BUOYANCY AND ELASTICITY

OF

IMPORTANT STATE INDIRECT TAXES
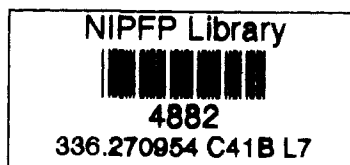(1960-61 to 1974-75)

R.J. CHELLIAH

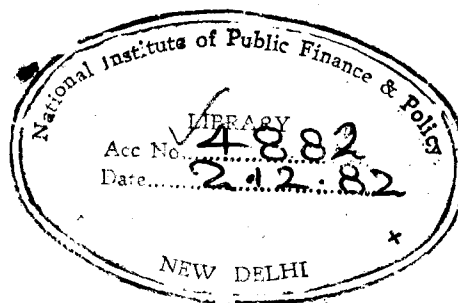AND

SHYAM NATH

Submitted to

Indirect Taxation Enquiry Committee
Government of India

DECEMBER 1977

NATIONAL   INSTITUTE   OF   PUBLIC
FINANCE   AND   POLICY

Buoyancy And Elasticity Of Important State Indirect Taxes (1960-61 to 1974-75)

I. Introduction

The main objectives of this paper are to analyse the trends and composition of major indirect taxes levied by the State Governments and to measure their buoyancy and income-elasticity[1] The period covered generally is 1960-61 to 1974-75, though for particular taxes, slightly different periods have been chosen.

In order to estimate the automatic growth in a tax for the purpose of calculating elasticity, adjustments have to be made to the actual revenue series for eliminating the effects of discretionary tax changes, if any, undertaken during the given period. Two methods of adjustments generally used, namely, the proportional adjustment method and the constant rate-base method, have been explained in the companion paper cited in the foot-note below. In this paper, the proportional adjustment method as well as a variant of this, have been used. The methodology of the latter method is explained in Annexure I, while the former is spelt out in the companion paper.

The details of sources of data used are given in Annexure II.

---

[1] The terms buoyancy and elasticity have been defined and explained in detail in the companion paper on "Trends Composition and Elasticity of Union Excise and Import Duties" (Hereinafter referred to as companion paper)submitted to the Indirect Taxation Enquiry Committee. Briefly, the measure of buoyancy shows the percentage change in the actual yield of the tax for a one per cent change in national income or other relevant base, while the elasticity co-efficient gives the percentage automatic change in the yield of the tax in response to a one percent change in national income.

II.   Trends and Changes in the Composition
        Of Major State Indirect Taxes

The tax structure of the States has undergone per-
ceptible changes over time, in terms of both the absolute
and relative contributions of direct and indirect taxes. Direc
taxes on income, property and capital transactions accounted
for over one third, or 34.6 per cent, of the total tax revenue
of the States in 1960-61; this share has fallen to less than
one-sixth, or 13.8 per cent, in 1975-76. On the other hand,
the share of indirect taxes on commodities and services has
increased from 65.4 per cent to 86.4 per cent over the same
period; in absolute terms there has been a ten-fold increase
in their yield from Rs.295 crores to Rs.2955 crores. In terms
of proportion of net national product, State indirect taxes
constituted 2.2 per cent in 1960-61, 3.7 per cent in 1970-71
and 4.9 per cent in 1975-76.

Among the State indirect taxes, a certain structural
transformation of the relative role of different constituents
is evident from the statistical data. Sales taxes of course
remain the most significant source of indirect tax revenue
for the States. Four types of sales taxes, namely, the general
sales tax, Central sales tax, sales tax on motor spirit and
purchase tax on sugarcane together contribute more than half
of the total indirect tax revenue of the States. Yet, over
the period under study, the relative importance of these taxes
in terms of percentage contribution to tax revenue has changed.
Their combined contribution declined from 60.4 per cent of
total indirect tax revenue of all States in 1970-71 to 54.2
per cent in 1973-74, but then improved significantly to 62.8
per cent in 1974-75. (Table I)

Among the four sales taxes, the most important contri-
bution is of the general sales tax, which accounts for about
three-fourths of the sales tax revenue of all the States, with
Central sales tax accounting for about one-fifth of the total

sales tax revenue of the States (Table II).

An analysis of data over a longer time period from 1960-61 to 1974-75 given in Table I also brings out the dominating position of the general sales tax in the State indirect tax structure, even though there has been a nominal fall in its contribution in some of the years. Between 1960-61 and 1973-74, the contribution of the general sales tax to the total indirect tax revenue of the States declined from 42.3 per cent to 40.0 per cent, but then increased to 46.2 per cent the following year. In absolute terms, the yield of the general sales tax has increased very substantially from Rs.125 crores to Rs.1166 crores, that is, an increase of 933 per cent.

The contribution of State excises to State tax revenues is also quite significant, at about one sixth of their total indirect tax revenue. Over time, however, there has been some decline in its relative contribution from 18.2 per cent to 15.3 per cent (during 1960-61 to 1974-75). A similar decline in the relative share is also discernible in the case of tax on motor vehicles and electricity duty; however, while the decline is sharp for the former from 11.1 per cent of total State indirect tax revenue in 1960-61 to 7.4 per cent in 1974-75, it is nominal for the latter from 4.5 per cent in 1960-61 to 3.6 per cent in 1974-75.

The relative contribution of the tax on passengers and goods has, on the other hand, improved substantially from 1.5 per cent of indirect tax revenue in 1960-61 to 4.4 per cent in 1965-66 and 5.5 per cent in 1974-75. The contribution of entertainment tax has been fairly constant, varying only between 4.5 and 4.9 per cent.

The foregoing analysis of the trends in the yield of major State indirect taxes brings out the predominant significance of sales taxes, particularly the general sales tax, for the State exchequers. It is noteworthy that their relative importance has increased, inspite of the exploitation of other sources of

revenue by the State Governments. State excises, though dec-
lining relatively to serveral others, still remain next in
importance only to sales taxes. The changes in the relative
shares of the different indirect taxes have been the result
of their differing rates of automatic growth and of the
directions of additional resources mobilisations by the States.
These factors can be analysed through the measurement of the
buoyancy and elasticity of the major indirect taxes.

III   Buoyancy and Elasticity of State Indirect Taxes
       Methodology of Estimation and Limitations

Gross and net tax yields are regressed on State income
at factor cost to estimate the buoyancy and elasticity coeffi-
cients. The tax yield data used in the study relate to 18
States, as some States like Sikkim, Manipur, Tripura and
Meghalaya did not exist throughout the period and for some others,
like Nagaland, consistent data are not available. Even though
the number of States have increased over time, the increase is due
to geographical breakup and can only nominally affect tax coll-
ection data at the aggregate or all States level. Income is
taken as the single explanatory variable in the equation and
the significance of coefficients is tested on the basis of the
't' test.

The methodology of estimation adopted for the study as
well as the data used for estimation have certain inherent
limitations:

    i) data used in eliminating the effects of additional
        tax measures from the gross yield are generally
        ex-arte estimates; as such, any over estimation by
        States of the yield from the tax measures under-
        estimates the elasticity coefficient.

    ii) Changes in arrears in tax collections limit the
        validity of annual data on the yield of taxes
        given in the budget. The total tax demand in any
        year consists of current demand and demand in
        relation to part or whole of arrears of earlier
        years, the yearwise break-up of which is not
        available. Similarly, tax collection in a year

comprises realisation from the current demand and also a part of the backlog of arrears. This brings in distortion in the data because the realisation of arrears is very erratic, linked closely to administrative factors, responsiveness of assessees and general economic conditions. Studies on buoyancy and elasticity, therefore, have to assume that the problem of arrears does not unduly distort the normal rate of growth of tax revenue, i.e. that either arrears are negligible or that they are growing more or less at the same rate as collections.

iii) Gross tax yield is in reality a function of changes in State income, the rate schedule, changes in coverage through additions to, or omissions from, taxed items, changes in administrative efficiency, changes in the degree of compliance, evasion and avoidance. However, for lack of information and on account of difficulties in quantifying such intangible factors as compliance, we are forced to leave several of the factors out. The use of State income alone as an explanatory variable carries the implicit assumption that even additional tax mobilisation efforts are dependent on the growth of income. Again, the use of income as the independent variable in the function for each tax overlooks the fact of inter-dependence of the bases of different taxes. Thus, for instance, the imposition of a tax on one commodity changes consumer equilibrium resulting in a different pattern of consumer demand. This reduces the base of taxes on certain commodities and enhances that of some others. In a federal set up, the problem is even more pronounced as more than one authority operate on the same base to get more revenue.

iv) As explained in the companion paper, the proportional method of adjustment enables one to capture only the "average" of the elasticities of the different tax structures extant during the reference period and not that of a structure of any given year.

The above-mentioned limitations must be borne in mind in interpreting the results of the exercise. Although it is not possible to quantify the margin of error involved, on the basis of best judgement, it may be stated that the elasticity coefficients derived here give us a broad picture of the relationship between State indirect tax revenues and State incomes.

III, 2a Buoyancy and Elasticity Of State Indirect Taxes-
Aggregates for All States

Estimates of elasticity coefficients of individual
taxes for different States reveal significant variations in-
dicating that the responsiveness of individual taxes to changes
in State income vary from State to State and also between
different taxes within a given State. The variations in buoyancy
coefficients are to be attributed also to an additional factor,
namely, differences in policies regarding discretionary tax
changes.

Buoyancy and elasticity coefficients have been computed
at the all States level for a few specific State taxes, namely,
the general sales tax (including the sales tax on motor spirit),
the motor vehicles tax, the passengers and goods tax and the
entertainment tax. The results of these computations presented
in Table III indicate that the State tax systems on the average
are not only buoyant but also elastic with reference to changes
in State income.

The general sales tax, the most important source of
revenue for State Governments, was highly buoyant; and it has
also been income elastic. The elasticity coefficient of 1.15
indicates that a 1 per cent change in net national product (NNP)
will lead to a 1.15 per cent change in the yield of the general
sales tax. The value of elasticity coefficient shows that the
State sales tax structures are such that even if there would
have been no change in tax parameters in successive years, the
tax yield would have grown faster than NNP. State sales tax
systems have been highly buoyant because the States exploit
this source to a large extent for additional resource mobilisa-
tion. However, it will be seen later that the degree of
buoyancy and elasticity of the sales tax varies as between States.

The general sales tax (including sales tax on motor
spirit) and the entertainment tax have the highest buoyancy

co-efficient among the State taxes for which computations
have been made; in both the cases, buoyancy is 1.43. In the
case of the taxes on the motor vehicles and passengers and
goods (together), buoyancy is lower at 1.27.

Not only were the general sales tax systems highly
buoyant, but they have also been most elastic to changes in
income, the elasticity coefficient at the all States level
being 1.15. On the other hand, the elasticity co-efficients
of entertainment tax and taxes on motor vehicles and on
passengers and goods are much lower at 1.04 and 1.05 respectivel;
The earlier analysis in section II on the trend in revenue from
various taxes had already shown that the relative contributions
of the tax on passengers and goods had improved over time, but
that of the tax on motor vehicles had declined very significantly

The coefficient for the tax on motor vehicles and on
passengers and goods which have been taken together relates to
18 States for the period 1963-64 to 1973-74, while the co-
efficients for the other two taxes (general sales tax and enter-
tainment tax) relate to fewer States (14) but for a longer time
period (1963-64 to 1974-75).

Buoyancy and elasticity coefficients have been computed
for 16 States also for another, shorter period (1968-69 to
1975-76). These co-efficients have been computed for the genera
sales tax (including sales tax on motor spirit) and for the
entertainment tax. In both the cases, the buoyancy and elasti-
city coefficients are higher than those presented earlier for
fewer states but for a longer time period. While in the case
of the general sales tax, the buoyancy coefficient for a
smaller time period and larger number of states is 1.44 (1.43
earlier), the elasticity coefficient is 1.23 (1.15) and for
entertainment tax the buoyancy coefficient is 1.54 (1.43) and
elasticity co-efficient 1.18 (1.04).

The preceding analysis thus shows that buoyancy and
elasticity coefficients for State taxes are more affected by

differences in time period than by differences in the number
of States covered, provided the major States are included.
The method of computation of elasticity and buoyancy does not
significantly affect the values of the coefficients at the
all-India (aggregate) level.

III. 2b. Inter-State Comparisons

Buoyancy and elasticity estimates at the aggregate level
conceal inter-state variations. Due to the operation of various
factors, there are significant inter-state variations in the
buoyancy and elasticity of different indirect taxes. Among the
influencing factors are consumer expenditure pattern, the degree
of urbanisation, the rate of development of transport industry,
the degree of movement of passengers and goods, the efficiency
of tax administration, and the relative rates of growth of the
volume of trade.

Inter-State comparisons of buoyancy and elasticity are
confined to selected indirect taxes like the general sales tax,
the sales tax on motor spirit, taxes on motor vehicles and on
passengers and goods and the entertainment tax.

General Sales Tax

The range of variations in the buoyancy and elasticity
of the general sales tax is quite wide among the 16 States for
which estimates have been computed and are presented in Table IV.
The general sales tax is the most a buoyant in Jammu and Kashmir
with buoyancy coefficient being 1.86, while the buoyancy of
this tax is lowest in Bihar at 1.16. As against the average
of 1.43 for all the States, eight States have above average
buoyancy, these being Jammu and Kashmir, Karnataka, Uttar Pradesh
Tamil Nadu, Assam, Haryana, Gujarat and Punjab. In none of the
States is the buoyancy of the general sales tax less than 1.0, in
dicating that sales tax collections increased faster than State
incomes in all the States.

In the case of elasticity, the range of variation is
between 0.85 for West Bengal and 1.52 for Assam; in nine out
of the 16 States elasticity coefficients are higher than the
all-States average of 1.15. In Kerala, Jammu & Kashmir and
West Bengal the elasticity of these taxes is less than unity,
the lowest being 0.85. Thus the States having a low elasticity
in their sales tax system are not only the under developed
states but also industralized States like West Bengal.

A comparative examination of the buoyancy and elasticity
coefficients indicates that highly buoyant State general sales-
tax systems are also highly elastic with respect to income. All
the States having above average buoyancy, except Gujarat and
Jammu & Kashmir, have above average elasticity, though even
in the case of Gujarat the elasticity is more than unity (1.08)
and in the case of Jammu & Kashmir it is slightly less than
unity (0.98). Similarly, all States with above average elasticity
have above average buoyancy except Andhra Pradesh, Rajasthan and
Maharashtra. Even in these three cases the buoyancy is quite
high ranging between 1.38 and 1.42. In other words, a high level
of buoyancy is associated with a high level of elasticity and
vice versa. Similarly, a low level of elasticity is associated
with a low level of buoyancy as in the case of West Bengal,
Kerala and Bihar.

While for all States taken together, the difference
between buoyancy and elasticity is only 0.28, for some individual
States the differences are larger. They vary from 0.88 in
Jammu & Kashmir to 0.05 in Haryana; in 5 of the 16 States for
which the co-efficients have been worked out, the variations
exceed the all India average of 0.28; these States are Jammu
& Kashmir, West Bengal, Karnataka and Gujarat. In Madhya·
Pradesh it equals the all-India average.

In respect of the States that have low elasticity, the
additional mobilisation effort during the period 1964-65 to
1974-75 is given in Table A. It is evident that in these States

Table A

Extent of Additional Tax Mobilisation in Selected States
(1964-65 to 1974-75)   (General sales tax)*

(In lakhs of rupees)

Year/States	Bihar	Gujarat	J & K	Kerala	Orissa	West Bengal
1964-65	1	15	-	-	-	-
1965-66	48	35	-	10	-	20
1966-67	73	440	10	40	20	785
1967-68	-	80	28	30	8	532
1968-69	-	553	20	-	-	180
1969-70	60	-	5	65	-	95
1970-71	90	287	-	100	84	-
1971-72	90	90	16	283	10	6
1972-73	34	207	10	300	-	245
1973-74	-	-	-	-	-	110
1974-75	225	270	45	700	200	600

* including Central sales tax.

Source: State Governments' Memoranda to the Finance Commissions.

either the magnitude of yield of additional taxation is quite high or the frequency of tax change is more, leading to higher tax yields over time. On the other hand, States like Assam, Punjab, Haryana, Karnataka, Uttar Pradesh and Tamil Nadu have a more elastic sales tax structure.

Sales Tax on Motor Spirit

Data on sales tax on motor spirit are available only for 10 of the 16 States, as in the case of the others these are merged with the revenue data for the general sales tax and the Central sales tax. The following analysis therefore relates only to these 10 States. The results are presented in Table V.

Even though this tax is generally levied on a specific
basis, it has shown a reasonable degree of elasticity in a
number of States, with high values being obtained for Punjab,
Haryana, Uttar Pradesh and Tamil Nadu. In the case of Jammu
& Kashmir and Orissa, the elasticity coefficients are negative.
There must be some special reasons for these abnormal values
of the coefficients but this have not been examined in the
present study. In the case of West Bengal, Gujarat and Assam
these taxes have exhibited low income elasticity, with changes
in income explaining only between 11 per cent and 41 per cent
of the total variation in the tax. The special reasons explaining
these results have also not been examined in this study.

Taxes on Motor Vehicles and Passengers and Goods

The generally high level of buoyancy of this group of
taxes and the differences between buoyancy and elasticity seen
in most of the States indicate that during the period under
reference these taxes were relied upon for additional mobilisation
of resources. The tax on motor vehicles is levied on a specific
basis and on that score can be expected to be price-inelastic.
On the other hand, the tax on passengers and goods should prove
elastic with reference to income at current prices not only
because it is often levied on an ad valorem basis but also
because passenger and goods traffic tend to grow faster than
income. This is inherent in greater industrialisation and
geographical specialisation or division of labour. It is
noteworthy that in all the relatively advanced (per capita
income basis) or industrialized States, excepting Tamil Nadu,
the elasticity of this group of taxes is higher than unity.
The results are contained in Table VI.

We notice that the buoyancy and elasticity co-efficients
in the case of motor vehicle & passenger and goods taxes
(taken together) in Bihar are unusually high at 2.36 and 2.18
respectively. These were not due to any discretionary changes
in tax measures or to a high degree of responsiveness but were

presumably due to some administrative re-organisation in 1968-69, when the yield from the motor vehicle tax increased to Rs.237 lakhs from Rs.33 lakhs in the previous year. The Bihar figures for these taxes for the period1963-64 to 1974-75 cannot therefore be taken to reflect a normal trend. We have therefore computed two other sets of figures. For a shorter time period, 1968-69 to 1974-75 buoyancy and elasticity co-efficients for Bihar for these taxes worked out to 1.30 and 0.76; these are not only more in consonance with similar co-efficients for other States but also have a better explanatory power (the R^2 being 0.94 and 0.81 and the t statistic being 9.21 and 4.58, respectively). Another set of co-efficients using a dummy variable for the period 1963-64 to 1974-75, having a value 0 from 1963-64 to 1967-68 and 1 from 1968-69 to 1974-75, gives buoyancy of 1.02 (R^2 0.96) and elasticity of 0.76(R^2 0.89). A similar exercise with a dummy variable was also carried out, which yielded the buoyancy coefficient for the motor vehicle tax only of 1.08 (R^2 0.99).

Entertainment Tax

In a number of highly industralised states the entertainment tax system is inelastic to changes in income (Table VII). The elasticity coefficient of entertainment tax in West Bengal and Maharashtra is 0.93 and 0.95 respectively and in Gujarat 0.47. On the other hand, the elasticity coefficient is quite high and above the all-State average of 1.04 in the case of under developed States like Uttar Pradesh, Orissa, Jammu & Kashmir and Bihar. These findings are contrary to expectations as the general belief is that the revenue from entertainment tax would increase with industralisation and the general improvement in economic conditions.

The buoyancy coefficients are unusually high in Karnataka and Haryana (2.07 and 2.04) which also have a very high elasticity coefficients (1.88 and 1.80). Elasticity coefficient is less than unity in the case of Gujarat, Madhya Pradesh, Maharashtra

and West Bengal. There were no discretionary changes in Kerala
indicated by the identical values of buoyancy and elasticity
co-efficients.

IV   Concluding Observations

It is often stated that the taxes at the disposal of the
State Governments are inelastic relatively to those at the
disposal of the Central Government. The findings of this study
contradict this general impression. While, as we showed in the
companion paper, the elasticity of the major indirect tax levied
by the Centre, namely, Union excise, is clearly below unity,
we find that, taking the States as a whole, their major indirect
taxes including the sales taxes, the taxes on motor vehicles
and on passengers and goods and the entertainment tax, have
elasticities greater than unity.

As indicated in the note on sources of data in Annexure II,
for estimating net yield, we have relied upon the cumulative
yields of additional tax measures supplied by the State governments
to the Planning Commission and the Finance Commissions. Elast-
icity estimates are naturally sensitive to the estimates of the
yield of additional tax measures. When all States are taken
together, there is a chance that over-and under-estimates may
at least partly, cancel each other. Also, we have not been able
to look carefully into the relevant factors that affect the
yield of every indirect tax separately in every individual State.
Sometimes, fortuitous factors such as a High Court judgement
or an administrative change leads to a spurt or fall in revenue,
which in turn affects the estimated automatic growth. In the
aggregate, this influence is not likely to be so important, but
in the case of particular States the results might get distorted.
Hence we would like to caution that the elasticity excercises
for the individual State should be looked upon more as preli-
minary ones that yield only tentative conclusion and indicate
the lines of further enquiry. Subject to this caveat, we might
make the following observations:

Generally speaking, the change in the yield of the
indirect taxes covered by the study was more than proportionate
to changes in State income, i.e., the buoyancy of taxes in the
different States exceeds unity. The exceptions are sales tax on
motor spirit and the taxes on motor vehicles and on passengers
and goods in Assam, the sales tax on motor spirit in Orissa,
the tax on motor vehicles in Jammu & Kashmir, the taxes on
motor vehicles and on passengers and goods in Kerala, Tamil Nadu
and Madhya Pradesh. Thus in 4 out of the 16 States, the taxes
on vehicles and on passengers and goods did not grow as fast
as State income inspite of discretionary tax increases in most
of them.

In a good majority of States (13 and 12 out of 16), the
elasticities of the general Sales tax and the entertainment tax
are greater than unity. The performance of the motor spirit tax
and the motor vehicles, passengers and goods taxes has not been
as good. In fact, the elasticity of the latter group is less
than unity in as many as 9 out of the 16 States; and in the case
of the former, elasticity is less than unity in 3 out of the
10 States for which computations have been made, and in 2 others
it is negative. As regards the performance of particular States,
in West Bengal and Jammu & Kashmir three of the four taxes
studied have proved to be inelastic though in the fourth case
(motor vehicles and passenger and goods in the former and
entertainment tax in the latter) the elasticity coefficient is
significantly higher than the average of all the States taken
together. In the case of Kerala and Madhya Pradesh two of the
three taxes studied have inelastic systems, the exceptions
being the entertainment tax in Kerala and the general sales tax
in Madhya Pradesh. For two of the four taxes studied, elasti-
city is less than unity in Assam, Gujarat and Orissa. On the
other hand, all the 4 taxes are elastic in the case of Uttar
Pradesh, Punjab and Haryana and all the 3 studied in Bihar. Three
of the four taxes studied are elastic in Tamil Nadu and Maharashtra

and two of the three studied in Rajasthan, Karnataka and
Andhra Pradesh.

Some important questions suggested by our findings
are: First, why have the taxes on motor vehicles and on pass-
engers and goods proved to be income inelastic? Is it because
of the specific nature of the motor vehicles tax or is it due
to large-scale evasion? Second, what are the causes of low
elasticity in some States of taxes that have proved to be quite
elastic in other States? Lastly, in a case like West Bengal,
there must be special reasons that have made for the inelasticity
of most of the indirect taxes considered. These and other
questions could be studied in detail if the States could gather
and preserve adequate information on the nature of discretionary
tax changes and the yield thereof.

ANNEXURE I

Method of Adjustments for Discretionary changes
used in Relation to Planning Commission Data[1]

The period covered in the study is 1963-64 to 1974-75.
The data on the effect of discretionary changes are available
according to sub-periods: 1964-65 to 1968-69, 1969-70 to
1973-74 and 1974-75 to 1976-77 on different base levels of
taxation. We have to work out the hypothetical growth of the
cumulative yield due to discretionary changes in the terminal
year of one period over the years of the succeeding periods in
order to obtain the series of tax yield due to discretionary
changes with 1963-64 as the base year. If the cumulative yield
due to discretionary measures undertaken in different years
is deducted from the actual yield, the residual is the hypothe-
tical yield adjusted to the rates and exemptions structure of the
base year.

Symobolically,

T_i = Actual tax yield in year i

$D_i(J,M)$ = Effect of discretionary changes introduced
from year J to year M in year i

T_{ij} = Tax Revenue in year j and adjusted to the
structure of year i.

The method of derivation of the hypothetical tax series
is demonstrated in Table B. In column 1 yearly actual tax
yields for the period 1963-64 to 1975-76, i.e., T_i (i=0......12)
are given. In columns 5,4 and 3 respectively, changes introduced

---

1   This method has been used in the case of taxes on motor
    vehicles and on passengers and goods.

Table B

METHOD OF COMPUTING THE HYPOTHETICAL TAX YIELD

Actual tax yield	Tax yield adjusted to given base year	Cumulative Effect of Discretionary changes beginning year –			Hypothetical tax yield adjusted to the structure of year 0
		Year 11	Year 6	Year 1	
1	2	3	4	5	6
T_0					$T_{0,0}=T_0$
T_1				$D_1(1,1)$	$T_{0,1}=T_1-D_1(1,1)$
T_2				$D_2(1,2)$	$T_{0,2}=T_2-D_2(1,2)$
T_3				$D_3(1,3)$	$T_{0,3}=T_3-D_3(1,3)$
T_4				$D_4(1,4)$	$T_{0,4}=T_4-D_4(1,4)$
T_5				$D_5(1,5)$	$T_{0,5}=T_5-D_5(1,5)$
T_6	$T_{5,6}=T_6-D_6(6,6)$		$D_6(6,6)$	$D_6(1,5)=D_5(1,5).\dfrac{T_{5,6}}{T_5}$	$T_{0,6}=T_{5,6}-D_6(1,5)$
T_7	$T_{5,7}=T_7-D_7(6,7)$		$D_7(6,7)$	$D_7(1,5)=D_6(1,5).\dfrac{T_{5,7}}{T_6}$	$T_{0,7}=T_{5,7}-D_7(1,5)$
T_8	$T_{5,8}=T_8-D_8(6,8)$		$D_8(6,8)$	$D_8(1,5)=D_7(1,5).\dfrac{T_{5,8}}{T_7}$	$T_{0,8}=T_{5,8}-D_8(1,5)$
T_9	$T_{5,9}=T_9-D_9(6,9)$		$D_9(6,9)$	$D_9(1,5)=D_8(1,5).\dfrac{T_{5,9}}{T_8}$	$T_{0,9}=T_{5,9}-D_9(1,5)$
T_{10}	$T_{5,10}=T_{10}-D_{10}(6,10)$		$D_{10}(6,10)$	$D_{10}(1,5)=D_9(1,5).\dfrac{T_{5,10}}{T_9}$	$T_{0,10}=T_{5,10}-D_{10}(1,5)$
T_{11}	$T_{10,11}=T_{11}-D_{11}(11,11)$	$D_{11}(11,11)$	$D_{11}(6,10)=D_{10}(6,10).\dfrac{T_{10,11}}{T_{10}}$	$D_{11}(1,5)=D_{10}(1,5).\dfrac{T_{10,11}}{T_{10}}$	$T_{0,11}=T_{10,11}-D_{11}(1,5)-D_{11}(1,10)$
T_{12}	$T_{10,12}=T_{12}-D_{12}(11,12)$	$D_{12}(11,12)$	$D_{12}(6,10)=D_{11}(6,10).\dfrac{T_{10,12}}{T_{11}}$	$D_{12}(1,5)=D_{11}(1,5).\dfrac{T_{10,12}}{T_{11}}$	$T_{0,12}=T_{10,12}-D_{12}(1,5)-D_{12}(6,10)$

from year 1 to year 5 in year 5, from year 6 to year 10 in
year 10 and from 11 to year 12 in year 12 are given along with
the growth of cumulative yield due to discretionary measures,
i.e. D_i (J,M) where J is the first year and M is the last year
of the period. In column 2 the tax yields adjusted to the
given base structure, i.e., $T_{5,j}$ and $T_{10,j}$ are given. In
column 6 tax revenue in year j adjusted to the structure of
year 0(1963-64) is given.

The general formula for constructing the series of
hypothetical tax yield adjusted to the structure of year 0
can be given as below:

The total period beginning from year 0 to n can be
divided into m-sub-periods:

$$(1,M_1), (M_1 + 1, M_2) \ldots\ldots\ldots (M_{m-1} + 1, M_m)$$

Adjusted tax revenue for any year j $(T_{0,j})$ where the last
series for cumulative effects of discretionary changes starts
from year $(M_k + 1)$ with $j \geqslant (M_k + 1)$ can be derived by

$$T_{0,j} = T_j - D_j (1,M_1) - D_j (M_1+ 1, M_2)\ldots\ldots D_j (M_k+1,j)$$

ANNEXURE II

SOURCES OF DATA

Data on three items were needed for the study; State income, tax yield and yield due to additional tax measures. Various sources of data were examined to collect the necessary information.

The major sources of data on tax yield due to additional tax measures are the 'Forecast of Financial Resources' submitted by the State Governments to the Planning Commission and the 'Memoranda' submitted by the State Governments to the various Finance Commissions. The first document provides data on a cumulative basis relating to specified periods with different years as bases. Additional tax yield data are available for the period 1964-65 to 1968-69 with 1964-65 as the base, for the period 1969-70 to 1973-74 with 1969-70 as the base and for the period 1974-75 to 1976-77 with 1974-75 as the base. These forecasts, however, do not relate to all taxes and for all the years; hence some data gaps arise. These gaps were filled in through data from other sources, namely:

(i) Data provided by the States themselves on a cumulative basis for additional tax yield, period-wise as well as year-wise.

(ii) Explanatory memoranda to State budgets and budget speeches of Finance Ministers.

(iii) Studies on State Finances in the Reserve Bank of India Bulletins.

Tax yield data were mainly obtained from State budget documents. State income data were obtained from Central Statistical Organisation, who in turn gather these data from the Directorates of Economics and Statistics in the States.

Table I

Trends and Composition of Revenue from State Indirect Taxes (All States)

(1960-61 - 1974-75)

(in crores of rupees)

	General sales tax	Central sales tax	Sales tax on motor spirit	Purchase tax on sugarcane	State excise	Tax on motor vehicles	Tax on passengers & goods	Electricity duty	Entertainment tax	Other taxes & duties	Total taxes on commodities & services
1960-61	124.88[1/] (42.25)	–	11.41 (3.86)	4.43 (1.50)	53.68 (18.16)	35.06 (11.08)	4.51 (1.53)	13.26 (4.49)	13.35 (4.52)	34.99 (11.84)	295.57 (100.00)
1965-66	276.87[1/] (43.23)	–	23.59 (3.68)	10.65 (1.66)	95.46 (14.90)	73.23 (11.43)	28.29 (4.42)	37.56 (5.86)	29.52 (4.61)	65.35 (10.20)	640.52 (100.00)
1970-71	559.06 (43.86)	158.38 (12.43)	41.70 (3.27)	11.10 (0.87)	203.56 (15.97)	105.41 (8.27)	66.98 (5.26)	69.67 (5.47)	57.41 (4.50)	1.31 (0.10)	1274.58 (100.00)
1971-72	639.41 (41.01)	159.25 (10.21)	45.26 (2.90)	10.89 (0.70)	233.73 (14.99)	113.10 (7.25)	84.37 (5.41)	75.10 (4.82)	69.93 (4.49)	128.03 (8.21)	1559.07 (100.00)
1972-73	732.46 (40.58)	202.98 (11.24)	55.82 (3.09)	16.71 (0.93)	278.67 (15.44)	127.16 (7.04)	99.24 (5.50)	81.79 (4.53)	87.89 (4.87)	122.36 (6.78)	1805.08 (100.00)
1973-74	842.51 (40.01)	212.21 (10.08)	67.64 (3.21)	18.43 (0.88)	352.64 (16.75)	148.04 (7.03)	118.41 (5.62)	81.82 (3.89)	97.78 (4.64)	162.50 (7.72)	2105.58 (100.00)
1974-75	1165.79 (46.15)	300.77 (11.91)	88.51 (3.50)	30.30 (1.20)	386.36 (15.30)	185.54 (7.35)	138.93 (5.50)	91.30 (3.61)	117.75 (4.66)	20.62 (0.82)	2525.87 (100.00)

Notes: 1. Figures in brackets are percentages to totals.

2. Figures of 'other taxes and duties' are not comparable year to year due to change in classification from time to time.

1/ includes Central Sales tax.

REFERENCE BOOK.

Table II

Components of Sales Taxation

(in crores of rupees)

	General Sales Tax	Central Sales Tax	Sales Tax on Motor Spirit	Purchase Tax on Sugarcane	Total Sales Tax
1970-71	559.06 (72.58)	158.38 (20.56)	41.70 (5.42)	11.10 (1.44)	770.24 (100.00)
1971-72	639.41 (74.80)	159.25 (18.63)	45.26 (5.30)	10.89 (1.27)	854.81 (100.00)
1972-73	732.46 (72.67)	202.98 (20.14)	55.82 (5.53)	16.71 (1.66)	1007.97 (100.00)
1973-74	842.51 (73.85)	212.21 (18.60)	67.64 (5.93)	18.43 (1.62)	1140.79 (100.00)
1974-75	1165.79 (73.53)	300.77 (18.97)	88.51 (5.58)	30.30 (1.91)	1585.37 (100.00)

Note: Figures in brackets are percentages to totals.

Source: Same as for Table I.
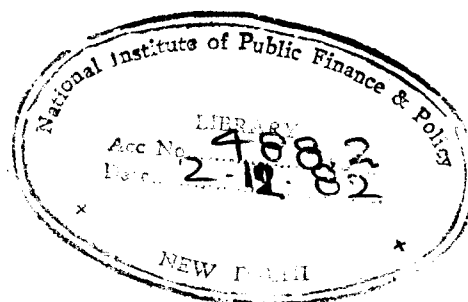
Table III

Buoyancy And Elasticity Of Selected Indirect Taxes (All States)
(1963-64 to 1974-75)

	Buoyancy	R^2	Elasticity	R^2
General sales tax (including sales tax on motor spirit)	1.43 (1.44)	0.97 (0.93)	1.15 (1.23)	0.99 (0.99)
Entertainment tax	1.43 (1.54)	0.96 (0.94)	1.04 (1.18)	0.96 (0.92)
Taxes on motor vehicles and on passengers and goods.**	1.27	0.98	1.05	0.97

Note: All t values are highly significant.

Relates to 14 major States, excluding Punjab,
Haryana and Himachal Pradesh.
Figures in Parenthesis relate to 16 States
including Punjab and Haryana for the period
1968-69 to 1975-76.

Relates to 18 States for the period 1963-64
to 1973-74.

Estimates of elasticity for General sales tax
and Entertainment tax are based on the net yields
derived from proportional adjustment method while
estimates of elasticity for taxes on motor vehicles
and on passengers and goods have been worked out
using net yields derived from a variant of proportional
adjustment method.

Table IV

Buoyancy And Elasticity of General Sales Tax For Individual States (1963-64 - 1975-76)

	Buoyancy	R^2	Elasticity	R^2
Andhra Pradesh	1.42*	0.97	1.26*	0.96
Assam	1.61	0.91	1.52	0.90
Bihar[1]/	1.16*	0.94	1.01*	0.94
Gujarat[1]/	1.48	0.94	1.08	0.93
Haryana[2]/	1.53	0.93	1.48	0.92
Jammu & Kashmir[1]/	1.86	0.92	0.97	0.80
Karnataka	1.82*	0.97	1.40*	0.97
Kerala[1]/	1.22*	0.98	0.99*	0.98
Madhya Pradesh	1.40*	0.94	1.12*	0.94
Maharashtra	1.40	0.99	1.18	0.99
Orissa	1.25	0.96	1.08	0.97
Punjab[2]/, [3]/	1.47	0.92	1.47	0.92
Rajasthan[1]/	1.38*	0.93	1.19*	0.93
Tamil Nadu	1.67	0.98	1.40	0.99
Uttar Pradesh	1.70	0.94	1.46	0.94
West Bengal	1.33	0.96	0.85	0.83

Note: All t values are highly significant.

    * Figures include General Sales tax, central sales tax and sales tax on motor spirit. In others, sales tax on motor spirit is not included.

[1]/ 1963-64 to 1974-75

[2]/ 1967-68 to 1974-75

[3]/ There were no discretionary changes.

The estimates of elasticity are based on the net yields derived from proportional adjustment method.

Table V

Buoyancy and Elasticity of Sales Tax on Motor Spirit
for Individual States (1963-64 to 1975-76)

State	Buoyancy	R^2	t	Elasticity	R^2	t
Andhra Pradesh[1]/	-	-	-	-	-	-
Assam	0.85	0.62	4.24	0.50	0.37	2.52
Bihar[1]/	-	-	-	-	-	-
Gujarat[2]/	1.62	0.91	10.32	0.29	0.41	2.61
Haryana[3]/	1.62	0.86	6.18	1.33	0.94	9.44
Jammu & Kashmir[2]/	-0.14	0.02	-0.47	-0.30	0.09	-1.02
Karnataka[1]/	-	-	-	-	-	-
Kerala[1]/	-	-	-	-	-	-
Madhya Pradesh[1]/	-	-	-	-	-	-
Maharashtra	1.23	0.98	20.89	1.08	0.98	23.23
Orissa	0.48	0.33	2.30	-0.95	0.57	-3.81
Punjab[3]/	1.84	0.90	7.43	1.50	0.86	6.16
Rajasthan[1]/	-	-	-	-	-	-
Tamil Nadu	1.77	0.98	21.95	1.16	0.91	10.77
Uttar Pradesh	1.63	0.95	14.33	1.21	0.91	10.36
West Bengal	1.29	0.94	13.46	0.26	0.11	1.16

Notes: 1/ Included with general sales tax
and central sales tax

2/ 1963-64 to 1974-75

3/ 1967-68 to 1974-75

The estimates of elasticity are based
on the net yields derived from proportional
adjustment method.

Table VI

Buoyancy And Elasticity Of Taxes On Motor Vehicles And On Passengers And Goods For Individual States (1963-64-1974-75)

	Buoyancy	R^2	Elasticity	R^2
Andhra Pradesh	1.34	0.92	0.99	0.91
Assam	0.50	0.80	0.25	0.56
Bihar	2.36	0.79	2.18	0.71
Gujarat[1]/	1.32	0.91	1.16	0.91
Haryana[2]/	1.86	0.91	1.32	0.93
Jammu & Kashmir[1]/	0.98*	0.74*	0.39*+	0.34*
	1.59**	0.85**		
Karnataka[3]/	1.00	0.95	0.92	0.94
Kerala[1]/	0.73	0.90	0.48	0.84
Madhya Pradesh[1]/	0.91	0.95	0.91	0.75
Maharashtra	1.31	0.99	1.04	0.99
Orissa[1]/	1.16	0.94	0.83	0.95
Punjab[2]/	1.69	0.94	1.16	0.89
Rajasthan	1.30	0.92	0.98	0.90
Tamil Nadu	0.97	0.96	0.68	0.91
Uttar Pradesh	1.38	0.96	1.02	0.94
West Bengal	1.63	0.52	1.53	0.48

Note: + In the case of motor vehicles tax t value not significant at 5 per cent probability level. All other t values are significant.

   * Tax on motor vehicles.

   ** Tax on passengers and goods.

   1/ 1963-64 to 1973-74

   2/ 1967-68 to 1973-74

   3/ 1964-65 to 1974-75.

   The estimates of elasticity are based on the net yield derived from a variant of proportional adjustment method.

Table VII

Buoyancy and Elasticity of Entertainment Tax for
Individual States - (1963-64 to 1975-76)

State	Buoyancy	R^2	t	Elasticity	R^2	
Andhra Pradesh	1.71	0.96	16.07	1.32	0.96	16.30
Assam	1.39	0.79	6.37	1.03	0.75	5.78
Bihar[1]/	1.26	0.71	4.92	1.18	0.69	4.70
Gujarat[1]/	1.54	0.91	9.89	0.47	0.41	2.66
Haryana[2]/	2.04	0.94	0.86	1.80	0.94	9.80
Jammu & Kashmir[1]/	1.70	0.78	5.38	1.25	0.06	4.26
Karnataka	2.07	0.99	29.21	1.88	0.99	32.62
Kerala[1]/, [3]/	1.11	0.81	6.43	1.11	0.81	6.43
Madhya Pradesh	1.30	0.93	12.01	0.68	0.77	6.09
Maharashtra	1.47	0.98	25.84	0.95	0.95	13.86
Orissa	1.38	0.92	11.60	1.22	0.93	12.31
Punjab[2]/	1.77	0.94	9.45	1.17	0.90	7.22
Rajasthan[1]/	1.41	0.91	9.76	1.02	0.86	7.83
Tamil Nadu	1.36	0.98	25.33	1.20	0.99	31.67
Uttar Pradesh	1.61	0.95	14.16	1.06	0.90	10.02
West Bengal	1.48	0.92	11.40	0.93	0.89	9.13

[1]/   1963-64 to 1974-75

[2]/   1967-68 to 1974-75

[3]/   There were no discretionary changes
of tax base and tax rate.

The estimates of elasticity are based on
the net yields derived from proportional
adjustment method.

SN/SP.