0.90 but below the average. The tax effort of the rest of the 6 States namely West Bengal, Uttar Pradesh, Orissa, Bihar and Assam was distinctly below the average.

Thus, it is clear from Table 5.1 that the tax efforts of the southern States were appreciable as all the southern States occupied the top four ranks in terms of tax effort, during the VII Plan and the tax effort of Andhra Pradesh was laudable as the State achieved second rank among the 15 major States of the Indian Union.

Responsiveness of Tax System in Andhra Pradesh

The responsiveness of tax revenue to changes in the State income is of great interest to Policy makers and researchers, because it is
measured with reference to a given tax structure. The responsiveness of tax revenue to changes in the State income implies a functional relationship between the two, with tax revenue as a dependent variable and State income as an independent variable. If a one per cent increase in State income leads to a more than one per cent increase in tax revenue, we may say that the tax revenue is responsive to changes in State Income and say it is elastic. A quantitative measure of responsiveness of tax revenue to State income is useful for having a better understanding of the tax-structure and its behaviour. There are two measures for this responsiveness of tax revenue to State income. One is called 'Buoyancy' and the other is called 'Elasticity'.

Buoyancy of a tax refers to the growth in tax revenue both as result of the additional taxation measures and on account of the growth in State income. In other words, it includes both natural growth through built-in-income elasticity of a tax as well as the growth due to raising of the tax rates and tax bases.

Elasticity only refers to the growth in the tax revenue on account of the growth in the State income. It measures the automatic response of the tax revenue to changes in the State income i.e. revenue increase excluding the effects of discretionary changes. It indicates by what percentage the tax revenue increases automatically for a one per cent increase in the State income.
Method for separation of discretionary changes from actual series of tax

For measuring buoyance actual series of tax receipts are taken without any adjustment. For measuring elasticity the part of the growth of tax receipts accounted for by discretionary changes has to be eliminated from the actual series of tax receipts. The separation of discretionary effects is done in two steps.

1. A series of adjusted tax yields are prepared by deducting from the actual tax yield for each year, the estimated amount attributed to discretionary change in that year.

2. The series so adjusted are further refined by the application of the procedure explained below to form a final series that excludes the continuing impact of each discretionary change on future years, so that the elasticity of a given tax structure in the base year may be estimated.

A series showing the adjusted tax revenue that excludes the continuing impact of each discretionary change on future years has been obtained as follows.

\[
T_{1,1} = (T_1 - D_1)
\]

\[
T_{1,2} = (T_2 - D_2) \times \frac{(T_1 - D_1)}{T_1}
\]

\[
T_{1,3} = (T_3 - D_3) \times \frac{(T_2 - D_2)}{T_2} \times \frac{(T_1 - D_1)}{T_1}
\]
\[T_{1,4} = (T_4 - D_4) \times \frac{(T_3 - D_3)}{T_3} \times \frac{(T_2 - D_2)}{T_2} \times \frac{(T_1 - D_1)}{T_1}\]

\[T_{1,n} = (T_n - D_n) \times \frac{(T_{n-1} - D_{n-1})}{T_{n-1}} \times \cdots \times \cdots \times \frac{(T_1 - D_1)}{T_1}\]

where

- \(T_1, T_2, \ldots, T_n\) are actual tax revenue series.
- \(D_1, D_2, \ldots, D_n\) are additional tax revenue series.
- \(T_{1,1}, T_{1,2}, \ldots, T_{1,n}\) are the adjusted tax revenue series that excludes the continuing impact of each discretionary change on future years, if the base year tax structure had prevailed.

**Method for estimating Buoyancy or Elasticity coefficient**

Assuming a non-linear relationship between tax revenue and State income, it is denoted by the function

\[T = ay^b\]

where

- \(T\) = tax revenue and
- \(y\) = State income

The equation used to estimate tax-income relationship on the basis of above function is a log-linear equation which is as follows.

\[\log T = \log a + b \log y.\]
The regression coefficient i.e. 'b' gives the percentage change in the tax receipts that accompanies one per cent change in State income i.e., it is the coefficient of Buoyancy or Elasticity of a tax. If the estimated coefficient of 'b' is equal to one, it indicates that one per cent increase in State income will lead to a one per cent increase in the tax revenue. If the estimated coefficient of 'b' is more than one, it indicates that one per cent increase in State income will lead to a more than one per cent in tax revenue and vice versa.

Empirical Analysis

With the aid of the above method, tax buoyancy and elasticity for the tax system as a whole had been estimated for the period of Seventh Five Year Plan of Andhra Pradesh i.e. from 1985-86 to 1989-90 and the results are presented in the following equations.

Buoyancy equation

\[ \log \text{SOTR} = -1.1957 + 1.0554 \log \text{SNDP} \]

\[ R^2 = 0.9895; \quad F = 282.7143 \quad \text{and} \quad t = 16.8141 \]

From the above equation, it is clear that the buoyancy coefficient for the system as a whole i.e., for State's own tax revenue was 1.0554 and it indicates that a one per cent increase in State Net Domestic Product led to a more than one per cent increase in State's own tax revenue in Andhra Pradesh during the Seventh Plan Period.
**Elasticity equation**

\[
\log \text{SOTR} = -0.4014 + 0.8574 \log \text{SNDP}
\]

\[R^2 = 0.9779; F = 132.7466 \text{ and } t = 11.5216.\]

From the above equation, it is clear that the elasticity coefficient for the tax system as a whole i.e., for the State's own tax revenue was 0.8574 and it implies that the tax system of Andhra Pradesh was not adequately progressive during the Seventh Five Year Plan.

The difference between buoyancy and elasticity coefficients indicates the nature and extent of the effort made by the State Government in the mobilisation of additional resources from taxes.

It is obvious from the above equations that the difference between the buoyancy and elasticity coefficients of the State's own tax revenue was 0.1980 and it indicates the success of the State Government in mobilising the additional resources from the taxes in Andhra Pradesh during the Seventh Five Year Plan.