REGIONAL DISPARITIES IN HOUSEHOLD CONSUMPTION IN INDIA

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This paper analyses the distributions of persons by per capita household consumer expenditure on all items estimated from the 13th Round (Sept. 1957–May 1958) of the Indian National Sample Survey (NSS) separately for the rural and urban sectors of the different states of India [19]. For rural India, urban India and all-India, the disparities in consumption are analysed into between states and within states components. This is easily done by an analysis of variance of logarithms. Greater attention is given to measures related to the Gini-Lorenz concentration curve; but while the 'between states' concentration curve could be defined in an interesting manner, the 'within states' component could not be defined with equal success.

1. INTRODUCTION

The problems of regional development and regional disparity have been exercising the minds of planners in India and elsewhere. It may be useful in this connection to have one or more objective statistical measures of regional disparity. Disparities in level of living deserve the greatest attention. This is best studied by using the estimates of consumer expenditure like those thrown up by the NSS and other agencies, for the difficulties of regional income estimation are well-known [3]. Other measures would be needed for regional disparities in other respects, e.g., in agricultural development.

The main object of this paper is to put forward statistical measures of regional disparity in India based on statewise estimates of consumer expenditure available from the 13th round of the NSS. Earlier rounds of the NSS did not publish statewise tables of the type required; also results for the 14th and later rounds are yet to be published. If analyses of the type proposed here are carried out for different rounds of the NSS, it might be possible to assess how far the regional disparities in level of living are increasing or decreasing with time.

Section 2 gives some background information on the NSS consumer expenditure data utilised here. In Section 3 we present the concentration curves and associated measures for the distribution of persons by size of per capita consumer expenditure on all items, separately for rural India, urban India and all-India. We next try to resolve the concentration at all-India level into between states and within states components, again separately for rural, urban and rural-plus-urban sectors. In Sections 4 and 5 we do this, without complete success, using the measures related to the concentration curve. Section 6 does the same using the standard deviation of logarithms as the measure of inequality. Section 7 presents the measures of within state inequality separately for individual states. Section 8, the last one, points out some limitations of the present work.

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As regards the choice of measures of inequality, those depending on the shares of a few largest individuals are not quite appropriate here, useful as they are in analyses of business and industry [2]. Among those more or less appropriate for income and allied variates, we have chosen the most widely used ones, viz., some selected ordinates of the Gini-Lorenz concentration curve and the associated concentration coefficient, and the standard deviation of logarithms [4, 8, 9, 17]. These do not depend on any distribution assumptions; but the s.d. (log) becomes particularly meaningful when, as in the present case, the size distribution is approximately lognormal.[3] The s.d. (log) should be relatively insensitive to the absolute sizes of the few largest observations and can also be used for resolving the concentration into between groups and within groups components (say). This last property is possessed by the coefficient of variation also, but the lognormality of the distribution points to the superiority of the s.d. (log). The Gini-Lorenz measures cannot be so successfully partitioned into components,[3] but they have the attraction of being connected in a simple manner with the shares of different groups such as those in Table 4.

2. BACKGROUND INFORMATION ON THE NSS DATA

The household consumer expenditure data used were thrown up by the 13th Round of the NSS. The NSS tabulation gave separate estimates for what are generally speaking the 'states' of India, as constituted by the States Reorganisation Act of 1956 [vide Table 3, col. 1]. These 'states' are the regions considered for the present investigation. The State of Bombay had been later split into two smaller states, viz., Gujrat and Maharashtra, but this division was ignored in the NSS tabulation and hence in the present study. On the other hand, the NSS tables show a heterogeneous region called "Union Territories" comprising four non-contiguous areas (Delhi, Himachal Pradesh, Manipur and Tripura). The use of this region is a minor limitation of the present study. Finally, the NSS did not cover some small areas of the Indian Union, viz., Andaman and Nicobar Islands, the islands of Aminidivi, Laccadive and Minicoy and the part B tribal areas of Assam, apart from areas like Sikkim, Pondicherry and Goa. These areas which covered only 0.46 per cent of India's population in 1961 had to be left out for purposes of the present analysis.

A word or two about the NSS data on consumer expenditure. The NSS is a multipurpose sample survey covering practically the whole of India and is carried out in the form of successive "rounds," each "round" taking a few months or a year for its completion. The NSS uses probability sampling for all its enquiries, and throws up valid statistical estimates of population characteristics. The design is generally stratified multistage, and the sample consists of two or more independent and interpenetrating subsamples giving equally valid and independent estimates. The agreement between subsample estimates throws light on the error of the combined estimate.

The enquiry on consumer expenditure has been carried out in every round of

[2] The distribution of persons by size of per capita consumer expenditure on all items has been found to be very nearly lognormal for both rural and urban India from the estimates from different rounds of NSS [1, 5, 6, 15, 16]. Under the circumstances, different measures of inequality are monotonically related to one another.

[3] The simplicity of Mendershausen's [13] result is due to his having considered groups of observations lying in different non-overlapping size-ranges.

the NSS, starting from the first, which was carried out during October 1950–March 1951. The 13th Round of the NSS was carried out during September 1957–May 1958, and covered the whole of rural and urban India, excepting the small areas mentioned earlier. In all, 6738 households in 1848 villages and 3583 households in 1168 urban (census) blocks were covered for the enquiry. As in all other rounds the interview method was used for the enquiry on consumer expenditure. The investigators collected consumer expenditure data from sample households by interrogating the heads or other representative members of the households. The budget collected related to the last 30 days preceding the date of enquiry and the dates of enquiry for individual sample households were evenly spread over the duration of the round according to the sample design. Total consumer expenditure includes all expenditure on domestic account for consumption out of purchase plus imputed values of consumption out of home grown stock, out of transfers (gifts, loans, etc.), and out of goods obtained in exchange of goods and services.

It may also be mentioned that NSS consumer expenditure data have been used for various types of analyses, e.g., for estimation of Engel elasticities of demand [1, 5, 6, 9, 10, 15, 16] and have been found to give generally sensible results. Also, a recent comparison showed encouraging agreement between NSS estimates of aggregate consumer expenditure and the official national income estimates of private consumption [14].

3. THE CONCENTRATION CURVE FOR ALL-INDIA

It is convenient to begin by constructing the concentration curve for all-India,[4] that is, for all the regions taken together, separately for the rural and the urban sectors and again for rural-plus-urban. The basic material is shown in Table 1.

In terms of symbols introduced in the column headings of Table 1, the concentration curve was obtained by plotting cumulative percentages of share

$$Q_i = \sum_{j=1}^{i} p_j\bar{x}_j \Big/ \sum_{j=1}^{12} p_j\bar{x}_j$$

against the corresponding cumulative percentages of population

$$P_i = \sum_{j=1}^{i} p_j, \qquad \text{for } i = 1, 2, \cdots, 12,$$

and joining these points and the point $(P_0, Q_0) = (0, 0)$ successively by straight lines. This was done for both sectors, and in each case, for both the subsamples and for the combined sample. The concentration coefficient was calculated by the formula based on the trapezoidal rule

$$L = 1 - \sum_{j=1}^{12} p_j(Q_j + Q_{j-1}) \tag{1}$$

By linear interpolation on the (P_i, Q_i)'s, the ordinates of the concentration curve were found for $P = 0.1, 0.25, 0.5, 0.75, 0.9$ and 0.95. Clearly, these are

[4] Some small areas noted in Section 3 were not covered by the NSS enquiry.

TABLE 1. ESTIMATED DISTRIBUTION OF PERSONS BY LEVELS OF CONSUMER EXPENDITURE ON ALL ITEMS PER CAPITA PER 30 DAYS: ALL-INDIA, RURAL AND URBAN, NSS, 13TH ROUND, (SEPTEMBER 1957–MAY 1958)*

Class (j)	Monthly per Capita Consumer Expenditure (Rs.)	P.c. of Population (p_j)						Average Consumer Expenditure per Person per 30 Days (Rs) ($\bar{x}_j$)					
		Rural			Urban			Rural			Urban		
		s.s. 1	s.s. 2	Comb.	s.s. 1	s.s. 2	Comb.	s.s. 1	s.s. 2	Comb.	s.s. 1	s.s. 2	Comb.
(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
1	0– 8	11.58	13.30	12.44	5.65	5.52	5.58	6.15	6.18	6.17	6.71	6.62	6.65
2	8–11	16.02	16.73	16.38	10.66	9.80	10.22	9.49	9.50	9.50	9.80	9.71	9.75
3	11–13	9.54	10.75	10.14	7.29	8.30	7.81	12.06	12.02	12.03	12.01	11.93	11.96
4	13–15	10.65	9.26	9.96	9.54	7.66	8.57	14.03	14.07	14.04	13.95	13.96	13.96
5	15–18	12.09	15.02	13.55	10.67	10.84	10.76	16.45	16.43	16.45	16.39	16.52	16.45
6	18–21	10.32	7.97	9.14	11.26	8.92	10.05	19.47	19.49	19.48	19.34	19.30	19.32
7	21–24	8.45	6.42	7.44	8.40	8.52	8.46	22.32	22.48	22.40	22.48	22.30	22.38
8	24–28	6.42	6.85	6.63	8.39	9.61	9.02	25.72	25.90	25.82	26.21	25.93	26.06
9	28–34	5.81	5.49	5.65	8.90	8.50	8.69	30.53	30.93	30.72	30.57	30.32	30.47
10	34–43	4.48	4.53	4.51	7.13	8.85	8.02	37.89	38.49	38.19	38.06	38.22	38.12
11	43–55	1.82	1.70	1.76	5.12	5.95	5.55	48.88	47.43	48.21	48.89	48.58	48.70
12	55–	2.82	1.98	2.40	6.99	7.53	7.27	82.14	81.45	81.87	81.24	81.10	81.17
Total		100.00	100.00	100.00	100.00	100.00	100.00	19.10	18.11	18.59	25.20	26.16	25.68

* No. of sample households: rural-6738, urban-3583.

the shares of the lowest 10 per cent, 25 per cent etc., in the population. These measures of inequality are exhibited in cols. (6)–(8) of Table 2; but the (P_i, Q_i)'s are not shown for want of space. Since, in general, the concentration curve is convex to the P-axis, all these measures slightly understate the inequality, being based on the broken-chain approximation to the true concentration curve.[5]

The rural-plus-urban results shown in Table 2 were obtained in precisely the same manner from the corresponding set of (P_i, Q_i)-values, $i=0, 1, \cdots, 12$, not shown again for want of space. Here the P_i's were weighted averages of corresponding rural and urban P_i's with the estimated 13th Round populations in the two sectors as weights [vide Table 3, bottom row]; for Q_i's the procedure

TABLE 2. OVERALL AND BETWEEN REGION INEQUALITY IN CONSUMER EXPENDITURE IN INDIA: NSS, 13TH ROUND (SEPTEMBER 1957–MAY 1958)

Sector	Measure of Inequality	Between Regions			Overall (All Regions)		
		s.s. 1	s.s. 2	Comb.	s.s. 1	ss. 2	Comb.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Rural	1. Gini-Lorenz ratio	0.101	0.082	0.088	0.337	0.330	0.334
	2. Shares (%) of:						
	(i) bottom 10%	7.67	7.69	7.68	3.22	3.41	3.32
	(ii) bottom 25%	20.94	21.13	21.12	10.41	10.68	10.54
	(iii) bottom 50%	43.50	44.68	44.44	26.60	27.62	27.52
	(iv) bottom 75%	67.33	69.76	68.80	52.12	52.31	52.20
	(v) bottom 90%	85.22	86.24	85.73	72.90	73.95	73.43
	(vi) bottom 95%	92.26	92.59	92.48	82.49	83.83	83.15
Urban	1. Gini-Lorenz ratio	0.071	0.089	0.077	0.357	0.360	0.359
	2. Shares (%) of:						
	(i) bottom 10%	7.85	7.94	8.12	3.19	3.05	3.11
	(ii) bottom 25%	21.31	20.15	21.16	9.87	9.53	9.68
	(iii) bottom 50%	45.21	43.69	44.51	26.04	25.50	25.74
	(iv) bottom 75%	70.93	69.90	70.34	49.90	49.73	49.82
	(v) bottom 90%	86.99	86.54	86.88	71.69	72.15	71.93
	(vi) bottom 95%	92.96	92.77	92.93	83.92	84.54	84.12
Rural plus urban	1. Gini-Lorenz ratio	0.088	0.078	0.081	0.346	0.346	0.346
	2. Shares (%) of:						
	(i) bottom 10%	8.07	8.05	8.11	3.07	3.18	3.12
	(ii) bottom 25%	21.42	21.47	21.53	10.07	10.16	10.12
	(iii) bottom 50%	43.93	44.87	44.48	26.98	26.90	26.92
	(iv) bottom 75%	68.82	69.65	69.46	51.10	50.98	51.03
	(v) bottom 90%	85.93	86.56	86.28	72.16	72.65	72.40
	(vi) bottom 95%	91.99	92.67	92.73	82.08	82.68	82.37

[5] If the p_i's were all equal, as in fractile graphical analysis [10], one could easily use more general methods of interpolation or numerical integration, and remove these biases for all practical purposes.

was very much similar, the weights being the total consumer expenditures in the two sectors.

The rural-plus-urban concentration curve is shown in Fig. 1, separately for the two subsamples and the combined sample. Here as well as for the individual sectors, the divergence between subsamples seems to be reasonably small.

The all-India picture presented here seems to be typical in the sense that very similar estimates have emerged from many other rounds of NSS [1, 6]. Concentration is greater in urban areas than in rural, and the rural-plus-urban results are intermediate between the two.

4. A CONCENTRATION CURVE FOR BETWEEN GROUPS DISPARITY

As stated in the Introductory Section, we try in this and the following sec-

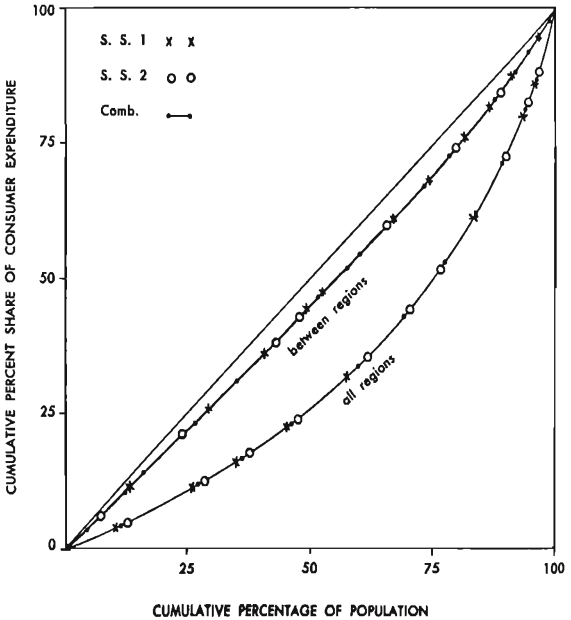

FIG. 1. Between regions (states) and all-region concentration curves of total consumer expenditure for all-India, rural plus urban, based on NSS, 13th round (September 1957–May 1958).

tions to resolve the all-India concentration measures of the foregoing section into between states and within states components.

Concentration curves are usually defined for continuous distributions of non-negative variates like income, where the concept of "shares" of different groups is meaningful [7]. The definition, can, however, be extended to the case of a discrete non-negative variate x, assuming the values $x_1, x_2, \cdots, x_k$ supposed to be arranged in ascending order, with probabilities $p_1, p_2, \cdots, p_k$ with $\sum_{j=1}^{k} p_j = 1$.[6] The mean $\sum_{j=1}^{k} x_j p_j$ must, of course, exist. Denote this by μ. Then

$$\Phi_r = \sum_{j=1}^{r} x_j p_j / \mu (r = 1, 2, \cdots, k) \tag{2}$$

is obviously the proportionate share in the total amount of the variate x possessed by individuals having $x \leq x_r$. Plotting Φ_r against the cumulative proportion of individuals $F_r = \sum_{j=1}^{r} p_j$, one gets a series of points including the point (1, 1) and also, of course, the point (0, 0).[7] The question is: can we join these points in any meaningful way to get a continuous concentration curve?

If the individuals having the same value of x are ranked arbitrarily to get a ranking of x-values without ties, the concentration curve becomes the broken chain obtained by joining the above-mentioned points successively by straight lines, each to the next. But this kind of construction has a stronger support.

In the continuous case, there are two equivalent definitions of the Gini-Lorenz measure of inequality [7]. According to the first, the measure is twice the area of concentration, i.e., twice the area between the concentration curve and the egalitarian line $\Phi = F$. According to the second, it is the Gini mean difference Δ divided by 2μ. The latter definition is meaningful even for discrete variates. The construction described above ensures that twice the area of concentration obtained thereby equals the Gini-Lorenz measure obtained from the Gini mean difference.

For we have, for the Gini mean difference

$$\Delta = E\left| x^{(1)} - x^{(2)} \right|,$$

where $x^{(1)}$ and $x^{(2)}$ are two independent observations from the given population,

$$= 2 \sum_{x_j \leq x_i} p_i p_j \left| x_i - x_j \right| = 2 \sum_{i} \left[x_i p_i F_i - p_i \mu \Phi_i \right]$$

$$= 2\mu \sum_{i} \left[F_i(\Phi_i - \Phi_{i-1}) - \Phi_i(F_i - F_{i-1}) \right]. \tag{3}$$

Geometrical considerations show that the value of $\Delta/2\mu$ equals twice the area between the egalitarian line $\Phi = F$ and the broken chain concentration curve defined in an earlier paragraph.

The concentration coefficient may be calculated, exactly in this case, from the relation

$$L = 1 - \sum_{j} p_j (\Phi_j + \Phi_{j-1}) \tag{4}$$

[6] The number k need not be finite.

[7] For the Poisson distribution with parameter λ, $F_r = e^{-\lambda} \sum_{x=1}^{r} \frac{\lambda^x}{x!}$ and Φ_r is found to equal F_{r-1} (with $F_{-1} = 0$).

Suppose now we have continuous distributions of, say, income (x) for individuals belonging to k groups (regions, in the present application). Denote the proportions of individuals belonging to these k groups by $p_1, p_2, \cdots, p_k$; the corresponding distribution functions of income by $F_1(x), F_2(x), \cdots, F_k(x)$; and the means by $\mu_1, \mu_2, \cdots, \mu_k$. The pooled distribution function is $F(x) = \sum_{i=1}^{k} p_i F_i(x)$ and the corresponding mean $\mu = \sum_{i=1}^{k} p_i \mu_i$.

The concentration curve for the pooled distribution may be constructed in the usual manner. It is desired to show the total inequality as split up into two components, (1) between groups and (2) within groups.

Intuitively, it is reasonable to lay down that the between groups component should not change if the group distributions $F_i(x)$ are changed, keeping μ_i fixed ($i = 1, 2, \cdots, k$). It follows that the between groups component in the general case is the same as the between groups component in the special case where within group variation is zero for every group. But in this case the overall and the between groups concentration curves coincide; they can be constructed by the method given earlier in this section—only here the variable x assumes the value μ_i with probability p_i. This is then the definition of the between groups concentration curve. It shows the extent to which overall inequalities in consumption shares could be reduced if each region separately engaged in a completely equalizing internal redistribution, without modifying regional shares. The 'between groups' concentration coefficient is $\Delta_B/2\mu$ where Δ_B, the 'between groups' component of Gini mean difference is

$$\Delta_B = \sum_{i \neq j} p_i p_j \left| \mu_i - \mu_j \right| \tag{5}$$

Symbolically, the overall Gini mean difference can be split in the following manner:

$$\begin{aligned} \Delta &= E\left| x^{(1)} - x^{(2)} \right| \\ &= \sum p_i^2 \Delta_i + \sum_{i \neq j} p_i p_j \left\{ E\left| x_i^{(1)} - x_j^{(2)} \right| \right\} \end{aligned} \tag{6}$$

where $x_i^{(1)} F_{i(x)}$, $x_j^{(1)} F_{j(x)}$, and $x_i^{(1)}$ and $x_j^{(2)}$ are statistically independent. Here Δ_i is the Gini mean difference for the distribution $F_i(x)$. Obviously, the 'within groups' component of the Gini mean difference is

$$\Delta_W = \sum p_i^2 \Delta_i + \sum_{i \neq j} p_i p_j \left\{ E\left| x_i^{(1)} - x_j^{(2)} \right| - \left| \mu_i - \mu_j \right| \right\}. \tag{7}$$

The second component of Δ_W vanishes if and only if the distributions are all non-overlapping. Only in this case the two components are completely analogous to those in the analysis of variance. In this case, the overall concentration curve passes through the points used for drawing the between groups curve, but whereas the latter is a broken chain, the former is a curve convex to F-axis. The area lying between the two indicates the term $\sum p_i^2 \Delta_i$. The area between this convex curve and the overall curve indicates the other term in Δ_W.

In general, the overall concentration curve will be below the between groups concentration curve, provided within group variation is not zero in every group. It is not possible, apparently, to define a within groups concentration

curve, but the difference indicates the effect of within group disparities. Nor is it possible to express the within component clearly in terms of the within group variabilities, as in the analysis of variance.

5. THE CONCENTRATION CURVE FOR BETWEEN STATES DISPARITY

We now apply the above theory to the statewise estimates available in Table 3, which shows the averages of consumer expenditure on all items per person per 30 days, separately for rural and urban sectors, and also by subsamples. The rural-plus-urban figures were obtained as weighted averages using the population figures in cols. (4)–(5) as weights. For the sake of interest, some idea of sample sizes is also given in cols. (2)–(3). In general, the subsamples are of roughly equal size; so only the combined sample size is shown.

Interpolation based on population figures of 1951 and 1961 censuses [18] gave the above-mentioned estimates of population at the midpoint of the 13th Round. A geometric rate of growth was assumed separately for each state and each sector. For Jammu & Kashmir, however, no 1951 figures were available, since the 1951 census did not cover this state. Accordingly, the 13th Round population of Jammu & Kashmir was estimated by using the overall ratio between the estimated 13th Round population and the 1961 population for the rest of the country; the same ratio was used for both the rural and the urban sectors of this state.[8]

Multiplying the averages by the population figures one gets aggregates of consumer expenditure. The aggregates for different states may be expressed as percentages of the aggregate over all states. Such percentages are shown in Table 4 separately for rural India, urban India and all-India and, in each case, by subsamples and combined. For the sake of convenience, the statewise populations are also shown as percentages of all-state population.

Tables 5(R), 5(U) and 5($R+U$) exhibit the figures for the between region concentration curves, separately for rural India, urban India and all-India. In each case, the regions are ranked in ascending order of average per person consumer expenditure as shown in Table 3. The ranking is done separately for the subsamples and for the combined sample. The tables are otherwise self-explanatory.

In Table 4 the estimated shares of different regions are not very precise in several cases, particularly for the urban sector; this may often be attributed to the relatively small sizes of the samples.[9] In Tables 5(R) and 5($R+U$), the two subsample-wise rankings are fairly close, but the same cannot be said about Table 5(U), where the positions of Bihar, Orissa, UP and Kerala are quite different in the two subsamples.[10] Nevertheless, the between regions concentration curve seems to be precisely determined, as shown by the measures based on it in Table 2. The rural-plus-urban curve is actually shown in Fig. 1 alongside the corresponding all-region curve. Since the between regions curve is really

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[8] We have ignored the small differences between the definitions of the rural/urban sectors adopted for the 1951 and the 1961 censuses.

[9] Note, for example, the rural-plus-urban shares for Mysore and Assam.

[10] Spearman's rank correlation coefficient is 0.88, 0.65 and 0.88 for rural, urban and rural-plus-urban respectively.

TABLE 3. AVERAGE CONSUMER EXPENDITURE ON ALL ITEMS PER PERSON PER 30 DAYS BY REGIONS AND BY SECTORS: NSS, 13TH ROUND (SEPTEMBER 1957–MAY 1958)

Regions (States)	No. of Sample Households		Estimated Population (Million)		Average Consumer Expenditure per Person per 30 Days (Rs.)								
					Rural			Urban			Rural Plus Urban		
	Rural	Urban	Rural	Urban	s.s. 1	s.s. 2	Comb.	s.s. 1	s.s. 2	Comb.	s.s. 1	s.s. 2	Comb.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Andhra Pradesh	536	283	28.37	5.97	17.32	16.47	16.93	22.75	22.65	22.68	18.26	17.55	17.93
Assam	218	34	10.08	0.71	27.36	22.92	25.39	40.31	32.96	34.02	28.21	23.58	25.96
Bihar	719	108	40.41	3.45	17.88	16.87	17.40	20.73	26.63	23.86	18.10	17.64	17.91
Bombay	716	859	40.59	15.52	17.26	17.05	17.15	26.64	27.97	27.23	19.86	20.07	19.94
Jammu & Kashmir	319	133	2.79	0.56	24.44	20.88	22.77	21.17	23.72	22.42	23.90	21.35	22.71
Kerala	254	92	13.46	2.30	17.49	15.92	16.61	24.86	21.60	23.21	18.56	16.75	17.57
Madhya Pradesh	555	139	26.12	4.09	19.92	17.08	18.56	26.66	27.54	27.09	20.56	18.50	19.71
Madras	506	372	24.07	8.41	15.37	14.50	14.96	24.31	25.19	24.65	17.68	17.27	17.47
Mysore	373	228	17.18	4.99	24.24	18.03	21.02	19.32	21.31	20.31	23.13	18.77	20.86
Orissa	284	53	15.64	0.91	13.82	13.07	13.43	21.85	27.58	24.68	14.26	13.87	14.05
Punjab	300	161	15.15	3.73	28.36	26.05	27.15	24.25	27.60	26.04	27.55	26.36	26.93
Rajasthan	302	147	15.54	3.18	25.81	22.10	24.00	23.77	26.11	24.93	25.46	22.78	24.16
Uttar Pradesh	1142	441	61.02	9.20	17.13	18.48	17.81	23.93	20.93	22.34	18.02	18.80	18.40
West Bengal	447	431	24.18	7.75	18.84	19.44	19.15	30.10	32.23	31.18	21.57	22.54	22.07
Union Territories	67	102	3.06	2.19	35.01	29.36	31.24	35.72	43.01	39.07	35.81	35.06	34.51
Total	6738	3583	337.66	72.96	19.10	18.11	18.59	25.20	26.16	25.68	20.18	19.54	19.85

TABLE 4. PERCENTAGE SHARES OF DIFFERENT REGIONS IN TOTAL POPULATION AND TOTAL CONSUMER EXPENDITURE OF INDIA, SEPARATELY BY SECTORS: NSS, 13TH ROUND (SEPT. 1957–MAY 1958)

Regions (States)	Percent Share of Total Population (p_i)			Per cent Share of Total Consumer Expenditure (q_i)								
				Rural			Urban			Rural Plus Urban		
	Rural	Urban	Rural Plus Urban	s.s. 1	s.s. 2	Comb.	s.s. 1	s.s. 2	Comb.	s.s. 1	s.s. 2	Comb
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Andhra Pradesh	8.40	8.19	8.36	7.61	7.69	7.67	7.40	7.03	7.20	7.57	7.53	7.56
Assam	2.99	0.97	2.63	4.27	3.80	4.08	1.55	1.21	1.29	3.67	3.18	3.44
Bihar	11.97	4.72	10.68	11.19	11.21	11.22	3.89	4.77	4.37	9.57	9.66	9.64
Bombay	12.02	21.28	13.67	10.86	11.38	11.10	22.51	22.54	22.46	13.43	14.07	13.73
Jammu & Kashmir	0.83	0.77	0.81	1.06	0.96	1.01	0.64	0.68	0.66	0.96	0.89	0.93
Kerala	3.98	3.14	3.84	3.65	3.52	3.56	3.10	2.58	2.84	3.53	3.30	3.40
Madhya Pradesh	7.74	5.60	7.36	8.06	7.34	7.73	5.48	5.85	5.89	7.49	6.98	7.31
Madras	7.13	11.53	7.91	5.73	5.75	5.75	11.13	11.00	11.02	6.93	7.01	6.96
Mysore	5.08	6.85	5.40	6.45	5.09	5.76	5.25	5.52	5.39	6.18	5.20	5.67
Orissa	4.63	1.24	4.03	3.35	3.36	3.35	1.08	1.30	1.19	2.85	2.87	2.85
Punjab	4.48	5.11	4.60	6.66	6.49	6.56	4.92	5.35	5.16	6.27	6.21	6.24
Rajasthan	4.60	4.35	4.56	6.21	5.65	5.95	4.11	4.30	4.21	5.75	5.32	5.55
Uttar Pradesh	18.08	12.62	17.10	16.19	18.55	17.34	11.98	10.00	10.93	15.26	16.49	15.86
West Bengal	7.16	10.62	7.77	7.05	7.73	7.39	12.69	12.97	12.84	8.30	8.99	8.64
Union Territories	0.91	3.01	1.28	1.66	1.48	1.53	4.27	4.90	4.55	2.24	2.30	2.22
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

TABLE 5(R). RANKING OF REGIONS AND BETWEEN REGIONS CONCENTRATION CURVE BY SUB-SAMPLES AND COMBINED: NSS, 13TH ROUND, SEPTEMBER 1957–MAY 1958: *RURAL INDIA*

Ranking*	Sub-Sample 1: Region (State)	Average Consumer Expenditure per Person per 30 Days (Rs.) ($\bar{x}_j$)	Cumulative Percentage of Population (P_j = cum p_j)	Cumulative Percentage of Consumer Expenditure (Q_j = cum q_j)	Sub-Sample 2: Region (State)	Average Consumer Expenditure per Person per 30 Days (Rs.) ($\bar{x}_j$)	Cumulative Percentage of Population (P_j = cum p_j)	Cumulative Percentage of Consumer Expenditure (Q_j = cum q_j)	Combined: Region (State)	Average Consumer Expenditure per Person per 30 Days (Rs.) ($\bar{x}_j$)	Cumulative Percentage of Population (P_j = cum p_j)	Cumulative Percentage of Consumer Expenditure (Q_j = cum q_j)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
1	Orissa	13.62	4.63	3.35	Orissa	13.07	4.63	3.36	Orissa	13.43	4.63	3.35
2	Madras	15.37	11.76	9.08	Madras	14.50	11.76	9.11	Madras	14.96	11.76	9.10
3	Uttar Pradesh	17.13	29.84	25.27	Kerala	15.92	15.74	12.63	Kerala	16.61	15.74	12.66
4	Bombay	17.26	41.86	36.13	Andhra Pradesh	16.47	24.14	20.32	Andhra Pradesh	16.93	24.14	20.33
5	Andhra Pradesh	17.32	50.26	43.74	Bihar	16.87	36.11	31.53	Bombay	17.15	36.16	31.43
6	Kerala	17.49	54.24	47.39	Bombay	17.05	48.13	42.91	Bihar	17.40	48.13	42.65
7	Bihar	17.88	66.21	58.58	Madhya Pradesh	17.08	55.87	50.25	Uttar Pradesh	17.81	66.21	59.09
8	West Bengal	18.84	73.37	65.63	Mysore	18.03	60.95	55.34	Madhya Pradesh	18.56	73.95	67.72
9	Madhya Pradesh	19.92	81.11	73.09	Uttar Pradesh	18.48	79.03	73.89	West Bengal	19.15	81.11	75.11
10	Mysore	24.24	86.19	80.14	West Bengal	19.44	86.19	81.02	Mysore	21.02	86.19	80.87
11	Jammu & Kashmir	24.44	87.02	81.20	Jammu & Kashmir	20.88	87.02	82.58	Jammu & Kashmir	22.77	87.02	81.88
12	Rajasthan	25.81	91.62	87.41	Rajasthan	22.10	91.62	88.23	Rajasthan	24.00	91.62	87.83
13	Assam	27.36	94.61	91.68	Assam	22.02	94.61	92.03	Assam	25.39	94.81	91.91
14	Punjab	28.36	99.09	98.34	Punjab	26.05	99.09	98.52	Punjab	27.15	99.09	98.47
15	Union Territories	35.01	100.00	100.00	Union Territories	29.30	100.00	100.00	Union Territories	31.24	100.00	100.00
	Total	19.10	—	—		18.11	—	—		18.59	—	—

* In ascending order of average consumer expenditure per person per 30 days.

TABLE 5 (U). RANKING OF REGIONS AND BETWEEN REGIONS CONCENTRATION CURVE BY SUB-SAMPLES AND COMBINED: NSS, 13TH ROUND, SEPTEMBER 1957–MAY 1958: *URBAN INDIA*

	Sub-Sample 1				Sub-Sample 2				Combined			
Ranking*	Region (State)	Average Consumer Expenditure per Person per 30 Days (Rs.) (x_j)	Cumulative Percentage of Population (P_j = cum p_j)	Cumulative Percentage of Consumer Expenditure (Q_j = cum q_j)	Region (State)	Average Consumer Expenditure per Person per 30 Days (Rs.) (x_j)	Cumulative Percentage of Population (P_j = cum p_j)	Cumulative Percentage of Consumer Expenditure (Q_j = cum q_j)	Region (State)	Average Consumer Expenditure per Person per 30 Days (Rs.) (x_j)	Cumulative Percentage of Population (P_j = cum p_j)	Cumulative Percentage of Consumer Expenditure (Q_j = cum q_j)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
1	Mysore	19.32	6.85	5.25	Uttar Pradesh	20.93	12.62	10.00	Mysore	20.31	6.85	5.39
2	Bihar	20.73	11.57	9.14	Mysore	21.31	19.47	15.52	Uttar Pradesh	22.34	19.47	16.32
3	Jammu & Kashmir	21.17	12.34	9.78	Kerala	21.60	22.61	18.10	Jammu & Kashmir	22.42	20.24	16.98
4	Orissa	21.85	13.58	10.86	Andhra Pradesh	22.65	30.80	25.13	Andhra Pradesh	22.68	28.43	24.18
5	Andhra Pradesh	22.75	21.77	18.26	Jammu & Kashmir	23.72	31.57	25.81	Kerala	23.21	31.57	27.02
6	Rajasthan	23.77	26.12	22.37	Madras	25.19	43.10	36.81	Bihar	23.86	36.29	31.39
7	Uttar Pradesh	23.93	38.74	34.35	Rajasthan	26.11	47.45	41.11	Madras	24.65	47.82	42.41
8	Punjab	24.25	43.85	39.27	Bihar	26.63	52.17	45.88	Orissa	24.68	49.06	43.60
9	Madras	24.31	55.38	50.40	Madhya Pradesh	27.54	57.77	51.73	Rajasthan	24.93	53.41	47.81
10	Kerala	24.86	58.52	53.50	Orissa	27.58	59.01	53.03	Punjab	26.04	58.52	52.97
11	Bombay	26.64	79.80	76.01	Punjab	27.60	64.12	58.38	Madhya Pradesh	27.09	64.12	58.86
12	Madhya Pradesh	26.66	85.40	81.40	Bombay	27.97	85.40	80.92	Bombay	27.23	85.40	81.32
13	West Bengal	30.10	96.02	94.18	West Bengal	32.23	96.02	93.89	West Bengal	31.18	96.02	94.16
14	Union Territories	35.72	99.03	98.45	Assam	32.96	96.99	95.10	Assam	34.02	96.99	95.45
15	Assam	40.31	100.00	100.00	Union Territories	43.01	100.00	100.00	Union Territories	39.07	100.00	100.00
	Total	25.20	—	—		26.10	—	—		25.08	—	—

* In ascending order of average consumer expenditure per person per 30 days.

TABLE 5 (R+U). RANKING OF REGIONS AND BETWEEN REGIONS CONCENTRATION CURVE BY SUB-SAMPLES AND COMBINED: NSS, 13TH ROUND, SEPTEMBER 1957–MAY 1958: *RURAL PLUS URBAN INDIA*

	Sub-Sample 1				Sub-Sample 2				Combined			
Ranking*	Region (State)	Average Consumer Expenditure per Person per 30 Days (Rs.) (t_j)	Cumulative Percentage of Population (P_j = cum p_j)	Cumulative Percentage of Consumer Expenditure (Q_j = cum q_j)	Region (State)	Average Consumer Expenditure per Person per 30 Days (Rs.) (t_j)	Cumulative Percentage of Population (P_j = cum p_j)	Cumulative Percentage of Consumer Expenditure (Q_j = cum q_j)	Region (State)	Average Consumer Expenditure per Person per 30 Days (Rs.) (t_j)	Cumulative Percentage of Population (P_j = cum p_j)	Cumulative Percentage of Consumer Expenditure (Q_j = cum q_j)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
1	Orissa	14.26	4.03	2.85	Orissa	13.87	4.03	2.87	Orissa	14.05	4.03	2.85
2	Madras	17.68	11.94	9.77	Kerala	16.75	7.87	6.10	Madras	17.47	11.94	9.82
3	Uttar Pradesh	18.02	29.04	25.03	Madras	17.27	15.78	13.17	Kerala	17.57	15.78	13.21
4	Bihar	18.10	39.72	34.01	Andhra Pradesh	17.55	24.14	20.70	Bihar	17.91	26.46	22.85
5	Andhra Pradesh	18.26	48.09	42.17	Bihar	17.64	34.82	30.36	Andhra Pradesh	17.93	34.82	30.40
6	Kerala	18.56	51.93	45.70	Madhya Pradesh	18.50	42.18	37.34	Uttar Pradesh	18.40	51.93	46.26
7	Bombay	19.86	65.59	59.13	Mysore	18.77	47.58	42.54	Madhya Pradesh	19.71	59.28	53.57
8	Madhya Pradesh	20.56	72.95	66.62	Uttar Pradesh	18.80	64.08	59.03	Bombay	19.94	72.95	67.30
9	West Bengal	21.57	80.72	74.93	Bombay	20.07	78.35	73.10	Mysore	20.80	78.35	72.98
10	Mysore	23.13	86.12	81.11	Jammu & Kashmir	21.35	79.16	73.99	West Bengal	22.07	86.12	81.62
11	Jammu & Kashmir	23.90	86.94	82.08	West Bengal	22.54	86.94	82.98	Jammu & Kashmir	22.17	86.94	82.55
12	Rajasthan	25.46	91.50	87.82	Rajasthan	22.78	91.50	88.31	Rajasthan	24.16	91.50	88.10
13	Punjab	27.55	96.09	94.09	Assam	23.58	94.12	91.48	Assam	25.06	94.13	91.54
14	Assam	28.21	98.72	97.76	Punjab	26.36	98.72	97.70	Punjab	26.93	98.72	97.78
15	Union Territories	35.81	100.00	100.00	Union Territories	35.06	100.00	100.00	Union Territories	34.51	100.00	100.00
	Total	20.18	—	—		19.54	—	—		19.85	—	—

* In ascending order of average consumer expenditure per person per 30 days.

a broken-chain of straight lines, the quadrature formula (1) and linear interpolation on (P_i, Q_i)'s give exact results.

It is interesting to note the differences in ranking of the fifteen regions between Tables 5(R) and 5(U) relating to rural and urban sectors.[11]

6. THE ANALYSIS OF VARIANCE OF LOGARITHMS

For the results given in Table 6 below and also for the s.d.'s of logarithms presented in the following section, we utilised the individual household cards of the NSS 13th Round consumer expenditure inquiry, giving besides sector (rural/urban) and subsample number (1/2), the size of the household (h), total monthly consumer expenditure of the household (E), and the multiplier or raising factor (m) of the sample household for purposes of estimating population aggregates. For each household we calculated $\log_e (E/h)$, and supposed that mh persons in the population had this value of $\log_e(E/h)$. We then carried out an analysis of variance of these logarithms for this population of persons.[12]

Assuming that the distributions are lognormal, the overall mean squares 0.3343, 0.3855 and 0.3566 for rural, urban and rural-plus-urban, correspond respectively to Lorenz ratios 0.317, 0.339 and 0.327, which are somewhat lower than the estimates given in Table 2.

Apparently, only about 6 per cent of the total sum of squares could be accounted for by the between states component. So if within states variation could be eliminated,[13] overall mean square would be about 6 per cent and over-all s.d. about *one-fourth* of the present value. The latter is nearly equal to the proportion observed for the Lorenz ratio in Table 2. So both measures show that between region variation explains nearly one-fourth of the overall inequalities. This is quite surprising. Perhaps the use of squares in the s.d. has partly counteracted the effects of the logarithmic transformation. And perhaps the distributions are not too skewed to make the logarithmic transformation particularly effective in giving relatively large weightage to the variation among state means than to the extreme values in the over-all distribution.

7. CONCENTRATION WITHIN INDIVIDUAL REGIONS

We present here some measures of inequality for the distributions within individual regions. The s.d's of logarithms are by-products of the ANOVA of the foregoing section. The Lorenz ratios and the selected ordinate of the concentration curve were obtained by methods already described from distributions given in NSS Report No. 80. Actually, for the rural and the urban sectors, these were available from Iyengar [6], who gives several other ordinates of the concentration curve; only the rural-plus-urban calculations had to be done for our work. All-India figures are reproduced for the sake of interest.

Owing to the small sample sizes (vide Table 3), some estimates in Table 7

[11] Spearman's rank correlation coefficient is only 0.38, using the combined sample rankings.

[12] Actually, we used the set of households used by Professor Mahalanobis for some important inter-temporal comparisons. A process of scrutiny and subsequent rejection had brought down the total number of sample households from 6738 to 6662 for the rural sector and from 3583 to 3306 for the urban sector. Broadly speaking, this rejection did not affect the size distribution of per capita consumer expenditure.

[13] Here all values should equal the corresponding state geometric mean.

TABLE 6. ANALYSIS OF VARIANCE OF NAPIERIAN LOGARITHMS OF PER CAPITA MONTHLY CONSUMER EXPENDITURE (RS.) OF PERSONS, SEPARATELY BY SECTORS: ALL-INDIA, NSS, 13TH ROUND (SEPT. 1957–MAY 1958)*

Sector		Between States			Within States			Total		
		s.s. 1	s.s. 2	Comb.	s.s. 1	s.s. 2	Comb.	s.s. 1	s.s. 2	Comb.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Rural	d.f.	14	14	14	34047 (4)	34858 (4)	34453 (4)	34047 (4)	34858 (4)	34453 (4)
	s.s.	625 (4)	987 (4)	757 (4)	10294 (4)	11128 (4)	10762 (4)	10918 (4)	12115 (4)	11518 (4)
	m.s.	44.61 (4)	70.50 (4)	54.05 (4)	0.3023	0.3192	0.3123	0.3207	0.3476	0.3343
Urban	d.f.	14	14	14	7886 (4)	8383 (4)	8135 (4)	7886 (4)	8383 (4)	8135 (4)
	s.s.	110 (4)	266 (4)	178 (4)	2843 (4)	3046 (4)	2958 (4)	2053 (4)	3312 (4)	3130 (4)
	m.s.	7.84 (4)	19.11 (4)	12.71 (4)	0.3606	0.3633	0.3636	0.3745	0.3951	0.3855
Rural plus urban	d.f.	14	14	14	41933 (4)	43241 (4)	42587 (4)	41933 (4)	43241 (4)	42587 (4)
	s.s.	707 (4)	1158 (4)	895 (4)	13586 (4)	14925 (4)	14294 (4)	14293 (4)	16084 (4)	15188 (4)
	m.s.	50.51 (4)	82.74 (4)	63.90 (4)	0.3239	0.3452	0.3356	0.3409	0.3719	0.3566

* 625(4) means 625×10^4 and similarly in other cases.

have wide margins of uncertainty. One may see, for example, the estimates for urban Assam.

The three measures of inequality are closely inter-correlated. Thus, for rural-plus-urban and the combined sample, we get 0.94 as the Spearman rank correlation coefficient between the s.d's of logarithms and the Gini-Lorenz measures.

In each of the sectors, the statewise Gini-Lorenz ratios range from 0.25 to 0.40, roughly speaking. Assam shows the lowest values in each case, but its urban figure is unreliable, as already stated; Madhya Pradesh (rural, rural-plus-urban) and Madras (urban) shows the highest values.

For the urban sector, the statewise averages and the Gini-Lorenz ratios show a clearly positive correlation, remembering that Assam and Union Territories have unreliable estimates. This seems to be contrary to the findings of Sovani [17] which shows little correlation between these two aspects for incomes of earners or families in some major Indian cities. But the situations are really different. Thus, the Gini-Lorenz ratios in Sovani's study ranged from 0.4 to 0.6, broadly speaking.

For the rural sector, there is some indication of a negative correlation between these two characteristics, but a number of exceptional states tend to make the scatter round. For rural-plus-urban, the picture is similar and again the evidence of a negative correlation is very weak.[14] It may be recalled that Kuznets [9, pp. 36–45] found a clear negative correlation between these two characteristics for regions in Italy, U. S. and Brazil.

8. CONCLUDING OBSERVATIONS

Some minor limitations of the study have already been noted. The remaining may be mentioned here.

The between region concentration, of course, depends on the set of regions chosen for the study. The between region concentration could be appreciably larger if smaller and more homogeneous regions were used instead of the states.[15] In fact, the overall concentration curve is the limit of the between region curve when each region comprises a single household or households having the same value of per capita consumer expenditure.

Secondly, the price variation between states and between rural and urban areas have been ignored in this study, although some variation is known to exist [12]. On a more sophisticated level, we have ignored the variation in needs from one region to another, say, due to climatic reasons. Both these affect the measures for between region as well as all-region concentration.

Third, there are the limitations of NSS consumer expenditure data (which, as already noted, relate to private consumption) collected by the interview

[14] It may be noted that the rural and the urban averages for the same state showed a small positive correlation, but the corresponding correlation between the Gini-Lorenz ratios is probably negative, excluding Assam which has an unreliable urban figure.

[15] In the analysis of variance, the between group sum of squares $\Sigma p_i(\mu_i - \mu)^2$ is increased if any group is split into two smaller groups with unequal means; the increase depends on the difference between these two means. A similar increase occurs in the between group mean difference $\Sigma p_i p_j |\mu_i - \mu_j|$ when any group say, the ith, is split into two subgroups with proportions p_i' and p_i'' (say), but here the difference does not depend solely on the difference between means $\mu_i' - \mu_i''$. For even apart from the new term $p_i' p_i'' |\mu_i' - \mu_i''|$, the two terms replacing $p_i p_j |\mu_i - \mu_j|$ together exceed it unless the means μ_i' and μ_i'' both fall on the same side of μ_j.

TABLE 7. SELECTED MEASURES OF INEQUALITY IN CONSUMER EXPENDITURE WITHIN DIFFERENT REGIONS OF INDIA, SEPARATELY BY SECTORS: NSS, 13TH ROUND (SEPT. 1957–MAY 1958)

Region (State)	Rural			Urban			Rural Plus Urban		
	s.s. 1	s.s. 2	Comb.	s.s. 1	s.s. 2	Comb.	s.s. 1	s.s. 2	Comb.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
				(a) Gini-Lorenz ratio					
Andhra Pradesh	0.310	0.345	0.327	0.272	0.334	0.309	0.309	0.346	0.330
Assam	0.252	0.238	0.252	0.395	0.209	0.246	0.268	0.243	0.255
Bihar	0.295	0.330	0.312	0.303	0.414	0.366	0.296	0.344	0.321
Bombay	0.279	0.306	0.293	0.350	0.344	0.347	0.321	0.341	0.330
Jammu & Kashmir	0.258	0.271	0.268	0.292	0.276	0.287	0.268	0.274	0.272
Kerala	0.357	0.327	0.345	0.344	0.348	0.340	0.362	0.337	0.352
Madhya Pradesh	0.420	0.360	0.402	0.340	0.330	0.342	0.419	0.381	0.403
Madras	0.313	0.320	0.316	0.389	0.428	0.405	0.348	0.376	0.356
Mysore	0.410	0.300	0.374	0.302	0.299	0.302	0.400	0.303	0.359
Orissa	0.332	0.303	0.313	0.324	0.427	0.381	0.337	0.316	0.328
Punjab	0.337	0.290	0.317	0.342	0.335	0.335	0.337	0.302	0.321
Rajasthan	0.396	0.380	0.393	0.318	0.303	0.343	0.384	0.379	0.385
Uttar Pradesh	0.282	0.303	0.293	0.342	0.335	0.335	0.307	0.311	0.309
West Bengal	0.246	0.280	0.265	0.405	0.354	0.385	0.300	0.313	0.307
Union Territories	0.414	0.318	0.353	0.348	0.298	0.323	0.380	0.355	0.370
Total	0.337	0.330	0.334	0.357	0.360	0.359	0.346	0.346	0.346
				(b) per cent share of top 10 per cent					
Andhra Pradesh	23.55	28.65	26.33	22.78	27.09	25.53	23.56	29.10	26.42
Assam	19.93	20.60	20.21	26.17	19.03	22.46	21.81	20.86	20.77
Bihar	23.66	23.84	23.55	24.36	30.56	28.09	23.67	25.04	24.37
Bombay	22.18	23.50	22.87	26.48	26.88	26.66	25.54	26.02	26.17
Jammu & Kashmir	18.65	18.17	18.42	23.32	24.90	24.39	19.35	19.48	19.42
Kerala	27.41	25.72	28.41	26.47	27.29	26.91	27.50	26.40	27.19
Madhya Pradesh	35.00	32.35	34.52	25.75	24.31	25.58	34.28	31.70	33.03
Madras	24.70	26.50	26.56	30.28	34.86	32.59	27.97	30.92	29.43
Mysore	34.85	24.60	31.35	23.31	21.23	22.19	32.73	24.16	29.31
Orissa	26.16	26.06	25.85	29.48	32.82	33.43	26.75	27.67	27.21
Punjab	27.19	20.27	24.52	25.82	27.18	26.66	27.14	21.88	24.92
Rajasthan	31.92	30.80	32.28	26.97	30.12	28.72	32.09	30.69	31.76
Uttar Pradesh	22.50	24.86	23.77	25.82	27.18	26.66	24.96	25.84	25.37
West Bengal	21.17	22.39	21.79	34.25	30.54	32.69	25.44	24.33	24.82
Union Territories	25.87	30.01	31.94	26.62	21.06	23.80	24.95	29.23	27.46
Total	27.10	26.06	26.57	28.31	27.85	28.07	27.84	27.35	27.60
				(c) standard deviation of napierian logarithms					
Andhra Pradesh	0.558	0.607	0.584	0.490	0.606	0.558	0.556	0.618	0.588
Assam	0.355	0.456	0.405	0.562	0.302	0.418	0.380	0.456	0.423
Bihar	0.524	0.597	0.562	0.517	0.690	0.619	0.525	0.608	0.568
Bombay	0.565	0.584	0.571	0.610	0.607	0.614	0.597	0.618	0.608
Jammu & Kashmir	0.474	0.457	0.500	0.496	0.457	0.483	0.496	0.478	0.498
Kerala	0.617	0.648	0.583	0.631	0.584	0.624	0.628	0.561	0.590
Madhya Pradesh	0.634	0.677	0.656	0.611	0.644	0.630	0.646	0.696	0.672
Madras	0.510	0.556	0.547	0.630	0.717	0.677	0.566	0.639	0.608
Mysore	0.688	0.536	0.611	0.497	0.496	0.500	0.646	0.530	0.589
Orissa	0.601	0.545	0.624	0.528	0.703	0.626	0.509	0.571	0.541
Punjab	0.480	0.502	0.523	0.648	0.590	0.573	0.494	0.570	0.534
Rajasthan	0.708	0.661	0.713	0.513	0.630	0.570	0.725	0.659	0.691
Uttar Pradesh	0.494	0.520	0.507	0.678	0.579	0.628	0.529	0.530	0.530
West Bengal	0.477	0.414	0.446	0.629	0.552	0.596	0.549	0.502	0.526
Union Territories	0.638	0.623	0.696	0.645	0.603	0.633	0.758	0.629	0.678
Total	0.566	0.589	0.578	0.612	0.628	0.621	0.584	0.610	0.597

method and involving considerable amount of imputation work [1, 11].

Finally, unless the sample sizes are much larger than here, intertemporal comparisons may not reveal slow trends in regional disparity unless the time-interval covered is moderately long. The measures would be rather sensitive to transitory changes due, for example, to floods affecting particular regions.

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† Note added in proof: In a recent issue of Sankhya (Series B, Vol. 27, pp. 225–250) G. B. Hainsworth has made a similar use of the concentration curve for measuring variation in per capita product between a set of countries.