A MODEL FOR DESIGNING THE RATE STRUCTURE OF SALES TAX

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NO. 11/88 DECEMBER 1988

I am grateful to Dr. M.N. Murty for his comments on an earlier version of the paper.

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A common problem faced by tax administrators in the case of commodity taxation is to devise a method to determine the relative rates for different commodities. This paper attempts to examine this issue with respect to sales taxation. The paper comprises three sections: The first briefly describes the existing criteria suggested in the literature for designing rate structure and examines the applicability of these criteria in the Indian situation; the second section examines the rate structure of sales taxation in major Indian States; and the concluding section attempts to devise and suggest an operational technique for evolving a rate structure appropriate to the Indian context.

1. The Existing Criteria

Broadly, three criteria are suggested for evolving a tax structure: equity, administrative convenience and efficiency.

The first criterion is in fact based on the theory of ability-to-pay approach which argues that the burden of taxation should be shared among the members of the society so as to conform to the principle of justice and equity. Thus this criterion suggests high tax rate on commodities whose consumption is confined

mainly to rich people and a low rate on those commodities on which the poor people expend the major portion of their income. The second criterion is well known, without which any objective of a tax is difficult to achieve, thus making it a requisite characteristic for a sound tax structure. The last criterion indicates that the rate should be levied in such a way as to minimise the deadweight loss for a given tax revenue.

The first two criteria are clear-cut; it is, however, the last canon which requires some attention. This criterion of efficient tax structure is developed by advocating a uniform rate on all commodities so as to minimise the deadweight loss since the uniform rate does not distort the relative prices of commodities[1]. In recent literature on the optimal taxation theory, it has been shown that the uniform rate is not necessarily required from the efficiency point of view[2]. Atkinson and Stiglitz have set out that the uniform rate is a desirable feature for an efficient tax structure if all goods have the same demand elasticity for a given labour supply[3], and it is, in fact, a special case of optimal taxation which was exposed through Ramsey's work[4]. It was shown that deadweight loss would be minimum if the proportional reduction in the compensated demand as a result of the imposition of a tax is the same for all commodities. In other words, this rule says that tax should be higher on the demand-inelastic goods than on demand-elastic goods. It means that tax should be inversely proportional to the value of demand elasticities.[5] This principle is derived in terms of one class of consumers and ignores the effects of taxes on distributional equity. However, this problem is taken

care of by taking into account a social welfare function, which consists of individual utility functions. This formulation involving the social welfare function consisting of individual utility functions shows that for given demand elasticities, the rate on a good should be higher so that the higher is its share in the consumption expenditure of the rich. That is, the new formulation takes into account the equity aspect of taxes as well.

In developing countries, which are generally lacking in a good data base, the estimation of optimal tax rates is a formidable problem. Moreover, in these countries, the redistributive role of taxes is more important than the objective of merely raising revenue.[6]

States do attempt to achieve the redistributive role of sales tax by introducing variation in the rates of tax. However, the existing differential rate structure does not appear to fulfil the very objective implicit in having gradation of rates due to lack of any rule for keeping the variation across commodities. This is taken up in the next section.

2. Rate Structure of Sales Tax in Some Indian States

Table 1 gives information on Sales tax rates on different commodities in all major States. Overall, States levy lower taxes on mass consumption goods than on luxury goods. For example, cereals and pulses are

taxed at not more than 4 per cent or are fully exempted from the tax in some States; non-hydrogenated edible oils are subject to rates ranging from 2 per cent to 6 per cent; fish is exempt from tax in most States and is taxed at the relatively low rate of 4 and 6 per cent in Orissa and Madhya Pradesh respectively. In contrast, the highest rates broadly cover all luxury goods, varying from 10 per cent (Punjab) to 20 per cent (Karnataka)[7]. Besides, most States levy a very high rate on liquor, such as 25 per cent in Maharashtra and 55 per cent in Kerala.

Between the lowest and the highest rates, there exists a wide range of various rates. For instance, Andhra Pradesh imposes 13 rates varying from 1 to 18 per cent; Bihar has 14 rates varying between 2 and 16 per cent; West Bengal levies 15 rates, varying from 1 per cent to 20 per cent, Tamil Nadu has 14 rates, varying from 1 per cent to 15 per cent. The magnitude of different rates on commodities depends upon the degree of essentiality in the consumption basket of the public. For instance, toothpaste and powder are taxed at the rate of 8 per cent to 12 per cent, whereas aluminium furnitures, not an essential, are taxed at the rate of 12 to 15 per cent in various States.

It will be valid to ask why the highest range of tax in the States is from 10 to 20 per cent, for a given low rate of 4 per cent and less; in other words, on what grounds are the different magnitudes of rates between the

lowest and the highest rates, arrived at. Most States keep a gradation of rates with a difference of one per cent, such as, in Orissa iron and steel furnitures are taxed at the rate of 13 per cent and furniture other than iron and steel at the rate of 12 per cent. It is difficult to understand as to how States intend to achieve equity by imposing rates with a difference of just one per cent. That is, States hardly have any concept or principle for designing rate structure so as to exploit the redistributive role of sales tax. In the next section we attempt to suggest a normative approach which can be used as a thumb rule for devising the gradation of rates from the point of view of the equity objective.

3. Designing a Rate Structure: A Normative Approach

Let Y_i be the average expenditure of the i^{th} expenditure class; P_{ij} be the proportion of expenditure on j^{th} commodity by the people in the i^{th} expenditure class; t_j be the rate of commodity tax on j^{th} commodity and TR_i be the amount of a commodity tax revenue collected from the people in the i^{th} expenditure class.

Arranging expenditure classes by ascending order, we have $Y_1 < Y_2 < Y_3 < \ldots\ldots\ldots Y_n$.

Using the notations specified above, TR_i, the amount of a commodity tax collected from the people in

the i^{th} expenditure class, can be expressed through the following equation:

$$TR_i = t_1 p_{i1} Y_i + t_2 p_{i2} Y_i + \ldots\ldots\ldots + t_n p_{in} Y_i \qquad (1)$$

or

$$Y_i \sum_{j=1}^{n} t_j p_{ij} \qquad (1a)$$

Suppose government thinks that people in the Y_{i+1} expenditure class should pay tax (as a proportion of their total expenditure) α_1 times that of what people in Y_1 (the poorest people in the economy) pay: That is,

$$\begin{aligned} \frac{TR_2}{Y_2} &= \alpha_1 \frac{TR_1}{Y_1} \\ \frac{TR_3}{Y_3} &= \alpha_2 \frac{TR_1}{Y_1} \qquad (2) \\ &\vdots \qquad\qquad \vdots \\ \frac{TR_n}{Y_n} &= \alpha_{n-1} \frac{TR_1}{Y_1} \end{aligned}$$

where value of α_i is more than one, and $\alpha_1 < \alpha_2 < \ldots\ldots < \alpha_{n-1}$

Replacing value of TR_i in the above equations gives :

$$\begin{aligned}
\Sigma t_j p_{2j} &= \alpha_1 \Sigma \bar{t}_1 p_{1j} \\
\Sigma t_j p_{3j} &= \alpha_2 \Sigma \bar{t}_1 p_{1j} \\
&\vdots \qquad\qquad \vdots \\
\Sigma t_j p_{nj} &= \alpha_{n-1} \Sigma \bar{t}_1 p_{1j}
\end{aligned} \qquad (3)$$

For given values of $\bar{t}_1$ - tax rate on essential or any one of value of t_j - and of α_i, the values of t_{j+1} can be estimated. This can be shown as follows.

Equation 3 can be written thus:

$$\begin{aligned}
\bar{t}_1(p_{21} - \alpha_1 p_{11}) &= (\alpha_1 p_{12} - p_{22}) t_2 + (\alpha_1 p_{13} - p_{23}) t_3 + \ldots + (\alpha_1 p_{1n} - p_{2n}) t_n \\
\bar{t}_1(p_{31} - \alpha_2 p_{11}) &= (\alpha_2 p_{12} - p_{32}) t_2 + (\alpha_2 p_{13} - p_{33}) t_3 + \ldots + (\alpha_2 p_{1n} - p_{3n}) t_n \\
&\vdots \qquad\qquad\qquad\qquad\qquad\qquad \vdots \\
\bar{t}_1(p_{n1} - \alpha_{n-1} p_{11}) &= (\alpha_{n-1} p_{12} - p_{n2}) t_2 + (\alpha_{n-1} p_{13} - p_{n3}) t_3 + \ldots + (\alpha_{n-1} p_{1n} - p_{nn}) t_n
\end{aligned} \qquad (4)$$

or

$$\begin{bmatrix} t_2 \\ t_3 \\ \vdots \\ t_n \end{bmatrix} = \begin{bmatrix} (\alpha_1 p_{12} - p_{22}) & \cdots & (\alpha_1 p_{1n} - p_{2n}) \\ (\alpha_2 p_{12} - p_{32}) & \cdots & (\alpha_2 p_{1n} - p_{3n}) \\ \vdots & & \vdots \\ (\alpha_{n-1} p_{12} - p_{n2}) & \cdots & (\alpha_{n-1} p_{1n} - p_{nn}) \end{bmatrix}^{-1} \begin{bmatrix} (p_{21} - \alpha_1 p_{11}) \bar{t}_1 \\ (p_{31} - \alpha_2 p_{11}) \bar{t}_1 \\ \vdots \\ (p_{n1} - \alpha_{n-1} p_{11}) \bar{t}_1 \end{bmatrix} \qquad (4a)$$

Values of $t_2, t_3 \ldots\ldots\ldots t_n$ can be solved through the above system of equations for a given value of $\bar{t}_1$8.

An empirical exercise using the above formulation is carried out here to show the estimates of sales tax rate in two cases: first, rates are computed for two types of major commodities: essentials and non-essentials, and in the second case, rates are computed for three types of commodities - essential, semi-essential and luxury goods. The exercise is done with respect to Orissa which has 4 per cent rate of sales tax on various kinds of essentials[9].

First Case: In the case of two groups of commodities - essential and non-essential - and of two expenditure classes, equation 4a for the estimation of t_2 - tax rate on luxury goods - for a given value of $\bar{t}_1$ will reduce as shown below :

$$t_2 = \frac{(\alpha_1 P_{11} - P_{21})\bar{t}_1}{(P_{22} - \alpha_1 P_{12})} \qquad (5)$$

The value of the numerator in the above expression will be positive since the magnitude of P_{11} is expected to be greater than P_{21} and $\alpha_1 > 1$ by assumption. Thus, denominator in the above expression gives a condition which should be met for a determinate solution.

$$1 < \alpha_1 < \frac{P_{22}}{P_{12}} \qquad (5a)$$

Although the value of α_1 depends upon the government's willingness to introduce progressivity in tax structure to the extent desired, the value fixed

should be more than unity but less than P_{22}/P_{12} for a determinate solution of t_2.

The proportion of expenditure on cereals and pulses (considered essential commodities) and durable goods (considered non-essential) by the poor and rich people[10] were computed using NSSO consumption-expenditure data relating to the 38th Round held in 1983. There are 13 expenditure classes. We have assumed that people having monthly per capita expenditure below Rs. 200 are poor and people having monthly per capita expenditure above Rs. 200 are rich people. NSSO consumption-expenditure data are given for urban and rural areas separately. These data were worked out for the State as a whole, using sample population of rural and urban areas across expenditure classes as weights.

The results are set out in Table 2. For the determinate value of tax rates on non-essentials, the value of α_1 should be more than one but less than 3.33. The results shown in the table indicate that for a given rate of 4 per cent on cereals and pulses, the rate on durables should be 15, 17, 20 and 22 per-cent for 1.05, 1.10, 1.20 and 1.25 values of α_1 respectively. That is, in order to achieve 1.25 degree of progressivity in the tax structure, or to require rich people to pay 1.25 times more taxes as proportion of their total expenditure than what poor people pay, Orissa needs to tax durable at 22 per cent. It also indicates that

the same level of progressivity can be achieved for a given rate of 13 per cent on non-essentials (prevailing rate on most luxury goods in Orissa) by levying 2 per cent tax on cereals and pulses.

The following exercise attempts to show the computation of the rates in the case of three groups of commodities.

Second Case: In the case of three groups of commodities - essential, semi-essential and luxury goods - Equation 4 or 4a for the estimation of rates t_2 and t_3 will reduce as follows :

$$t_2 = \frac{E_1 \left[\alpha_1 (P_{12}P_{33} - P_{31}P_{13}) + \alpha_2 (P_{21}P_{13} - P_{11}P_{23}) + (P_{32}P_{21} - P_{22}P_{31})\right]}{\alpha_1 (P_{13}P_{32} - P_{33}P_{12}) + \alpha_2 (P_{23}P_{12} - P_{13}P_{22}) + (P_{33}P_{22} - P_{23}P_{32})} \quad (6a)$$

$$t_3 = \frac{E_1 \left[\alpha_1 (P_{12}P_{31} - P_{32}P_{11}) + \alpha_2 (P_{22}P_{11} - P_{12}P_{21}) + (P_{32}P_{21} - P_{22}P_{31})\right]}{\alpha_1 (P_{13}P_{32} - P_{33}P_{12}) + \alpha_2 (P_{23}P_{12} - P_{13}P_{22}) + (P_{33}P_{22} - P_{23}P_{32})} \quad (6b)$$

In this case essential and luxury goods are the same as were taken in the earlier two-commodity model. The group of semi-essential goods consists of edible oils, footwear, fuel, clothing, meat and eggs, etc. Regarding income classes, the class relating to poor people is the same as was taken in the earlier cases. The rich income class in the earlier case is divided into middle-income class and rich class in the present case. Middle-income class people are considered to be those having monthly per capita expenditure more than Rs. 200 but less than Rs. 300 and the rich people are

those having monthly per capita expenditure Rs. 300 and above.[11]

The restrictions on the values of α_i are already specified: $\alpha_i > 1$ and $\alpha_2 > \alpha_1$, but in the present case there are two more restrictions on the value of α_2 for a given value of α_1 so as to achieve $t_3 > t_2 > t_1$.

These are as follows:

$$\alpha_2 > \frac{\alpha_1[p_{11}(p_{33}+p_{32})-p_{31}(p_{13}+p_{12})]+p_{31}(p_{23}+p_{22})-p_{21}(p_{33}+p_{32})}{p_{11}(p_{23}+p_{22})-p_{21}(p_{13}+p_{12})} \quad (7a)$$

$$\alpha_2 < \frac{\alpha_1[p_{13}(p_{32}+p_{31})-p_{33}(p_{12}+p_{11})]+p_{33}(p_{22}+p_{21})-p_{23}(p_{32}+p_{31})}{p_{13}(p_{21}+p_{22})-p_{23}(p_{11}+p_{12})} \quad (7b)$$

According to the above restrictions, the value of α_2 for the given value of α_1 : 1.05, 1.10 and 1.15 should be between 1.37 and 1.67; 1.47 and 1.82, and 1.50 and 1.96 respectively.

Further, the condition $\alpha_2 > \alpha_1$ does not ensure a progressive rate structure since a progressive tax is characterised by increasing marginal rates. That is, this assumes:

$$\frac{TR_2}{Y_2} = a_1 \frac{TR_1}{Y_1}; \quad \frac{TR_3}{Y_3} = a_2 \frac{TR_2}{Y_2}; \ldots; \frac{TR_n}{Y_n} = a_{n-1} \frac{TR_{n-1}}{Y_{n-1}} \quad (8)$$

where $a_1 < a_2 < \ldots < a_{n-1}$. This pattern of a_i will guarantee a progressive tax structure.

Equation 2 does not fundamentally differ from the above equation. The relationship between a_i and α_i can be shown as follows :

$$\alpha_1 = a_1 \; ; \; \alpha_2 = a_1 a_2 ; \; \ldots \; ; \; \alpha_{n-1} = a_1 a_1 \ldots a_{n-1}$$

This relationship shows that the following conditions relating to the values of α_i are required to have a progressive commodity tax structure:

$$\alpha_2 > \alpha_1 a_1 \; ; \; \alpha_3 > \alpha_2 a_2 \; ; \; \ldots \; ; \; \alpha_{n-1} > \alpha_{n-2} a_{n-2}$$

The results are presented in Table 4. The table indicates the magnitudes of t_2 and t_3 for the different combinations of the values of α_1 and α_2 as well as those of a_2. For example, the results indicate that for given values of $\alpha_1 = 1.05$ and $\alpha_2 = 1.50$, the estimated rates for semi-essential (t_2) and luxury goods (t_3) are 11 per cent and 24 per cent respectively. This approach also suggests, if any one of these rates is raised, how other rates are adjusted to achieve the desired degree of progressivity in the tax structure.

The computation of rates with this approach is very simple. Basic data relating to consumption expenditure are available for each State separately. However, a problem arises in grouping of commodities. The grouping

should be based on price and income elasticities of the market demand for goods. The computation of elasticities is not a simple task. Similar problem arises in arriving at different expenditure classes. However, a small number of groups of commodities and of expenditure classes, such as two or three, can be made on the basis of value judgement. In spite of these problems this technique may be considered to be useful to sales tax administrators in providing at least a simple formula for designing a rational rate structure of sales tax.

NOTES AND REFERENCES

1. Hicks, U. (1971). Public Finance, Cambridge, University Press, and Hymon, David N. (1973) The Economics of Governmental Activity, Rhinehart & Winston.

2. Sandmo, A. (1976). "Optimal Taxation; An Introduction to the Literature", Journal of Public Economics 6, pp. 37-54.

3. Atkinson, A.B. and J.E. Stiglitz (1980). Lectures on Public Economics, pp. 366-393.

4. Ramsay, F.P. (1927). "A Contribution to the Theory of Taxation", Economic Journal, pp. 47-61.

5. This result is derived having assumed no-income effect, and cross-elasticities of demand as zero.

6. A study using the Indian budget has shown that Ramsayian-based tax rates fail to accomplish the redistrivutive role of taxes. See: R. Ray "On setting Indirect Taxes in India using the Ramsay Approach: Evidence from Household Budget Data", Journal of Quantitative Economics, 2, p. 261.

7. Liquor is excluded for specifying the highest and lowest rates since the rate on liquor depends on prohibition policy and rate of excise duty in the States.

8. The reason for estimating the rates of t_2, t_3... t_n with respect to a given rate of t_1 - the rate on essentials - is this: the rate of sales tax on essentials, such as cereals and pulses, cannot exceed the limit specified through Union legislation. At present the limit is 4 per cent.

9. There is no specific reason for deriving the rates of sales tax for Orissa only except that data for this State were readily available.

10. The classification is made on the basis of the poverty line in India.

11. The reason for equating the expenditure class of Rs. 300 and above with high income class is a substantial change in the pattern of expenditure of the people in this expenditure class as compared to that in the preceding expenditure classes.

TABLE 1

RATES OF GENERAL SALES TAX IN STATES

SL.	Commodity	AP	ASM	BHR	GUJ	KAR	KER	MP	MAH	ORS	PUN	TN	UP	WB	HYN
1.	Cereals	2FS	E	4FS	E	2FS	4FS	3FS	E	4LS	4LS	1FS	4FP	E	4LS
2.	Paddy	4FP	2LP	4FS	E	2FS	4FS	2.5LS	E	4FP	4LP	1FS	4FP	E	4LS
3.	Atta, Maida and Suji	1FS	E	4FS	E	3FS	4FS	3FS	E	4FS	4LS	2FS	4FS	E	4FS
4.	Pulses	4FS	E	4FS	E	2FS	4FS	2FS	E	4LS	4LS	4FS	4FP	E	4LS
5.	Non-hydrogenated oil	8FS	7FS	9FS	-	4FS	6FS	3FS	8	8FS	7FS	8FS	4FS	8LS	8FS
6.	Rice	4FS	-	4FS	E	2FS	E	3FS	E	8FS	4LP	1FS	4FP	1	4LS
7.	Meat & fish	E	E	E	E	E	10FS	6FS	E	4P	E		E	E	E
8.	Gur	7VAS	E	6FP	E	3MP	8FS	3FS	E	4FS	7LS	8FS	8FP	E	4FS
9.	Tea leaf	6FS	E	9FS	10FS	13FS	5FS	10FS	6	8FS	7FS	6FS	8FS	8	8LS
10.	Coffee	6FS	6LS	9FS	10FS	13FS	6FP	10FS	6	8FS	7LS	6FS	8FS	15FS	8LS
11.	Spices	5FS	6LS	9FS	6FS	5FS	6FS	10FS	6FS	8LS	7LS	8FS	8FS	11FS	8LS
12.	Cooked food	5FS	6LS	6LS	10FS	8FS	E	3LS	8FS	4LS	E	10FS	5LS	E	8LS
13.	Milk food	4FS	7FS	8FS	E	8FS	8FS	12FS	4FS	8FS	4LS	4FS	6FS	7FS	8LS
14.	Fire wood	3FS	E	7LS	E	6FS	5	3FS	E	E	E	-	4FS	8	8LS
15.	Coal & coke	4FS	4FS	4FS	4FS	4FS	4FS	4FS	4FS	4FS	-	3FS	4FS	E	4FS
16.	Kerosene superfine	4FS	2FS	6FS	3FS	5FS	4FS	10FS	E	8LS	7FS	25FS	8FS	5FS	8LS
17.	Kerosene inferior	4FS	E	5FS	3FS	5FS	4FS	-	E	E	-	-	8FS	E	-
18.	Cooking gas	10FS	7FS	8LS	12FS	15FS	15FS	-	4FS	6FS	7FS	8FS	8FS	15FS	8LS

19. Charcoal	3FS	6LS	NIL	E	6FS	8FS	3FS	E	8LS	7LS	E	4LS	E	8LS
20. Furnace oil	4FS	E	8LS	7FS	13FS	5FS	3FS	4FS	8LS	7FS	–	6FS	E	8LS
21. Match boxes	5FS	7FS	9FS	E	–	3FS	3FS	2FS	E	7FS	4FS	8FS	7FS	8FS
22. Tooth paste	10ES	7FS	8FS	54DS	7MS	8FS	12FS	8FS	6FS	8FS	8FS	8FS	8FS	8FS
23. Washing soap	6FS	7FS	7FS	6FS	8FS	5FS	12FS	6FS	6FS	7LS	6FS	6FS	8FS	8FS
24. Toilet soap	6FS	3FS	8LS	6FS	13FS	5FS	12FS	6FS	8FS	10LS	6FS	8FS	8FS	8FS
25 Hair oil	10FS	7FS	8LS	94DS	13FS	10FS	12FS	15FS	3LS	10LS	12FS	12FS	8FS	8LS
26. Cosmetics	10FS	13FS	15FS	124DS	13FS	10FS	16FS	15FS	13FS	10LS	12FS	12FS	15FS	12FS
27. Medicines	5FS	4FS	6FS	4FS	10FS	6FS	3FS	4FS	8FS	7FS	8FS	6FS	4FS	8LS
28. Cotton Hosiery goods	4FS	6FS	E	4FS	2FS	5FS	6FS	4FS	4LS	2LS	5FS	4FS	E	8FS
29. Readymade garments	4FS	3LS	7LS	4FS	4FS	5FS	6FS	4FS	8LS	2LS	–	E/4FS	2LS	8LS
30. Footwear	7FS	7FS	8LS	10F	10FS	7FS	12FS	15FS	10LS	7LS	–	8LS	8LS	8FS
31. Cycle & accessories	6FS	4FS	8FS	6FS	3FS	6FS	10FS	8FS	6FS	5LS	6FS	8FS	4LS	8FS
32. Aerated waters	7FS	6LS	11FS	12FS	103DS	10FS	12FS	12FS	10FS	10FS	5FS	12FS	15FS	8FS
33. Cement	10FS	10FS	11FS	12FS	10FS	10FS	12FS	10FS	8LS	7FS	12FS	10FS	–	12FS
34. Indian made foreign liquor	25÷5*	40FS	25FS	45FS	45FS	55FS	50FS	25FS	10FS	10FS	25÷5*	26FS	E	20FS

35.	Bullion & Species	2FS	6LS	-	1,1DS	7MS	2FS	2FS	2FS	7LS	2LS	2FS	2FP	1	2.5LS
36,	Articles of gold and silver	2FS	6LS	4LS	1,1DS	7MS	5FS	4FS	2FS	4LS	7LS	-	6LS	3	4LS
37.	Ivory Products	8FS	12FS	13LS	12,4DS	8FS	10FS	16FS	25FS	13LS	7LS	10FS	8FS	-	8LS
38.	Marble & its products	10FS	6LS	8LS	15FS	15FS	15FS	16FS	15FS	12LS	7LS	15FS	6LS	15FS	8LS
39.	Articles of stainless steel	6FS	12FS	8LS	6FS	10FS	10FS	12FS	12FS	13FS	10LS	-	12FS	-	12LS
40.	Ladies handbags	6FS	7FS	10FS	8,4DS	7MS	10FS	12FS	15FS	13LS	7LS	4LS	8FS	-	8LS
41.	Leather goods	7FS	6LS	8LS	8,4DS	13FS	7FS	12FS	10FS	10LS	10LS	8FS	8FS	-	12LS
42.	Suit cases & brief cases.	6FS	6LS	10LS	4DS	15FS	10FS	12FS	15FS	8LS	7LS	-	12FS	15FS	8LS
43.	Domestic electrical appliances	10FS	12FS	12FS	15FS	10FS	10FS+	12FS	15FS	10FS	10LS	12FS	8FS	15FS	12FS
44.	Clocks & time pieces	10FS	13FS	13FS	10FS	12FS	15FS	16FS	12FS	13FS	10FS	15FS	12FS	11LS	12FS
45.	Refrigerators	10FS	13FS	16FS	10FS	15FS	15FS	16FS	15FS	13FS	10FS	15FS	12FS	11LS	10FS
46.	Wooden furniture	10FS	12FS	12LS	10FS	13FS	7FS	14FS	12FS	12LS	10LS	6FS	12FS	8LS	8LS
47.	Iron & Steel safes, almirahs & furniture	10FS	13FS	13FS	8,4DS	15FS	12FS	14FS	15FS	13FS	10LS	15FS	12FS	15FS	12LS

48.	Sound transmitting equipment	10FS	12FS	10FS	15FS	15FS	15FS	16FS	15FS	13LS	10LS	15FS	12FS	11LS	12LS
49.	Motor cycles scooters	10FS	12FS	9FS	10FS	20FS	15FS	16FS	12FS	10FS	10FS	12FS	10LS	6FS	10LS
50.	Heavy motor vehicles	10FS	7FS	13FS	10FS	20FS	15FS	16FS	12FS	10FS	10FS	9FS	10LS	6FS	10FS
51.	Motor cars	10FS	7FS	9FS	10FS	20FS	15FS	16FS	12FS	FS	10FS	9FS	10LS	8FS	610FS
52.	Tyres & Tubes	10FS	12FS	9FS	10FS	10FS	15FS	16FS	12FS	10FS	10FS	9FS	10FS	11FS	10FS
53.	Motor parts	10FS	12FS	10FS	12FS	13FS	15FS	16FS	12FS	10FS	10LS	–	10FS	8LS	10FS
54.	Tabulating & calculating machines	10FS	12FS	14FS	15FS	20FS	15FS	16FS	15FS	13FS	10FS	15FS	12FS	11LS	12LS
55.	Binoculars telescopes	10FS	12FS	15FS	12FS	13FS	15FS	16FS	12FS	13FS	10LS	15FS	12FS	15FS	12LS
56.	Sewing machine	6FS	7FS	8FS	4FS	7FP	6FS	12FS	10FS	12LS	7LS	5FS	8FS	–	8LS
57.	Vacuum flask	9FS	12FS	13FS	10FS	10FS	10FS	6FS	12ES	13LS	10ES	10FS	12FS	15FS	12LS
58.	Crockery & cutlery	6FS	7FS	8FS	124DS	10FS	10FS	14FS	12FS	12LS	10LS	–	10FS	15FS	12FS
59.	Arms & ammunitions	10FS	13FS	16FS	12FS	15FS	20FS	16FS	12FS	13FS	10FS	15FS	14FS	11LS	12FS
60.	Cigaretto cases	10FS	12FS	15FS	12FS	15FS	15FS	16FS	12FS	13LS	10LS	15FS	12FS	15FS	12LS
61.	Precious stone	7FS	7FS	10FS	E	15FS	10FS	16FS	12LS	13LS	7LS	10FS	10FS	11LS	8LS
62.	Plastic goods	6FS	7FS	7FS	10FS	10FS	8FS	12FS	12FS	8LS	10LS	10FS	8FS	11LS	12LS
63.	Cotton waste	5FS	6LS	–	4FS	8FS	6FS	–	4FS	8LS	2LS	4FS	4FS	E	4LS
64.	Raw wool,yarn	4FS	6LS	–	4LS	5LP	CFS	E	4FS	10LS	2LS	2FS	4LS	8LS	2LS

65.	Staple yarn	5FS	6LS	E	6.5FS	4FS	4FS	3FS	4FS	6LS	2LS	4FS	E	E	2LS
66.	Sewing thread	5FS	3LS	2LS	4FS	5FS	3FS	3FS	4FS	E	2LS	3FS	2FS	8LS	2LS
67.	Chemical fertiliser	3FS	E	5FS	4FS	3FS	2FS	3FS	E	4FS	E	3.5FS	5FS	4FS	E
68.	Posticides	4FS	7FS	4FS	84DS	3FS	4FS	3FS	8FS	E	2LS	3.5FS	-	4FS	2LS
69	Timber	7FS	7FS	8FS	10FS	13FS	-	10FS	8FS	8LS	7LS	8FS	12FS	8LS	8LS
70.	Paints & varnishes	9FS	7FS	12FS	12FS	15FS	10FS	16FS	12FS	12LS	7LS	10FS	-	11LS	8LS
71.	Caustic Soda	5FS	7FS	7FS	6FS	7MP	8FS	12FS	4FS	8LS	7LS	6FS	6FS	8LS	8LS
72.	Machinery of all kinds	7FS	7FS	8FS	5FS	13FS	8FS	12FS	10FS	12LS	7LS	8FS	5FS	8LS	8LS
73.	Petrol	18FS	10FS	9FS	15FS	20FS	15FS	16FS	15FS	10FS	E	14FS	-	12FS	6FS
74.	Diesel oil	12FS	11FS	14FS	15FS	20FS	20FS	14FS	12FS	13FS	7FS	14FS	-	12FS	6FS
75.	Photographic cameras	10FS	12FS	13FS	15FS	8FS	15FS	16FS	15FS	13LS	10LS	15FS	12FS	11LS	12LS
76.	Hosiery goods	10FS	6FS	E	14DS	8FS	8FS	6FS	4FS	4E	2LS	8FS	-	1LS	8LS
77.	Molasses	25FS	E	13FS	-	40FS		25FS	-	7FS	7FS	25FS	12FS	8LS	8FS
78.	Electrical motors/oil engines	7FS	7FS	9FS	84DS	15FS	15FS	12FS	8FS	8FS	7LS	8FS	12FS	8LS	8FS
79.	Furniture other than iron & steel	9FS	7FS	12FS	8FS	13FS	7FS	10FS	12FS	12FS	8LS	10FS	12FS	8FS	10FS
80.	General rate	5MS	6LS	8FS	84DS	7MS	5MS	12FS	10FS	8LS	7LS	5MS	8FS	8LS	8LS

Notes :

E = Exempted goods

FP = First Purchase point

LP = Last Purchase point

FS = First Sale point

LS = Last Sale point

DS = Double point sales tax (first and last)

VAS = Value added sales tax

* = 25% at the stages before the last stage and 5% at the last stage. The taxable turnover before the last sale is derived by deducting the turnover on which the tax is already paid.

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TABLE 2

Estimated Rates in the Case of Two Commodities and Two Expenditure Classes

Items	Proportion of expenditure among people		Value of t_2 with different values of a_1 when t_1 = 4 per cent					
	Poor	Rich	1.02	1.05	1.10	1.15	1.20	1.25
Cereals and pulses	.6152	.2385	4	4	4	4	4	4
Durables including beverage and refreshment	.0469	.1564	14	15	17	18	20	22

TABLE 3

Proportion of Expenditure on Three Types of Commodities in Three Income Classes

Commodities	Poor	Middle	Rich
Essentials	.6152 (p_{11})	.2914 (p_{21})	.1818 (p_{30})
Semi-essentials	.2536 (P_{12})	.2779 (p_{22})	.3036 (p_{32})
Luxury	.0397 (p_{13})	.962 (p_{23})	.2210 (p_{33})

TABLE 4

Estimated Rates in the Case of Three Commodities and Three Expenditure Classes

(Per cent)

Value of			Rates*		
$\alpha_2 = \frac{\alpha_2}{\alpha_1}$	$\alpha_1 = \alpha_1$	α_2	t_1	t_2	t_3
1.33	1.05	1.40 (1.37 min)**	4	18	22
1.38	1.05	1.45	4	14	23
1.43	1.05	1.50	4	11	24
1.48	1.05	1.55	4	8	24
1.52	1.05	1.60 (1.67 max)	4	6	25
1.36	1.10	1.50 (1.47 min)	4	24	30
1.41	1.10	1.55	4	18	29
1.45	1.10	1.60	4	14	29
1.55	1.10	1.65 (1.82 max)	4	11	29
1.39	1.15	1.60 (1.56 min)	4	33	43
1.43	1.15	1.65	4	24	39
1.48	1.15	1.70	4	18	38
1.52	1.15	1.75 (1.96 max)	4	14	36

Notes: * $\bar{t}_1$ implies rate of t_1 is given; and

** Figures in parentheses indicate the minimum and maximum values of α_2 for a given value of α_1 in order to have $t_3 > t_2 > \bar{t}_1$ [2]

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