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OCCUPATIONAL VARIATION IN THE PATTERN OF CONSUMER EXPENDITURE IN RURAL INDIA*

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INTRODUCTION

A significant number of empirical studies have been made over the last few years to analyse consumer expenditure pattern in India. By and large, these studies have remained confined to estimating and analysing Engel elasticity for various items of expenditure by fitting alternative forms of Engel curves to the data obtained from different rounds of the National Sample Survey (NSS). A few studies have also taken into consideration such variables as household size, etc., to explain the variation in household consumption expenditure. Very little has, however, been done to analyse the differences in the pattern of consumption expenditure among occupation groups, although one would expect such occupational differences to exist. Needless to say, the primary reason for this is the paucity of household expenditure data for different occupation groups. The present paper based on a special tabulation of the 18th Round NSS data (February, 1963-January, 1964) covering the whole of rural India, is concerned primarily with the examination of differences in the expenditure patterns of households having different types of agricultural occupations.

As regards earlier studies which attempted to examine the variation in household consumer expenditure pattern among different occupation groups, mention may be made of those by Ganguly (1960),[1] Singh (1968)[2] and Jain and Tendulkar (1973).[3] The study by Singh was based on expenditure data of households of different occupation groups in the rural and urban sectors of western Uttar Pradesh. Jain and Tendulkar examined the pattern of occupational differences in consumption separately for the rural and the urban sectors of the country as a whole. The occupational classification used in these studies was much too broad, specially for the rural sector. Ganguly compared the expenditure patterns of rural households in Uttar Pradesh between different types of agricultural occupations, but he did not employ any rigorous statistical procedure to confirm his subjective conclusions.

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1. A. Ganguly, "Consumption Patterns in Different Occupation Groups," in Studies on Consumer Behaviour, Edited by A. Ganguly, Asia Publishing House, Calcutta, 1960.

2. Balvir Singh, "Role of Occupational Factors in Household Consumption," *Indian Economic Review*, Vol. 3 (New Series), No. 2, October, 1968, pp. 85-110.

3. L. R. Jain and S. Tendulkar, "Analysis of Occupational Differences in Consumer Expenditure Patterns in India," *Sankhyä*, Series B, Vol. 35, Part 2, 1973, pp. 239-267.

Before reporting the results of the present analysis, it would be useful to summarise briefly the features of the studies mentioned above.

Ganguly (1960) found considerable differences in the consumption pattern of households of farmers and cultivators, agricultural labourers, and other households in rural Uttar Pradesh utilizing NSS 7th Round data (October, 1953-March, 1954). In this study, occupationwise Engel curves for five food items were compared subjectively through graphs. However, this pioneering study has the limitation that the expenditure estimates have been obtained through simple averaging of householdwise data without using the probability weights for estimation, so crucial for a sample survey like the NSS.

Singh's study (1968), based on ungrouped consumer expenditure data for the rural and urban sectors of western Uttar Pradesh obtained from the 15th Round of NSS (July, 1959-June, 1960), considered four broad occupational groups, *viz.*, (*i*) semi-professionals, clericals, shop keepers and big cultivators, (*ii*) cultivators,[4] (*iii*) skilled and semi-skilled workers, and (*iv*) unskilled unemployed and unclassifiable workers.[5] Expenditure patterns of these occupation groups were compared on the basis of Engel elasticities of 12 food and 9 non-food items. Precisely, for each item-occupation-sector combination 10 Engel curve forms were fitted. For each occupation the Engel elasticities for different items were estimated separately for the two sectors, at the occupation specific average per capita total consumer expenditure on the basis of the best-fitting form of Engel curve (having the maximum coefficient of determination), and the commodities were classified into luxury, necessary and inferior items according as the computed Engel elasticity for any item is greater than or equal to unity, less than unity but positive, and negative respectively. The resultant commodity classifications were found to differ considerably among occupation groups within a sector, and also between sectors for any specific occupation group.

This study, though an important empirical exercise has some limitations. First, the magnitudes of some of the estimated elasticities raise suspicion. Indeed, one may question the reliability of these estimates in view of the fact that in most cases the sample size was quite small. Finally, the conclusions about the occupational differences in the consumption patterns were not examined through statistical tests.

Jain and Tendulkar's study (1973) is elegant and satisfactory in many respects. They used all-India estimates of per capita item expenditure cross-classified by levels of per capita monthly total consumer expenditure and occupation separately for rural and urban India, obtained from the 19th Round NSS (July, 1964-June, 1965). Expenditure patterns for nine items/

4. For the urban sector 'big cultivators,' were grouped with 'cultivators' in (*ii*).
5. The difference between 'big cultivators' and 'cultivators' was that whereas the former might have some marketable surplus, the latter were 'subsistence farmers.'

item-groups were examined for each of five occupational groups, *viz.*, (*i*) professionals, technical, administrative, executive, managerial and clerical and related workers, (*ii*) sales workers, (*iii*) farmers, fishermen, hunters, loggers and related workers, (*iv*) craftsmen, production process and related workers, and (*v*) miners, quarrymen, workers in transport and communication, services, sports and recreation workers and workers not classified elsewhere. For comparing the expenditure pattern of different occupation groups in respect of specific items of expenditure, the authors insisted that in a sector the item-specific Engel curves must have the same form across occupation groups. They fitted six two-parameter forms of Engel curve, *viz.*, linear, semi-log, double-log, log-inverse, hyperbola and exponential for each item in each sector using all-occupation expenditure data and selected the best-fitting form as the one for which the weighted sum of squares of differences between observed and predicted item expenditures turned out to be minimum, the weights being the estimated population in individual per capita monthly total expenditure classes in the sector. In subsequent analysis, they applied the analysis of covariance tests of homogeneity to the occupation groupwise Engel curves for each item of expenditure in each sector. The results of these tests showed considerable inter-occupational differences in the consumer expenditure patterns. Having established this, Jain and Tendulkar went on further to identify what they called the 'dominant occupation' in the sense of having a consumption pattern, on the whole, different from the rest. This was done by performing occupation pairwise tests of homogeneity of Engel curves. Their results showed that the agricultural occupations and the professionals, technical and related workers are the dominant groups in rural and urban India respectively.

As already mentioned, studies by Singh and Jain and Tendulkar consider occupation groups that are much too broad and heterogeneous, particularly in the rural sector. Agricultural occupation in the latter study includes agricultural labourers as well as cultivators and accounts for approximately 81 per cent of the estimated rural population. These two groups are expected to have distinctly different consumption patterns. Jain and Tendulkar themselves admitted this lumping together of all agricultural occupations as a limitation of their study. In this respect the occupational classificaton used by Ganguly seems more reasonable for the rural sector of the country.

THE PRESENT STUDY : SCOPE AND MATERIAL

Apart from carrying out some technical refinements and detailed analysis, the present study is expected to throw some new light with regard to the difference in the consumption pattern particularly between the agricultural labourers and the cultivators and this we consider to be the most important aspect of our study.

The present work is based on the data available from a special tabulation of the 18th Round NSS (February, 1963-January, 1964) household budget

enquiry. This tabulation provides, among many other things, occupationwise averages of monthly per capita total consumer expenditure and item expenditure for 15 selected items, by the usual size classes of monthly per capita total expenditure separately for rural and urban India. Since our primary interest is to examine the differences in the consumption pattern of certain agricultural occupations, we have considered only the rural sector. To save time and volume of computational work, we have also confined ourselves to an analysis of the combined sample data only, though half-samplewise estimates were also obtained in this tabulation.

It may be mentioned that in the NSS enquiries, household industry-occupation status is also recorded in a six-digited code (first three digits of which indicate the industry while the last three digits indicate the type of occupation) along with information about consumer expenditures. Precisely, a household's occupation-type indicates the major sources of income of the household during the year preceding the date of enquiry. Based on these household occupation codes, the present tabulation classified the rural sample households covered in the 18th Round into four occupation groups , *viz.*, (*i*) cultivators, (*ii*) agricultural labourers, (*iii*) other agricultural workers, ad (*iv*) non-agricultural workers. The coverage of these groups is briefly as follows : Cultivators includes both owner and tenant cultivators who operate with household or hired labour. Agricultural labour households include those households for which agricultural wage employment constitutes the major source of income. The term agricultural wage employment may be defined as employment in the capacity of a labourer on hire (paid in cash and/or in kind) or on exchange in agricultural activities. Other agricultural occupations include activities of rural artisans primarily and non-agricultural occupation is the residual group.

We have taken up in this study all the 15 items of expenditure for which the necessary estimates are available. The items are as follows : (1) cereals, (2) milk, (3) milk products, (4) pulses, (5) oils, (6) vegetables, (7) fruits, (8) fish, egg, etc., (9) sugar, (10) spices, (11) beverages, (12) all-food, (13) tobacco, (14) fuel and light and (15) services.

Table I gives some general information and Engel ratios (*i.e.*, expenditure on a particular item expressed as a proportion of total expenditure) for the 15 items separately for the four occupation groups. It is seen that the average per capita monthly total consumer expenditure figures display a wide range of variation between occupation groups. It is highest for other agricultural occupations (Rs. 24.39), followed by cultivators (Rs. 23.54), non-agriculture (Rs. 21.74) and with agricultural labourers (Rs. 16.43) at the bottom. It is clear therefore that in terms of the average per capita consumer expenditure, the cultivators are much better-off as compared to the agricultural labourers.

TABLE I—ENGEL RATIOS AND GENERAL CHARACTERISTICS OF THE HOUSEHOLDS BY OCCUPATION GROUPS: NSS 18TH ROUND, ALL-INDIA RURAL, COMBINED SAMPLE

Sr. No.	Item	Occupation groups				
		Cultivator	Agricultural labourer	Other agriculture	Non-agriculture	All
(1)	(2)	(3)	(4)	(5)	(6)	(7)
		Engel ratios				
1.	Cereals	40.82	50.03	35.68	38.13	41.42
2.	Milk	4.80	2.25	4.47	4.05	4.33
3.	Milk products	3.48	1.10	2.79	2.67	3.01
4.	Pulses	4.76	4.38	4.47	4.05	4.56
5.	Oils	2.93	2.74	3.08	3.17	2.97
6.	Vegetables	2.93	3.04	2.99	2.85	3.01
7.	Fruits	0.98	0.79	1.31	1.38	1.05
8.	Fish, egg, etc.	1.66	2.19	2.17	2.44	1.87
9.	Sugar	3.65	2.43	3.36	3.13	3.38
10.	Spices	2.80	3.65	3.04	2.99	2.97
11.	Beverages	1.49	2.43	2.99	4.37	2.24
12.	All-food	65.80	69.51	63.70	65.59	66.20
13.	Tobacco	1.95	2.62	2.05	2.25	2.10
14.	Fuel and light	2.25	8.09	6.89	7.13	6.94
15.	Services	3.14	1.64	3.94	2.76	2.87
	No. of sample households ..	11,784	4,247	455	5,055	21,541
	Average monthly per capita total expenditure (Rs.) ..	23.54	16.43	24.39	21.74	22.36
	Proportion of estimated number of persons	59.96	17.87	1.92	20.25	100.00

The items covered in the study account for roughly four-fifths of the total household expenditure for the two groups, other agriculture and non-agriculture, but about 87 per cent and 77 per cent respectively for agricultural labourers and cultivators respectively. It is also seen that the Engel ratio for food is highest (69.51 per cent) for agricultural labourers. The same is true for cereals (50.03 per cent).

CHOICE OF ENGEL CURVE FORM

In our analysis we have considered four two-parameter forms of Engel curve *viz.*, linear (L), double-log (DL), semi-log (SL) and long-inverse (LI), and the three-parameter log-log-inverse (LLI) form which is known to give very satisfactory fit to Indian data. All these forms have been fitted for each item and occupation group. In every case, per capita item expenditure or its logarithm has been regressed on per capita total consumer expenditure and/or its transformations by the method of weighted least squares, the weights being the percentage of estimated population in different size classes of per capita total expenditure.

While comparing the consumption patterns of different occupation groups, we decided not to base the comparison on a single form of Engel curve. The reason is that for many items the best-fitting form of Engel curve was found to differ among occupation groups and the choice of a single form for all the occupation groups would involve some arbitrariness. We, therefore, preferred to have the comparisons, for each item, based separately on all the two-parameter forms which were found to give best-fit for at least one occupation group as well as on the log-log-inverse form. To decide upon the best-fitting two-parameter form for each item-occupation pair we used the squared correlation coefficient (R_y^2) between the observed and predicted values of item expenditure for each of the forms mentioned above. It may be mentioned that the LLI yielded maximum R_y^2 for most of the item-occupation combinations thus justifying its inclusion and separate treatment in the study. In 30 out of 60 cases the LLI form turned out to be the best-fitting, while the linear form was seen to be best in 19 cases. Considering the second-best forms, it was seen that in 20 and 16 cases the double-log and the LLI turned out to be second-best forms repectively.

ESTIMATES OF ENGEL ELASTICITIES

Before applying the tests of homogeneity to examine the patterns of consumer expenditure across different occupation groups, we calculated the Engel elasticities for each item and occupation group. Precisely, for each item-occupation pair three estimates of Engel elasticity were calculated, *viz.*, the average elasticity ($\bar{\eta}$),[6] the elasticity at occupationwise average per capita

6. An advantage of calculating the average elasticity for a variable elasticity Engel curve is that it becomes possible to summarise the whole curve by means of one number taking due account of the share of aggregate expenditure for any item accounted for by each monthly per capita expenditure class to its mean expenditure. It is defined as

$$\left[\bar{\eta} = \int_0^\infty \eta_x \frac{E(y/x)}{E(y)} g(x)dx \right]$$

where η_x is the variable elasticity at per capita total expenditure level x, E(y/x) is the item expenditure predicted by the Engel curve, g(x) is the density function of x and E(y) is the mean level of item expenditure. For computation procedure of $\bar{\eta}$, see N. Bhattacharya, "The Average Elasticity of a Variable Elasticity Engel Curve," Presented at the 11th Indian Econometric Conference, Hyderabad, 1972.

total consumer expenditure ($\eta_{|\bar{x}}$) and the elasticity at all-occupation average per capita total consumer expenditure ($\eta_{|\bar{\bar{x}}}$). Tables IIA-IIB present these estimates. While $\bar{\eta}$ is a single measure of elasticity for the entire Engel curve and takes into account the distribution of population among different per capita expenditure levels within a single occupation group, the $\eta_{|\bar{x}}$ gives the elasticity for the consumer with the average per capita total expenditure within a particular occupation group. $\eta_{|\bar{\bar{x}}}$ is perhaps most relevant from the point of view of inter-occupational comparison of Engel elasticities, since this is free of any effect arising from inter-occupational differences in the level of average per capita total consumer expenditure. For each item-occupation pair $\bar{\eta}$, $\eta_{|\bar{x}}$ and $\eta_{|\bar{\bar{x}}}$ have been computed separately for the LLI curve and for the best-fitting two-parameter Engel curve. Table IIA presents the elasticities for the two-parameter forms while Table IIB presents the elasticities for the LLI form.

TABLE IIA—ESTIMATES OF ITEM ELASTICITIES BASED ON THE BEST-FITTING TWO-PARAMETER ENGEL CURVE FORM FOR EACH OCCUPATION GROUP : NSS 18TH ROUND, ALL-INDIA RURAL, COMBINED SAMPLE

Sr. No.	Item	Occupation group: Cultivator				Occupation group: Agricultural labourer			
		Form	$\bar{\eta}$	$\eta_{\bar{x}}$	$\eta_{\bar{\bar{x}}}$	Form	$\bar{\eta}$	$\eta_{\bar{x}}$	$\eta_{\bar{\bar{x}}}$
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
1.	Cereals	SL	0.551	0.508	0.528	SL	0.693	0.645	0.544
2.	Milk	L	1.153	1.154	1.168	LI	1.530	1.822	1.366
3.	Milk products ..	L	1.457	1.469	1.521	L	2.195	2.258	1.717
4.	Pulses	DL	0.758	0.758	0.758	DL	0.938	0.938	0.938
5.	Oils	DL	0.885	0.885	0.885	SL	1.013	0.913	0.723
6.	Vegetables	SL	0.927	0.814	0.864	SL	1.038	0.935	0.736
7.	Fruits	L	1.300	1.300	1.330	L	1.295	1.314	1.218
8.	Fish, egg, etc. ..	LI	0.894	0.931	0.999	LI	1.035	1.094	0.820
9.	Sugar	L	1.225	1.224	1.244	L	1.336	1.330	1.229
10.	Spices	L	0.677	0.677	0.662	L	1.296	1.295	1.206
11.	Beverages	L	1.282	1.739	1.839	L	1.466	1.465	1.312
12.	All-food	DL	0.844	0.844	0.844	DL	0.899	0.899	0.899
13.	Tobacco	DL	0.705	0.705	0.705	DL	1.068	1.068	1.068
14.	Fuel and light ..	DL	0.715	0.715	0.715	L	1.026	1.026	1.020
15.	Services	DL	1.846	1.846	1.846	L	1.716	1.745	1.471

(Contd.)

TABLE IIA—(*Concld.*)

Sr. No.	Item	Occupation group							
		Other agriculture				Non-agriculture			
		Form	$\bar{\eta}$	$\eta_{\bar{x}}$	$\eta_{\bar{\bar{x}}}$	Form	$\bar{\eta}$	$\eta_{\bar{x}}$	$\eta_{\bar{\bar{x}}}$
(1)	(2)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
1.	Cereals	LI	0.475	0.395	0.440	LI	0.452	0.391	0.388
2.	Milk	L	0.948	0.947	0.942	L	1.448	1.453	1.448
3.	Milk products ..	DL	1.143	1.143	1.143	L	1.649	1.652	1.643
4.	Pulses	L	0.888	0.886	0.875	SL	0.842	0.752	0.747
5.	Oils	L	0.916	0.915	0.907	SL	0.943	0.832	0.826
6.	Vegetables	SL	0.972	0.825	0.904	SL	1.014	0.886	0.879
7.	Fruits	L	1.571	1.596	1.711	L	1.376	1.377	1.372
8.	Fish, egg, etc. ..	SL	1.114	0.925	1.026	L	1.076	1.079	1.078
9.	Sugar	DL	1.143	1.143	1.143	L	1.071	1.072	1.071
10.	Spices	L	0.517	0.507	0.480	SL	0.685	0.624	0.620
11.	Beverages	L	1.231	1.231	1.264	DL	1.506	1.506	1.506
12.	All-food	DL	0.765	0.765	0.765	DL	0.824	0.824	0.824
13.	Tobacco	LI	0.573	0.497	0.553	DL	0.882	0.882	0.882
14.	Fuel and light ..	DL	0.621	0.621	0.621	DL	0.714	0.714	0.714
15.	Services	DL	2.054	2.054	2.054	DL	1.774	1.774	1.774

$\bar{\eta}$ = Average elasticity.

$\eta_{\bar{x}}$ = Elasticity at occupation-specific average monthly per capita total expenditure.

$\eta_{\bar{\bar{x}}}$ = Elasticity at all-occupation average monthly per capita total expenditure (Rs. 22.36).

A few comments regarding the relative magnitudes of $\bar{\eta}$ and $\eta_{\bar{x}}$ may be worthwhile. As between $\bar{\eta}$ and $\eta_{\bar{x}}$ it is observed that in some cases these elasticities are similar in magnitude while in other cases they differ considerably.[7] This, however, is not surprising because while $\bar{\eta}$ is affected by the size distribution of total expenditure, $\eta_{\bar{x}}$ is dependent upon only the mean level of total expenditure. As regards the relative magnitudes of $\eta_{\bar{x}}$ computed from the best-fitting two-parameter form and from the LLI form, it is seen that in most of the cases where the LLI form and the best-fitting two-parameter form give equally good fit, the $\eta_{\bar{x}}$ computed from either form shows close agreement.

7. This is quite likely. For example, for the semi-log form, $\bar{\eta}$ is the elasticity computed at geometric mean of x and hence it is less than $\eta_{\bar{x}}$.

TABLE 11B—ESTIMATES OF ITEM ELASTICITIES BASED ON THE LOG-LOG-INVERSE ENGEL CURVE FORM FOR EACH OCCUPATION GROUP : NSS 18TH ROUND, ALL-INDIA RURAL, COMBINED SAMPLE

Sr. No.	Item	Occupation group											
		Cultivator			Agricultural labourer			Other agriculture			Non-agriculture		
		η	$\eta_{\bar{x}}$	$\eta_{\bar{\bar{x}}}$	$\bar{\eta}$	$\eta_{\bar{x}}$	$\eta_{\bar{\bar{x}}}$	$\bar{\eta}$	$\eta_{\bar{x}}$	$\eta_{\bar{\bar{x}}}$	$\bar{\eta}$	$\eta_{\bar{x}}$	$\eta_{\bar{\bar{x}}}$
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
1.	Cereals	0.540	0.524	0.532	0.885	0.664	0.588	0.487	0.422	0.458	0.476	0.431	0.428
2.	Milk	1.359	1.373	1.385	1.746	1.960	1.628	1.037	1.037	1.045	1.556	1.568	1.567
3.	Milk products	1.666	1.634	1.617	2.061	2.200	2.047	1.539	1.375	1.237	1.804	1.760	1.762
4.	Pulses	0.726	0.711	0.725	0.892	0.885	0.800	0.899	0.903	0.890	0.818	0.804	0.802
5.	Oils	0.875	0.873	0.876	0.969	0.966	0.858	0.905	0.908	0.899	0.904	0.897	0.895
6.	Vegetables	0.901	0.895	0.908	0.985	0.984	0.959	0.927	0.910	0.970	0.965	0.962	0.960
7.	Fruits	1.387	1.421	1.443	1.412	1.408	1.437	1.694	1.684	1.678	1.399	1.393	1.394
8.	Fish, egg, etc.	1.141	1.158	1.191	1.247	1.272	1.158	1.118	1.177	1.380	1.205	1.213	1.212
9.	Sugar	1.308	1.311	1.315	1.456	1.486	1.404	1.140	1.140	1.142	1.202	1.219	1.217
10.	Spices	0.679	0.690	0.684	0.908	0.909	0.961	0.532	0.568	0.546	0.662	0.642	0.640
11.	Beverages	1.346	1.384	1.412	1.504	1.456	1.591	1.426	1.513	1.587	1.578	1.547	1.549
12.	All-food	0.836	0.834	0.837	0.879	0.874	0.835	0.755	0.745	0.757	0.797	0.786	0.784
13.	Tobacco	0.715	0.721	0.716	1.110	1.101	1.152	0.574	0.499	0.554	0.866	0.862	0.862
14.	Fuel and light	0.725	0.730	0.726	0.830	0.836	0.886	0.615	0.586	0.607	0.724	0.730	0.731
15.	Services	2.032	1.937	1.911	1.767	1.785	1.757	2.092	2.067	2.060	1.922	1.842	1.845

N.B.: For explanation of notations $\bar{\eta}$, $\eta_{\bar{x}}$ and $\eta_{\bar{\bar{x}}}$, see footnote to Table IIA.

We may now briefly indicate the pattern of differences of itemwise elasticities $\eta_{\bar{x}}$ across occupation groups. The variation is quite large for items such as milk, milk products, fruits, fish, egg, etc., sugar, spices, tobacco, fuel and light and services. The elasticities computed from the LLI form confirm the impressions based on the elasticities from two-parameter forms.

One may get a clearer picture by classifying the items into luxuries and necessities on the basis of $\bar{\eta}$ calculated from the best-fitting two-parameter form and the LLI form separately. We may report here only the results of such a classification. The classification based on the best-fitting two-parameter form exhibits considerable inter-occupational variation in consumption pattern, specially for the agricultural labourers (occupation 2) for which maximum number of items (12 out of 15) turn out to be luxuries, the only necessities being pulses, all-food and cereals. In terms of the log-log-inverse form, however, the number as well as the list of items classified as luxuries and necessities are on the whole the same for different occupation groups. This kind of classification is therefore found to be sensitive to the choice of the Engel curve form.

TEST OF HOMOGENEITY OF ITEMWISE ENGEL CURVES

To examine the pattern of inter-occupational differences in item expenditures, we applied the analysis of covariance technique and tested the homogeneity of itemwise Engel curves across occupation groups. These tests have been carried out in three stages : In the first stage, we considered all the four occupation groups together and examined the homogeneity of the Engel curves for all the four occupation groups; in the next stage, we dropped the non-agricultural occupation (group 4) and repeated the tests with three agricultural occupations; in the final stage we have sought to identify occupation pairs between which consumption patterns are clearly homogeneous or clearly distinct. In each of these three stages of analysis, we first examined the overall homogeneity of the itemwise Engel curves among occupation groups taking those forms of two-parameter Engel curve which gave best-fit for at least one occupation group and also the LLI form. If the hypothesis of overall homogeneity is rejected for any item, we have examined the homogeneity of slopes and intercepts of the best-fitting two-parameter Engel curve form(s).

Table IIIA summarises the results of the overall homogeneity tests for multi-group comparisons based on best-fitting two-parameter forms and also the LLI form. The results indicate that when all the four occupation groups are taken together, the Engel curves for only three items, *viz.*, vegetables, services, and all-food, are homogeneous. In all other cases, the null hypothesis of overall homogeneity has been rejected at 5 per cent level of significance. As regards the conformity of conclusions regarding the homogeneity of Engel curves reached on the basis of different curve forms, it may be mentioned that

only in the case of spices, tobacco and services the alternative two-parameter forms indicate different results. These anomalies may largely be resolved if we check the goodness of fit of the competing Engel curve forms across occupation groups, since the form that fits relatively poorly for occupation groups, other than the one for which it gives best-fit, often leads to such anomalous conclusion.

TABLE IIIA—COMPUTED VALUES OF F-RATIOS ASSOCIATED WITH THE TESTS OF OVERALL HOMOGENEITY OF ITEMWISE ENGEL CURVES ACROSS OCCUPATION GROUPS : NSS 18TH ROUND, ALL-INDIA RURAL, COMBINED SAMPLE

Sr. No.	Item	Including occupation 4					Excluding occupation 4				
		Form of Engel curve					Form of Engel curve				
		L	SL	LI	DL	LLI	L	SL	LI	DL	LLI
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
1.	Cereals ..	—	20.14	4.31	—	16.26	—	7.95	0.95	—	6.15
2.	Milk ..	5.82	—	9.89	—	17.11	7.16	—	—	—	23.43
3.	Milk products	11.0	—	—	19.99	14.07	12.43	—	—	27.50	19.96
4.	Pulses ..	—	6.00	—	14.03	23.52	—	3.93	—	13.44	25.07
5.	Oils ..	2.42	—	—	7.90	10.20	3.20	—	—	8.83	10.09
6.	Vegetables ..	—	1.55	—	—	1.56	—	1.47	—	—	0.51
7.	Fruits ..	14.20	—	—	—	9.13	3.54	—	—	—	1.19
8.	Fish, egg, etc.	6.80	7.92	6.16	—	11.47	2.18	4.91	—	—	8.59
9.	Sugar ..	12.95	—	—	11.98	8.70	13.29	—	—	16.14	10.57
10.	Spices ..	8.26	0.73	—	—	7.75	9.42	0.72	—	—	7.84
11.	Beverages ..	82.98	—	—	49.11	49.09	29.23	—	—	20.25	24.27
12.	All-food ..	—	—	—	0.94	1.47	—	—	—	1.25	0.84
13.	Tobacco ..	—	—	0.68	9.88	8.11	—	—	0.59	9.88	8.46
14.	Fuel and light	8.44	—	—	7.11	7.00	9.93	—	—	7.30	7.57
15.	Services ..	2.92	—	—	1.64	2.06	4.34	—	—	1.86	2.42
Degrees of freedom		40.6	40.6	40.6	40.6	36.9	30.4	30.4	30.4	30.4	27.6
Critical values of F at 5 per cent level		2.34	2.34	2.34	2.34	2.15	2.69	2.69	2.69	2.60	2.46
Critical values of F at 1 per cent level		3.29	3.29	3.29	3.29	2.94	4.02	4.02	4.02	4.02	3.56

The exclusion of occupation group 4 marginally alters the picture of heterogeneity described above. In this case, in addition to vegetables, all-food and services, the Engel curves for fruits also turn out to be similar across occupation groups.

The results of tests of homogeneity of slopes and intercepts of two-parameter forms are presented in Table IIIB. In this table F_1 is associated with the null hypothesis that the slopes are the same for different occupation groups, and F_2 is associated with the null hypothesis that the intercepts are the same given the fact that slopes are homogeneous. The results based on double-log and linear forms are particularly interesting, because the slope coefficients of these forms measure Engel elasticity and marginal propensity to consume respectively. Thus, when occupation 4 is included in the comparison, the Engel elasticities turn out to be similar for milk products, pulses, oils, sugar, beverages and fuel and light. Exclusion of occupation 4 does not alter this picture. Among the cases where the linear form has been used, the marginal propensities are found to be similar for milk and oil.[8] Exclusion of occupation 4 leads to homogeneity of slopes for fish, egg, etc., in addition. The overall picture that one gets from Tables IIIA-IIIB is thus one of considerable heterogeneity of expenditure patterns across occupation groups. With this picture in view we next proceed to examine the results of pairwise comparisons of Engel curves for different occupation groups.

Tables IVA and IVB present the F-ratios associated with the null hypothesis of pairwise homogeneity of Engel curves (of best-fitting two parameter forms as also of LLI form). The following observations can be made on the basis of these results :

(*i*) Between occupation groups 1 and 2 Engel curves differ for all items except vegetables, fruits and all-food items. For cereals and oils the semi-log form indicates homogeneity while other forms reject this. Similarly, for services the double-log form suggests homogeneity at 5 per cent level of significance while linear and LLI forms indicate significant differences. In most of these cases while for one form F is just significant, for other form(s) F is slightly smaller and non-significant.

(*ii*) Between occupation groups 1 and 3, significant differences of Engel curves are established only for cereals, beverages and fuel and light.

(*iii*) Engel curves for cereals, pulses, fruits, fish, egg, etc., beverages, tobacco and fuel and light are seen to be significantly different between occupation groups 1 and 4. For sugar, while the LLI-based test indicates homogeneity, the linear Engel curves show clear difference. For milk products and oils, on the other hand, the LLI-based tests indicate heterogeneity, while the tests based on two-parameter forms do not reject homogeneity.

8. This list of items excludes the cases where overall homogeneity has, been observed.

TABLE IIIB—ITEMWISE COMPUTED VALUES OF F-RATIOS ASSOCIATED WITH THE TESTS OF (*i*) HOMOGENEITY OF SLOPES (F_1) AND OF (*ii*) HOMOGENEITY OF INTERCEPTS (WHEN F_1 IS NOT REJECTED) OF BEST-FITTING TWO-PARAMETER ENGEL CURVES : NSS 18TH ROUND, ALL-INDIA RURAL, COMBINED SAMPLE

Sr. No.	Item	Form	Including occupation 4		Excluding occupation 4	
			F_1	F_2	F_1	F_2
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1.	Cereals	SL	15.35	—	6.10	—
		LL	0.66	8.16	0.13	1.13
2.	Milk	L	2.73	7.95	3.10	10.27
		LI	1.72	17.19	3.29	29.88
3.	Milk products	L	9.23	—	11.17	—
		DL	3.64	30.67	5.20	40.60
4.	Pulses	DL	3.45	21.03	4.83	18.37
		SL	2.64	8.40	3.79	4.07
5.	Oils	L	0.54	4.45	1.06	5.49
		DL	2.61	11.87	3.87	12.09
6.	Fruits	L	14.88	—	5.77	—
7.	Fish, egg, etc.	L	6.54	—	2.15	2.16
		SL	4.64	—	0.91	9.42
		LI	2.55	8.82	4.92	8.91
8.	Sugar	L	13.58	—	10.73	—
		DL	2.36	19.75	3.05	26.66
9.	Spices	L	15.08	—	17.32	—
		SL	0.79	0.68	0.68	0.83
10.	Beverages	L	98.95	—	25.10	—
		DL	0.33	102.68	0.40	42.68
11.	Tobacco	DL	13.68	—	15.71	—
		LI	0.71	0.66	0.61	0.59
12.	Fuel and light	L	14.35	—	18.01	—
		DL	2.46	10.68	3.22	10.34
13.	Services	L	5.72	—	8.73	—
		DL	0.35	3.08	0.29	3.69
	Degrees of freedom		40.3	43.3	30.2	32.2
	Critical values of F at 5 per cent level		2.84	2.82	3.32	3.30
	Critical values of F at 1 per cent level		4.31	4.28	5.39	5.34

Note : The items for which overall homogeneity was observed have been dropped in this table.

TABLE IVA—COMPUTED VALUES OF F-RATIOS ASSOCIATED WITH THE TESTS OF OVERALL HOMOGENEITY OF ITEMWISE ENGEL CURVES FOR EACH OCCUPATION PAIRS : NSS 18TH ROUND, ALL-INDIA RURAL, COMBINED SAMPLE

Sr. No.	Item	Occupation pairs											
		1,2		1,3		1,4		2,3		2,4		3,4	
		Form	F*	Form	F*	Form	F*	Form	F*	Form	F*	Form	F*
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
1.	Cereals	SL	2.39	SL	3.72	SL	28.74	SL	25.12	SL	65.20	SL	0.18
		—	—	LI	0.33	LI	3.38	LI	3.17	LI	14.23	LI	0.68
		LLI	5.84	LLI	3.27	LLI	20.75	LLI	19.06	LLI	43.08	LLI	0.40
2.	Milk	L	9.67	L	0.51	L	1.45	L	9.53	L	15.35	L	2.91
		LI	16.30	—	—	—	—	LI	19.44	LI	11.41	—	—
		LLI	31.98	LLI	0.30	LLI	2.78	LLI	17.75	LLI	23.67	LLI	2.82
3.	Milk products	L	18.81	L	0.58	L	4.36	L	13.03	L	23.30	L	0.56
		—	—	DL	0.56	—	—	DL	11.16	—	—	DL	1.13
		LLI	26.28	LLI	0.66	LLI	1.67	LLI	10.21	LLI	18.02	LLI	1.56
4.	Pulses	DL	19.17	DL	1.23	DL	19.23	DL	0.47	DL	1.00	L	3.02
		—	—	L	0.88	SL	10.90	L	1.20	SL	0.33	SL	4.74
		LLI	43.23	LLI	4.22	LLI	39.91	LLI	2.31	LLI	0.55	LLI	2.39
5.	Oils	DL	12.00	DL	0.20	DL	2.86	L	4.39	—	—	L	0.44
		SL	1.90	L	1.08	SL	0.42	SL	7.40	SL	12.14	SL	0.73
		LLI	13.48	LLI	0.24	LLI	3.88	LLI	14.19	LLI	30.95	LLI	1.71
6.	Vegetables	SL	1.13	SL	0.14	SL	1.45	SL	2.63	SL	4.62	SL	0.07
		LLI	0.26	LLI	0.48	LLI	1.97	LLI	2.29	LLI	4.54	LLI	1.29
7.	Fruits	L	1.07	L	4.65	L	25.46	L	11.87	L	30.75	L	0.69
		LLI	1.73	LLI	0.39	LLL	21.18	LLI	0.44	LLI	21.70	LLI	3.24
8.	Fish, egg, etc.	LI	6.46	L I	21.23	LI	6.89	LI	7.97	LI	0.59	L	2.08
		—	—	SL	2.22	L	11.68	SL	—	L	0.48	SL	0.23
		LLI	10.23	LLI	2.29	LLI	13.19	LLI	12.19	LLI	0.72	LLI	10.40

(Contd.)

TABLE IVA—(*Concld.*)

Sr. No.	Item	Occupation pairs											
		1,2		1,3		1,4		2,3		2,4		3,4	
		Form	F*	Form	F*	Form	F*	Form	F*	Form	F*	Form	F*
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
9.	Sugar	L	10.06	L	0.71	L	13.48	L	7.51	L	3.96	L	1.85
		—	—	DL	0.43	—	—	DL	7.22	—	—	DL	0.65
		LLI	14.51	LLI	0.25	LLI	2.37	LLI	4.95	LLI	11.81	LLI	0.83
10.	Spices	L	12.82	L	2.41	L	2.49	L	5.40	L	11.10	L	0.32
		—	—	—	—	SL	0.26	—	—	SL	1.04	SL	0.73
		LLI	11.85	LLI	2.16	LLI	7.38	LLI	4.14	LLI	9.54	LLI	3.75
11.	Beverages	L	29.18	L	39.85	L	145.06	L	0.38	L	18.30	L	10.59
		—	—	—	—	DL	108.64	—	—	DL	12.61	DL	5.32
		LLI	33.70	LLI	8.81	LLI	127.48	LLI	1.10	LLI	8.81	LLI	4.87
12.	All-food	DL	1.23	DL	0.48	DL	0.24	DL	4.21	DL	1.76	DL	0.42
		LLI	0.80	LLI	0.35	LLI	1.69	LLI	2.43	LLI	1.37	LLI	0.70
13.	Tobacco	DL	16.92	DL	0.88	DL	11.59	DL	5.34	DL	4.52	DL	3.01
		—	—	LI	0.10	—	—	LI	0.04	—	—	LI	0.10
		LLI	12.67	LLI	2.00	LLI	9.04	LLI	5.67	LLI	4.03	LLI	3.23
14.	Fuel and light	DL	11.74	DL	3.41	DL	12.56	DL	1.59	DL	2.20	DL	1.02
		L	13.80	—	—	—	—	L	7.45	L	8.57	—	—
		LLI	12.56	LLI	4.08	LLI	13.30	LLI	2.68	LLI	3.09	LLI	1.70
15.	Services	DL	2.73	DL	0.24	DL	0.14	DL	1.04	DL	4.95	DL	0.95
		L	5.20	—	—	—	—	L	26.66	LL	7.66	—	—
		LLI	3.82	LLI	0.27	LLI	0.11	LLI	0.72	LLI	4.80	LLI	0.66

* The degrees of freedom associated with F are (20, 2) for two-parameter forms and (18, 3) for the LLI form. The 5 per cent critical values of F are 3.49 and 3.16 respectively; corresponding 1 per cent values are 5.85 and 5.09 respectively.

TABLE IVB—ITEMWISE COMPUTED VALUES OF F-RATIOS ASSOCIATED WITH THE TESTS OF (*i*) HOMOGENEITY OF SLOPES (F_1) AND OF (ii) HOMOGENEITY OF INTERCEPTS (WHEN F_1 IS NOT REJECTED) OF BEST-FITTING TWO-PARAMETER ENGLE CURVES FOR EACH OCCUPATION PAIR : NSS 18TH ROUND, ALL-INDIA RURAL, COMBINED SAMPLE

Sr. No.	Item	Occupation pairs*								
		1,2			1,3			1,4		
		Form	F_1	F_2	Form	F_1	F_2	Form	F_1	F_2
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
1.	Cereals	—	—	—	SL	2.82	4.24	SL	21.71	—
		—	—	—	—	—	—	—	—	—
2.	Milk	L	3.61	14.00	—	—	—	—	—	—
		LI	2.47	28.17	—	—	—	—	—	—
3.	Milk products ..	L	16.63	—	—	—	—	L	2.45	5.87
		—	—	—	—	—	—	—	—	—
4.	Pulses	DL	6.63	—	—	—	—	DL	2.43	33.74
		—	—	—	—	—	—	SL	1.72	19.42
5.	Oils	DL	5.27	15.57	—	—	—	—	—	—
		—	—	—	—	—	—	—	—	—
6.	Vegetables	—	—	—	—	—	—	—	—	—
7.	Fruits	—	—	—	L	7.20	—	L	23.59	—
8.	Fish, egg, etc. ..	LI	1.74	10.79	—	—	—	LI	0.42	13.74
9.	Sugar	L	15.03	—	—	—	—	L	18.57	—
		—	—	—	—	—	—	—	—	—
10.	Spices	L	22.86	—	—	—	—	—	—	—
11.	Beverages	L	24.22	—	L	34.45	—	L	174.85	—
		—	—	—	—	—	—	DL	0.04	227.64
12.	All-food	—	—	—	—	—	—	—	—	—
13.	Tobacco	DL	26.07	—	—	—	—	DL	12.23	—
14.	Fuel and light ..	DL	4.37	16.46	—	—	—	DL	0.00	26.37
		L	24.11	—	—	—	—	—	—	—
15.	Services	—	—	—	—	—	—	—	—	—
		L	10.38	—	—	—	—	—	—	—

(Contd.)

TABLE IVB—(*Concld.*)

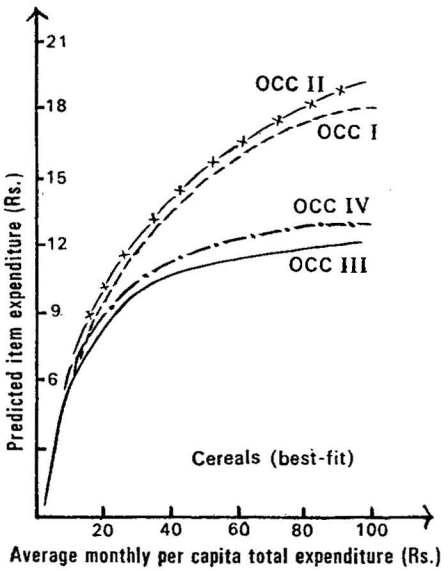
Sr. No.	Item	Occupation pairs*								
		2,3			2,4			3,4		
		Form	F_1	F_2	Form	F_1	F_2	Form	F_1	F_2
(1)	(2)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)
1.	Cereals	SL	5.44	10.11	SL	9.58	—	—	—	—
		—	—	—	LI	3.09	23.07	—	—	—
2.	Milk	L	0.74	18.57	L	15.41	—	—	—	—
		LI	6.29	—	LI	2.08	19.72	—	—	—
3.	Milk products ..	L	19.20	—	L	25.34	—	—	—	—
		DL	9.20	—	—	—	—	—	—	—
4.	Pulses	—	—	—	—	—	—	—	—	—
		—	—	—	—	—	—	SL	6.62	—
5.	Oils	L	3.75	4.45	—	—	—	—	—	—
		SL	10.03	—	SL	11.47	—	—	—	—
6.	Vegetables	—	—	—	SL	7.11	—	—	—	—
7.	Fruits	L	19.28	—	L	35.28	—	—	—	—
8.	Fish, egg, etc. ..	LI	15.33	—	—	—	—	—	—	—
9.	Sugar	L	7.78	—	L	0.22	7.99	—	—	—
		DL	6.07	—	—	—	—	—	—	—
10.	Spices	L	9.73	—	L	20.83	—	—	—	—
11.	Beverages	—	—	—	L	29.83	—	L	15.76	—
		—	—	—	DL	0.65	24.99	DL	0.31	10.70
12.	All-food	DL	8.32	—	—	—	—	—	—	—
13.	Tobacco	DL	9.75	—	DL	6.79	—	—	—	—
14.	Fuel and light ..	—	—	—	—	—	—	—	—	—
		L	14.13	—	L	16.30	—	—	—	—
15.	Services	—	—	—	DL	0.06	10.29	—	—	—
		L	50.22	—	L	15.22	—	—	—	—

* The degrees of freedom associated with F_1 and F_2 are (20.1) and (21.1) respectively; corresponding critical values at 5 per cent level are 4.35 and 4.32 respectively.

(*iv*) For the pair of occupations 2 and 3, complete homogeneity of Engel curves is obtained for pulses, vegetables, beverages. For fruits, fuel and light and services the LLI-based tests indicate homogeneity while the test based on linear Engel curves suggests otherwise. In all other cases, the Engel curves differ significantly.

(*v*) As between occupations 2 and 4, the Engel curves for pulses, fish, egg, etc., and all-food items are seen to be homogeneous. For sugar, the linear Engel curves are homogeneous while the LLI curves are not so, and an opposite picture is observed for fuel and light and also for services.

(*vi*) The extent of homogeneity of itemwise Engel curves is quite remarkable for the pair of occupations 3 and 4 . For this pair, LLI Engel curves for fish, egg, etc., and linear Engel curves for beverages are seen to be significantly different. In all other cases, the Engel curves are homogeneous.


21
18
15
12
9
6
OCC II
OCC I
OCC IV
OCC III
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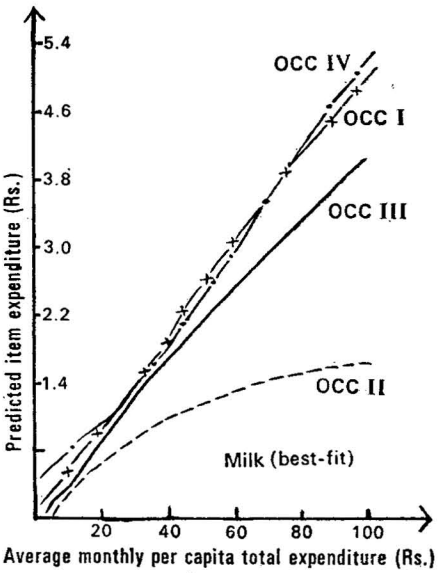
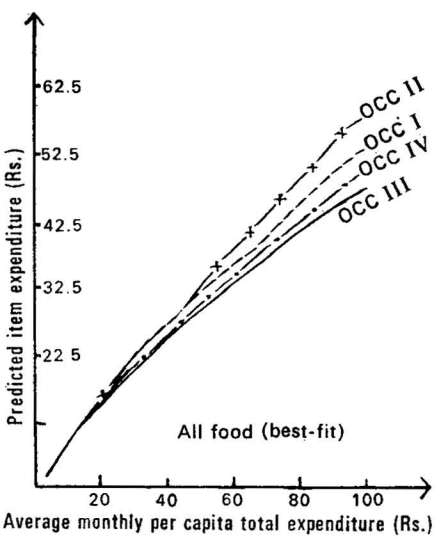
Cereals (best-fit)
20 40 60 80 100
Average monthly per capita total expenditure (Rs.)


5.4
4.6
3.8
3.0
2.2
1.4
OCC IV
OCC I
OCC III
OCC II
Predicted item expenditure (Rs.)
Milk (best-fit)
20 40 60 80 100
Average monthly per capita total expenditure (Rs.)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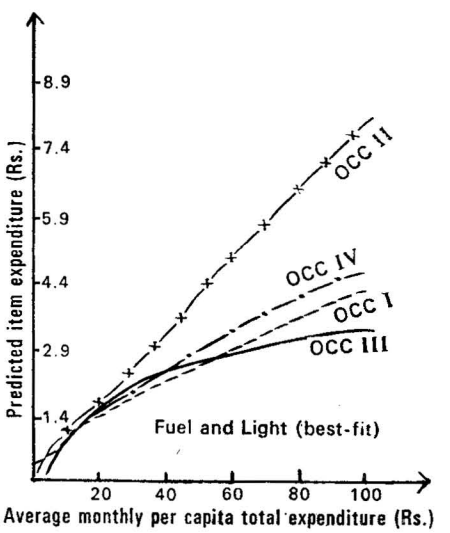
52.5
42.5
32.5
22.5
OCC II
OCC I
OCC IV
OCC III
Predicted item expenditure (Rs.)
All food (best-fit)
20 40 60 80 100
Average monthly per capita total expenditure (Rs.)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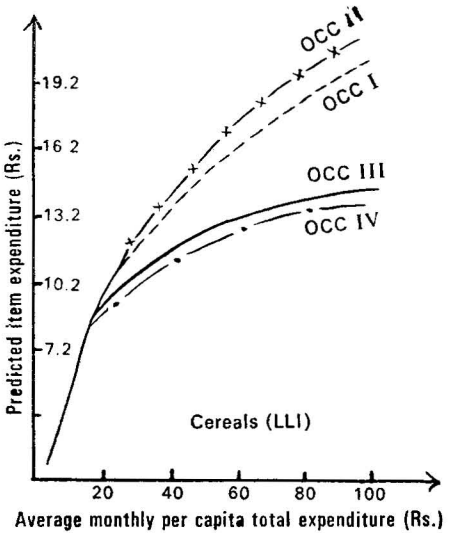
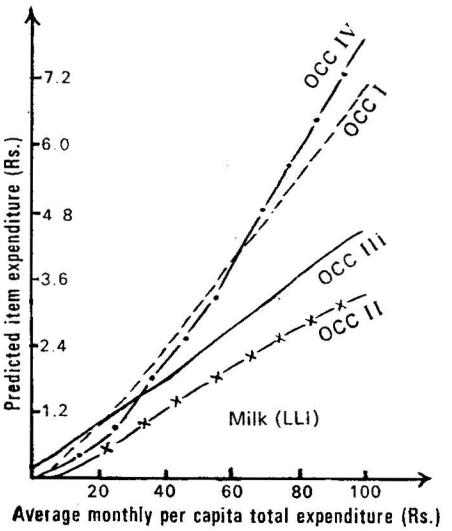
7.4
5.9
4.4
2.9
1.4
OCC II
OCC IV
OCC I
OCC III
Predicted item expenditure (Rs.)
Fuel and Light (best-fit)
20 40 60 80 100
Average monthly per capita total expenditure (Rs.)


OCC II
OCC I
OCC III
OCC IV
19.2
16.2
13.2
10.2
7.2
Predicted item expenditure (Rs.)
Cereals (LLI)
20
40
60
80
100
Average monthly per capita total expenditure (Rs.)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OCC III
OCC II
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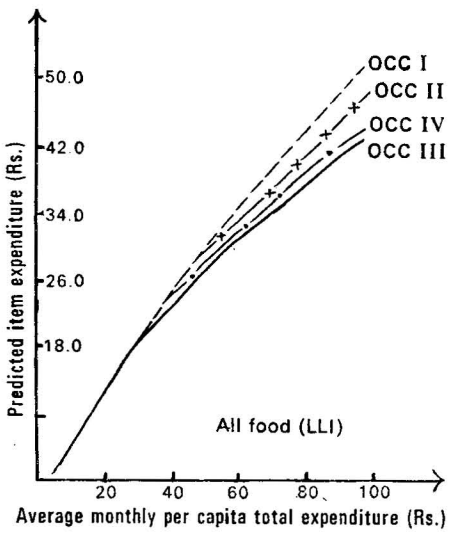
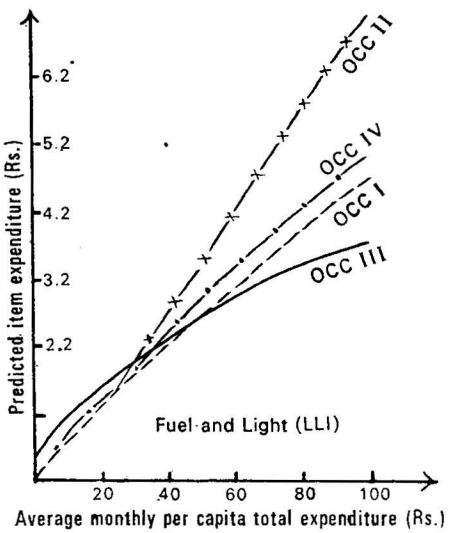
6.0
4.8
3.6
2.4
1.2
Predicted item expenditure (Rs.)
Milk (LLI)
20
40
60
80
100
Average monthly per capita total expenditure (Rs.)


OCC I
OCC II
OCC IV
OCC III
50.0
42.0
34.0
26.0
18.0
Predicted item expenditure (Rs.)
All food (LLI)
20
40
60
80
100
Average monthly per capita total expenditure (Rs.)


OCC II
OCC IV
OCC I
OCC III
6.2
5.2
4.2
3.2
2.2
Predicted item expenditure (Rs.)
Fuel and Light (LLI)
20
40
60
80
100
Average monthly per capita total expenditure (Rs.)

To convey an idea about the direction and extent of the differences in the pattern of consumption expenditure among the different occupation groups, the predicted occupationwise item expenditures obtained from the best-fitting two-parameter form as also the LLI form are plotted and presented for four items, viz., cereals, milk, fuel and light and all-food in the Figures.

It may be seen from these graphs that (*i*) the differences in item expenditures become more pronounced at higher levels of per capita total expenditure, whereas at lower levels the predicted item expenditures lie within a very narrow range; (*ii*) the fitted Engel curves for different occupation groups sometimes intersect, indicating that the signs of the differences in item expenditures between two occupation groups are often different at higher and lower levels of per capita total expenditure, though at lower levels the differences are rather small.

CONCLUSIONS AND LIMITATIONS

The concluding observations that result from the above exercises are briefly that while occupation groups 1 and 2 have, by and large, different patterns of expenditure, the expenditure pattern is more or less similar for occupation groups 3 and 4. The results also indicate that while occupation groups 1 and 3 and 1 and 4 exhibit similar expenditure patterns, occupation 2 is, on the whole, distinct from occupation groups 3 and 4 from the point of view of expenditure pattern.

We may finally point out the scope of refinement of the analysis. It is well-known that in a predominantly agricultural economy like rural India, a significant proportion of total transactions takes place in non-monetized form. This is particularly true for cultivators who consume a part of their own production, and for agricultural labourers who quite often receive their wages in kind. It would be of interest to see how far the differences in the consumer expenditure patterns between these groups observed here are due to the existence of non-monetized transactions. This question is being examined in another study in progress.

In the present study we have ignored the possible regional variations in the expenditure pattern of different occupational groups. The extent of such regional variations will also be examined in a separate study.

A serious limitation of the present study is that it ignores factors such as household size and composition which vary considerably across occupational groups. In fact, more concrete conclusions regarding the pattern of occupational differences in consumption could be made through eliminating the effects of varying household size and composition.