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EFFECT OF REFERENCE PERIOD ON ENGEL ELASTICITIES OF CLOTHING AND OTHER ITEMS : FURTHER RESULTS

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SUMMARY. This paper analyses Indian NSS household budget data with a view to examining the effect of the reference period used for data collection on the estimates of engel elasticities. NSS generally uses the 'last month' reference period, and so seasonal and other short-run factors may bias the estimates obtained from such data. Analysis of data from different NSS rounds showed that the elasticities for clothing and several other items decline dramatically when available 'last year' data for these items are used in place of corresponding 'last month' data. These results highlight the need of special methods of estimating engel elasticities from budget data relating to short reference periods like 'last month' or 'last week'.

1. INTRODUCTION

This paper analyses Indian National Sample Survey (NSS) household budget data with a view to studying the effect of the 'last month' reference period used for data collection, that is, the effect of seasonal and other transitory elements, on engel elasticities of different items of consumption. [The first results of this study relating to rural and urban India as a whole have been communicated to the *Sarvekshana*, Journal of the NSS Organisation, Govt. of India (Ghose and Bhattacharya, 1994)]. For its enquiries on household consumer expenditure, the NSS generally employs a moving reference period of 'last 30 days' preceding the date of interview (also known as the 'last month' reference period) and staggers the interviews evenly over the survey period, usually one year. Different households thus furnish information for different periods of 30 days and it is likely that this introduces seasonality and other short-run factors into the data for any particular household. While the average consumption over sample households gives a fair approximation to annual levels of consumption, seasonal and other short-run fluctuations get superimposed on the true variation across households

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exaggerating the inequality in the size distribution of population by PCE (per capita total consumer expenditure), denoted x, the widely used measure of level of living. Also, engel curves (strictly, expenditure-consumption curves) may get distorted, especially for items like clothing which are considerably affected by seaonality and other transitory factors because both item consumption and total consumer expenditure (per capita) contain correlated errors-in-variables.

For example, if foodgrains consumption is much more stable over the different months than say, consumption of clothing, then if households are ranked in ascending order of PCE, households spending a higher proportion of (per capita) total consumption (x) on foodgrains would tend to be those with lower values of x, because they have provided the information for the periods in which they spent relatively little on items other than foodgrains. The reverse will happen for seasonal commodities like clothing ; the households having higher values of x would show a greater proportion of their total consumption expenditure spent on clothing, partly because they have given the information for some festive seasons. Thus, such data would exaggerate the rise in the proportion of total expenditure spent on clothing with increase in PCE (x), simply because of the seasonal nature of expenditure on clothing.

This problem is discussed in Cramer (1969, 139–141) who indicates likely effects of errors in household budget data on the estimates of engel relations. Earlier, Liviatan (1961) had considered this problem and suggested the use of instrumental variables for overcoming the difficulties arising out of errors in both the variables. Liviatan had suggested using 'recorded income' as an instrument for consistent estimation of the regression coefficients in the presence of errors in the data. However, recorded income is not readily available and there may arise further difficulties in using it since errors in the variables may have a definite relation with recorded income. The grouping methods of Wald and Bartlett and IV estimates like Durbin's are not appropriate as the errors in the regressor affect the ranking of the regressor-values. One may either look for other suitable instruments for IV estimation or use suitable method of moments estimators like those proposed by Pal (1980, 1981) to get better estimates of elasticities in the presence of errors in the variables.

To return to the Indian context, Bhattacharya (1967,1978) drew attention to this problem citing two pieces of evidence from Indian empirical research on estimation of engel elasticities. The first evidence was from the work of Biswas and Bose (1962). Bhattacharya (1967) noticed that there was a sudden jump in the engel elasticities for clothing presented by Biswas and Bose from NSS 7th round onwards as compared to NSS 4th and 5th rounds. Biswas and Bose noticed the large variation in clothing elasticity across rounds but had no idea about the cause of such variation, thinking that the month reference period had been used uniformly for all these rounds. Actually, in rounds 4 and 5, NSS employed the 'last month' reference period for food and many other item groups, but the 'last year' (i.e.,the last 365 days preceding the date of interview) for clothing, footwear and durables. For these two rounds, the elasticities for

clothing were around 1. But from the 7th round onwards the 'last month' reference period was used for all items of the budget and the elasticities jumped to higher values around 1.5.

Secondly, the 1st Indian Agricultural Labour Enquiry (ALE) (Ministry of Labour, Govt. of India, 1954) using an annual reference period (where, in fact, for each sample household data were collected through 12 monthly visits) had shown that the proportion of income spent on food and other item groups did not change appreciably with rising income, implying that the engel elasticities for food etc. were fairly close to 1. However, the 2nd ALE (1956-57) and later Rural Labour Enquiries conducted by NSS using the 'last month' reference period showed marked shifts in engel ratios with rising PCE implying that the engel elasticities for food etc. were relatively far from 1 compared to the findings from the 1st ALE.

Another evidence is found in a recent study undertaken by the NCAER (1986,1987) with a view to analysing changes in the extent of poverty and the pattern of household consumption, based on two sample surveys covering rural India, one conducted in 1970–71 and a resurvey conducted in 1981–82. This study which used a fixed annual reference period gave, amongst other things, elasticities of clothing which were once again very close to 1.

In principle, consumption data should be collected for an annual reference period for every sample household to get an approximation to what might be called the 'permanent consumption' of the household. Since this is infeasible in practice, annual data should at least be collected for those items which show large seasonal and short-run fluctuations, provided recall error is not too large.

Since its 32nd round (1977–78) the NSS has been employing 'last 365 days' as reference period for items like clothing, footwear and durables besides the 'last month' which is used for all items of the budget. Unfortunately, however, the data relating to the annual reference period are not being utilised for most of the tabulations. Recently, however, NSS Report No.384 (National Sample Survey Organisation, Govt. of India,1993) for the NSS 43rd round (July 1987–June 1988) has presented Lorenz curves of the size distribution of population by PCE constructed in two ways : (i) by considering expenditure on all items for the last month reference period, to get what might be called *conventional* PCE, and (ii) by modifying the above, using data for the last year reference period for clothing, footwear and durable goods and the data for the last month reference period for all other items of the budget, to get the *adjusted* PCE. It is clear that the Lorenz curve shifts inward — or, in other words, relative variation in PCE gets reduced — if annual data are used for items like clothing. However, nothing has been said in the NSS Report No.384 about the effect of this adjustment on the engel relations.

The aim of this paper is to go further and show how the engel elasticities of clothing and other items of the budget change noticeably if NSS consumer expenditure data collected for the last year reference period are utilised for engel curve analysis. This study begins with a re-examination of data from earlier

NSS rounds, beginning with the 4th and 5th rounds (1952–53), to see the effect of the change in reference period in the 7th round (Nov.53–Mar.54) clearly. Next, data for the NSS 38th round (January–December 1983) is analysed ; both last month and last year reference periods were used in this round for collection of data on some items of consumption like clothing, durables, medical care etc.

Section 2 describes the NSS data analysed in this study. In particular, it reports the small discrepancies found between the results of the NSS 38th round budget data presented in the NSS Report No.332 and those obtained in this study utilizing computer tapes supplied by the NSSO, Govt. of India, to ISI, Calcutta. Section 3 outlines the methodology adopted for choosing the best-fitting engel curve forms and for computing engel elasticities from the chosen form. The findings are reported in Sections 4 and 5. Section 4 presents the elasticities obtained for the earlier NSS rounds, from the 4th to the 28th. It may be recalled that the reference period for data collection was changed in the 7th round. Section 5 briefly mentions the findings relating to the size distribution of PCE and the Lorenz curve of PCE based on NSS 38th round data. The Lorenz curve shifts inward as one switches over from *conventional* to *adjusted* PCE. Section 5 mainly presents state-wise and all-India elasticities for items like clothing separately for rural and urban sectors based on 38th round data. It appears that the engel elasticities change dramatically for many items when one uses 'last year' data instead of 'last month' data for items like clothing and durables. Section 6 concludes the paper with some observations on better methods of engel curve estimation when 'last year' data are not available.

2. MATERIAL ANALYSED

As already mentioned, the present study is based on NSS household budget data collected from nationwide probability samples of households. The sampling design is stratified two-stage with provision for two independent and interpenetrating half-samples.

NSS uses the interview method where information is usually collected from each sample household for a period of 'last 30 days' preceding the date of interview. The interviews for the different households are staggered evenly over the survey period, which is usually one year, in order to minimise the effects of seasonal variation.

Consumption included consumption out of purchases in cash or credit, out of home grown produce, out of receipts in exchange of goods and services and out of gifts, loans and free collections. Non-monetized consumption was imputed at producer's/local retail prices. The imputed rental of owner-occupied houses or of free/subsidized quarters provided by employers was excluded from the data on consumer expenditure.

The present study is mainly based on a retabulation of NSS 38th round (Jan.-Dec. 1983) ungrouped (household level) data using the computer tapes

supplied to ISI, Calcutta, by the NSSO, Govt. of India. In the 38th round enquiry both 'last month' and 'last year' data were recorded simultaneously for some items of consumption, mainly, clothing, footwear, durables, medical care and education. The main findings of the 38th round enquiry were released through NSS Report No.332 (National Sample Survey Organisation, Govt. of India,1986).

NSS data for 13 states, namely, Andhra Pradesh, Bihar, Gujarat, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Orissa, Punjab, Rajasthan, Tamil Nadu, Uttar Pradesh and West Bengal, separately for the rural and urban sectors, are analysed together with all-India data. For all-India data, besides the combined sample, the two half-samples were also separately analysed.

The results presented in NSS Report No.332 were based on data relating to the last month reference period for all item-groups. There were some discrepancies between the results presented in the NSS Report and those obtained in the retabulation of the last month data at ISI, Calcutta. We refrain from presenting state-wise results, for want of space. As the following all-India results would show, these discrepancies are generally small and should not vitiate the main findings of this paper:

	all-India rural		all-India urban	
	NSS report	present study	NSS report	present study
sample size(no. of hhs)	79692	76797	43410	40010
avg. PCE per 30 days(Rs.)	112.31	111.93	165.80	163.72

PCE (per capita household consumer expenditure on all items per 30 days), used as a substitute for income, was calculated in two ways from the 38th round ungrouped data: (i) utilising 'last month' data for all items of the household budget and (ii) utilising data for 'last year' for the item-groups of interest, namely, clothing, footwear, durables, medical care and education and 'last month' data for all other item-groups. The former was called '*conventional* PCE' and the latter was termed '*adjusted* PCE'.

Grouped data from earlier rounds were also analysed in this study but only for rural and urban India. Data for rounds 4, 5, 7, 9,10 and 28 were obtained from NSS Report Nos. 20, 40, 47 and 240 (*vide* References cited at the end). For the 18th round, the data were based on a special tabulation done at ISI, Calcutta, by Chatterjee and Bhattacharya (1974). The item coverage was clothing and foodgrains upto the 10th round ; footwear and durables were added for the 18th and 28th rounds.

3. METHODOLOGY

The 38th round ungrouped household level data were grouped into 13 PCE classes using first the *conventional* PCE and then, the *adjusted* PCE, separately for the 13 states and for all-India, and also by sectors (rural, urban). In

each case, tables were generated showing the following for the 13 size classes of PCE : percentage of population (p_j), average PCE ($\bar{x}_j$), and average per capita expenditure on the item under study ($\bar{y}_j$), j = 1,2,.....,13.

Five forms of engel curves were considered, viz., the following :

$$\begin{aligned}
&\text{(i)} \quad y = \alpha + \beta \ln x && \text{(semi-log or SL)}\\
&\text{(ii)} \quad \ln y = \alpha + \beta \ln x && \text{(double-log or DL)}\\
&\text{(iii)} \quad \ln y = \alpha + \beta \ln x + \gamma/x && \text{(log-log-inverse or LLI)}\\
&\text{(iv)} \quad \ln y = \alpha - \beta/x && \text{(log-inverse or LI)}\\
&\text{(v)} \quad y/x = \alpha + \beta \ln x + \gamma/x && \text{(budget-share or BS)}
\end{aligned}$$

For the seven earlier NSS rounds these forms were compared for each item, round and sector on the basis of certain statistical criteria of goodness of fit in order to choose one or two best-fitting forms in every case. These criteria included apart from the R^2, $\bar{R}^2$, $R_y^2 = r^2(y, \hat{y})$, W = 1 - $\Sigma p_j(\bar{y}_j - \hat{\bar{y}}_j)/\Sigma p_j(\bar{y}_j - \bar{y})^2$, the DW statistic for the residuals and the adjusted DW statistic based on $\sqrt{p}_j e_j$ where e_j is the residual $\bar{y}_j - \hat{\bar{y}}_j$. For the 38th round data, the same criteria were applied to choose one or two best-fitting forms, from the five engel curve forms considered earlier, for each item, sector and state. In most cases, the best-fitting form was the same for the two half-samples for any given sector, state and item.

Weighted least squares method was used to estimate the parameters. Thus, to fit the double-log form we minimised

$$\Sigma p_j(\ln \bar{y}_j - \alpha - \beta \ln \bar{x}_j)^2$$

with respect to α and β, using p_j's as the class weights. For the 18th round data, estimation was based on fractile groupwise averages and then the weights p_j's became equal for all the classes.

For the double-log form the engel elasticity (η_x) is constant and is equal to β; for the variable elasticity forms, the engel elasticity varies with x. In such cases, one generally presents the value of η_x at $x = \bar{x}$, though other representative values like the median of x can be used. In this paper we use the average elasticity of a variable elasticity engel curve defined by Bhattacharya (1972) (see also Coondoo, 1975) as a weighted average of the elasticities at all points of the curve, i.e,

$$\bar{\eta} = \frac{\int_0^\infty g(x)\, E(y|x)\, \eta_x\, dx}{\int_0^\infty g(x)\, E(y|x) dx} = \frac{\int_0^\infty g(x)\; E(y|x) \eta_x\, dx}{E(y)}$$

where $g(x)$ is the frequency function of the marginal distribution of persons by PCE (x) and $E(y|x)$, the conditional expectation of y given x. This is in fact an application of the general idea of Stone (1954) for deriving the market elasticity from micro elasticities of all individuals. For particular curve forms $\bar{\eta}$ may coincide with η_x at a particular value of x, say, at $x = \bar{x}$. The values of η_x

at $x = \bar{x}$ are not presented, for want of space. They depict very much the same picture as the average elasticities ($\bar{\eta}$).

The expressions for $\bar{\eta}$ for the four variable elasticity forms used are as follows:

$$\begin{aligned} \text{SL} &: \bar{\eta} = \beta/[\alpha + \beta E(\ln x)] \\ \text{LLI} &: \bar{\eta} = \beta - \gamma E(y/x)/E(y) \\ \text{LI} &: \bar{\eta} = \beta E(y/x)/E(y) \\ \text{BS} &: \bar{\eta} = 1 + [\beta E(x) - \gamma]/E(y) \end{aligned}$$

In the computations, $E(x)$ was taken as $\bar{x}$; the other expectations were estimated as weighted averages of PCE-classwise values of $\ln \bar{x}_j$, $\hat{\bar{y}}_j$, or $\hat{\bar{y}}_j/\bar{x}_j$, with the p_j's as weights.

4. Engel elasticities from earlier NSS rounds

This and the following section present the findings of this study. This section makes a beginning with the estimates of engel elasticities for foodgrains and clothing for rural and urban sectors of India, as a whole, based on NSS rounds 4, 5, 7, 9, 10, 18 and 28, spanning about two decades from 1952–53 to 1973–74.

The estimates of engel elasticities are set out in Table 1. Note that for variable elasticity engel curve forms the table shows the average elasticity of the entire engel curve (denoted $\bar{\eta}$). Also, for all rounds except the 28th, the estimates are presented for the two half-samples of the NSS sample, as also for the combined sample. The divergence between the two half-sample estimates indicates the margin of uncertainty of the combined sample estimates.

The most striking result is that for both rural and urban India the engel elasticity for clothing rose markedly from about 0.9–1.0 in the 4th and 5th rounds to about 1.4–1.5 in rounds 7, 9 and 10. This rise is clearly significant. This was almost certainly due to a change in the reference period used for data collection. In rounds 4 and 5, as stated earlier, last week or last month was used for most items including food, but last year was used for clothing, footwear and durables.[1]

From the 7th round onward, last month began to be used for all items of the budget including clothing, footwear and durables. Such a shift in the engel elasticities for clothing was noticed by Bhattacharya (1967,1978) from the elasticities reported by Biswas and Bose (1962). Note that while Biswas and Bose used the double-logarithmic engel curves in all cases, the present study uses those engel curve forms which are found to fit the data best.

No such shift over time is clearly discernible in the engel elasticities for foodgrains presented in Table 1.

[1]The data analysed here relates to that part of the sample where the last month and not the last week was employed for items like food.

Table 1. ENGEL ELASTICITIES *FOR FOODGRAINS* AND *FOR CLOTHING* ESTIMATED FROM HOUSEHOLD BUDGET DATA COLLECTED IN DIFFERENT NSS ROUNDS, SEPARATELY FOR TWO BEST-FITTING ENGEL CURVE TYPES : ALL-INDIA RURAL AND URBAN

	all-India rural							
	curve type 1				curve type 2			
NSS	curve	$\bar{\eta}$			curve	$\bar{\eta}$		
Round*	type	h.s.1	h.s.2	comb.	type	h.s.1	h.s.2	comb.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
				foodgrains				
4	LLI	0.65	0.65	0.65	SL	0.64	0.66	0.65
5	LLI	0.52	0.54	0.54	LI	0.53	0.50	0.51
7	LI	0.49	0.48	0.50	SL	0.49	0.48	0.49
9	LLI	0.58	0.51	0.55	LI	0.55	0.50	0.53
10	LLI	0.62	0.59	0.61	SL	0.66	0.62	0.63
18	LLI	0.51	0.55	0.53	BS	0.49	0.52	0.51
28	LLI	–	–	0.55	SL	–	–	0.54
				clothing				
4	DL	0.90	0.86	0.88	–	–	–	–
5	LLI	0.90	0.83	0.87	BS	0.91	0.85	0.88
7	LLI	1.42	1.46	1.43	–	–	–	–
9	LLI	1.49	1.40	1.45	–	–	–	–
10	LLI	1.57	1.39	1.46	BS	1.59	1.38	1.48
18	LLI	1.87	1.83	1.84	BS	1.79	1.78	1.78
28	LLI	–	–	2.20	BS	–	–	2.06

	all-India urban							
	curve type 1				curve type 2			
NSS	curve	$\bar{\eta}$			curve	$\bar{\eta}$		
Round*	type	h.s.1	h.s.2	comb.	type	h.s.1	h.s.2	comb.
(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
				foodgrains				
4	LI	0.31	0.26	0.30	SL	0.33	0.26	0.30
5	LLI	0.34	0.38	0.36	SL	0.32	0.38	0.35
7	LLI	0.33	0.28	0.31	LI	0.33	0.28	0.31
9	LLI	0.37	0.31	0.34	SL	0.38	0.29	0.33
10	LLI	0.27	0.32	0.32	SL	0.31	0.30	0.30
18	LLI	0.25	0.32	0.28	LI	0.24	0.31	0.28
28	LLI	–	–	0.32	LI	–	–	0.33
				clothing				
4	LLI	1.01	0.98	0.99	DL	1.03	1.02	1.02
5	LLI	0.94	0.99	0.94	DL	0.96	1.04	0.98
7	LLI	1.35	1.18	1.27	BS	1.45	1.19	1.35
9	LLI	1.62	1.52	1.56	DL	1.73	1.56	1.63
10	LLI	1.30	1.19	1.26	BS	1.40	1.20	1.31
18	LLI	2.04	1.90	2.00	BS	1.41	1.56	1.48
28	LLI	–	–	2.03	BS	–	–	1.89

See Section 1 on change in reference period for data collection introduced in the 7th round.

Another finding, not related to the main question addressed in this paper, is the rising trend in engel elasticity for clothing over time, in both the sectors. This merits in-depth study. Presumably, this engel elasticity could be related to time trends in the price of clothing relative to the general price level or to time trends in relative prices within the clothing group (*vide* Coondoo, 1969, for a study of this nature on the engel elasticity for cereals in India).

5. ENGEL ELASTICITIES OF CONSUMPTION BASED ON THE 38TH ROUND DATA

This section presents the results obtained from household budget data collected in NSS 38th round (Jan.–Dec. 1983). As stated in Section 2, the retabulation of the 38th round data done for the present study gave estimates slightly different from those appearing in NSS Report No.332.

We may mention in passing that the size distribution of population by PCE shows a significant shift consequent upon a switch over from *conventional* to *adjusted* PCE. Lorenz curves are not presented, for want of space, but the main findings will be briefly reported here. For both rural and urban India, the distribution is more dispersed for conventional PCE than for adjusted PCE. Thus, for rural India, the percentage of population with PCE $\leq$ Rs 60 was 16.9 for conventional PCE but 14.55 for adjusted PCE; at the other end, 8.0% of the population reported conventional PCE $\geq$ Rs 200 as against 6.02% for adjusted PCE. The Lorenz curve for adjusted PCE was *interior* to that for conventional PCE, for both the sectors. The following shows the Lorenz ratios of the two sets of size distributions, computed from grouped data, taking the Lorenz curve as the broken chain of straight lines joining points obtained from such data :

	all-India rural		all-India urban	
half-sample	conventional PCE	adjusted PCE	conventional PCE	adjusted PCE
1	0.302	0.266	0.334	0.307
2	0.298	0.263	0.328	0.306
comb.	0.300	0.265	0.321	0.306

It appears that the inward shift of the Lorenz ratio was somewhat larger for the rural sector.

It may be of interest to quote here similar results from NSS Report No.384 (NSSO, Govt. of India,1993) which examined the shifts in the size distribution of PCE based on NSS 43rd round (Jul.'87–Jun. 1988) data when last year data for clothing, footwear and durable goods were utilized in the same manner as done in the present paper for NSS 38th round data. Lorenz ratios of PCE based on NSS 43rd round data :

all-India rural		all-India urban	
conventional PCE	adjusted PCE	conventional PCE	adjusted PCE
0.297	0.273	0.347	0.327

Note that in the present study the adjustment was done for two more items — education and medical care.

The averages of *conventional* and *adjusted* PCE based on the present retabulation of NSS 38th round data may be noted from Tables 2.1 and 2.2. The averages were smaller for adjusted PCE by about 4 per cent for the rural India and by less than 2 per cent for urban India. The effect of adjustment is larger here than for NSS 43rd round data (*vide* NSS Report No.384), mainly because for medical care the year-based figures are much smaller than month-based figures for NSS 38th round data.

One may now consider the estimates of engel elasticities of consumption of certain items of the household budget, focussing on the effect of switching over from 'last month' to 'last year' reference period for item groups like clothing. These results are all based on the re-tabulation of NSS 38th round data undertaken at ISI, Calcutta, for the purpose of the present study.

Table 3 shows the all-India results separately for the rural and urban sectors and also for the two half-samples and the combined sample. To save space, estimates based on only one best-fitting Engel curve form in each case are presented here.

As Table 3 reveals, η changes dramatically for clothing with a switch in the reference period ; in both the sectors the elasticity is around 2.0–2.2 when last month data is used for all items of the budget but it drops to about 1.0–1.1 when annual data for clothing and other items, listed in the footnote of Table 3, is used.

For footwear, the elasticity changes from 1.9–2.1 to about 1.4 for rural India and from 1.7–1.9 to 1.2–1.3 for urban India.

For durable goods, the elasticity is around 2.75 for rural India and 2.6–3.2 for urban India when data relate to the last month, but drops to about 2.1–2.2 for both the sectors when annual data are used for item groups like clothing.

For medical care, based on last month data, the elasticities are 1.6–1.7 for rural India and 1.3–1.4 for urban India; these drop to about 1.25 and 1.1, respectively, when annual information is used for items like clothing.

For education, the drop in elasticity is much smaller. For rural India, the elasticity decreases from about 1.8–1.9 to 1.65–1.75 when annual data are used for the listed items; the corresponding decline for urban India is from 1.5–1.8 to 1.5–1.6.

A small shift in elasticities is seen for foodgrains also but this shift is in the *opposite direction*, from about 0.4 to 0.5 for the rural sector.[2] However, for urban India, no such shift is discernible.

[2]It is possible that, on the whole, the change in reference period would shift most of the engel elasticities towards unity, which is the weighted average of engel elasticities of all items of the budget.

Table 2.1. SIZE DISTRIBUTION OF PCE AND AVERAGE EXPENDITURES ON DIFFERENT ITEMS BY SIZE CLASSES OF PCE, SEPARATELY FOR *CONVENTIONAL AND ADJUSTED* PCE, BASED ON NSS 38th ROUND (JAN. - DEC. 1983) : ALL-INDIA RURAL

Interval of PCE (Rs.)	percentage of population	conventional PCE: average expenditure per person per 30 days (Rs.) food-grains	cloth-ing	foot-wear	dur-ables	medical care	edu-cation	total
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
0– 30	1.01	12.21	0.30	0.04	0.03	0.30	0.05	24.32
30– 40	2.57	18.98	0.44	0.06	0.05	0.54	0.06	35.77
40– 50	5.18	23.00	0.73	0.11	0.07	0.85	0.09	45.42
50– 60	8.14	26.57	1.18	0.18	0.12	1.26	0.17	55.27
60– 70	9.81	29.75	1.85	0.24	0.24	1.59	0.29	65.16
70– 85	15.36	33.24	2.71	0.36	0.30	2.34	0.35	77.33
85–100	13.64	36.96	4.30	0.56	0.52	3.15	0.53	92.24
100–125	16.83	39.49	6.58	0.94	0.94	4.79	0.76	111.45
125–150	9.83	41.85	10.68	1.39	1.64	6.62	1.35	136.48
150–200	9.63	44.97	17.14	2.30	3.22	9.66	1.81	170.73
200–250	3.84	48.00	30.20	3.40	6.29	15.06	2.70	221.81
250–300	1.73	49.06	44.71	5.25	9.81	17.73	3.62	272.03
300 & abv.	2.43	60.97	79.21	8.71	49.48	33.35	7.09	462.03
all classes	100.00	36.29	9.00	1.13	2.40	5.19	0.95	111.93

Interval of PCE (Rs.)	percentage of population	adjusted PCE: average expenditure per person per 30 days (Rs.) food-grains	cloth-ing	foot-wear	dur-ables	medical care	edu-cation	total
(1)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
0– 30	0.74	11.53	1.98	0.09	0.09	0.50	0.08	24.52
30– 40	1.96	17.58	2.54	0.15	0.17	0.56	0.10	35.66
40– 50	4.44	21.91	3.34	0.22	0.26	0.86	0.14	45.58
50– 60	7.41	25.63	4.10	0.30	0.40	1.11	0.19	55.37
60– 70	9.95	28.43	4.73	0.39	0.55	1.40	0.28	65.10
70– 85	16.32	32.52	5.52	0.49	0.74	1.71	0.40	77.48
85–100	14.88	36.33	6.59	0.67	1.07	2.14	0.56	92.37
100–125	18.21	39.56	7.99	0.90	1.66	2.72	0.82	111.56
125–150	10.67	42.62	10.11	1.25	2.73	3.67	1.19	136.41
150–200	9.38	45.96	13.13	1.71	4.54	4.81	1.68	170.68
200–250	3.31	50.62	17.30	2.12	8.49	7.11	2.28	220.78
250–300	1.30	53.75	21.03	2.63	11.84	9.06	3.18	271.44
300 & abv.	1.41	71.63	31.28	3.71	21.72	11.40	4.08	435.00
all classes	100.00	36.30	7.92	0.87	2.14	2.72	0.81	107.75

Table 2.2. SIZE DISTRIBUTION OF PCE AND AVERAGE EXPENDITURES ON DIFFERENT ITEMS BY SIZE CLASSES OF PCE, SEPARATELY FOR *CONVENTIONAL AND ADJUSTED* PCE, BASED ON NSS 38th ROUND (JAN. - DEC. 1983) :

ALL-INDIA URBAN

Interval of PCE (Rs.)	conventional PCE: percentage of population	average expenditure per person per 30 days (Rs.): food-grains	cloth-ing	foot-wear	dur-ables	medical care	edu-cation	total
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
0–30	0.40	9.21	0.17	0.16	0.04	0.49	0.44	20.54
30–40	0.57	15.06	0.09	0.18	0.01	0.76	0.17	35.95
40–50	1.47	19.10	0.43	0.08	0.09	0.88	0.27	45.74
50–60	3.13	21.07	0.58	0.25	0.12	1.18	0.37	55.38
60–70	5.02	24.19	0.91	0.17	0.17	1.55	0.51	65.28
70–85	9.52	27.19	1.32	0.31	0.17	1.86	0.64	77.44
85–100	10.62	29.34	2.43	0.54	0.27	2.64	0.94	92.59
100–125	17.35	31.08	3.68	0.80	0.56	3.27	1.48	111.91
125–150	12.90	33.46	5.61	1.24	0.89	4.80	2.26	137.08
150–200	16.07	34.84	10.19	1.77	1.82	6.09	3.51	172.12
200–250	8.53	36.15	16.72	2.95	2.93	8.63	5.63	223.02
250–300	5.25	36.90	23.46	4.18	5.65	10.79	7.12	272.81
300 & abv.	9.17	39.82	59.29	8.61	29.00	22.17	13.50	462.76
all classes	100.00	31.96	11.55	1.95	3.77	6.09	3.41	163.72

Interval of PCE (Rs.)	adjusted PCE: percentage of population	average expenditure per person per 30 days (Rs.): food-grains	cloth-ing	foot-wear	dur-ables	medical care	edu-cation	total
(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
0–30	0.31	8.98	1.97	0.31	0.25	0.41	0.23	20.66
30–40	0.36	13.53	2.97	0.40	0.23	0.99	0.38	35.91
40–50	1.40	17.41	3.38	0.34	0.42	1.00	0.43	45.67
50–60	2.25	20.65	3.77	0.37	0.26	1.21	0.40	55.60
60–70	4.45	23.18	4.35	0.42	0.36	1.33	0.52	65.57
70–85	9.33	26.83	5.29	0.53	0.49	1.50	0.77	77.92
85–100	10.27	28.50	6.35	0.73	0.70	1.86	1.05	92.28
100–125	17.46	30.90	8.22	1.04	1.08	2.42	1.68	112.38
125–150	13.89	33.17	10.38	1.36	1.72	2.94	2.50	137.14
150–200	17.57	34.56	13.42	1.95	3.16	3.85	3.67	172.34
200–250	9.16	36.93	17.49	2.55	5.71	5.22	5.50	222.77
250–300	5.16	37.31	21.90	3.25	8.01	6.01	6.66	272.45
300 & abv.	8.39	39.68	32.62	4.74	18.84	10.15	11.41	431.20
all classes	100.00	31.96	12.19	1.67	3.65	3.58	3.31	161.34

Table 3. ESTIMATES OF ENGEL ELASTICITIES FOR SELECTED ITEMS OF CONSUMPTION, SEPARATELY FOR THE TWO REFERENCE PERIODS, BY ENGEL CURVE TYPE AND BY HALF SAMPLES : ALL INDIA, RURAL AND URBAN

		no. of sample households : 76497				*no. of sample households : 40010*			
		all-India rural				all-India urban			
	half-	reference period		reference period		reference period		reference period	
		last 30 days		last 365 days*		last 30 days		last 365 days*	
item	sample	curve type	$\bar{\eta}$	curve type	$\bar{\eta}$	curve type	$\bar{\eta}$	curve type	$\bar{\eta}$
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
foodgrains	h.s.1	LLI	0.45	LLI	0.52	LLI	0.28	LLI	0.30
	h.s.2	LLI	0.45	LLI	0.52	LLI	0.28	LLI	0.30
	comb.	LLI	0.45	LLI	0.52	LLI	0.28	LLI	0.30
clothing	h.s.1	LLI	2.09	LLI	1.02	LLI	2.17	LLI	1.06
	h.s.2	LLI	2.13	LLI	1.06	LLI	1.98	LLI	1.10
	comb.	LLI	2.11	LLI	1.00	LLI	2.07	LLI	1.08
footwear	h.s.1	LLI	1.96	LLI	1.37	LLI	1.84	LLI	1.26
	h.s.2	LLI	2.01	LLI	1.37	LLI	1.92	LLI	1.30
	comb.	LLI	1.98	LLI	1.38	BS	1.71	BS	1.24
durables	h.s.1	DL	2.73	DL	2.07	LLI	3.33	LLI	2.22
	h.s.2	DL	2.75	DL	2.16	DL	2.63	DL	2.10
	comb.	DL	2.75	DL	2.11	DL	2.57	DL	2.08
medical	h.s.1	LLI	1.66	LLI	1.24	LLI	1.40	LLI	1.12
care	h.s.2	BS	1.60	BS	1.26	LLI	1.30	LLI	1.06
	comb.	LLI	1.65	LLI	1.27	BS	1.33	BS	1.10
education	h.s.1	LLI	1.79	LLI	1.67	BS	1.53	BS	1.48
	h.s.2	LLI	1.91	LLI	1.71	LLI	1.79	LLI	1.63
	comb.	LLI	1.86	LLI	1.67	BS	1.60	BS	1.49

*Actually the reference period was last 30 days for most items of the budget but last 365 days for clothing, footwear, durables, medical care and education.

Similar results were obtained for 13 major states, namely, Andhra Pradesh, Bihar, Gujarat, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Orissa, Punjab, Rajasthan, Tamil Nadu, Uttar Pradesh and West Bengal. Table 4 gives a summary of these results based on average elasticities ($\bar{\eta}$).

The averages of the statewise elasticities for each item group are set out in cols.(4) and (5) of Table 4. The shift in elasticities with a change in the reference period is clearly discernible from these two columns, as in the case of the all-India results. For clothing, here too, elasticities drop from around 2.1 and 2.2 to around 1.0–1.1, for the two sectors, with a switch from last month to last year reference period.

Col.(7) shows that the drop in elasticities was the most dramatic for clothing — the average (simple mean) difference between the two sets of statewise elasticities being nearly 1.1 in both the sectors. This is followed by durables for which the average difference is 0.84 for the rural sector and 0.63 for the urban sector. The average differences are numerically smaller, but still quite sizeable, for footwear and medical care. The differences between the elasticities based on last month data and last year data are the least pronounced for the item groups foodgrains and education.

Table 4. SUMMARY OF STATEWISE DIFFERENCES IN ENGEL ELASTICITIES ($\bar{\eta}$) FOR 13 MAJOR STATES BASED ON *LAST MONTH* DATA AND ON (ii) *LAST YEAR* DATA, WHENEVER, AVAILABLE* : NSS 38th ROUND

sector	item	no. of states covered	avg. of statewise elasticities		summary of statewise differences*			
			last month data	last year data	no. of +ve differences	average difference	range of difference minimum	range of difference maximum
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
rural	foodgrains	13	0.51	0.58	0	-0.08	-0.16	-0.01
	clothing	13	2.07	1.05	13	1.02	0.61	1.41
	footwear	11	1.91	1.34	11	0.57	0.39	0.79
	durables	12	2.97	2.06	12	0.91	0.41	1.82
	medical care	13	1.68	1.28	13	0.39	0.21	0.58
	education	11	1.69	1.51	9	0.18	-0.04	0.73
urban	foodgrains	13	0.32	0.36	0	-0.04	-0.11	-0.01
	clothing	13	2.02	1.09	13	0.93	0.59	1.34
	footwear	13	1.74	1.37	12	0.37	-0.10	0.86
	durables	13	2.68	2.09	12	0.59	-0.06	1.18
	medical care	13	1.36	1.11	11	0.25	-0.34	0.55
	education	13	1.72	1.62	9	0.10	-0.35	0.71

*See note below Table 3

Col.(6) presents counts needed for an application of the sign test to the 13 statewise differences. Note that for foodgrains and clothing, in either sector, all the statewise differences have the same sign and the same is true of medical care in the rural sector. The statistical significance of such shifts in the elasticities is beyond all doubt. A similar verdict can be given in all cases where the count in col.(6) is 11 or 12. However, for education, the sign test is rather inconclusive; the shift is *not* significant for the either sector.

Note, from cols.(8) and (9), that in case of clothing the minimum differences between the two sets of statewise elasticities, for the rural and urban sectors, are as high as 0.61 and 0.59, respectively, the maximum difference being 1.41 and 1.34, respectively.

On the whole, Table 4 shows that the statewise results are broadly corroborative of the all-India picture. In both the sectors, for foodgrains, the elasticity rises significantly but by a *small* amount and for all other items considered here, the elasticity falls significantly by *large* amounts, when one utilizes last year data in place of last month data for items like clothing. However, for education, in either sector, the fall is *small* and not significant, by the sign test applied to col.(6) of Table 4, for either sector.

Since the average of PCE ($\bar{x}$) was slightly smaller for adjusted PCE than for conventional PCE the values of $\bar{\eta}$ based on last month data and on last year data presented in Tables 3 and 4 may not be strictly comparable. However, the differences in average PCE are too small to explain the differences in $\bar{\eta}$ found in most of the items.

6. CONCLUSIONS

The previous sections reveal that for item groups like clothing, where seasonality is pronounced, the estimates of engel elasticities depend critically on the reference period used for collecting household budget data.

This problem has not received much attention in international literature.

In principle, one should use annual data as far as possible in engel curve analysis, and one should use appropriate methods of engel curve analysis when annual data is not available or when such data is liable to suffer from problems like recall lapse etc.

In the absence of reliable annual data one may utilize 'last month' or 'last week' data, treating the problem of seasonality as an errors- in-variables (EIV) problem where the presence of errors in both item consumption and total consumption expenditure based on last month or last week data may lead to biased estimates of regression parameters. The standard techniques of dealing with the EIV problem suffer from certain limitations and offer no easy solutions in this case especially because here the two errors are correlated. Instrumental variable estimation, suggested by Liviatan (1961) is a possibility. In the present case, one might use total expenditure excluding expenditures on items like clothing as the instrumental variable.[3] However, one is not absolutely certain that such an IV would be uncorrelated with the errors.

Pal (1980, 1981) suggested certain solutions, in terms of method of moments estimators, to the EIV problem. With suitable extensions these may be applied to empirical analysis of household budget data for short reference periods like last week or last month; hopefully, the results would approximate to those obtained using last year data of the kind available from NSS 38th round.

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[3]This was suggested by Professor Angus Deaton in a personal communication to the authors.

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