



# **REPORT**

**OF**

**THE STUDY GROUP ON PARAMETERS**

**OF**

**CONSUMPTION SUB-MODEL**

**PERSPECTIVE PLANNING DIVISION  
GOVERNMENT OF INDIA  
PLANNING COMMISSION  
NEW DELHI  
MARCH 1991**



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**CHAPTER 1**

**INTRODUCTION**

The Planning Commission decided in October, 1986, to constitute a Study Group for identifying the desirable improvements in the data-base of the consumption sub-model, as well as improvements and updating of crucial parameters. Substantial work had earlier been done towards formulation of a private consumption model by the 'Task Force on Projections of Minimum Needs and effective Consumption Demands' (Jan. 1979) and subsequently by the 'Study Group on Concepts and Measurement of Poverty Line' (Nov. 1984).

1.1 The terms of reference of the Study Group were as follows :—

“to re-estimate the parameters of the consumption sub-model and to review the model for possible improvement”.

The following was the composition of the Study Group :

1. Dr. S. R. Hashim —(Chairman)  
Adviser (PP)  
Planning Commission  
New Delhi.
2. Dr. R. Radhakrishna —(Member)  
Director, Centre for  
Economic & Social Studies,  
Hyderabad.
3. Dr. S. N. Ray —(Member)  
Chief Executive Officer,  
NSSO,  
Central Statistical Organisation,  
Sardar Patel Bhavan,  
New Delhi.
4. Dr. Padam Singh —(Member)  
Director, Institute for Research in  
Medical Statistics (ICMR)  
Ansari Nagar,  
New Delhi-110029.

5. Dr. (Mrs.) Savita Sharma  
Senior Research Officer  
P.P. Division,  
Planning Commission,  
New Delhi.

—(Member-Secretary)

1.2 The Study Group was ably assisted by the officers and staff of the Perspective Planning Division of Planning Commission. Special mention must be made of Shri J. Satyanarayana, Deputy Adviser and Shri Rajeev Malhotra for valuable help in the preparation of this report. The estimation of Linear Expenditure System was carried out by Dr. R. Radhakrishna and C. Ravi at the Centre for Economic and Social Studies, Hyderabad. Dr. Padam Singh supervised the estimation of consumer demand functions with the help of the data made available by NSSO, Department of Statistics.

## CHAPTER 2

### METHODOLOGICAL FRAME-WORK

2.1 At present private consumption is estimated for 71 commodity sectors and by four income/consumption groups. The data base of estimated parameters of the model extends from 1960-61 to 1973-74. These parameters are used after adjusting predictions of the model for the base year of the Plan. As the estimates are econometric, the farther we go from the estimation period, the prediction errors tend to become larger. Moreover, besides other variables, significant changes have occurred since 1977-78 in per capita income, income distribution and consumption baskets of people. Some more rounds of consumption expenditure surveys (by NSSO) have become available now.\* It was, therefore, thought to be desirable that for the VIII Plan exercises, the parameters of the consumption sub-model were re-estimated and in the process, the model was reviewed for possible improvements.

2.2 The first meeting of the Study Group was held on November 8th, 1986 at Planning Commission, New Delhi. Based on the consensus of opinion emerging out of the deliberations, the following decisions were taken :—

- (i) The existing model was to be validated for the years 1977-78 and 1983-84 by running the model at 1973 prices and comparing the results with the actuals as reported by NSSO for the said years.
- (ii) For the re-estimation of the parameters it was decided to utilize, 24th to 28th, 32nd and 38th rounds of the National Sample Survey Organisation. It was agreed that NSSO would provide the basic data in a form desired by the Study Group. The level of disaggregation was to be decided as per the availability of data.
- (iii) It was decided that using a time series of cross section data on private consumption expenditure, the parameters of the Linear Expenditure System (LES)/Demand functions should be estimated separately for the rural and urban areas and for the following categories of people :
  - (a) Very poor
  - (b) Moderately poor
  - (c) Non-poor middle, and
  - (d) Non-poor higher

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\*42nd (1986-87) and 43rd (1987-88) rounds of NSSO on private consumption expenditure could not be utilised in this exercise because they were released recently.

This would introduce a further level of disaggregation in the existing sub-model. It would require appropriate cut-offs to be worked out by dividing poor into very poor and poor and non-poor into rich and very rich.

- (iv) Dr. R. Radhakrishna was to prepare a review paper on the relevant work done in the field relating to estimation of private consumption and its possible use in the modification of the existing model.

Following additional points also emerged in the course of discussions :—

- (i) For estimation of LES parameters it was decided to use the movement of wholesale prices alongwith the actual weights as revealed by NSSO for different items. It was also decided to consider the implicit prices as observed by NSSO and agricultural labour prices as maintained by Labour Ministry for this purpose.
- (ii) For estimation of the demand functions/Engel curves, NSSO Computer Centre, Department of Statistics was to provide the necessary data. This data was to be processed in the Planning Commission, to arrive at the estimates of required parameters.
- (iii) For estimation of poverty, the poverty line as defined by the 'Task Force on Minimum Needs and effective Consumption Demand' was to continue as the bench mark for the VIII Plan. However, for the updating of the poverty line, an index was to be worked out by utilising the consumption basket of the persons near the poverty line (30th to 50th percentile for rural areas and 20th to 40th percentile for urban areas) alongwith the appropriate prices. For the adjustments that are required to be made in the NSSO distribution so as to match it with the C.S.O. level of total private consumption, item specific information on the extent of under/over estimation was to be used in preference to the existing method of prorata adjustment.

2.3 Dr. Radhakrishna circulated a paper (included here in Appendix), reviewing the current literature on the subject and outlined some improvements that are desired in the consumption sub-model. The extensive literature on the application of demand systems to Indian data suggests that there are no substantial differences in goodness of fit between alternative demand systems. It could be because the commodity grouping is broad and also price movements are mostly collinear. It is also worth pointing out that most of the non-additive models are found to violate some of the theoretical properties required of such models. It was thought that given the requirement of the planning model, the consumption sub-model should be able to handle a large number of commodity groups and should be easily estimable from the existing data. It should also reflect the effects of income redistribution and dual price policies resulting from alternative governmental policies. There was a need to re-estimate the parameters of LES and the demand functions using the latest data, since the existing consumption sub-model did not reflect the recent consumption behaviour as revealed by the comparison of model results and actuals for the years 1977-78 and 1983-84.

**In this context it would be useful to :—**

- (i) Utilize the LES and Almost Ideal Demand System (AIDS) for broad group of consumer expenditure and compare their performance.**
- (ii) Estimate sub-group models and enlarge the LES by employing hierarchic method.**
- (iii) Where ever data is not available for estimating the sub-groups model, one could use the procedure suggested by the previous task force for disaggregating the predicated group expenditure.**



## CHAPTER 3

# DEMAND PROJECTIONS MODEL

### *Introduction*

3.1 Within the framework delineated in the previous chapter, this chapter presents the methodology to estimate effective demand. We have looked at effective demand in two stages. In the first stage, using the Linear Expenditure System (LES), demand has been estimated for nine commodity groups. In the second stage, Engel/Demand curves have been fitted for selected commodities, using the latest available data. It is felt that since demand pattern has undergone significant changes it may not be proper to use the old parameters any more. Moreover estimates have been made for four expenditure strata: very poor, moderately poor, non-poor middle and non-poor higher of rural and urban areas. The purpose of the estimates is to aid the planning model in making demand projections for base and terminal years of the VIII Five Year plan. The estimates permit analysis of alternative scenarios based on different assumption, concerning population growth, changes in income distribution and can incorporate the effects of prices on demand projections.

### *Linear Expenditure System*

3.2 LES is a complete demand system which is derived from the additive utility function. It is usually specified as

$$p_i q_i = c_i p_i + b_i \left( M - \sum_{k=1}^n c_k p_k \right) \text{----- (1)}$$

$i=1, \dots, n$

$$\sum_{i=1}^n b_i = 1$$

where  $q_i$  represents quantity consumed of the  $i$ th commodity;  $p_i$  is the price of  $i$ th commodity;  $M$  is total expenditure i.e.

$$M = \sum_{k=1}^n p_k q_k$$

$b$  and  $c$  are the parameters of the system. The  $b$ 's are marginal budget shares and  $c$ 's are sometimes interpreted as committed quantities. This interpretation is only suggestive and fails when any  $c_i$  is negative. A negative  $c_i$  is however not inconsistent with theory.

The LES can be derived from an additive utility function:

$$U(q) = \sum_{i=1}^n b_i \log(q_i - c_i) \text{ ----- (2)}$$

Fulfilment of the second order condition of utility maximization requires that  $b_i > 0$  for all  $i$  i.e. no inferior goods and

$$M > \sum_{i=1}^n c_i p_i$$

Since LES can be derived from a utility function, it satisfies all the theoretical properties namely, adding up, homogeneity and symmetry of Slutsky substitution matrix.

For commodity  $i$ , expenditure elasticity  $\eta_{io}$  compensated own price elasticity  $\eta_{ii}$  and cross price elasticity with respect to  $j$ th price  $\eta_{ij}$  are given by

$$\eta_{io} = b_i / W_i ; \text{ where } W_i = p_i q_i / M \text{ ----- (3)}$$

$$\eta_{ii} = -1 + (1 - b_i) c_i / q_i \text{ ----- (4)}$$

$$\eta_{ij} = -b_i p_j c_j / p_i q_i \text{ ----- (5)}$$

3.3 LES is criticised on the ground that it gives rise to linear Engel curves and its underlying utility function is additive. The first limitation can be taken care of by using piece-wise LES (Radhakrishna and Murty 1980, Ahmed and Ludlow, 1988). Additive utility function besides not allowing inferior goods, has strong implications on price effects. Nevertheless, so long as commodity grouping is broad, additive utility specification may not restrict the usefulness of estimates. At a more disaggregative grouping of the commodities, one can use Nasse's extended version of LES.

#### Estimation of LES

3.4 By incorporating random disturbances in equation (1) LES can be specified as

$$p_{it} q_{it} = c_i p_{it} + b_i (M_t - \sum_k c_k p_{kt}) + e_{it} \text{ --- (6)}$$

-  $t = 1, \dots, m$

Such that

$$E(e) = 0$$

$$E(e e') = \Omega (+) 1$$

Since the adding up property implies that  $I\Omega = 0$ ,  $\Omega$  becomes singular and poses estimation problem. This can be overcome by deleting one equation from the system. Without loss of generality we can delete the last equation and formulate the likelihood function. Denoting  $i$ th truncated residuals as  $\bar{e}_t, \bar{b}$  and  $\bar{\Omega}$  for  $e_t, b$  and  $\Omega$ , respectively, the likelihood function in logarithmic form can be written as

$$\ln L = -\frac{1}{2} m(n-1) \ln 2 \prod - m/2 \ln (\det \bar{\Omega}) - \frac{1}{2} \sum_t (\bar{e}_t' \bar{\Omega}^{-1} \bar{e}_t) \dots (7)$$

The first order conditions of the maximum likelihood function entails non-linear equation in parameters and the estimates can be obtained only by applying iterative methods such as Gauss Newton, Newton Raphson methods. The solution vector does not yield the estimate for the last  $b$  i. e.  $b_n$ . However  $b_n$  can be obtained by using the relation.

$$\sum b_i = 1$$

The performance of the model can be judged by computing

$$R_i^2 = 1 - \frac{\sum e_{it}^2}{\sum_t (V_i - \bar{V}_i)^2} \dots (8)$$

where  $V_i$  is average expenditure of  $i$ th commodity. It can also be done by using theils' average information inaccuracy given by

$$II = \frac{1}{m} \sum_i \sum_t W_{it} \ln \hat{W}_{it} / W_{it} \dots (9)$$

**Consumer Demand Functions—Engel Curves**

3.5 The following demand functions/Engel curves have been fitted for each commodity/commodity groups :

- (i) Double Log (DL) :  $\text{Log } C_i = a + b \log C$
- (ii) Semi Log (SL) :  $C_i = a + b \log C$
- (iii) Log Log Inverse (LLI) :  $\text{Log } C_i = a + b \log C + d/C$
- (iv) Log Inverse (LI) :  $\text{Log } C_i = a + b/C$
- (v) Linear (L) :  $C_i = a + bC$
- (vi) Hyperbola (HYP) :  $C_i = a + b/C$
- (vii) Proportional (PRP) :  $c_i = bC$

where  $C_i$  is monthly per capita expenditure on the  $i$ th commodity; and  $C$  is total monthly per capita expenditure for all commodities. For each item the best fitting engel curve from among the listed functions is selected on the basis of goodness of fit as reflected by  $R^2$  or coefficient of determination corrected for the degrees of freedom.

The demand functions/Engel curves are used for projection purposes after taking into consideration their expected values under the assumption that monthly per capita total expenditure is log normally distributed.

## CHAPTER 4

### PARAMETER ESTIMATES

4.1 The population has been grouped into four categories on the basis of private consumption expenditure cut-off for rural and urban India as given in table 11. The expenditure classes below 75 per cent of the poverty line are considered as very poor; between 75 per cent of the poverty line and poverty line as moderately poor; between poverty line and 150 per cent of the poverty line as non-poor middle; and the remaining classes as non-poor higher. The cut-off points have been adjusted for inflation. It may be noted that each expenditure stratum contains more than one NSSO expenditure class.

4.2 LES has been estimated using Gauss Newton maximum likelihood procedure. A time series of cross section NSSO data for the rounds 24th (1969-70) through 28th (1973-74), 32nd (1977-78) and 38th (1983) have been used. Commodity group price indices with 1969-70 as base have been compiled from the Economic Advisor's monthly wholesale price indices, separate weights, based on the 32nd round consumer expenditure data, have been used for rural and urban areas. Table 17 and Table 18 give the commodity groups and weights respectively. The estimated parameters of LES along with the measures of goodness of fit are presented in Tables 1 and 2. It can be seen that LES provides a satisfactory description of consumer behaviour in India:  $R^2$  values are higher than 0.90 for 62 out of 72 estimates and lies between 0.85—0.90 for 7. Average information inaccuracy measures show that LES gives comparatively better fit for middle groups.

4.3 The marginal budget shares, i.e., the 'b' parameters are positive and hence possess expected signs. They exhibit substantial variations across expenditure groups. It can be seen that the marginal budget share of cereals declines from 0.43 to 0.03 in rural areas and from 0.37 to 0.01 in urban areas as one shifts from very poor to non-poor higher groups. A similar decline is also noticeable for fuel and light. In contrast, the marginal budget shares for clothing and other non-food commodities increase as one moves from very poor to non-poor higher group. For instance, the budget share of other non-food increases from 0.13 to 0.62 in rural areas and from 0.15 to 0.59 in urban areas. It would imply that income shifts in favour of poor expands the demand for cereals and reduces the demand for clothing and non-food items. It is worth observing that the estimates of 'b' parameters for the top groups of rural and urban areas are distinct. For instance the marginal budget share of milk and milk products increases and of edible oils; meat, egg and fish; sugar and gur; and other food remains constant as one shifts from very poor to non-poor middle groups and in contrast they all decline between non-poor middle and non-poor higher groups. Thus any change in distribution of income in one or the other direction will affect the demand projections.

4.4 Table 3 to 6 give the expenditure and uncompensated price elasticities at mean level for each of the expenditure strata. Expenditure elasticities vary significantly across expenditure

groups and reveal patterns similar to those of marginal budget shares. For food items and fuel and light, the expenditure elasticities generally decline with an increases in expenditure level and for other non-food items, as a group, it increases. Uncompensated price elasticities also exhibit variations across the expenditure strata and their numerical values decline with expenditure level. The cross price elasticity with respect to cereal price elasticities are negligible.

4.5 The demand functions/Engel curves have been estimated using the NSSO data on household consumption expenditure for the 38th round. The data relates to over 50 thousand households, about 3/4th from rural areas and about 1/4th from urban areas. For estimation purpose, this household level data has been used with multipliers to capture the effect of sampling designs. The estimated parameters of the fitted demand function/Engel curves along with the  $R^2$  values for various items and for various expenditure groups are given in tables 9 to 16. Since the number of observation on which these estimates are based is very large (usually in 4 digits),  $R^2$  values higher than 0.2 (approximately) are significant. Expenditure elasticities for these items as estimated from the fitted equations are summarised in tables 7 and 8.

4.6 It is observed that food accounts for about 65.6% of consumption expenditure in rural areas and 58.7% in urban areas. There are significant variations in the share of food for poor and non-poor. In rural areas the share of consumption expenditure going to food is 80% for very poor and only 60% for non-poor. While in the urban areas it is 75% for very poor but only 53% for non-poor. Other food accounts for about 24% of consumption expenditure in rural areas and 31% in urban areas. Clothing and footwear together account for about 5% of consumption expenditure. This share however varies widely among different groups.

## CHAPTER 5

### RECOMMENDATIONS OF THE STUDY GROUP

The present Study Group was set up to re-estimate the parameters of the consumption sub-model and to review the model for possible improvements. The Group has accordingly undertaken the work of re-estimation of parameters of consumption sub-model and has in the process introduced further categories of expenditure strata. The results are reported in the form of detailed tables. The group recommends that in working out the consumption projections for the plan henceforth, the new consumption parameters as brought out here only may be taken into consideration. The group makes some further recommendations and observations as follows :

- (1) It is suggested that in the subsequent rounds of NSSO survey, expenditure for purchased items (other than self grown) should be collected separately from 'ration shop' and from 'open market'. This would be useful in building appropriate price indices and will also be incidentally useful in knowing who are the real beneficiaries of the subsidised products.
- (2) The estimates of the demand projection model justify the use of piece-wise LES for demand projections for broad commodity groups. The model is theoretically consistent, compact and the commodity grouping can readily be enlarged by means of sub-models. A great advantage with hierarchic specification would be that it allows non-overlapping between time periods of the first and second stage models. Hence we can overcome the data constraint caused by non-availability of disaggregate data of previous years for estimating sub-models.
- (3) A primary advantage of piece wise LES is that it allows simulations of a wide range of assumptions on income distribution. Given the targeted income distribution, per capita expenditure of each strata can be computed and using it in its LES, per capita consumption of individual items can be obtained. The national level estimates can be computed on the basis of projected per capita consumption and population of each strata. Further, given a normative consumption bundle of very poor group, implications in terms of income transfers, ration quota and price etc. can be worked out.

**TABLE-1**  
**PARAMETER ESTIMATES OF LINEAR EXPENDITURE SYSTEM FOR EXPENDITURE STRATA**  
**ALL INDIA—RURAL**

S. No.	COMMODITY GROUPS	VERY POOR			MODERATELY POOR		
		b	c	R <sup>2</sup>	b	c	R <sup>2</sup>
1.	Cereal & Cereal substitutes	0.4310 (0.0166)	5.0496 (0.5467)	0.9691	0.2458 (0.0358)	10.0060 (0.6023)	0.9624
2.	Milk and Milk substitutes	0.0601 (0.0032)	-0.0587 (0.0736)	0.9104	0.1224 (0.0565)	-0.2393 (0.1134)	0.9740
3.	Edible Oils	0.0467 (0.0012)	0.1639 (0.0442)	0.9850	0.0454 (0.0029)	0.4177 (0.0586)	0.9817
4.	Meat, Egg and Fish	0.0257 (0.0013)	0.1103 (0.0239)	0.9535	0.0383 (0.0019)	0.1584 (0.0352)	0.9850
5.	Sugar and Gur	0.0335 (0.0021)	0.0598 (0.0372)	0.8812	0.0379 (0.0018)	0.2052 (0.0301)	0.9778
6.	Other Food	0.1645 (0.0028)	0.8857 (0.0157)	0.9935	0.1709 (0.0082)	1.7134 (0.1901)	0.9894
7.	Fuel and Light	0.0648 (0.0032)	0.8033 (0.0697)	0.9724	0.0570 (0.0080)	1.1547 (0.1226)	0.9714
8.	Clothing	0.0409 (0.0024)	-0.0180 (0.0478)	0.8961	0.0876 (0.0063)	-0.1106 (0.1111)	0.9392
9.	Other Non—Food	0.1327 (0.0080)	0.4310 (0.1569)	0.9268	0.1929 (0.0236)	0.5769 (0.4106)	0.9175
Theil's Information Inaccuracy		0.06403			0.0039		

S. No.	COMMODITY GROUPS	NON—POOR MIDDLE			NON—POOR HIGHER		
		b	c	R <sup>2</sup>	b	c	R <sup>2</sup>
1.	Cereal & Cereal substitutes	0.1104 (0.0288)	13.7290 (0.6759)	0.9573	0.0326 (0.0085)	17.7420 (1.0902)	0.8661
2.	Milk and Milk substitutes	0.1470 (0.0056)	0.2366 (0.3209)	0.9883	0.0526 (0.0065)	4.5250 (0.8778)	0.8723
3.	Edible Oils	0.0396 (0.0020)	0.6780 (0.0673)	0.9900	0.0192 (0.0031)	1.2635 (0.3025)	0.8424
4.	Meat, Egg and Fish	0.0350 (0.0021)	0.3586 (0.0628)	0.9884	0.0161 (0.0023)	0.7851 (0.1754)	0.8772
5.	Sugar and Gur	0.0396 (0.0019)	0.3839 (0.0672)	0.9813	0.0192 (0.0038)	1.3738 (0.3838)	0.6903
6.	Other Food	0.1586 (0.0101)	2.5563 (0.3328)	0.9860	0.0670 (0.0093)	5.3762 (0.7841)	0.8848
7.	Fuel and Light	0.0492 (0.0062)	1.4486 (0.1495)	0.9766	0.0167 (0.0019)	2.1817 (0.2012)	0.9515
8.	Clothing	0.1549 (0.0081)	-0.4115 (0.3164)	0.9706	0.1601 (0.0117)	-2.3748 (2.3542)	0.9346
9.	Other Non—Food	0.2656 (0.0219)	0.5217 (0.7017)	0.9567	0.6164 (0.0358)	-34.4120 (15.2043)	0.9411
Theil's Information Inaccuracy		0.0038			0.1759		

NOTE—Figures in brackets are asymptotic standard errors.

**TABLE—2**  
**PARAMETER ESTIMATES OF LINEAR EXPENDITURE SYSTEM FOR EXPENDITURE STRATA**  
**ALL INDIA—URBAN**

S. No.	COMMODITY GROUPS	VERY POOR			MODERATELY POOR		
		b	c	R <sup>2</sup>	b	c	R <sup>2</sup>
1.	Cereal & Cereal substitutes	0.3692 (0.0141)	4.8917 (0.4014)	0.9627	0.1174 (0.0379)	10.2760 (0.5904)	0.9742
2.	Milk and Milk substitutes	0.0769 (0.0035)	0.2586 (0.0839)	0.9279	0.1436 (0.0046)	0.8083 (0.1507)	0.9966
3.	Edible Oils	0.0604 (0.0011)	0.3698 (0.0535)	0.9905	0.0656 (0.0017)	0.9397 (0.0576)	0.9990
4.	Meat, Egg and Fish	0.0366 (0.0013)	0.1966 (0.0294)	0.9602	0.0427 (0.0039)	0.4960 (0.0544)	0.9886
5.	Sugar and Gur	0.0375 (0.0011)	0.2773 (0.0362)	0.9744	0.0393 (0.0027)	0.6233 (0.0518)	0.9893
6.	Other Food	0.1772 (0.0084)	1.7757 (0.1708)	0.9487	0.2014 (0.0114)	3.4302 (0.2235)	0.9960
7.	Fuel and Light	0.0759 (0.0021)	0.8898 (0.0647)	0.9876	0.0595 (0.0024)	1.6214 (0.0529)	0.9992
8.	Clothing	0.0204 (0.0016)	0.0769 (0.0249)	0.8072	0.0567 (0.0041)	0.1849 (0.0871)	0.9830
9.	Other Non—Food	0.1459 (0.0106)	1.5940 (0.1670)	0.9133	0.2738 (0.0458)	2.7433 (0.7516)	0.9603
Theil's Information Inaccuracy		0.0259			0.0024		

S. No.	COMMODITY GROUPS	NON—POOR MIDDLE			NON—POOR HIGHER		
		b	c	R <sup>2</sup>	b	c	R <sup>2</sup>
1.	Cereal & Cereal substitutes	0.0178 (0.0153)	12.0830 (0.9777)	0.9789	0.0074 (0.0016)	13.3560 (0.2045)	0.9900
2.	Milk and Milk substitutes	0.1099 (0.0044)	-1.8081 (0.3077)	0.9749	0.0604 (0.0048)	4.6758 (0.3966)	0.9330
3.	Edible Oils	0.0592 (0.0042)	-0.7336 (0.2947)	0.9839	0.0140 (0.0012)	2.6472 (0.0994)	0.9650
4.	Meat, Egg and Fish	0.0403 (0.0019)	-0.4152 (0.0632)	0.9954	0.0213 (0.0016)	1.0884 (0.1075)	0.9464
5.	Sugar and Gur	0.0227 (0.0013)	0.2030 (0.0723)	0.9029	0.0082 (0.0007)	1.5658 (0.0601)	0.9458
6.	Other Food	0.2059 (0.0099)	-2.3760 (0.3016)	0.9977	0.1314 (0.0126)	6.1623 (1.0872)	0.8931
7.	Fuel and Light	0.0896 (0.0064)	-1.4682 (0.2916)	0.9067	0.0218 (0.0013)	2.7004 (0.1023)	0.9817
8.	Clothing	0.0717 (0.0093)	-2.0177 (0.6565)	0.9368	0.1446 (0.0061)	-4.9092 (1.6761)	0.9715
9.	Other Non—Food	0.3829 (0.0156)	-10.9460 (1.0973)	0.9873	0.5909 (0.0206)	-22.0180 (7.7466)	0.9791
Theil's Information Inaccuracy		0.0028			0.0116		

NOTE—Figures in brackets are asymptotic standard errors.



**TABLE—3**  
**EXPENDITURE ELASTICITIES**

(ALL INDIA RURAL)

SL. NO.	COMMODITY GROUPS	VERYMODERATE POOR	NON-POOR POOR	NON-POOR MIDDLE	NON-POOR HIGHER
1.	Cereal & Cereal substitutes	0.8107	0.5191	0.2831	0.1694
2.	Milk and Milk Prod.	2.0440	2.3565	1.8457	0.5599
3.	Edible Oils	1.2852	1.1525	1.0076	0.5811
4.	Meat, Egg and Fish	1.1569	1.4673	1.2000	0.6226
5.	Sugar and Gur	1.5137	1.3998	1.2829	0.5573
6.	Other Food	1.1126	1.1209	1.0455	0.5393
7.	Fuel and Light	0.7324	0.7710	0.7548	0.4243
8.	Clothing	1.7779	2.2513	2.3064	1.1256
9.	Other Non—Food	1.3321	1.6639	1.8097	1.9625

**TABLE—4**  
**EXPENDITURE ELASTICITIES**

(ALL INDIA URBAN)

SL. NO.	COMMODITY GROUPS	VERYMODERATE POOR	NON-POOR POOR	NON-POOR MIDDLE	NON-POOR HIGHER
1.	Cereal & Cereal substitutes	0.8829	0.3608	0.0704	0.0665
2.	Milk and Milk Prod.	1.7637	1.8328	1.1660	0.6372
3.	Edible Oils	1.3059	1.2014	1.1009	0.3776
4.	Meat, Egg and Fish	1.3205	1.2631	1.0852	0.6755
5.	Sugar and Gur	1.1963	1.1597	0.7358	0.3847
6.	Other Food	0.9729	1.0849	1.0850	0.7221
7.	Fuel and Light	0.8709	0.7967	1.2515	0.4715
8.	Clothing	1.6730	2.0673	1.6282	1.4821
9.	Other Non—Food	0.9631	1.4701	1.6987	1.5640

TABLE : 5.1

## UNCOMPENSATED OWN AND CROSS ELASTICITIES

Very Poor

(All India—Rural)

Commodity Groups	Own and Cross Price Elasticities								
	1	2	3	4	5	6	7	8	9
1. Cereal and Cereal Substitutes	-0.6676	0.0028	-0.0092	-0.0068	-0.0030	-0.0485	-0.0436	-0.0009	-0.0232
2. Milk & Milk Prod.	-0.6307	-1.1123	-0.0238	-0.0177	-0.0083	-0.1255	-0.1126	-0.0023	-0.6001
3. Edible Oils	-0.3871	0.4044	-0.7102	-0.0109	-0.0054	-0.0770	-0.0691	-0.0014	-0.0368
4. Meat, Egg & Fish	-0.3484	0.0040	-0.0131	-0.6283	-0.0049	-0.0693	0.6222	-0.0013	-0.0331
5. Sugar & Gur	-0.4590	0.0052	-0.0172	-0.0128	-0.8157	-0.0907	-0.8142	-1.0017	-0.0433
6. Other Food	-0.3351	0.0038	-0.0176	-0.0094	-0.0047	-0.6615	-0.0598	-0.0013	-0.0319
7. Fuel & Light	-0.2206	0.0025	-0.0086	-0.0062	-0.0003	-0.0438	-0.4309	-0.0008	-0.0209
8. Clothing	-0.5358	0.0061	-0.0202	-0.0151	-0.0075	-0.1065	-0.0556	-0.9525	-0.0509
9. Other Non-Food.	-0.4012	0.0046	-0.0151	-0.0113	-0.0056	-0.0798	-0.0716	-0.0015	-0.7503

TABLE : 5.2

## UNCOMPENSATED OWN AND CROSS ELASTICITIES

Moderately Poor

(All India—Rural)

Commodity Groups	Own and Cross Price Elasticities								
	1	2	3	4	5	6	7	8	9
1. Cereal and Cereal Substitutes	-0.4382	0.0043	-0.0039	-0.0038	-0.0044	-0.0356	-0.0238	0.0021	-0.0109
2. Milk & Milk Prod.	-0.8315	-1.1382	-0.0402	-0.0171	-0.0200	-0.1614	-0.1082	0.0097	-0.0499
3. Edible Oils	-0.4066	0.0096	-0.5859	-0.0083	-0.0097	-0.0789	-0.0529	0.0048	-0.0244
4. Meat, Egg & Fish	-0.5176	0.0122	-0.0251	-0.7315	-0.0124	-0.1005	-0.0674	0.0061	-0.0310
5. Sugar & Gur	-0.4958	0.0117	-0.0259	-0.0101	-0.6995	-0.0959	-0.0643	-0.0058	-0.0296
6. Other Food	-0.3954	0.0093	-0.0191	-0.0081	-0.0094	-0.6275	-0.0515	0.0046	-0.0237
7. Fuel & Light	-0.2720	0.0064	-0.0131	-0.0056	-0.0065	-0.0528	-0.4142	0.0032	-0.0163
8. Clothing	-0.7942	0.0188	-0.0384	-0.0163	-0.0190	-0.1542	-0.1034	-1.0968	-0.0476
9. Other Non-Food.	-0.5870	0.0139	-0.0284	-0.0120	-0.0141	-0.1139	-0.0764	0.0069	-0.8528

TABLE : 5.3

## UNCOMPENSATED OWN AND CROSS PRICE ELASTICITIES

Non-Poor Middle

(All India—Rural)

Commodity Groups	Own and Cross Price Elasticities								
	1	2	3	4	5	6	7	8	9
1. Cereal and Cereal Substitutes	-0.2370	-0.0016	-0.0055	-0.0033	-0.0031	-0.0204	-0.0114	-0.0030	-0.0036
2. Milk & Milk Prod.	-0.6185	-0.9389	-0.0358	-0.0214	-0.0203	-0.1331	-0.0748	0.0197	-0.0246
3. Edible Oils	-0.3373	-0.0057	-0.5258	-0.0116	-0.0110	-0.0726	-0.0408	0.0108	-0.0134
4. Meat, Egg & Fish	-0.1017	-0.0068	-0.0237	-0.6168	-0.0132	-0.0864	-0.0486	0.0128	-0.0159
5. Sugar & Gur	-0.4295	-0.0073	-0.0249	-0.0148	-0.6588	-0.0924	-0.0519	0.0137	-0.0171
6. Other Food	-0.0550	-0.0060	-0.0203	-0.0121	-0.0115	-0.6007	-0.0423	0.0117	-0.0139
7. Fuel & Light	-0.2527	-0.0043	-0.0146	-0.0087	-0.0083	-0.0543	-0.4098	0.0081	-0.0100
8. Clothing	-0.7721	-0.0131	-0.0447	-0.0267	-0.0255	-0.1661	-0.0934	-1.1344	-0.0307
9. Other Non-Food.	-0.6058	-0.0103	-0.0351	-0.0209	-0.0198	-0.1303	-0.0732	0.0193	-0.9335

TABLE : 5.4

## UNCOMPENSATED OWN AND CROSS PRICE ELASTICITIES

Non-Poor Higher

(All India—Rural)

Commodity Groups	Own and Cross Price Elasticities								
	1	2	3	4	5	6	7	8	9
1. Cereal and Cereal Substitutes	-0.2013	-0.0067	-0.0023	-0.0016	-0.0025	-0.0094	-0.0038	0.0038	0.0543
2. Milk & Milk Prod.	-0.0891	-0.5985	-0.0074	-0.0052	-0.0082	-0.0309	-0.0124	0.0126	0.1793
3. Edible Oils	-0.0925	-0.0231	-0.6058	-0.0054	-0.0086	-0.0321	-0.0129	0.0131	0.1861
4. Meat, Egg & Fish	-0.0991	-0.0248	-0.0083	-0.6465	-0.0092	-0.0344	-0.0138	0.0140	0.1994
5. Sugar & Gur	-0.0887	-0.0222	-0.0074	-0.0052	-0.5817	-0.0308	-0.0124	0.0126	0.1785
6. Other Food	-0.0858	-0.0215	-0.0072	-0.0050	-0.0079	-0.5848	-0.0119	0.0121	0.1727
7. Fuel & Light	-0.0675	-0.0169	-0.0056	-0.0039	-0.0063	-0.0234	-0.4462	0.0096	0.1359
8. Clothing	-0.1791	-0.0448	-0.0149	-0.0105	-0.0166	-0.0621	-0.0250	-1.1330	0.3605
9. Other Non-Food.	-0.3123	-0.0781	-0.0261	-0.0183	-0.0289	-0.1083	-0.0436	0.0442	-1.3991

TABLE : 6.1

## UNCOMPENSATED OWN AND CROSS ELASTICITIES

Very Poor		(All India—Urban)								
Commodity Groups	Own and Cross Price Elasticities									
	1	2	3	4	5	6	7	8	9	
1. Cereal and Cereal Substitutes	-0.5754	-0.0134	-0.0211	-0.0125	-0.0154	-0.1027	-0.0521	-0.0041	-0.0861	
2. Milk & Milk Prod.	-0.4964	-0.6797	-0.0422	-0.0250	-0.0308	-0.2052	-0.1042	-0.0082	-0.1719	
3. Edible Oils	-0.3676	-0.0197	-0.5148	-0.0185	-0.0228	-0.1520	-0.0771	-0.0061	-0.1273	
4. Meat, Egg & Fish	-0.3717	-0.0199	-0.0316	-0.5077	-0.0230	-0.1537	-0.0780	-0.0061	-0.1287	
5. Sugar & Gur	-0.3368	-0.0181	-0.0286	-0.0169	-0.4638	-0.1392	-0.0707	-0.0055	-0.1166	
6. Other Food	-0.2739	-0.0147	-0.0233	-0.0138	-0.0169	-0.4735	-0.0575	-0.0045	-0.0948	
7. Fuel & Light	-0.2452	-0.0132	-0.0208	-0.0123	-0.0152	-0.1014	-0.3739	-0.0040	-0.0849	
8. Clothing	-0.4709	-0.0253	-0.0400	-0.0237	-0.0292	-0.1947	-0.0988	-0.6273	-0.1631	
9. Other Non-Food.	-0.2711	-0.0146	-0.0250	-0.0137	-0.0168	-0.1121	-0.0569	-0.0045	-0.4505	

TABLE : 6.2

## UNCOMPENSATED OWN AND CROSS ELASTICITIES

Moderately Poor		(All India—Urban)								
Commodity Groups	Own and Cross Price Elasticities									
	1	2	3	4	5	6	7	8	9	
1. Cereal and Cereal Substitutes	-0.2419	-0.0080	-0.0105	-0.0062	-0.0066	0.0386	-0.0186	-0.0019	-0.0286	
2. Milk & Milk Prod.	-0.5123	-0.7569	-0.0532	-0.0314	-0.0338	-0.1960	-0.0942	-0.0097	-0.1453	
3. Edible Oils	-0.3358	-0.0267	-0.5043	-0.0206	-0.0221	-0.1284	-0.0618	-0.0063	-0.0952	
4. Meat, Egg & Fish	0.3531	-0.0281	-0.0366	-0.5152	-0.0232	-0.1351	-0.0649	-0.0067	-0.1001	
5. Sugar & Gur	-0.3241	-0.0258	-0.0336	-0.0199	-0.4745	-0.1240	-0.0596	-0.0061	-0.0919	
6. Other Food	-0.3032	-0.0241	-0.0315	-0.0186	-0.0200	-0.0539	-0.0558	-0.0057	-0.0859	
7. Fuel & Light	-0.2227	-0.0177	-0.0231	-0.0137	-0.0147	-0.0852	-0.5522	-0.0042	-0.0631	
8. Clothing	-0.5779	-0.0460	-0.0600	-0.0355	-0.0381	-0.2211	-0.1065	-0.8187	-0.1638	
9. Other Non-Food.	0.4109	-0.0327	-0.0426	-0.0252	-0.0271	-0.1570	-0.0756	-0.0077	-0.6909	

TABLE : 6.3

## UNCOMPENSATED OWN AND CROSS ELASTICITIES

Non-Poor Middle

(All India-Urban)

Commodity Groups	Own and Cross Price Elasticities								
	1	2	3	4	5	6	7	8	9
1. Cereal and Cereal Substitutes	-0.0992	0.0025	0.0011	0.0007	-0.0003	0.0037	0.0024	0.0028	0.0185
2. Milk & Milk Prod.	-0.2707	-1.3317	0.0185	0.0120	-0.0048	0.0614	0.0395	0.0470	0.2627
3. Edible Oils	-0.2556	0.0387	-1.2785	0.0113	-0.0045	0.0579	0.0373	0.0444	0.2481
4. Meat, Egg & Fish	-0.2520	0.0381	0.0173	-1.2663	-0.0045	0.0531	0.0368	0.0438	0.2445
5. Sugar & Gur	-0.1709	0.0259	0.0117	0.0076	-0.8693	0.0387	0.0249	0.0297	0.1658
6. Other Food	-0.2520	0.0381	0.0173	0.0112	-0.0045	-1.2202	0.0368	0.0438	0.2445
7. Fuel & Light	-0.2906	0.0439	0.0199	0.0129	-0.0052	0.0659	-1.4309	0.0505	0.2820
8. Clothing	-0.3781	0.0572	0.0259	0.0168	-0.0067	0.0857	0.0551	-1.8511	0.3669
9. Other Non-Food.	-0.3944	0.0597	0.0270	0.0175	-0.0070	0.0894	0.0576	0.0686	-1.6170

TABLE : 6.4

## UNCOMPENSATED OWN AND CROSS ELASTICITIES

Non-Poor Higher

(All India-Urban)

Commodity Groups	Own and Cross Price Elasticities								
	1	2	3	4	5	6	7	8	9
1. Cereal and Cereal Substitutes	-0.0705	-0.0025	-0.0016	-0.0007	-0.0009	-0.0037	-0.0017	0.0027	0.0124
2. Milk & Milk Prod.	-0.0666	-0.6323	-0.0151	-0.0071	-0.0086	-0.0036	-0.0162	0.0258	0.1189
3. Edible Oils	-0.0395	-0.0140	-0.3696	-0.0042	-0.0051	-0.0213	-0.0096	0.0153	0.0704
4. Meat, Egg & Fish	-0.0707	-0.0250	-0.0160	-0.6520	-0.0091	-0.0381	-0.0172	0.0274	0.1261
5. Sugar & Gur	-0.0402	-0.0142	-0.0091	-0.0043	-0.3726	-0.0217	-0.0098	0.0156	-0.0718
6. Other Food	-0.0755	-0.0268	-0.0171	-0.0081	-0.0097	-0.7306	-0.0184	0.0293	0.1348
7. Fuel & Light	-0.0493	-0.0175	-0.0111	-0.0053	-0.0063	-0.0266	-0.4624	0.0191	0.0880
8. Clothing	-0.1550	-0.0549	-0.0351	-0.0166	-0.0199	-0.0837	-0.0378	-1.3558	0.2767
9. Other Non-Food.	-0.1636	-0.0580	-0.0371	-0.0175	-0.0210	-0.0883	-0.0399	0.0634	-1.2021

TABLE : 7

**IMPLICIT ELASTICITIES FROM DEMAND FUNCTIONS/ENGEL CURVES OF SELECTED ITEMS  
FOR ALL INDIA RURAL AREAS**

Sl No.	Items	BELOW POVERTY			ABOVE POVERTY			Overall
		Very Poor	Mod. Poor	Poor Combined	Non Poor MID.	Non Poor HIG.	Non Poor Com.	
1.	Rice	1.0030	1.0509	1.029	0.1053	0.8554	0.962	0.989
2.	Wheat	1.0053	1.3774	1.199	1.3095	0.8242	1.086	1.131
3.	Other Cereals	0.8148	0.9819	0.902	1.0214	0.7460	0.894	0.897
4.	Pulses	1.0347	1.1116	1.075	1.1237	0.9100	1.025	1.045
5.	Tea	1.1769	0.7889	0.975	0.9799	0.7856	0.793	0.867
6.	Coffee	0.4289	1.2562	0.859	1.0374	0.7064	0.885	0.874
7.	Other Crops	1.1334	1.0190	1.074	0.9709	0.8513	0.916	0.980
8.	Animal Husbandry	1.1890	0.8633	1.020	0.9076	0.8753	0.893	0.944
9.	Forestry & Logging	1.0346	0.8376	0.930	1.1573	0.6640	0.930	0.930
10.	Fishing	1.5635	0.6147	1.070	0.6235	1.0539	0.822	0.920
11.	Coal & Lignite	1.0412	1.0308	1.030	0.9569	0.8732	0.920	0.960
12.	Sugar	0.8599	0.9306	0.897	0.9908	0.9130	0.955	0.931
13.	Khandsari Boora	1.0304	0.7003	0.859	0.8306	0.5427	0.687	0.757
14.	Hydrogenated Oil	0.6611	0.7684	0.717	0.8030	0.8079	0.805	0.769
15.	Oth. Food & Beverages	0.9127	0.8903	0.901	0.8840	0.8706	0.878	0.887
16.	Cotton Textiles	1.0717	1.1599	1.093	0.9134			
	Mill Made	1.0275	1.1171	1.074	1.0572	0.9745	1.019	1.041
	Power Loom	1.0599	1.1978	1.131	1.1830	0.8625	1.035	1.074
	Hand Loom	1.1069	1.0902	1.098	1.0095	0.8458	0.934	1.001
	Khadi	0.9423	0.9777	0.961	1.3159	1.9165	1.593	1.336
17.	Woollen Textiles	2.5578	1.0976	1.799	0.8994	0.8430	0.873	1.249
18.	Art Silk & Syn. Fibre	0.7969	1.2521		1.0949	0.9934		
	A. Silk, Rayon, Oth. Syn.	0.7314	1.2538	1.003	1.0955	0.9666	1.036	1.022
	Pure Silk	2.9495	9.6206	6.416	0.9782	0.9563	0.968	3.180
19.	Other Tex,	0.9289	0.9743	0.950	0.8515	0.9193	0.880	0.910
	Mixed Wool, Silk, Cot,	1.0093	1.1962	1.106	1.0767	1.0446	1.062	1.080
	Others	0.9901	1.1399	1.068	0.9424	0.9868	0.963	1.005
	Tailoring	1.0428	0.9862		0.8505	0.8396		
20.	Footwear	0.8887	0.8588	0.859	0.8110	0.7823	0.792	0.819

TABLE : 8

**IMPLICIT ELASTICITIES FROM DEMAND FUNCTIONS/ENGEL CURVES OF SELECTED ITEMS  
FOR ALL INDIA URBAN AREAS**

Sl. No.	Items	Below Poverty			Above Poverty			Overall
		Very poor	Mod. poor	Poor Combined	Non poor MID.	Non poor HIG	Non poor Com.	
1.	Rice	0.9694	1.0693	1.027	1.0390	0.8640	0.937	0.962
2.	Wheat	0.9666	1.0114	0.993	1.0536	0.8754	0.950	0.962
3.	Other Cereals	0.9332	1.0508	1.002	1.1603	0.7508	0.921	0.944
4.	Pulses	1.0375	1.0693	1.056	1.0390	0.8640	0.937	0.970
5.	Tea	0.9815	0.9855	0.984	1.0088	0.9626	0.982	0.982
6.	Coffee	1.5105	1.0101	1.069	0.7164	0.8982	0.822	0.891
7.	Other Crops	1.0356	1.0260	1.030	1.0103	0.8982	0.946	0.970
8.	Animal Husbandry	0.9994	0.9732	0.984	0.9732	0.8567	0.859	0.894
9.	Forestry & Logging	0.9212	0.9714	0.950	0.8507	0.7704	0.800	0.840
10.	Fishing	0.9627	0.8912	0.921	0.8651	0.8685	0.867	0.882
11.	Coal & Lignite	1.0053	0.9825	0.990	0.9934	0.8433	0.900	0.930
12.	Sugar	0.9932	1.0464	1.024	1.0362	0.8435	0.924	0.952
13.	Khandsari Boora	1.0488	0.8893	0.956	0.9228	0.8866	0.903	0.918
14.	Hydrogenated oil	0.8619	0.7434	0.793	1.0455	0.9217	0.973	0.923
15.	Oth Food & Beverages	1.0053	0.9820	0.992	0.9650	0.9181	0.938	0.953
16.	Cotton Textiles	1.0510	1.0674		1.0278	0.9364		
	Mill made	1.0419	1.1069	1.088	1.0035	0.9005	0.943	0.981
	Power Loom	1.3982	0.9023	1.109	1.0327	0.9884	1.007	1.036
	Hand Loom	1.0328	0.9541	0.987	1.0307	0.5982	0.782	0.839
	Khadi	0.8780	0.9890	0.943	1.0211	1.0826	1.057	1.025
17.	Woollen Textiles	1.0397	0.6799	0.827	0.7042	0.9363	0.839	0.836
18.	Art Silk & Syn. Fibre	0.8635	2.1369		1.0027	1.0613		
	A. Silk, Rayon, Oth. Syn.	0.8788	2.1428	1.615	0.9753	1.0500	1.019	1.186
	Pure Silk	0.8286	17.5036	10.536	3.4163	1.0119	2.014	4.400
19.	Other Tex.	0.9794	1.1862	1.100	0.9353	1.0890	1.030	1.050
	Mixed wool, Silk, Cot	0.6907	1.0648	0.908	1.0018	1.0738	1.044	1.006
	Others	1.0197	0.8544	0.923	1.0058	0.7876	0.878	0.891
	Tailoring	0.9941	1.3262		0.9677	1.0555		
20.	Footwear	0.9300	1.4650	1.241	0.9000	0.9753	0.944	1.027

**DEMAND FUNCTION PARAMETERS FOR VERY POOR IN RURAL AREAS**

S. No.	Input Output Code	Item	Demand Function	Estimated parameters at 1983 prices			
				a	b	d	R <sup>2</sup>
1.	1	Rice	Proportional Linear	-1.6843	0.2955 0.2965		0.5434 0.5433
2.	2	Wheat	Proportional Linear	-2.7291	0.2803 0.2819		0.5538 0.5538
3.	3	Other Cereals	Log-Log Inverse	-0.0447	0.7826	-27.0693	0.2204
4.	4	Pulses	Proportional Linear	-5.4814	0.0419 0.0466		0.4305 0.4304
5.	8	Tea	Proportional Linear	-7.7698	0.0274 0.0327		0.4740 0.4739
6.	9	Coffee	Log Inverse	3.1309	-350.1011		0.0616
7.	11	Other Crops	Proportional Linear	-14.8683	0.0834 0.0897		0.6925 0.6924
8.	12	Animal Husbandry	Proportional Linear	-24.3960	0.0561 0.0748		0.5017 0.5016
9.	13	Forestry & Logging	Proportional Linear	-3.4154	0.0711 0.0730		0.6067 0.6066
10.	14	Fishing	Proportional Linear	-30.3756	0.0595 0.0715		0.6453 0.6452
11.	15	Coal & Lignite	Proportional Linear	-18.5106	0.0612 0.0787		0.2846 0.2799
12.	20	Sugar	Proportional Linear	4.8041	0.0177 0.0149		0.4082 0.4081
13.	21	Khandsari Boora	Double Log	-4.3055	1.0304		0.2732
14.	22	Hydrogenated Oil	Log-Log Inverse	-0.8026	0.5990	-51.1887	0.3244
15.	23	Other Food & Beverages	Proportional Linear	11.0703	0.0595 0.0527		0.5351 0.5350
16.	24	Cotton Textiles	Log-Log Inverse	-3.1358	1.0802	7.3670	0.3380
17.	25	Woollen Textiles	Log-Log Inverse	-16.9323	3.0392	440.3818	0.5486
18.	28	Other Textiles	Double Log	-3.7439	0.9289		0.1921
19.	26	Art Silk & Synthetic Textiles	Log-Log Inverse	-0.5861	0.7570	-39.2148	0.3364
20.	31	Leather & Leather Products	Log-Log Inverse	-2.6617	0.8811	-6.4245	0.3819
21.	54	Construction	Double Log	-1.3860	0.8944		0.2184
22.	60	Other Services	Log-Log Inverse	-4.3424	1.1811	8.7944	0.5589



TABLE : 10

## DEMAND FUNCTION PARAMETERS FOR MODERATELY POOR IN RURAL AREAS

S. No.	Input Output Code	Item	Demand Function	Estimated parameters at 1983 prices			
				a	b	d	R <sup>2</sup>
1.	1	Rice	Proportional Linear	-67.8818	0.2889 0.3328		0.3929 0.3929
2.	2	Wheat	Log-Log Inverse	-5.0138	1.4101	38.4993	0.3344
3.	3	Other Cereals	Double Log	-1.8651	0.9819		0.2414
4.	4	Pulses	Log-Log Inverse	-4.2665	1.1192	8.9375	0.5284
5.	8	Tea	Log-Log Inverse	-2.5454	0.7731	-16.9905	0.3600
6.	9	Coffee	Double Log	-5.9913	1.2562		0.2025
7.	11	Other Crops	Log-Log Inverse	-2.9812	1.0275	10.9204	0.7214
8.	12	Animal Husbandry	Double Log	-2.3424	0.8633		0.3072
9.	13	Forestry & Logging	Double Log	-1.9230	0.8376		0.4845
10.	14	Fishing	Log-Log Inverse	-0.7196	0.5887	-29.9113	0.2847
11.	15	Coal & Lignite	Proportional Linear	-10.7784	0.0538 0.0609		0.4799 0.4775
12.	20	Sugar	Double Log	-3.6219	0.9306		0.4780
13.	21	Khandsari Boora	Log Inverse	3.6994	-883.3601		0.1556
14.	22	Hydrogenated Oil	Log-Log Inverse	-1.4316	0.6967	-77.9702	0.3855
15.	23	Other Food & Beverages	Double Log	-2.0986	0.8903		0.4487
16.	24	Cotton Textiles	Log-Log Inverse	-3.7509	1.1728	15.7439	0.4310
17.	25	Woollen Textiles	Double Log	-3.5255	1.0976		0.6025
18.	28	Other Textiles	Log-Log Inverse	-4.3362	1.0107	45.2974	0.2153
19.	26	Art Silk & Synthetic Textiles	Log-Log Inverse	-4.4183	1.2973	42.0772	0.6308
20.	31	Leather & Leather Products	Log-Log Inverse	-2.2621	0.8199	-13.2703	0.5083
21.	54	Construction	Log-Log Inverse	-1.1492	0.8738	-9.1086	0.2866
22.	60	Other Services	Log-Log Inverse	-4.4718	1.2112	-3.8782	0.4627

TABLE : 11

## DEMAND FUNCTION PARAMETERS FOR NON-POOR MIDDLE IN RURAL AREAS

Sl. No.	Input Output Code	Item	Demand Function	Estimated parameters at 1983 prices			
				a	b	d	R <sup>2</sup>
1.	1	Rice	Proportional Linear	71.3657	0.2160 0.1820		0.1846 0.1846
2.	2	Wheat	Log-Log Inverse	-4.8441	1.3364	41.7075	0.3612
3.	3	Other Cereals	Double Log	-2.4591	1.0214		0.2734
4.	4	Pulses	Log-Log Inverse	-4.3988	1.1282	7.1458	0.5162
5.	8	Tea	Log-Log Inverse	-2.5612	0.7917	-10.7893	0.3897
6.	9	Coffee	Double Log	-4.4224	1.0374		0.1803
7.	11	Other Crops	Log-Log Inverse	-2.6649	0.9768	9.9631	0.7771
8.	12	Animal Husbandry	Log-Log Inverse	-2.5259	0.9146	10.8735	0.3823
9.	13	Forestry & Logging	Proportional Linear	-27.7085	0.0617 0.0740		0.5598 0.5598
10.	14	Fishing	Log-Log Inverse	-0.6176	0.5923	-47.9670	0.2741
11.	15	Coal & Lignite	Double Log	-2.9583	0.9569		0.3139
12.	20	Sugar	Log-Log Inverse	-4.0327	0.9947	5.6521	0.5364
13.	21	Khandsari Boora	Double Log	-2.8753	0.8104		0.1807
14.	22	Hydrogenated Oil	Log-Log Inverse	-1.8141	0.7515	-73.9502	0.3959
15.	23	Other Food & Beverages	Log-Log Inverse	-2.0995	0.8895	8.1519	0.6357
16.	24	Cotton Textiles	Log-Log Inverse	-3.1598	1.0986	9.5291	0.4722
17.	25	Woollen Textiles	Double Log	-2.1204	0.8994		0.5067
18.	28	Other Textiles	Log-Log Inverse	-3.1090	0.8647	23.3230	0.2857
19.	26	Art Silk & Synthetic Textiles	Log-Log Inverse	-3.0739	1.1057	18.0000	0.6563
20.	31	Leather & Leather Products	Log-Log Inverse	-2.0614	0.7960	-5.8818	0.5433
21.	54	Construction	Log-Log Inverse	-1.8086	0.9775	9.7966	0.3589
22.	60	Other Services	Log-Log Inverse	-4.1943	1.1864	6.7934	0.6980

TABLE : 12

## DEMAND FUNCTION PARAMETERS FOR NON-POOR HIGHER IN RURAL AREAS

Sl. No.	Input Output Code	Item	Demand Function	Estimated parameters at 1983 prices			
				a	b	d	R <sup>2</sup>
1.	1	Rice	Proportional Linear	138.3186	0.1200 0.0948		0.2205 0.2204
2.	2	Wheat	Log-Log Inverse	-1.5071	0.8539	91.7271	0.2882
3.	3	Other Cereals	Log -Log Inverse	-0.5446	0.7125	-102.6628	0.2268
4.	4	Pulses	Log-Log Inverse	-2.7396	0.8975	-40.0088	0.4631
5.	8	Tea	Log-Log Inverse	-2.3287	0.7733	-34.9304	0.3964
6.	9	Coffee	Log-Log Inverse	-3.3163	0.6406	-231.7893	0.2234
7.	11	Other Crops	Log-Log Inverse	-1.7276	0.8472	-13.5957	0.7527
8.	12	Animal Husbandry	Double Log	-2.0037	0.8753		0.3789
9.	13	Forestry & Logging	Log-Log Inverse	-0.7008	0.6480	-41.4265	0.3912
10.	14	Fishing	Proportional Linear	-11.6650	0.0348 0.0366		0.4459 0.4458
11.	15	Coal & Lignite	Proportional Linear	42.9979	0.0316 0.0237		0.2840 0.2815
12.	20	Sugar	Double Log	-3.3837	0.9130		0.5069
13.	21	Khandsari Boora	Log-Log Inverse	-0.5027	0.4984	-161.3713	0.1668
14.	22	Hydrogenated Oil	Log-Log Inverse	-1.9459	0.7714	-109.9224	0.4115
15.	23	Other Food & Beverages	Double Log	-1.9663	0.8706		0.5306
16.	24	Cotton Textiles	Proportional Linear	46.2537	0.1215 0.1192		0.5896 0.5896
17.	25	Woollen Textiles	Double Log	-1.5565	0.8430		0.5118
18.	28	Other Textiles	Log-Log Inverse	-3.3695	0.9359	58.1440	0.3365
19.	26	Art Silk & Synthetic Textiles	Double Log	-2.1123	0.9934		0.5892
20.	31	Leather & Leather Products	Log-Log Inverse	-1.7498	0.7714	-34.1997	0.5196
21.	54	Construction	Double Log	-1.2150	0.9175		0.3897
22.	60	Other Services	Proportional Linear	-966.3059	0.3433 0.3989		0.8333 0.8333

TABLE-13

## DEMAND FUNCTION PARAMETERS FOR VERY POOR IN URBAN AREAS

S. No.	Input Output Code	Item	Demand Function	Estimated parameters at 1983 prices			
				a	b	d	R <sup>2</sup>
1.	1	Rice	Proportional Linear	-13.2007	0.2584		0.4602
2.	2	Wheat	Proportional Linear	11.1585	0.2199 0.2080		0.3066 0.0364
3.	3	Other Cereals	Proportional Linear	32.1785	0.2537 0.2155		0.2990 0.2985
4.	4	Pulses	Proportional Linear	-13.2007	0.2443 0.2584		0.4603 0.4602
5.	8	Tea	Log-Log Inverse	-3.7700	0.9893	4.3345	0.4189
6.	9	Coffee	Log-Log Inverse	-11.8310	2.0640	236.0322	0.3551
7.	11	Other Crops	Log-Log Inverse	-3.1996	1.0462	6.1892	0.6600
8.	12	Animal Husbandry	Proportional Linear	0.0698	0.0932		0.3991
9.	13	Forestry & Logging	Log-Log Inverse	-2.5093	0.9281	3.7372	0.4752
10.	14	Fishing	Log-Log Inverse	-3.5262	0.9811	10.2906	0.4507
11.	15	Coal & Lignite	Double Log	-3.0103	1.0053		0.6260
12.	20	Sugar	Log-Log Inverse	-3.6938	1.0055	7.0416	0.5559
13.	21	Khandsari Boora	Proportional Linear	-2.7137	0.0391 0.0421		0.4412 0.4407
14.	22	Hydrogenated Oil	Double Log	-3.4257	0.8619		0.2742
15.	23	Other Food & Beverages	Double Log	-2.7791	1.0053		0.5605
16.	24	Cotton Textiles	Log-Log Inverse	-3.0448	1.0615	6.3456	0.4223
17.	25	Woollen Textiles	Double Log	-2.8302	1.0397		0.3483
18.	28	Other Textiles	Log-Log Inverse	-3.2295	0.9219	-36.0618	0.3162
19.	26	Art Silk & Synthetic Textiles	Double Log	-1.5492	0.8635		0.3221
20.	31	Leather & Leather Products	Log-Log Inverse	-3.4430	0.9716	24.4467	0.4329
21.	54	Construction	Log-Log Inverse	-2.1926	0.9724	15.1074	0.2407
22.	60	Other Services	Log-Log Inverse	-2.7754	1.0086	5.9448	0.4868

TABLE : 14

## DEMAND FUNCTION PARAMETERS FOR MODERATELY POOR IN URBAN AREAS

S. No.	Input Output Code	Item	Demand Function	Estimated parameters at 1983 prices			
				a	b	d	R <sup>2</sup>
1.	1	Rice	Proportional		0.2126		0.4876
			Linear	-27.0743	0.2317		0.4874
2.	2	Wheat	Log-Log Inverse	-1.9001	0.9705	33.0227	0.3712
3.	3	Other Cereals	Log-Log Inverse	-2.0538	0.9907	-54.7607	0.3116
4.	4	Pulses	Proportional		0.2126		0.4875
			Linear	-27.0743	0.2317		0.4874
5.	8	Tea	Double Log	-3.6420	0.9855		0.5375
6.	9	Coffee	Log-Log Inverse	-5.7414	1.1009	54.5674	0.2318
7.	11	Other Crops	Log-Log Inverse	-3.0906	1.0306	3.9883	0.6997
8.	12	Animal Husbandry	Proportional		0.1045		0.4457
			Linear	6.4278	0.1030		0.4456
9.	13	Forestry & Logging	Log-Log Inverse	-3.1599	0.9909	14.6260	0.5408
10.	14	Fishing	Log-Log Inverse	-3.0542	0.9180	20.3970	0.4720
11.	15	Coal & Lignite	Double Log	-3.0165	0.9825		0.6059
12.	20	Sugar	Log-Log Inverse	-3.8722	1.0331	-10.8501	0.6852
13.	21	Khandsari Boora	Double Log	-2.8773	0.8893		0.4092
14.	22	Hydrogenated Oil	Double Log	-2.5283	0.7434		0.3244
15.	23	Other Food & Beverages	Log-Log Inverse	-2.5153	0.9773	-4.6165	0.6189
16.	24	Cotton Textiles	Double Log	-3.0885	1.0674		0.4291
17.	25	Woollen Textiles	Log Inverse	4.3623	-329.0137		0.2928
18.	28	Other Textiles	Proportional		0.0535		0.3851
			Linear	-14.8507	0.0620		0.3842
19.	26	Art Silk & Synthetic Textiles	Proportional		0.4500		0.7769
			Linear	-333.8147	0.5352		0.7762
20.	31	Leather & Leather Products	Proportional		0.0561		0.5675
			Linear	-31.1842	0.0777		0.5671
21.	54	Construction	Double Log	-2.2383	1.0001		0.3343
22.	60	Other Services	Log-Log Inverse	-2.7383	1.0270	-19.7056	0.6443

TABLE—15

## DEMAND FUNCTION PARAMETERS FOR NON-POOR MIDDLE IN URBAN AREAS

S. No.	Input Output Code	Item	Demand Function	Estimated parameters at 1983 prices			
				a	b	d	R <sup>2</sup>
1.	1	Rice	Proportional Linear	-14.6587	0.1641 0.1719		0.4167 0.4167
2.	2	Wheat	Log-Log Inverse	-2.4490	1.0192	-37.0476	0.4504
3.	3	Other Cereals	Proportional Linear	-59.3146	0.1306 0.1616		0.3751 0.3747
4.	4	Pulses	Proportional Linear	-14.6587	0.1641 0.1719		0.4167 0.4167
5.	8	Tea	Double Log	-3.6999	1.0088		0.5777
6.	9	Coffee	Log-Log Inverse	-4.1821	0.8481	137.3367	0.1484
7.	11	Other Crops	Log-Log Inverse	-3.0769	1.0211	12.4248	0.7058
8.	12	Animal Husbandry	Log-Log Inverse	-1.2478	0.8535	-3.6248	0.4833
9.	13	Forestry & Logging	Log-Log Inverse	-2.5208	0.8651	13.0632	0.4912
10.	14	Fishing	Log-Log Inverse	-2.9441	0.9085	41.6614	0.5054
11.	15	Coal & Lignite	Log-Log Inverse	-3.4362	1.0125	22.3455	0.5315
12.	20	Sugar	Log-Log Inverse	-3.7419	1.0060	-31.3008	0.7393
13.	21	Khandsari Boora	Log-Log Inverse	-2.9897	0.9060	-17.8384	0.4787
14.	22	Hydrogenated Oil	Proportional Linear	-2.7183	0.0193 0.0208		0.4658 0.4591
15.	23	Other Food & Beverages	Log-Log Inverse	-2.3197	0.9508	-16.1052	0.6800
16.	24	Cotton Textiles	Log-Log Inverse	-2.6962	1.0156	-13.7952	0.4818
17.	25	Woollen Textiles	Double Log	-0.8645	0.7042		0.4351
18.	28	Other Textiles	Log-Log Inverse	-3.2128	0.9574	24.6528	0.3164
19.	26	Art Silk & Synthetic Textiles	Log-Log Inverse	-2.0779	0.9855	-19.5833	0.5927
20.	31	Leather & Leather Products	Log-Log Inverse	-2.9522	0.9158	16.4605	0.5507
21.	54	Construction	Log-Log Inverse	-1.7886	0.9514	23.2512	0.3321
22.	60	Other Services	Log-Log Inverse	-2.8988	1.0676	-15.3777	0.7092

TABLE : 16

## DEMAND FUNCTION PARAMETERS FOR NON-POOR HIGHER IN URBAN AREAS

S. No.	Input Output Code	Item	Demand Function	Estimated parameters at 1983 prices			
				a	b	d	R <sup>2</sup>
1.	1	Rice	Log-Log Inverse	-2.0930	0.8953	72.9544	0.3470
2.	2	Wheat	Log-Log Inverse	-1.7473	0.8497	-62.1143	0.4674
3.	3	Other Cereals	Log-Log Inverse	-0.8966	0.6484	-249.1399	0.2179
4.	4	Pulses	Log-Log Inverse	-2.0930	0.8953	72.9544	0.3470
5.	8	Tea	Double Log	-3.3654	0.9626		0.5535
6.	9	Coffee	Log-Log Inverse	-4.4402	0.9083	31.7246	0.4220
7.	11	Other Crops	Log-Log Inverse	-2.1401	0.8779	-52.9365	0.6531
8.	12	Animal Husbandry	Double Log	-1.1683	0.8613		0.5217
9.	13	Forestry & Logging	Log-Log Inverse	-2.2045	0.7818	22.4004	0.3921
10.	14	Fishing	Double Log	-2.5451	0.8685		0.5165
11.	15	Coal & Lignite	Double Log	-2.4729	0.8433		0.4625
12.	20	Sugar	Log-Log Inverse	-2.5085	0.8099	-82.9983	0.6757
13.	21	Khandsari Boora	Log-Log Inverse	-2.9971	0.8789	-23.7302	0.5498
14.	22	Hydrogenated Oil	Double Log	-4.1548	0.9217		0.4826
15.	23	Other Food & Beverages	Log-Log Inverse	-2.1176	0.9055	-32.3054	0.6903
16.	24	Cotton Textiles	Log-Log Inverse	-2.1952	0.9291	-20.4263	0.4813
17.	25	Woollen Textiles	Double Log	-2.2299	0.9363		0.6456
18.	28	Other Textiles	Log-Log Inverse	-3.9404	1.1038	43.4419	0.4364
19.	26	Art Silk & Synthetic Textiles	Log-Log Inverse	-2.4489	1.0577	-11.0173	0.6513
20.	31	Leather & Leather Products	Log-Log Inverse	-3.3516	0.9869	30.4546	0.6015
21.	54	Construction	Log-Log Inverse	-2.4318	1.0659	44.8626	0.4458
22.	60	Other Services	Log-Log Inverse	-2.8606	1.0813	-22.4194	0.7486

**TABLE—17**  
**EXPENDITURE CUT-OFF CORRESPONDING TO VARIOUS**  
**EXPENDITURE STRATA**

(Monthly PCE \* in Rupees)

Year	Rural			Urban		
	X	Y	Z	X	Y	Z
1969-70	26.89	35.85	53.78	31.03	41.37	62.06
1970-71	26.48	35.31	52.97	30.56	40.75	61.13
1972-73	30.95	41.26	61.89	35.70	47.60	71.40
1973-74	36.82	49.09	73.64	42.48	56.64	84.96
1977-78	45.25	60.33	90.50	52.21	69.61	104.42
1983-84	75.65	100.86	151.29	87.28	116.37	174.56

Notes :—

People below X are very poor.

People between X & Y are moderately poor.

People between Y & Z are non-poor middle.

People above Z are non-poor higher.

Y is poverty line.

X is 75% of the poverty line.

Z is 150% of the poverty line.

P.C.E.\* : Per Capita Expenditure.

**TABLE—18**  
**COMMODITY CLASSIFICATION**

S. No.	Commodity Group	Commodities Included
1.	Cereals and Cereal substitutes	Rice, Wheat, Jowar, Bajra, Maize, Barley, Ragi and Small Millets and their products.
2.	Milk and Milk products	Liquid milk, Condensed and Powdered milk, Ghee, Butter and other Milk products.
3.	Edible Oils	Oil, Oil Seeds and products.
4.	Meat, Egg and Fish	Meat, Egg and Fish.
5.	Sugar and Gur	Caned sugar, Gur and Sugar Candy and products.
6.	Other Food	Pulses, Fruits and Vegetables, spices, beverages, Processed Food, Refreshments.
7.	Fuel and Light	Coke, Coal, Firewood, Electricity, Gas, Dung Cake, Kerosene, Candle, Matches, and other fuel and lighting oils.
8.	Clothing	Cotton Textiles, Khadi, Woollen Yarn, and Textiles, Silk Yarn and Textiles, Art Silk.
9.	Other Non-food	Pan, Tobacco and Intoxicants, Furniture and other sundry goods, Medicine, miscellaneous goods and services.



TABLE-19

**WEIGHTS USED IN COMPUTATION OF COMMODITY  
GROUP PRICE INDICES**

S. No.	Commodity	Weights	
		Rural	Urban
<b>I. Cereal &amp; Cereal Substitutes</b>			
1.	Rice	0.558	0.549
2.	Wheat	0.235	0.360
3.	Jowar	0.086	0.047
4.	Bajra	0.039	0.016
5.	Maize	0.034	0.005
6.	Barley	0.010	0.002
7.	Ragi	0.025	0.009
8.	Gram	0.013	0.012
<b>II. Milk and Milk Products</b>			
1.	Milk	0.813	0.837
2.	Butter	0.016	0.011
3.	Ghee	0.171	0.152
<b>III. Edible Oils</b>			
1.	Vanaspati	0.117	0.229
2.	Mustard Oil	0.458	0.269
3.	Coconut Oil	0.035	0.026
4.	Gingelly Oil	0.035	0.038
5.	Groundnut Oil	0.355	0.438
<b>IV. Meat, Egg and Fish</b>			
1.	Meat	0.527	0.548
2.	Eggs	0.060	0.108
3.	Fish	0.413	0.343
<b>V. Sugar and Gur</b>			
1.	Sugar	0.486	0.824
2.	Sugarcane (gur)	0.486	0.171
3.	Khandsari	0.022	0.004
4.	Sugar Candi	0.005	0.000
<b>VI. Other Food</b>			
1.	Gram	0.034	0.024
2.	Moong	0.046	0.045
3.	Urad	0.045	0.027
4.	Arhar	0.139	0.116
5.	Masoor	0.040	0.029
6.	Potato	0.104	0.089
7.	Onion	0.050	0.043
8.	Tomato	0.019	0.030
9.	Cauliflower	0.007	0.011
10.	Root Vegetables	0.012	0.010
11.	Banana	0.018	0.032
12.	Oranges	0.006	0.012
13.	Mango	0.012	0.016
14.	Copra	0.005	0.007

TABLE—19Contd.

S. No.	Commodity	Weights	
		Rural	Urban
15.	Ground Nuts	0.007	0.007
16.	Cashew Nuts	0.001	0.002
17.	Salt	0.018	0.009
18.	Turmeric	0.034	0.021
19.	Black Pepper	0.007	0.006
20.	Chillies (dry)	0.101	0.057
21.	Other Spices & Condiments	0.124	0.100
22.	Tea	0.150	0.213
23.	Coffee	0.013	0.020
24.	Biscuits	0.009	0.023
25.	Bread	0.003	0.017
<b>VII. Fuel and Light</b>			
1.	Coke	0.020	0.071
2.	Coal	0.048	0.123
3.	Electricity	0.114	0.332
4.	Kerosene	0.657	0.415
5.	Matches	0.143	0.053
6.	Candles	0.019	0.006
<b>VIII. Clothing</b>			
1.	Cotton Textiles (Mills)	0.648	0.454
2.	Cotton (Powerlooms & Handlooms)	0.153	0.085
3.	Khadi	0.008	0.002
4.	Woolen yarn & Textiles	0.015	0.036
5.	Silk Yarn & Textiles	0.172	0.419
6.	Cotton Yarn	0.004	0.004
<b>IX. Other Non-food</b>			
1.	Footwear	0.071	0.086
2.	Earthen ware	0.010	0.007
3.	Mattress	0.003	0.001
4.	Utensils	0.066	0.080
5.	Radio/TV	0.019	0.022
6.	Clock & Watch	0.005	0.009
7.	Fan	0.001	0.006
8.	Bicycles	0.011	0.011
9.	Tyre & Tubes	0.069	0.006
10.	Motor Vehicles	0.004	0.019
11.	Bulbs and Tubes	0.003	0.009
12.	Betel Nuts	0.022	0.018
13.	Cigarettes	0.014	0.068
14.	Biri	0.098	0.070
15.	Leaf Tobacco	0.032	0.012
16.	Tobacco Manufactures	0.169	0.196
17.	Country liquor	0.035	0.007
18.	Foreign liquor	0.001	0.007
19.	Toilet Soap	0.032	0.068
20.	Powder, snow & cream	0.060	0.021
21.	Comb	0.001	0.001
22.	Hair Oil	0.069	0.086
23.	Other toilet Articles	0.007	0.014
24.	Batteries	0.004	0.007
25.	Torch	0.003	0.001

## **Review of Emperical Studies reported on Complete Demand System**

By

*Dr. R. Radhakrishna*

It has been decided in the last meeting of the working group on Consumption Sub-Model to stratify the rural/urban population into 3 groups viz., very poor, poor, rich and estimate separate demand models for each group by pooling time series of cross section data on consumption provided by the NSSO. For this purpose, one needs to choose a model which can handle a large number of commodity groups and can be estimated easily from the existing data. The model should reflect the affects of income redistribution and dual pricing policies resulting from alternative government policies. In this context it would be helpful to review the emperical studies that have been reported on Complete Demand Systems. This will help us the considerations one has to take note of while formulating the model.

### *Engel Curves*

The availability of the National Sample Survey (NSS) data on consumer expenditure since 1950 has stimulated a large number of studies on consumption patterns (Rudra 1969 and Bhattacharya 1975). However, most of the early studies based on this wealth of data were confined to the estimation of Engel Curves (Coondo 1975 and Jain 1975). Expenditure elasticities obtained from them have become the conceptual tools for demand projection making the following assumptions : insensitivity of consumer expenditure to price changes; invariance of income elasticities over time and price structure. Projections made at the mean level further assume away the changes in income distribution. These assumptions appear unrealistic for a number of reasons. The influence of prices both on household consumption and income elasticities has been sharply brought into focus by the few studies carried out recently on complete demand systems for India (Bhattacharya 1967, Murty 1977, Murty 1978, Radhakrishna and Murty 1973 and Radhakrishna and Murty 1977). It would also be unrealistic to ignore dependencies between shifts in income distribution and demand projections, as there is a great deal of variation in the scale of preferences across certain definable groups within the economy. Income distributional effects may be ignored if the shifts in income distribution are marginal compared to total growth. But in a developing country like India, it is well established that frequent fluctuations in agricultural output alter the income terms of trade.

### *Indifference Surfaces*

In a few studies, quadratic utility functions have been estimated from family budget data (Mahajan 1972, Radhakrishna and Murty 1975 and Radhakrishna 1977). The estimated

quadratic utility functions mostly violate the convexity conditions. All other theoretical preconditions are satisfied as they are built into the method of estimation. Further, the quadratic utility function implies linear Engel curves which are restrictive when the range of income variation is wide. Further the methods of estimation are data demanding and the parameter estimates appear to be quite susceptible to measurement errors.

### *Linear Expenditure System (LES)*

Among the Complete Demand Systems, the Linear Expenditure System (LES) has received more attention; some have estimated the LES from the time series data (Bhattacharya 1967), whilst others from the time series of cross section data (Radhakrishna and Murty 1973). The LES possesses desirable theoretical properties. This is not surprising, since the additive utility functions, to which the LES conforms, are very rigid in specification and ensure the fulfilment of almost all the theoretical properties. They do not tell us whether the theoretical properties do or do not hold in practice. We can only explore whether they provide a satisfactory description of consumer behaviour at a reasonable level of commodity aggregation. The LES also gives rise to linear Engel curves. The severity of this restriction can be moderated, to some extent in time series models designed mainly for providing predictions at the mean level without changes in income distribution, either by introducing time trends into the parameters (Stone 1965) or by resorting to habit formation hypothesis (Pollack and Wales 1969). Even these moderations fail to forge a link between consumption patterns and income distribution.

Some attempts have been made by Radhakrishna and Murty at Sardar Patel Institute of Economic and Social Research (SPIESR) to overcome some of the above limitations of the LES by the use of the piece-wise LES. The NSS per capita expenditure brackets of the rural and urban areas have been aggregated into three expenditure (income) classes viz., lower, middle and higher and a separate LES (with six and nine commodity groups) has been fitted to each group. The results have clearly brought out the suitability of the LES for local approximation and show sizeable variations in the parameter estimates across the expenditure groups. For example, the foodgrains group takes a major share of the total expenditure of the lower expenditure group (about 45 per cent in rural areas and 30 per cent in urban areas) and its weightage reduces considerably as the total expenditure level rises (to about 9 per cent in rural higher expenditure group and 2 per cent in urban higher expenditure group). Rural-urban variations are also found to be sizeable : the marginal budgets of urban lower and middle expenditure groups are more varied and diversified than their counterparts in rural areas. Nevertheless, one notices that in the case of a majority of items, variation across income groups are more marked compared to rural-urban differences for corresponding income groups.

Radhakrishna, Murty and Shah (1979) have fitted piece-wise LES to the NSS data separately for NSS rounds 2nd to 20th and 8th to 20th. Their study indicated stability of parameter estimates. They have also attempted to study the changes in the estimates of parameters due to differences in the level of commodity aggregation by fitting nine-commodity as well as six-commodity LES to the same data. Further, by utilising detailed disaggregated NSS data on foodgrains, they have estimated sub-model for foodgrains and using it, they arrived at the enlarged version of the LES by employing hierarchy method.

Radhakrishna and Murty stratified rural/urban population into 5 groups and fitted nine-commodity LES to the NSS rounds 2nd to 25th. They also estimated sub-models for cereals and arrived at the enlarged LES for 13 commodity groups. The above results have been extensively used in policy analysis.

The LES has also been applied to the regional level data (Radhakrishna and Murty 1973, Murty and Shah 1983, Murty and Singh 1984, Indrakanth 1986). Radhakrishna and Murty (1973) have used two stage budgeting approach to estimate the complete set of demand elasticities for Gujarat economy. Adopting the Frisch scheme they arrived at the demand elasticities for enlarged commodity groups. This approach has a great practical value whenever price data are inadequate.

#### *Indirect Addilog System (IAS)*

An attempt has also been made to examine whether the Indirect Addilog System (IAS), a non-linear system, provides a reasonable description of consumer behaviour over the entire income range (Radhakrishna and Murty 1977). Both sample and post sample predictions of the expenditures of various income groups have shown that the IAS gives a poor fit for lower income groups. It emerges from the above study that the IAS is not flexible enough to provide a satisfactory description of the consumer behaviour over the entire range of total expenditure (income). Thus, it brings out the limitations of IAS in handling the distributional effects.

The IAS has also been separately estimated for each expenditure group. The parameter estimates differ markedly across expenditure groups, thus reinforcing the need for distinguishing expenditure groups. In a large number of cases, the IAS is found to violate the convexity conditions. There is not much difference between LES and IAS in terms of goodness of fit.

#### *Almost Ideal Demand System (AIDS)*

Deaton and Muellbauer 1980 proposed a general system of demand equations—called the Almost Ideal Demand System (AIDS). Ray 1980 and Anitha Majumdar (1984) applied the AIDS to Indian data. The model seems to give a satisfactory fit, but violates convexity conditions. The model as compared to the LES, has the disadvantage of possessing a large number of parameters which may pose a problem when the number of commodity groups are large in number.

Radhakrishna and Murty (1982) also estimated extended version of the LES proposed by NASSE (1970) which allows specific substitution effects among the consumer items separately for each of the above groups. The NASSE model has been first estimated without imposing any restriction on the C-matrix. It is observed that the estimated models violate convexity conditions. However, when the model has been estimated imposing a restriction that non-food items are additively separable, the estimated models are found to satisfy the convexity conditions.

#### *Suggested Model*

It is clear from the above discussion that the LES is widely applied. Taking into consideration the availability of data and the requirements of the planning model, the following

suggestions can be considered :

- (i) Use the LES and the AIDS for broad groups and compare their performances.
- (ii) Estimate sub-group models and enlarge the LES by employing hierarchic method.
- (iii) Wherever data are not available for estimating the sub-groups model, use the procedure suggested by the previous task force for disaggregating the predicted group expenditure.
- (iv) Since the NSS data appear to be under estimating the consumption of textiles and other durable goods special studies may be commissioned for the analysis of their demand. The LES can be used for the rest of items.

The procedure to estimate the LES and sub-models is given in Radhakrishna and Murty (1980).

#### REFERENCES

- (1) Bhattacharya, N. 1967. "Consumer Behaviour in India : An Application of Linear Expenditure System." *Economic and Political Weekly*, Vol. 2.
- (2) Bhattacharya, N. 1975. "Studies on Consumer Behaviour in India" *Indian Statistical Institute (mimeo)*.
- (3) Condo, D. 1975. *Contributions to the Analysis of Consumer Behaviour*. Ph.D. Thesis, Indian Statistical Institute.
- (4) Deaton, A.S. and Muellbauer, J. 1980. "An Almost Ideal Demand System" *American Economic Review*, Vol. 70.
- (5) Indrakant, S. 1986. *Effect of Price and Income on Household Expenditure Patterns in Andhra Pradesh : Some Policy Implications* Ph.D. Thesis, Osmania University.
- (6) Jain, L.R. 1975. *Methods of Demand Projections with Special Reference to the System of Addilog Functions* Ph.D. Thesis, Delhi School of Economics.
- (7) Mahajan, B.M. 1972. *Econometrics of Consumer Behaviour in India with Articulation of Method for Approximate Determination of Indifference Surfaces* Ph.D. Thesis, University of Poona.
- (8) Majumdar, A. 1987. *Statistical Models for Consumer Behaviour in India* Ph.D. Thesis, Indian Statistical Institute.
- (9) Murty, K.N. 1977. "On Non-linear Expenditure System" *Anvesak* Vol. 2.
- (10) Murty, K.N. 1978. *Econometrics of Consumer Behaviour in India : A Study of Complete Demand Systems* Ph.D. Thesis, Gujarat University.
- (11) Murty, G.V.S.N. and Singh, S. 1984. *Demand Patterns in Punjab : An Application of Linear Expenditure System*. SPIESR (mimeo) Ahmedabad.
- (12) Pollack, R.A. and Wales, T.J. 1969. "Estimation of the Linear Expenditure System" *Econometrica* Vol. 37.
- (13) Radhakrishna, R. 1977. 'Approximate Determination of Indifference Surfaces from Family Budget Data' *Anvesak* Vol. 19.
- (14) Radhakrishna, R. and Murty, G.V.S.N. 1973. "An Approach to Estimate Complete Set of Demand Elasticities Based on Two Stage Budgeting : An Application to the Patterns of Gujarat" *Anvesak* Vol. 3.

- (15) Radhakrishna, R. and Murty, G.V.S.N. 1975. "Estimation of Indifference Surfaces" Under Block Independence Specification". *3rd World Congress of Econometric Society (mimeo)*.
- (16) Radhakrishna, R., Murty, G.V.S.N. and Shah, N.C. 1979. *Models of Consumer Behaviour for Indian Economy*. SPIESR, Ahmedabad.
- (17) Radhakrishna, R. and Murty, K.N. 1977. "An Application of Indirect Addilog System to Consumer Behaviour in India" *Econometric Conference, Trivendrum*.
- (18) Radhakrishna, R. and Murty, K.N. 1980. *Models of Complete Expenditure System for India* Wp. 8098 International Institute of Applied Systems Analysis.
- (19) Ray, R. 1980. "Analysis of Time Series of Household Expenditure Surveys for India" *Review of Economics and Statistics*, Vol. 62.
- (20) Rudra, A. 1969. *Measurement in Economics* Allied Pub. Bombay.
- (21) Stone, J.R.N. 1965. "Models for Demand Projection" in C.R. Rao (ed.) *Essays in Econometrics and Planning* Oxford, Pergamon.

