ON RURAL-URBAN DIFFERENTIALS IN CONSUMER PRICES AND PER CAPITA HOUSEHOLD CONSUMPTION IN INDIA BY LEVELS OF LIVING

By N. BHATTACHARYA and G. S. CHATTERJEE

Indian Statistical Institute

SUMMARY. This paper presents (in Section 2) some indices of rural-urban consumer price differentials in India utilizing NSS 18th round (February 1963-January 1964) household budget data for estimating the weighting diagram and the item-wise average prices. The indices were calculated at all-India level but separately for the ten decile groups of the population in the two sectors (formed after ranking the households in increasing order of per capita consumer expenditure) and also for the general population. Laspeyres', Paasche's and Fisher's formulae were used. Separate indices were also computed for groups of consumer items like cereals and cereals substitutes, other food and non-food.

Consumer price level is about 15 per cent higher in urban India than in rural India; this differential rises from about 10 per cent when we compare the bottom decile groups of population in the two sectors to about 20 per cent when we compare the top decile groups.

Such indices are utilized in Section 3 for urban-rural comparisons of level of per capita household consumption in real terms.

Section 4 uses these indices to compare the sectoral Lorenz ratios for total consumer expenditure and again for pooling the sectoral size distributions of consumer expenditure to obtain the all-India distribution. The following values were obtained for the Lorenz ratio:

rural India	all-India (nominal or real)	urban India (at rural prices)	urban India
0.30	0.33	0.36	0.38

In Section 5 we compare the price levels for each of the urban decile groups with each of the rural decile groups. Comparisons among the ten decile groups of a particular sector are also made in this section.

Section 6 concludes the paper mentioning its limitations.

1. INTRODUCTION

1.1. There has been considerable discussion in recent years on inter-regional and inter-temporal comparisons of level of living. How does the level of living in one region compare with the level of living in another region, in any particular year? And how does the level of living in one period compare with that in a subsequent period? The regions might represent the different states of India or the rural and urban sectors of any state or of India as a whole. In all cases, the question may be concerned with particular groups of the population, say, the poorest ten per cent or the richest ten per cent. Objective answers to such basic questions are of great significance, economic as well as political.

*Some of the results have been communicated in earlier papers by the authors (vide Chatterjee and Bhattacharya, 1968a, 1968b; Bhattacharya and Chatterjee, 1968a, 1969b).

1.2. Level of living studies are often based on size distributions of per capita household income or household consumer expenditure. Given two such size distributions, differing in time or space, one may compare the means and also the disparities of the two size distributions. Considerable work has been done on these lines in India (Bhattacharya and Iyengar, 1961 ; Planning Commission, Government of India, 1964 ; Ojha and Bhatt, 1964 ; Ranadive, 1965 ; Bhattacharya and Mahalanobis, 1967 ; Mukherjee and Chatterjee, 1967) and other countries. Unfortunately, these studies have often suffered from the absence of satisfactory indices of inter-regional and inter-temporal differentials in consumer prices. While the need of such information for comparing the *means* is widely recognized, it is hardly realized that such price indices may vary systematically with the level of living vitiating inter-regional or inter-temporal comparisons of *disparity* of size distributions at regional or current prices. It is also often overlooked that a satisfactory pooling of the region-wise distributions to arrive at the global distributions requires detailed knowledge of inter-regional price differentials.

1.3. Thus, in most of the investigations undertaken in India, size distributions of income or expenditure are thrown up for broad regions, like rural India, ignoring inter-regional price variations which are known to be considerable (Maitra, 1959 ; Divakar Rao, 1960; Chatterjee and Bhattacharya, 1969b). Almost invariably, separate probing is done for rural India and urban India, and the few attempts to obtain the all-India picture have generally ignored urban-rural differentials in prices. Inter-temporal comparisons of disparity are generally based on distributions at nominal or current prices. Current investigations at the Indian Statistical Institute (ISI) have clearly shown that in India in recent periods, price movements have been very different for people in different levels of living, which vitiates inter-temporal comparisons of disparity between income or expenditure distributions at current prices (Mahalanobis, 1962 ; Mukherjee and Chatterjee, 1963 ; Iyengar, Chatterjee and Sarkar, 1964 ; Iyengar and Bhattacharya, 1965).

1.4. In this paper we present, in Section 2, some indices of urban-rural consumer price differentials in India utilizing the National Sample Survey (NSS) 18th round (February 1963-January 1964) household budget data for estimating the weighting diagram and the item-wise average prices. The price differentials were estimated at all-India level, but separately for ten decile groups of the population in the two sectors, formed after ranking the sample households in ascending order of per capita total consumer expenditure, and also for the general population in the two sectors. Such indices are also given for groups of consumer items like cereals and cereals substitutes, other food and non-food. Laspeyres', Paasche's and Fisher's formulae give very similar results. These indices are utilized in Section 3 for deflating the urban per capita consumer expenditure estimates for comparing the level of per capita household consumption in corresponding decile groups of population in rural and urban India. In Section 4, we use these indices to improve upon the current methods of comparing the sectoral Lorenz ratios for total consumer expenditure and for

pooling the sectoral size distributions of consumer expenditure to obtain the all-India distribution. In Section 5, we compare the price levels for each of the urban decile groups with each of the rural decile groups, to meet some possible criticism of our procedure of comparing a given decile group of urban India with the *corresponding* decile group of rural India. Comparisons among the ten decile groups of a particular sector are also made in this section. Section 6 discusses the limitations of the study and makes some concluding observations.

2. URBAN-RURAL PRICE DIFFERENTIALS

2.1. The present investigation is based on the household budget material collected during the 18th round of the NSS, between February 1963 and January 1964, as already stated. The enquiry covered practically the whole of India. Probability sampling was followed for selecting households; the design was stratified, multi-stage, and the sample consisted of two independent and inter-penetrating half-samples providing independent and equally valid estimates of population characteristics. The data were collected by the interview method. Consumption included consumption of goods and services (a) out of monetary purchases, (b) out of receipts in exchange of goods and services, (c) out of home-grown stock, and (d) out of gifts, loan etc. Consumption under categories (b) to (d) was imputed at ex-farm prices.

2.2. Table 1 shows the sample sizes and the average per capita consumer expenditure for different groups of consumer items for the ten decile groups in rural and urban India. The households were first ranked in ascending order of per capita total consumer expenditure and then arranged into ten decile groups (each containing ten per cent of the estimated population) denoted 0-10 per cent, 10-20 per cent, etc. This process was carried out separately for the two sectors and also for the two half-samples and the combined sample (Mahalanobis, 1960). Fractile graphs for total consumer expenditure were drawn with the figures in cols. (7) to (9). The graphs for urban India were clearly above those for rural India, especially over the higher decile groups.

2.3. For each of the large number of consumer items representing the different areas of the budget, the entries for quantity and value of consumption were subjected to a process of scrutiny. The main idea was to detect cases where the implicit price was absurd, either too high or too low, presumably due to confusion regarding local and standard units of quantity or to some shifting of the decimal point. This process of scrutiny threw a great deal of light on the quality of price data available for the analysis.

2.4. The selection of consumer items for the index construction was guided by the number of reporting households and the divergence between half-sample estimates of average price in the two sectors. The list of items varied to some extent between the ten decile groups, but generally speaking, 56 items were included in the calculations, covering food, pan, tobacco and intoxicants, fuel and light, and clothing groups of items of the household budget. The weights of these items were the percentages of total expenditure spent on them *plus* suitable allocations of weights of related

TABLE 1. NUMBER OF SAMPLE HOUSEHOLDS AND AVERAGE PER CAPITA CONSUMER
EXPENDITURE BY FRACTILE GROUPS : NSS 18TH ROUND (FEBRUARY 1963-
JANUARY 1964) : ALL-INDIA RURAL AND ALL-INDIA URBAN

fractile group (per cent)	no. of sample house-holds	average per capita consumer expenditure per 30 days (in Rs.)						
		cereals and cereals substitutes	other food	total food	*non-food	all items		
						h.s. 1	h.s. 2	combined
		combined						
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
(a) all-India rural								
0 — 10	1767	4.87	1.91	6.78	1.25	8.38	8.34	8.34
10 — 20	1896	6.35	2.95	9.30	1.68	11.52	11.45	11.49
20 — 30	1943	7.19	3.63	10.82	2.17	13.80	13.60	13.60
30 — 40	1980	7.92	4.33	12.25	2.33	15.68	15.40	15.47
40 — 50	2078	8.48	5.02	13.50	2.83	17.60	17.45	17.47
50 — 60	2187	9.17	5.92	15.09	3.32	19.86	19.90	19.81
60 — 70	2199	9.87	6.97	16.84	3.94	22.46	22.52	22.58
70 — 80	2357	10.60	8.32	18.92	4.85	26.29	26.23	26.26
80 — 90	2486	11.46	10.52	21.98	6.46	32.12	32.15	32.23
90 — 100	2883	14.06	16.90	30.96	11.71	55.43	58.26	55.81
0 — 100	21776	9.01	6.63	15.64	4.04	22.31	22.33	22.32
(b) all-India urban								
0 — 10	284	5.16	3.39	8.55	1.40	10.65	11.07	10.78
10 — 20	328	6.31	4.97	11.28	1.95	14.94	14.19	14.80
20 — 30	336	6.66	6.03	12.69	2.43	17.62	16.98	17.29
30 — 40	349	7.08	7.32	14.40	2.84	20.59	20.16	19.99
40 — 50	349	7.54	8.34	15.88	3.66	23.05	22.52	22.85
50 — 60	385	7.50	10.07	17.57	4.03	26.76	26.64	26.40
60 — 70	407	8.27	11.97	20.23	4.62	31.81	31.12	31.29
70 — 80	534	8.80	15.31	24.11	5.85	37.76	37.87	37.97
80 — 90	611	8.73	20.68	29.41	8.10	52.95	49.09	50.79
90 — 100	713	10.09	37.42	47.51	16.50	113.75	99.46	107.00
0 — 100	4296	7.65	12.52	20.17	5.14	34.99	32.91	33.92

*includes pan, tobacco, intoxicants, fuel and light and clothing ; and excludes amusements and
sports, education, medicine, services, conveyance, furniture, footwear etc.

items not included in the calculations. Nothing could be done to cover the subgroups like education, medicine, conveyance, services and durable goods. The total weightage of these excluded items is shown below, based on the combined samples :

	fractile group (per cent)									
	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90	90-100	0-100
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
rural India	3.7	4.4	5.1	5.8	6.5	7.0	7.9	9.5	11.7	23.6	11.8
urban India	7.7	10.6	12.5	13.7	14.5	18.2	20.6	21.1	28.1	40.2	25.4

Since these items were very important for the higher decile groups of population, our findings on rural-urban price differentials are very tentative for those groups. Our calculations are based on the tacit assumption that the average price differential for these excluded items is the same as the average price differential for the included items.

2.5. Laspeyres and Paasche's formulae were employed for expressing the urban price level as percentage of the rural price level, in the hope that the two indices would together indicate some bounds for the true index. Fisher's index was also computed.

2.6. *Price indices.* The price indices are given in Table 2, separately for the ten decile groups of the population and for different broad categories of consumption, namely, cereals and cereals substitutes, other food items, total food items, non-food items and finally all items. In such case, Laspeyres' (L) and Paasche's (P) indices have been shown; Fisher's index, used subsequently, has been omitted from considerations of space. The same considerations prevent the inclusion of half-samplewise indices excepting for all consumer items.

2.7. Judging by the agreement between half-sample estimates, the indices seem to be quite reliable (excepting those for the non-food items). This must be due to the fairly large sizes of the samples of households. What is more interesting, the Laspeyres' (L) and Paasche's (P) formulae do not give very different results. This means that although the rural and the urban weighting diagrams are very different, the choice does not materially affect the comparisons between price levels in the two sectors. The gap between L and P is often taken as an indication of the uncertainty regarding the 'true' price index. In this sense, the agreement between the two suggests that the 'true' indices are not far from either L or P.

2.8. On the whole, the urban price level is about 15 per cent above the rural price level for the general population. This differential is not uniform for the different areas of the budget. For cereals and cereals substitutes, the differential is smaller, about 11 or 12 per cent; for other food items, it is about 14 per cent; and for all food items, about 13 per cent. For the non-food items covered in our index, the price differential is wider, nearly 26 per cent.

TABLE 2. INDEX SHOWING URBAN PRICE LEVEL AS PERCENTAGE OF RURAL PRICE
LEVEL BY FRACTILE GROUPS : NSS 18TH ROUND (FEBRUARY 1963-JANUARY 1964)
ALL-INDIA

fractile group (per cent)	formula*	urban price level as percentage of rural price level						
		cereals and cereals substitutes	other food	total food	non-food**	all items		
						h.s. 1	h.s. 2	combined
		combined						
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
0 — 10	L	107.9	107.2	107.7	133.1	110.9	114.6	111.7
	P	108.1	106.9	107.6	128.4	110.2	110.6	110.1
10 — 20	L	110.9	109.8	110.5	133.9	113.8	115.0	114.1
	P	109.4	109.1	109.2	126.3	111.6	111.8	111.5
20 — 30	L	107.7	109.9	108.4	124.3	111.2	111.1	111.1
	P	108.0	109.1	108.5	120.6	110.7	108.9	110.3
30 — 40	L	112.7	110.8	112.0	131.8	117.4	114.0	115.2
	P	110.0	109.9	109.9	126.3	113.0	111.8	112.3
40 — 50	L	108.7	108.4	108.0	130.7	114.6	109.5	112.4
	P	108.8	106.5	107.6	124.1	112.3	108.6	110.3
50 — 60	L	109.7	113.7	111.2	126.2	113.1	116.3	114.0
	P	109.4	111.4	110.5	115.9	110.0	112.2	111.5
60 — 70	L	113.1	113.5	113.3	130.4	116.0	117.1	116.5
	P	112.1	113.5	112.9	124.2	117.5	114.3	114.8
70 — 80	L	113.3	115.5	114.3	128.3	118.8	118.2	117.1
	P	112.6	113.3	113.1	120.1	113.6	115.2	114.4
80 — 90	L	123.0	119.7	121.4	131.6	124.1	121.2	123.7
	P	121.0	116.0	117.4	124.4	119.3	117.9	118.8
90 — 100	L	119.6	119.9	119.8	131.6	123.9	121.6	122.9
	P	118.8	118.0	118.2	124.4	120.4	120.5	119.7
0 — 100	L	111.3	114.5	112.7	128.8	116.3	116.3	116.0
	P	111.6	113.4	112.7	123.4	114.5	114.9	114.7

*L = Laspeyres index,   P = Paasche index.

**vide footnote under Table 1.

2.9. Regarding the price differentials for the ten decile groups, the price differentials show systematic trends over the decile groups, excepting for the non-food items. For all consumer items, the differential is about 10 or 11 per cent for the five or six decile groups from the bottom, but thereafter it rises reaching about 20 per cent for the top decile groups. This invalidates the usual comparisons of inequality of the size distributions of consumer expenditure in the two sectors. Similar trends are observed for cereals and cereals substitutes, for other food and for all food ; but for the non-food items, there is very little trend in the price differentials for the ten decile groups. These conclusions are based on fractile graphs showing the price indices against the decile groups; the significance of the trends was judged in a semi-intuitive manner.

3. URBAN-RURAL DIFFERENTIALS IN LEVEL OF LIVING

3.1. In Table 3 we utilize the price indices in Table 2 for comparing the level of per capita household consumption in rural and urban sectors. The 'before defla-tion' figures give the usual comparisons, which disregard the existence of price differen-tials between the two sectors. For example, for the general population as a whole,

TABLE 3. URBAN PER CAPITA CONSUMER EXPENDITURE AS PERCENTAGE
OF RURAL PER CAPITA CONSUMER EXPENDITURE BY FRACTILE GROUPS
NSS 18TH ROUND (FEBRUARY 1963-JANUARY 1964) : ALL-INDIA

fractile group (per cent)	cereals and cereals substitutes	other food	total food	*non-food	all items		
					b.s. 1	b.s. 2	combined
			combined				
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
			(a) before deflation				
0 — 10	106.0	177.5	126.1	112.0	127.1	132.7	129.3
10 — 20	99.4	168.5	121.3	116.1	129.7	123.9	126.6
20 — 30	92.6	166.1	117.3	112.0	127.7	124.9	126.3
30 — 40	89.4	169.0	117.6	121.9	132.2	130.9	129.2
40 — 50	88.9	166.1	117.6	129.3	130.3	129.1	130.8
50 — 60	81.8	170.1	116.4	121.4	134.7	133.9	133.3
60 — 70	83.8	171.6	120.1	117.3	141.6	138.2	138.6
70 — 80	83.0	184.0	127.4	120.6	143.6	144.4	144.6
80 — 90	76.3	196.6	133.8	125.4	164.9	152.7	157.6
90 — 100	71.8	221.4	153.5	140.9	205.2	176.8	191.7
0 — 100	84.9	186.8	129.0	127.2	156.8	147.4	152.0
			(b) after deflation				
0 — 10	98.0	165.8	117.1	85.7	115.0	117.8	116.6
10 — 20	90.2	153.9	110.4	89.3	115.1	109.3	114.2
20 — 30	86.0	151.7	108.1	91.5	115.1	113.5	114.1
30 — 40	80.3	153.2	105.9	94.5	114.7	116.0	113.6
40 — 50	81.8	154.7	108.9	101.6	114.9	118.3	117.5
50 — 60	74.7	151.2	106.0	100.4	120.8	117.7	118.3
60 — 70	74.4	151.2	106.2	92.2	120.3	119.5	119.8
70 — 80	73.5	160.9	112.1	97.2	123.6	123.7	124.9
80 — 90	62.5	166.8	112.1	98.0	136.5	127.7	130.0
90 — 100	60.2	186.2	129.0	110.2	168.0	146.9	158.1
0 — 100	76.1	165.8	114.5	101.0	135.9	127.5	131.7

N.B. Deflation means expressing the urban average at rural price level and has been done with Fisher's index.

*Vide footnote under Table 1.

the average per capita consumer expenditure in urban areas is about 52 per cent higher than the corresponding average for rural areas. If, however, we deflate the urban average so as to bring it at par with the rural price level, using the Fisher's price index, the difference is narrowed to only about 32 per cent. Such figures are given in the columns headed 'after deflation'. Table 3 presents such results for the different decile groups of the population and for some broad categories of consumption. We refrain from presenting fractile graphs, but our observations are based on such graphs and on comparisons of separations with error areas, wherever necessary.

3.2. For total consumer expenditure on all items, the 'before deflation' percentages fluctuate around 128 or 129 for the five bottom decile groups, but then rise at increasing rate over the remaining five decile groups, reaching 192 for the highest group. But the percentages fall considerably when the urban expenditures are deflated, being about 115 for the five decile groups for the bottom, and then increasing to about 158 for the highest group, the rise being again marked between the ninth and the tenth groups. We may mention that the half-sample divergence is considerable for the per capita expenditure estimates for the top decile groups in urban India. Fractile graphs clearly show the wide gap between the level of per capita consumer expenditure in rural and urban India, especially for the higher decile groups, and how this gap is narrowed when the rural-urban price differentials are taken into account.

3.3. Regarding the different categories of consumption by the general population, the 'before deflation' percentages are 85 for cereals and cereals substitutes, 189 for other food, 129 for all food and 127 for the non-food items to the extent covered ; the corresponding 'after deflation' figures are 76, 166, 114.5 and 101, so that the deflation narrows the urban-rural differentials for other food, all food and the non-food items, but widens it for cereals and cereals substitutes.

3.4. The non-food items excluded from the calculations accounted for Rs. 2.64 per capita in the average rural household budget and Rs. 8.61 per capita in the average urban household budget. The urban average is about 326 when expressed as percentage of the rural average. Our implicit urban-rural price differential for this group is 115, roughly speaking. So, the deflated urban average is about 283 per cent of the rural average, which speaks of a wide disparity between the two sectors in the consumption of this group of items. The deflated urban per capita consumer expenditure is 114.5 per cent of the rural per capita consumer expenditure on *all food items*, and the corresponding percentage for the *included non-food items* is as low as 101 ; so it is because of the much higher percentage, 283, for the excluded non-food items that the percentage is 131.7 for the entire budget.

3.5. Relative to the rural level of per capita consumption of cereals and cereals substitutes, the urban level of consumption steadily declines over the ten

---

*Evidently, the urban size distribution of persons by total consumer expenditure has a higher average and greater Lorenz ratio than the corresponding rural distribution.

decile groups of population, reflecting well-known differences in consumption between the two sectors. The percentages in Table 3 fall from 106 to 72 when based on expenditure figures before deflation and from 98 to 60 when based on deflated data. Thus, the consumption level is nearly equal in the bottom groups in the two sectors, but the well-off sections in urban areas consume much less of cereals and cereals substitutes than corresponding sections of the rural population. The trend is not so simple for other food, total food and the non-food items covered. For other food there is a drop in the percentage after the lowest decile group, and considerable rise over the three highest decile groups and the pattern is broadly similar for all food. For the non-food items, the percentages before deflation rise slowly from 112 for the lowest decile group to 125 for the ninth and then reaches 141 for the highest group ; the percentages after deflation are mostly below 100 ; they rise from 88 in the bottom decile group to 110 for the highest decile group.

4. SIZE DISTRIBUTIONS OF REAL CONSUMER EXPENDITURE

4.1. We may now utilize the urban-rural price differential indices in Cols. 7 to 9 of Table 2 to compare the Lorenz ratios of consumer expenditure for the two sectors after eliminating the effect of these price differentials. Cols. 7 to 9 of Table 1 yield percentage shares of the decile groups in the sectoral aggregates of total consumer expenditure. After cumulation, these percentages give Lorenz curves of total consumer expenditure. As the cumulative percentage of population (P) proceeds by equal steps, we used Simpson's one-third rule for computing Lorenz ratios of the size distributions. Next, we deflated the urban groupwise averages of expenditure by the corresponding price differential indices, derived percentage shares of the decile groups in *deflated* aggregate expenditure, and computed Lorenz ratios in the same manner from the cumulated values of these shares. All these Lorenz ratios are shown below :

| | Lorenz ratio | | |
	h.a. 1	h.a. 2	combined
	(1)	(2)	(3)
all-India rural	0.298	0.302	0.300
all-India urban	0.338	0.366	0.378
-do- after deflation	0.370	0.348	0.360

It will be seen that the adjustment for price differentials reduces the urban Lorenz ratio roughly by 0.02 and partly bridges the gap between the ratios for the two sectors.

4.2. The two sectoral distributions had to be pooled graphically since lognormal or other forms did not fit both the distributions. For both sectors, we plotted cumulative percentages of population (P) and cumulative percentages of expenditure (Q) against log x, where x denotes per capita total consumer expenditure. For pooling the distributions at nominal prices, we averaged P's and Q's of the two sectors,

for selected values of x, using sectoral populations and aggregate expenditures respectively, as weights. For pooling after deflating the urban expenditure figures, we used a single deflator, viz., 115 per cent, this being broadly the overall urban-rural price differential index. (The use of separate deflators over different expenditure brackets seems to be complicated and unnecessary.) We then averaged P for rural India for a given x and P for urban India for $1.15x$ read from the graph ; and similarly for the Q's.

4.3. Table 4 presents the pooled or all-India expenditure distributions for the combined sample. The trapezoidal rule yields the following Lorenz ratios for the all-India distributions :

	Lorenz ratio
at nominal prices	0.324
at rural India prices	0.323

Thus, the deflation process hardly affects the Lorenz ratio ; indeed the two Lorenz curves are almost indistinguishable. But it would be incorrect to conclude that the size distribution is unaltered by the deflation. For any given x, the values of P and and Q are appreciably changed when urban expenditures are deflated.

TABLE 4. ALL-INDIA (RURAL-PLUS-URBAN) DISTRIBUTIONS
OF PERSONS BY PER CAPITA HOUSEHOLD CONSUMER
EXPENDITURE PER 30 DAYS (x) : NSS 18TH ROUND
(FEBRUARY 1963-JANUARY 1964)

per capita consumer expenditure per 30 days (Rs.)	at nominal prices		at rural prices	
	P	Q	P	Q
(1)	(2)	(3)	(4)	(5)
10	8.9	2.8	9.4	3.1
15	29.3	13.8	30.6	14.9
20	51.2	29.7	53.1	31.2
25	68.5	44.9	70.2	46.5
30	78.8	55.4	80.4	57.4
40	89.5	72.3	90.3	73.8
50	93.9	80.8	94.6	82.2
60	96.3	85.5	96.8	87.0
70	97.4	88.0	97.8	89.9
Lorenz ratios	0.324		0.323	

Note : P : Cumulative percentage of population.

Q : Cumulative percentage of consumer expenditure.

4.4.   Fig. 1 presents the Lorenz curves.   Only the nominal price curve has been presented for all-India, rural-plus-urban.
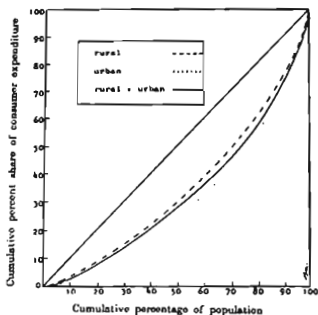

Fig. 1. Lorenz curves of the size distributions of persons by per capita household consumer expenditure for rural India, urban India and all-India (rural-plus-urban) based on NSS 18th round (February 1963-January 1964).

4.5.   The all-India Lorenz ratios presented above are based on the trapezoidal rule of quadrature, which ignores the convexity of the Lorenz curves ; and the true value should be close to 0.33. We may therefore conclude by pointing to the relative positions of the different Lorenz ratios :

rural	all-India	urban (deflated)	urban
0.30	0.33	0.36	0.38

5.   PRICE LEVEL COMPARISONS : ALL PAIRS OF DECILE GROUPS

5.1.   The price comparisons between corresponding decile groups of population in rural and urban India are open to a number of criticisms. First, one might argue that the comparison between the j-th decile group in rural India (R_j say) and the j-th decile group in urban India (U_j say), for any j, is not quite meaningful, a criticism which does not apply to the comparisons between the general populations in the two sectors. Next, one might point to the differences in level of living between corresponding decile groups in the two sectors. Thus, the average monthly per capita consumer expenditure in U_2 (Rs. 17.29) is much larger than the corresponding rural figure (Rs. 13.69) ; in fact, if such averages were the correct guide, U_2 is comparable to R_4 for which the average expenditure is Rs. 17.47. It might therefore be suggested that comparisons be carried out between decile groups in the two sectors which have nearly per capita consumption. An alternative would be to compare the budget

patterns and compare any given decile group in urban India with the decile group in rural India having the closest pattern of consumer expenditure. A preliminary examination showed that, in this latter case, U_1 should be compared with R_2 ; U_2 with R_7 ; U_3 with R_9 ; U_4, U_5 and U_6 with R_9 and U_7 to U_{10} with R_{10}. These findings were heavily influenced by the relative weightage of cereals items in the budgets of the different groups.

5.2. In view of these, and also for the sake of general interest, it was decided to compute Laspeyres' and Paasche's indices for comparing price levels for all possible pairs of groups formed from U_1, U_2,..., U_{10} ; R_1, R_2, ..., R_{10} and the general populations of the two sectors, denoted U_0 and R_0, separately by half-samples. Some of these indices are presented in Tables 5 and 6. The 56 consumer items indicated in para 2.4 above were used for these computations, throughout.

TABLE 5. INDEX SHOWING PRICE LEVEL FOR A DECILE GROUP AS PERCENTAGE OF THE PRICE LEVEL FOR THE GENERAL POPULATION, FOR DIFFERENT DECILE GROUPS IN RURAL AND URBAN INDIA. NSS 18TH ROUND
(FEBRUARY 1963-JANUARY 1964) : ALL-INDIA

fractile group (per cent)	rural						urban					
	Laspeyres			Paasche			Laspeyres			Paasche		
	h.s. 1	h.s. 2	comb.	h.s. 1	h.s. 2	comb.	h.s. 1	h.s. 2	comb.	h.s. 1	h.s. 2	comb.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
0 — 10	91.4	90.8	90.9	91.8	91.9	91.8	86.8	88.0	86.7	88.2	91.1	89.1
10 — 20	94.0	93.5	93.7	95.4	94.4	94.8	90.7	94.0	91.1	92.6	93.5	93.0
20 — 30	96.4	96.2	96.3	97.2	97.0	97.1	92.4	90.7	91.6	93.0	92.5	93.0
30 — 40	96.2	96.6	96.3	96.7	97.4	97.0	96.0	94.9	94.8	96.1	95.3	95.3
40 — 50	98.2	97.8	97.8	98.7	98.2	98.3	95.5	92.6	93.8	96.1	92.6	94.6
50 — 60	99.9	98.9	99.5	100.2	99.1	99.7	96.5	97.6	97.0	96.0	97.5	97.0
60 — 70	99.8	99.7	99.7	99.0	99.8	99.8	100.5	99.8	99.7	100.6	99.5	99.7
70 — 80	101.0	100.7	100.9	100.9	100.4	100.7	100.2	100.9	100.4	100.3	100.4	100.2
80 — 90	101.7	100.9	101.3	101.5	101.1	101.3	105.1	105.2	105.4	105.1	104.1	104.4
90 — 100	103.8	105.3	104.6	104.6	105.9	105.3	109.6	108.9	109.3	109.6	110.2	109.7
0 — 100	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

5.3. Broadly speaking, the half-sample indices are quite close, excepting in a few cases where an urban decile group is involved. The divergence between L and P is often appreciable in Table 6, but not in Table 5. Interestingly, P is frequently larger than L. However, the estimated indices seem to be reliable for most practical purposes.

5.4. Table 5 shows that taking the price level for the general population in rural India as 100, the price levels for R_1, R_2, ..., R_{10} rose steadily from 91 to 105, roughly speaking. A similar pattern is found for the urban decile groups, but here the indices seem to rise from 88 to 110, approximately.

5.5. For individual consumer items, the variation of price paid (p) over classes of per capita consumer expenditure (x) has been examined by Prais and Houthakker (1955) and others. The elasticity of p with respect to x has been called

TABLE 6. INDEX SHOWING URBAN PRICE LEVEL AS PERCENTAGE OF RURAL PRICE LEVEL FOR DIFFERENT PAIRS OF DECILE GROUPS IN THE TWO SECTORS: NSS 18TH ROUND (FEBRUARY 1963-JANUARY 1964): ALL-INDIA

urban fractile group (per cent)	half sample	rural fractile group (per cent)										0-100 general population		
		0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90	90-100	l.s. 1	h.s. 2	comb.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
0 — 10	comb.	111.0	107.7	104.8	104.8	103.2	101.5	101.3	99.9	99.3	94.3	100.0	101.8	100.8
		110.1	106.9	104.5	104.4	103.0	101.9	101.5	100.4	100.8	98.5	100.8	103.5	101.9
10 — 20	comb.	119.7	114.6	111.6	111.3	109.5	107.7	107.4	108.1	105.0	100.1	106.3	110.1	107.0
		114.8	111.5	109.1	108.8	107.5	105.0	105.7	104.5	104.6	101.9	105.7	106.2	105.8
20 — 30	comb.	118.8	114.3	111.2	111.2	109.4	107.6	107.4	106.0	105.0	100.1	107.5	106.0	106.9
		115.7	112.5	110.1	109.8	108.5	106.7	106.4	105.2	105.3	102.2	106.8	105.5	105.4
30 — 40	comb.	124.0	118.8	115.3	115.2	113.2	111.4	111.1	109.6	108.7	103.6	112.7	110.2	110.6
		118.5	115.5	112.9	112.6	111.4	109.4	109.3	108.0	108.0	104.9	109.7	109.1	109.1
40 — 50	comb.	122.6	117.7	114.2	114.3	112.4	110.7	110.4	110.0	107.9	103.1	112.4	107.4	110.0
		117.5	114.5	112.1	111.9	110.6	108.5	108.4	107.2	107.1	103.7	109.7	105.7	108.1
50 — 60	comb.	124.6	119.0	117.0	117.1	115.5	113.8	113.7	112.2	111.3	106.0	112.5	113.9	113.0
		120.6	117.6	115.2	114.0	113.8	111.4	111.1	110.0	109.7	106.2	109.4	111.2	110.8
60 — 70	comb.	128.4	123.0	119.9	119.0	118.2	116.4	116.4	115.1	114.5	109.9	116.5	116.4	116.1
		124.8	121.5	119.1	118.7	117.5	115.0	114.8	113.6	113.2	109.3	115.2	114.1	114.4
70 — 80	comb.	129.6	124.7	121.6	121.8	120.1	118.5	118.5	117.1	116.6	111.6	117.1	119.1	118.0
		125.2	122.3	120.0	119.4	118.3	115.8	115.4	114.4	113.8	109.7	114.6	115.0	114.8
80 — 90	comb.	137.0	131.9	128.5	129.0	127.0	125.3	125.3	123.9	123.1	117.6	125.5	124.3	124.7
		131.3	128.4	126.2	125.4	124.3	121.5	121.0	119.8	118.8	114.1	120.3	119.6	119.9
90 — 100	comb.	137.2	132.4	129.8	130.4	129.1	127.6	128.1	127.4	127.1	122.9	129.0	126.2	127.7
		138.5	136.0	133.6	132.6	131.7	128.6	128.0	126.9	125.5	119.7	125.2	127.6	126.4
0 — 100	h.s. 1	126.6	121.1	119.2	120.0	117.5	116.0	116.6	115.4	115.1	111.5	116.3		
		124.1	121.3	119.4	118.7	118.0	115.2	115.1	113.5	113.4	109.9	114.5		
(general population)	h.s. 2	126.0	122.4	118.9	118.7	117.8	116.9	116.5	115.9	115.1	110.4		116.2	
		125.6	122.5	119.6	119.0	118.0	116.0	115.1	114.7	113.3	109.1		114.6	
	comb.	126.2	121.7	118.9	119.3	117.9	116.4	116.6	115.8	115.3	111.0			116.2
		125.2	122.2	119.8	119.2	118.1	115.7	115.3	114.2	113.6	109.3			114.7

Note : In every cell, the upper figure is the Laspeyres index, and the lower one, Paasche index.

the quality elasticity of the item. It appears that here we have an idea of quality elasticity for all consumer items taken together.

5.6. Plotting the decile group indices of Table 5 against corresponding averages of per capita total consumer expenditure, we found an approximate linear relation on log-log scale for both rural and urban India. Passing freehand lines by inspection, the overall quality elasticity was estimated as 0.07 for rural India and 0.10 for urban India. These elasticities seem to be rather small. However, the quality elasticities usually obtained (Iyengar, 1963) relate to heterogeneous commodity-groups like cereals, and in our computations such groups were split into finer constituents. In any case, the urban elasticity is understandably larger than the rural elasticity.

5.7. Table 6 compares each $U_i (i = 1, 2, ..., 10$ and $0)$ with each $R_j (j = 1, 2, ..., 10$ and $0)$ and the results appear to be fairly smooth. The formulae employed do not meet the circular test ; so, we tried to see how far the indices given in Table 5 and the overall urban-rural price differential index can be used to estimate the indices in the main body of Table 6. For each pair (i, j), we calculated the "expected" value $\hat{F}_{U_i R_j}$ of the Fisher's Ideal Index for U_i (with $R_j = 100$) by using the formula

$$\hat{F}_{U_i R_j} = \frac{F_{U_i U_0} \, F_{U_0 R_0}}{F_{R_j R_0}}$$

and obtained the residual

$$F_{U_i R_j} - \hat{F}_{U_i R_j}$$

where $F_{U_i R_j}$ is the actual Fisher index based on Table 6. Table 7 presents these residuals for all (i, j).

TABLE 7. RESIDUALS OF FISHER'S IDEAL INDEX BASED ON TABLE 6:
COMBINED SAMPLE ONLY

urban fractile group (per cent)	rural fractile group (per cent)										
	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90	90-100	general population
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
0 — 10	−0.15	−0.44	−0.27	−0.42	−0.48	−0.24	−0.39	−0.55	−0.22	−0.37	−0.17
10 — 20	0.86	0.24	0.44	0.08	0.10	0.10	0.06	−0.14	−0.11	−0.28	0.15
20 — 30	0.59	0.30	0.46	0.25	0.19	0.16	0.08	−0.09	−0.10	−0.42	0.09
30 — 40	1.03	0.65	0.62	0.32	0.31	0.19	0.13	−0.09	−0.06	−0.38	0.16
40 — 50	0.97	0.64	0.70	0.55	0.53	0.39	0.36	0.17	0.07	−0.27	0.27
50 — 60	−0.04	−0.12	0.31	0.12	0.35	0.10	0.12	0.00	−0.12	−0.57	−0.14
60 — 70	0.50	0.07	0.47	0.16	0.36	0.11	0.19	0.11	0.09	−0.14	0.07
70 — 80	0.57	0.54	1.02	0.77	1.01	0.83	0.83	0.83	0.79	0.24	0.57
80 — 90	1.54	1.59	2.11	1.87	2.12	1.79	1.70	1.71	1.34	0.39	1.17
90 — 100	−0.60	−0.03	0.95	0.72	1.39	1.15	1.26	1.71	1.37	0.77	0.61
general population	−0.75	−0.60	−0.03	−0.19	0.20	0.11	0.22	0.34	0.42	0.21	0.00

5.8. It is clear that the residuals are quite small, so that one can very well summarise the detailed indices given in Table 6 by quoting the indices given in Table 5 and the overall index $F_{U_0 R_0}$ which is 115.5 approximately. Similar results were obtained from comparisons among $R_1, ..., R_{10}$ and R_0; and also among $U_1, U_2, ..., U_{10}$ and U_0; that is why only the summary is given in Table 5. It may be noted in passing that for L and P, the residuals seem to be numerically larger ; and they tend to be positive for L and negative for P, as expected.

6. Concluding Observations

6.1. We have already mentioned the exclusion of item-groups like education and durables from the computations of the index. It is difficult to cover items belonging to these subgroups (e.g. cinema tickets, domestic services, school fees) by collecting prices for use in inter-regional comparisons, especially when interest lies in particular sections (of decile groups) of the population.

6.2. There are in addition the limitations of the NSS household budget data, which were not collected for purposes of construction of consumer price indices. The items in the schedule represent broad groups of varieties or qualities; thus, 'rice' is one item and 'milk' another. In case, the *average* quality of an item varies over time or regions, the implicit prices in such schedules would not be comparable over time or regions. Our calculations assume that the average quality of the commodity consumed is more or less the same for the decile groups of population being compared by any index. This assumption does not seem to be fully realistic when there are substantial differences between the average per capita consumption expenditures of the two decile groups. It is thus possible that the rise in the urban-rural price differential over the decile groups is partly due to quality variation. However, the price data obtained through a household budget enquiry are based on statistically valid samples of households (or transactions) covering specified sections of the population; the availability of half-samplewise estimates is also an important advantage of this approach.

References

BHATTACHARYA, N. and CHATTERJEE, G. S. (1969a): Inter-regional and inter-temporal variations in size distributions of household consumer expenditure in India. Presented to the 11th General Conference of the International Association for Research in Income and Wealth, Nathanya, Israel.

———— (1969b): On rural-urban differentials in consumer prices and per capita household consumption in India. Presented to the 9th Indian Econometric Conference, Patna.

BHATTACHARYA, N. and IYENGAR, N. S. (1961): Changes in the pattern of distribution of persons by monthly per capita total consumer expenditure over NSS rounds. Working paper (mimeographed), Planning Division, Indian Statistical Institute.

BHATTACHARYA, N. and MAHALANOBIS, B. (1967): Regional disparities in household consumption in India. Jour. Amer. Stat. Assoc., 63, 143-161.

CHATTERJEE, G. S. and BHATTACHARYA, N. (1969a) : Rural-urban differentials in consumer prices and per capita household consumption in India, by levels of living. Presented to the 8th Indian Econometric Conference, Bombay.

————— (1969b) : Rural-urban differentials in consumer prices in India. *Economic and Political Weekly,* IV, 29, 850-853.

DIVAKAR RAO, G. (1960) : Estimation of real income differences between rural and urban areas on the basis of NSS price data. Working paper (mimeographed). National Sample Survey, Indian Statistical Institute.

IYENGAR, N. S. (1963) : Estimation of quality elasticities for certaine ommodities from National Sample Survey data. *Sankhyā,* Series B, 25, 15-22.

————— and BHATTACHARYA, N. (1965) : On the effect of differentials in consumer price index on measures of inequality. *Sankhyā,* 27, Series B, 47-56.

————— and CHATTERJEE, G. S. and SARKAR, D. (1964) : On consumer price indices by levels of living. Working paper (mimeographed). Planning Division, Indian Statistical Institute.

MAHALANOBIS, P. C. (1960) : A method of fractile graphical analysis. *Econometrica,* 28, 325-351.

————— (1962) : A preliminary note on the consumption of cereals in India. *Bull. Int. Stat. Inst.* 39(4), 53-76.

MAITRA, TARKAN (1959) : On the variation in prices between States of India. Working paper (mimeographed). Planning Division, Indian Statistical Institute.

MUKHERJEE, M. and CHATTERJEE, G. S. (1963) : Movement in consumer price index number in India, 1952-53—1957-58. Working paper (mimeographed). Planning Division, Indian Statistical Institute.

————— (1967) : Trends in distribution of national income, 1950-51 to 1965-66. *Economic and Political Weekly,* II, 26, 1259-1268.

OJHA, P. D. and BHATT, V. V. (1964) : Pattern of income distribution in an underdeveloped economy : A case study of India. *American Economic Review,* 54, 711-720.

PLANNING COMMISSION, GOVT. OF INDIA (1964) : Report on the Committee on the Distribution of Income and Levels of Living, Part I—Distribution of Income and wealth and concentration of economic power. Manager of Publications, New Delhi.

PRAIS, S. J. and HOUTHAKKER, H. S. (1955) : *The Analysis of Family Budgets,* Cambridge University Press, Cambridge.

RANADIVE, K. R. (1965) : "Equality" of incomes in India. *Bulletin, Oxford University of Economics and Statistics,* 27, 119-134.

Paper received : February, 1970.