STRUCTURAL CHANGES AND THE DISTRIBUTION OF INCOME BY SIZE: THE CASE OF INDIA

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The interrelation between changes in the economic structure, i.e., industrial distribution of income and labor force, and the size distribution of income is studied in this paper in a case study of India (1951–1960).

The change in the size distribution of income is the sum of changes due to (1) inter-sectoral factors and (2) intra-sectoral factors. The need for this distinction is emphasized by the result obtained for India, that 85% of the changes in the size distribution may be assigned to inter-sectoral factors, and only 15% to intra-sectoral factors. Since the inter-sectoral factors are significantly influenced by changes in the industrial distribution of income and labor force, our result points out a relation between economic growth and the size distribution which quite often is overlooked in studies of the size distribution.

The results obtained in this paper support several cross-section results of Professor Kuznets. In particular some of these are: (a) inter-sectoral inequality in the economic structure widened with economic growth, (b) the inequality in the size distribution of India widened, (c) the level of inequality in India is higher than in any of the eight developed countries considered.

1. Introduction

The interrelation between changes in the economic structure, i.e., industrial distribution of income and labor force, and the size distribution of income has been discussed by Kuznets.[2] This interrelation can easily be seen from the following construction. Consider two sectors 1 and 2. These may well be agricultural and non-agricultural sectors, rural and urban sectors, or developed and less-developed regions within a country. If we measure inequality by the coefficient of variation C, then

$$C = \frac{\sqrt{W_1 C_1^{\,2} + W_2 C_2^2 \lambda^2 + W_1 W_2 (\lambda - 1)^2}}{W_1 + W_2 \lambda} \tag{1}$$

where C_i = coefficient of variation in the i-th sector, W_i = proportion of

1. This paper is based on Chapter V of my doctoral dissertation, *Economic Growth and Income Distributions in a Developing Nation*, Harvard University, January 1965; also additional results are reported in this paper. Any expression of indebtedness to Professor Kuznets will fall hopelessly short—so I attempt none. To Mr. S. Subramanian goes my gratitude for his penetrating insights and discussions.

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2. Simon Kuznets, "Economic Growth and Income Inequality," Presidential Address to the American Economic Association, *American Economic Review* (March 1955). Also in "Quantitative Aspects of Economic Growth—The Distribution of Income by Size," *Economic Growth and Cultural Change* (January 1963).

households (or recipient units) in the i-th sector and λ = ratio of per-household income in sector 2 to per-household income in sector 1. We may look upon C_i, W_i, and λ as (1) the intra-sectoral inequality, (2) the weight of the sector, and (3) the inter-sectoral inequality respectively. Taking the time derivative of equation (1), we have

$$\dot{C} = \frac{\partial C}{\partial C_1}\dot{C}_1 + \frac{\partial C}{\partial C_2}\dot{C}_2 + \frac{\partial C}{\partial W_2}\dot{W}_2 + \frac{\partial C}{\partial \lambda}\dot{\lambda} \tag{2}$$

Thus, the change over time in the inequality in the total size distribution is a sum of changes due to *intra-sectoral*

$$\left(\frac{\partial C}{\partial C_1}\dot{C}_1 + \frac{\partial C}{\partial C_2}\dot{C}_2\right)$$

and *inter-sectoral* effects

$$\left(\frac{\partial C}{\partial W_2}\dot{W}_2 + \frac{\partial C}{\partial \lambda}\dot{\lambda}\right)$$

Also, since the *coefficients* of $\dot{C}_i$, $\dot{W}_2$, and $\dot{\lambda}$ are all positive, any positive change over time in the intra-sectoral variables (C_1, C_2) and in the inter-sectoral variables (W_2, λ) will imply widening of inequality in the total size distribution. The accounting identity (2) also makes clear how economic growth influences inequality: structural changes implied in economic growth govern the movements in W_2 and λ, and we noted above how changes in the latter imply changes in total inequality.[3]

In section 2 of this paper the time-trends[4] by sectors in the distribution of national income divided by labor-force are examined. In section 3 a study of the pattern of distribution of consumer expenditure and income is attempted.

2. Inter-Sectoral Inequality in Product per Worker

1. *Estimates*

Before discussing the trends over time in inter-sectoral inequality, the following points are worth noting.

First, the measure "product per worker," which is simply national income originating divided by working force, is not a strict measure of productivity, because income also includes the contribution of capital. However, though undistributed corporate profits and property incomes in general should be excluded before we arrive at a measure of productivity of labor, wide divergences between two sectors in product per worker may be assigned to differences in productivity of labor.

Second, estimates presented here are in current prices, because the

3. In this paper we have presented estimates of the Lorenz ratio more frequently than the coefficient of variation. This is in deference to common practice. However, in my opinion the latter coefficient is superior because of its amenability to statistical analysis.

4. It has often been suggested that data of underdeveloped countries are much too unreliable; no conclusions thus can be based on them. The data used here were tested for scope, valuation and netness errors by means of consistency tests. The results of these tests are presented in my doctoral dissertation, *op. cit.*; a summary of these results also appears in S. Swamy, "Pattern of Income Distribution in an Underdeveloped Economy: A Case Study of India—Comment," *American Economic Review*, 1965.

constant-price estimates are weak. However, the available data on constant-price estimates do not contradict the results of this paper; in fact, these data reveal the same trends but were less pronounced because of the operation of the so-called *Gerschenkron-price-effect.*[5]

Finally, income from manufacturing includes a component of rent from non-residential house property, and hence is a slight over-estimate of the true value-added. Also income from the sector "organized banking and insurance" is, for our purposes, an over-estimate.

We have used the Kuznets Index K to measure inter-sectoral inequality.[6] In a two-sector economy this index is: $K = 2W_1W_2(\lambda_2 - \lambda_1) \times 100$; $0 \leqq K \leqq 200$. Earlier, we defined inter-sectoral inequality in the size distribution as λ; similarly we define inter-sectoral inequality in the industrial distribution as the ratio λ_2/λ_1, which on inspection will yield the same trend as the Kuznets K except for the factor W_1W_2. But the maximum value of W_1W_2 occurs when $W_1 = W_2 = \frac{1}{2}$; therefore, in the earlier phases of growth ($W_2 < 0.5$, but increasing), a rise in λ_2/λ_1 will also imply a rise in K.

2. *Summary of Findings*

The coefficient of relative product per worker, that is product per worker in a sector divided by the national product per worker, is less than unity in the agricultural sector, and further, over the two plan periods (1955–60 over 1951–55) declined from 0.86 to 0.66, as the table below shows:

TABLE 1

CHANGES IN RELATIVE PRODUCT PER WORKER BASED ON ALL ACTIVITIES
(Current Prices)

Sector	Plan I: 1950–51 to 1954–55 (1)	Plan II: 1955–56 to 1959–60 (2)	Percentage Change, Plan I to Plan II (3)
Agriculture	0.68	0.66	−3.3
Non-Agriculture	1.83	1.86	+1.6
Kuznets index	45.9	49.0	+6.8

SOURCE: National income data from *Estimates of National Income in the Indian Union*, February 1965. Working force data are (adjusted) Srikantan estimates: K. S. Srikantan, "Working Force Estimation for National Income Compilation," *Monthly Abstract of Statistics* (1960), New Delhi. The adjustments made are explained in S. Swamy, *Economic Growth and Income Distributions in a Developing Nation*, Harvard University (1965).

5. Gerschenkron, A., *An Index of Soviet Machinery Ontput*, Rand Corporation, Santa Monica (1951). The Gerschenkron effect is the negative correlation between price and output relatives evidenced during periods of industrialization.

6. Defined as the weighted sum of absolute differences of relative product per worker and unity, the weights being the share of the sector in working force (see Kuznets, *op. cit.*). We shall define λ_i, the relative product per worker in the i-th sector, as the ratio of product per worker in the i-th sector and total product per worker. Let w_i denote the weight of the i-th sector, which is the share of the i-th sector in the working force. The maximum value of inter-sectoral inequality is then 200, and minimum is zero.

The same coefficient in the non-agricultural sector is greater than unity, and rises over the two Five-Year Plan periods, from 1.83 to 1.86. Thus, the product per worker in agriculture is less than the national or country-wide product per worker, and over time this divergence grew in India. Alternatively, the share of agriculture in product is less than the share in working force, and this former share relatively declined. In the remaining sectors, the trend is quite the opposite. Thus, the divergence between the two sectors, which is significant, widens over the two plan periods.

But why should we find this divergence, and what significance may we attach to it in studying the size distribution? It is clear that the widening divergence, measured by the Kuznets index, indicates significant structural changes have taken place in the Indian economy; that is, the shares of the two sectors in product and working force have "shifted." As for the divergence itself, several contributing reasons may be advanced.[7] First, there is the real possibility of oversupply of labor in agriculture and its consequent implications on productivity. Along with this factor is the lower employment of capital and the utilization of primitive technology. Secondly, labor[8] in the non-agricultural sectors, by virtue of its nearly monopolistic position and skills, earns not only a higher marginal product, but also a premium. This latter point is borne out rather strikingly by Kuznets' statistic: a university professor's salary in India, as a ratio of national product per worker, is seven times the same coefficient in the U.S.A., indicating that greater competition and diffusion of knowledge would narrow this divergence. The finding bears significantly on the size distribution because if agriculture were roughly identified with the rural sector, then a widening divergence between the relative product per worker in the two sectors would lead us to expect a widening difference between urban and rural per household incomes, or alternatively stated, an increasing λ.

Since widening inter-sectoral inequality in product per worker is an important finding, it is well worth investigating it at a more disaggregated level than at a two-sector classification. This disaggregation also allows us to explore whether the trends at the two-sector level were not mere statistical artifact, (which might have arisen from improving scope and data collection over time). We shall, thus, only examine those sub-sectors for which we have relatively firm estimation procedures, estimates for which have been cross-checked by alternative data sources.[9] The findings from these latter estimates support our earlier finding that inter-sectoral inequality had widened over the decade resulting in structural changes in the Indian economy. Table 2 below summarizes the evidence.

From Table 2 it is apparent that the coefficient of relative product per worker in agriculture declined more sharply (-6.4%) than in Table 1

7. Simon Kuznets: "Quantitative Aspects of Economic Growth—II. Industrial Distribution of National Product and Labour Force," *Economic Development and Cultural Change*, July 1957, Part II, pp. 37–39.

8. All those employed, whether "employed" or "self-employed."

9. An extensive survey of estimates with their biases and consistencies is attempted in my doctoral dissertation, *op. cit.* It is interesting to report that *agriculture* met the tests, but the *professional services* sector estimates had to be rejected.

TABLE 2

CHANGES IN RELATIVE PRODUCT PER WORKER BY SECTOR

Sector	Plan I: 1950–51 to 1954–55 (1)	Plan II: 1955–56 to 1959–60 (2)	Percentage Change Plan I to Plan II (3)
1. Agriculture	0.83	0.78	−6.4
2. Manufacturing	3.48	4.25	+22.1
a. Mining	2.03	2.61	+28.6
b. Factory Establishments	3.83	4.63	+20.9
3. Services	2.46	2.68	+17.1
a. Railways and Communications	3.04	3.47	+14.1
b. Banking and Insurance	9.14	12.82	+40.3
c. Public Administration	2.03	2.14	+5.4
4. Manufacturing plus Services	2.86	3.24	+13.3
Kuznets index	31.18	39.70	+27.3

SOURCES: See Table 1-A in the Appendix.

(−3.3%). Also, the same coefficient in the non-agricultural sectors rose more sharply (13.3% versus 1.6%). Thus, the basic trends are confirmed. Within the non-agricultural sectors, the product per worker in the manufacturing sector grew faster than in the services sector. Further, within the manufacturing sector, both the mining and the factory establishment sectors grew significantly while within the services sector "organized banking and insurance" grew at a phenomenal rate of 40.3%. Since the weighted average of relative product per worker in different sectors must equal unity, the weights being the share of the sector in the working force, it is apparent that manufacturing and banking contributed most significantly to widening inter-sectoral inequality. Early phases of industrialization would normally be characterized, among other things, by rapid growth of factory establishments and demand for capital.

Before concluding this section, it is interesting to find out to what extent Kuznets cross-section estimates support our conclusions. Table 3 is taken from Kuznets and summarizes for our purposes the cross-section estimates. India falls into the lower quartile of group VII. Our results do not contradict his; in fact, they lend support to the result that in the earlier phases of growth inter-sectoral inequality would widen.

3. THE SIZE DISTRIBUTION

For India there are no comprehensive data on income distribution. Earlier studies on income distribution in India[10] have had to estimate the distribution by the use of a large number of courageous assumptions and conclusions, and

10. See *Report of the Committee on Distribution of Income and Levels of Living, Part I*, Planning Commission (1964), for a partial survey. The Committee has no estimates of its own, and its conclusions are based on studies using diverse and perhaps not wholly consistent data and assumptions.

TABLE 3

RELATIVE PRODUCT PER WORKER IN COUNTRIES GROUPED BY PER CAPITA INCOME

Sector	Group I	II	III	IV	V	VI	VII
1. Agriculture	0.88	0.55	0.65	0.51	1.65	0.66	0.69
2. Manufacturing and Services	1.02	1.20	1.14	1.70	1.42	1.63	2.26
3. Manufacturing	0.95	1.34	1.03	1.38	1.29	1.19	2.08
4. Services	1.09	1.09	1.22	1.93	1.51	1.95	2.47
5. Kuznets index	17.0	27.0	24.6	60.9	42.3	42.5	55.4
6. Per capita income ($)	1,700	1,000	650	400	270	200	100

SOURCE: Kuznets: "Quantitative Aspects of Economic Growth; Paper II," *Economic Development and Cultural Change*, July 1957. Lines (1) and (2): Table 16, cols. (1) & (2). Lines (3) & (4): Table 18, cols. (1) & (2). Line (5): Table 21, col. (2). Line (6): p. 7.

therefore are severely limited by the assumptions. This is meant in no way to detract from their value; data from under-developed countries inevitably suffer from biases and weakness, and studies that attempt to piece together various data to arrive at some *consistent* conclusion are useful.

However, research on income distribution in India has concentrated on the national size distribution as a whole and neglected study of the major components of the distribution that go to constitute the whole. This has resulted in some inconsistent conclusions which cast doubt on the validity of the conclusion as a whole. For example, one of the studies on which the Committee on Distribution of Income bases its findings concludes that "available estimates and data suggest no significant change in the overall distribution of income"[11]; at the same time it also concludes[12] that (a) inequality within the rural sector was about stable, the Lorenz ratio in personal incomes changing from 0.305 to 0.304; (b) the inequality within the urban sector widened sharply[13] from 0.378 to 0.421; (c) the inter-sectoral inequality λ rose[14] from 1.50 to 1.54; and (d) the weight of the urban sector rose from 20.4% to 21.2%[15]. These findings together are inconsistent, because it is clear from equation (2) that an increase in intra-sectoral inequalities and inter-sectoral inequalities must *mathematically* imply a widening of the national size distribution.[16]

In this section we shall therefore explore interrelations between the size distribution and the industrial structure. The first formidable problem we face

11. *Report, op. cit.*, p. 23.

12. Ojha, P. D., and V. V. Bhatt, "Pattern of Income Distribution in India, 1953–54 to 1956–57," *Reserve Bank of India Bulletin*, September 1963.

13. *Op. cit.*, p. 1139, Table II.

14. Ojha and Bhatt have not calculated λ, but in a companion paper, "Distribution of Income in the Indian Economy 1953–54 to 1956–57," *Reserve Bank of India Bulletin*, September 1962, per household personal income is calculated at Rs. 1,143 and Rs. 1,722 for the rural and urban sectors respectively, in 1953–1954 to 1954–1955, and Rs. 1,157 and Rs. 1,777 respectively in 1955–56 to 1956–57. This implies λ rose from 1.50 to 1.54.

15. *Op. cit.*, Table IV.

16. This implies some inconsistency in the estimation techniques used by the author. See, for more details, S. Swamy, "Pattern of Income Distribution in an Underdeveloped Economy: A Case Study of India. Comment," *American Economic Review*, December 1965, pp. 1180–1185.

relates to the concept of "income." The concept preferred by the author is that of consumer expenditure, defined as the difference between personal disposable income and personal saving. There are several reasons for the choice beyond that of the unavailability of the income distribution.[17] It is to be remembered that in analysis of the size distribution, the major concern is with the differences between the "rich" and the "poor," over time, regions or sectors, and hence any concept of "share" must relate to population needs, not to the intrinsic properties of the productive capacities of the population. Hence in a country with a very low level of living, the consumer expenditure concept may be more appropriate than income. Second, it is not clear what income means to the rural households. Many economists (e.g., elasticity-of-marketable-surplus theorists) have advanced the argument that the rural worker is not motivated immediately by profit, but by securing and maintaining a minimum level of living. Such a behavior results from the uncertainty of the future and the indebtedness and impoverishment that is implied in a level of living below which it is impossible to survive. Thus the concept of consumer expenditure, again, seems preferable to the concept of income. Finally, even if the income concept is preferable, since the inequality in the distribution of saving is greater than the inequality in consumer expenditures it will become apparent that the results of this section will be all the more reinforced if they were to be applied to the income distribution.

The *National Sample Survey* (NSS) data on consumer expenditure cover the entire population (though large-scale sample surveys tend to exclude very high consumer expenditure households). In summary, the weaknesses and biases in the data are (1) changes in reference or survey periods, (2) changes in the valuation of retained produce, and (3) exclusion of certain items, e.g., imputed rent of owner-occupied dwellings. If the NSS is corrected for these biases, the implied national income estimates are consistent[18] with the Central Statistical Organization (CSO) estimates used in section 2.

1. All-India Distribution

The NSS data on per capita (or per household) consumer expenditure suffer from weaknesses and biases which, if ignored, would lead us to conclude that per-capita consumer expenditure declined in the first five years but rose in the next five years—but not to a level above that of 1951–52. On the other hand, if the NSS data are corrected for the biases, per capita consumer expenditure, *on the whole*, would rise from Rs. 22.00 per month to Rs. 23.00 per month. This finding also emerges from a completely independent source—the CSO. Since we have already noted significant rises in per capita income,[19] these two findings together imply that per-capita savings must have risen quite significantly.[20]

17. In this paper we shall only briefly consider the problem. For a more detailed treatment one could see for instance my doctoral dissertation, *op. cit.*, pp. 113–116.

18. See S. Swamy, "Comment," *Op. cit.*, p. 1180.

19. See Table 1.

20. In fact this can be confirmed by estimates of saving in *Reserve Bank of India Bulletin*, March 1965. Per capita saving rose from Rs. 11.06 in Plan I period to Rs. 18.64 in Plan II period, or by 68.4%.

The share in consumer expenditure of the lowest 5%, the shares being calculated in current prices, declined from 0.9% in the Plan I period to 0.8% in the Plan II period. Also, the share of the top 5% rose from 17% to 19%; thus the size distribution "stretched" at least at its end points, indicating a possible widening of inequality in the all-India size distribution. This finding is interesting in its possible implication on the intra- and inter-sectoral breakdowns. While the intra-urban and intra-rural distributions overlap, suppose as an extreme illustration that the 20% who are urban form the top 20% of the all-India distribution. This implies that even if the intra-sectoral distribution remained unchanged, an increase in the average *level* of living of the urban sector implied by a fast-growing manufacturing sector will "stretch" the all-India distribution.[21] With all the ordinal groups considered, Table 4 shows that the Lorenz curve has shifted away from the line of equality—the Lorenz index rose from 0.37 in the Plan I to 0.39 in the Plan II period. (The coefficient of variation and the Kuznets index showed similar rises.) This shifting or stretching referred to above may also be studied in terms of "rich" and "poor": if we define "rich" as the 60th to 100th percentiles and the "poor" as the 0 to 60th percentiles, the share of the poor declined over the decade, and the share of the rich rose from 66% to 70%. The *income* shares would be even sharper in trends over time. Now from the industrial distribution of income we may note that 72% of the working force are in the agricultural sector, producing 50% of the income. If we assume that the majority of the poor live in the agricultural sector, we may conclude that the distribution of property and landholdings must be very unequal in India because of the disparity between the distribution of income by origin and by receipt.

2. Intra-Sectoral Distributions

Over the decade, corrected per capita consumer expenditure estimates show a rise in the urban sector and constancy in the rural sector. This implies that the "distance" between the urban and rural sectors in average level of living widened, or in other words, the inter-sectoral inequality coefficient λ increased, from 1.43 in the Plan I period to 1.49 in the Plan II period, as Table 7 shows. The rise in λ implies, *ceteris paribus*, a widening of the size distribution.

Within the sectors, the shares of intra-rural ordinal groups show no particular trend; the share of the top 5% is steady at 17%, and the share of the bottom 5% fluctuates around 1%. Similarly, the 20% group shares at both ends are stable. The Lorenz index measuring the overall inequality shows no change from the Plan I period to the Plan II period. The picture is different for the urban sector. While the share of the bottom 5% did not decline, the share of the top 5% rose from 17.0% to 17.9% from the first to the second plan periods. The

21. To make the example clearer, assume there are only two individuals, one residing in the urban sector and the other in the rural sector. In this example the intra-sectoral inequalities are nil, and the weight of the urban sector = 50%. Hence the nationwide inequality in the size distribution is a monotonic increasing function of the relative level of living of the urban recipient. Therefore an improvement in the standard of living of the urban sector alone will worsen inequality in the nation.

TABLE 4

SIZE DISTRIBUTION OF CONSUMER EXPENDITURE
ALL INDIA HOUSEHOLDS: 1951–52 TO 1959–60
(Percentages of total expenditure in current prices)

Year	Percentiles of Households							Lorenz Ratio	Kuznets Index
	Lowest 5%	0–20%	20–40%	40–60%	60–80%	80–100%	Highest 5%		
1. 1951–52	1.0	6	12	16	23	43	16	0.37	53
2. 1952–53	1.0	6	11	16	23	43	17	0.36	52
3. 1953–54	1.0	6	11	16	23	44	17	0.37	53
4. 1954–55	0.8	5	10	16	22	47	18	0.39	57
5. 1955–56	0.9	6	11	15	23	45	17	0.37	54
6. 1956–57	0.8	5	10	15	23	47	19	0.41	60
7. 1957–58	0.8	5	10	15	24	46	19	0.40	58
8. 1958–59	0.9	5	10	16	23	46	18	0.38	56
9. 1959–60	0.8	5	10	15	24	46	19	0.39	56
Average:									
Plan I	0.9	6	11	16	23	44	17	0.37	54
Plan II	0.8	5	10	15	24	46	19	0.39	57

SOURCE: Data are from Government of India, Cabinet Secretariat, "Report on Pattern of Consumer Expenditure," *The National Sample Survey Reports*, Nos. 20, 42, 45, 48, 69, 72 and 81. All-India distributions were derived by pooling rural and urban distributions.

TABLE 5

SIZE DISTRIBUTION OF CONSUMER EXPENDITURE
ALL INDIA, RURAL SECTOR: 1951–52 TO 1959–60
(Percentages of total expenditure in current prices)

Year	Percentiles of Households							Lorenz Ratio	Kuznets Index
	Lowest 5%	0–20%	20–40%	40–60%	60–80%	80–100%	Highest 5%		
1951–52	1.1	7.3	12.2	16.7	22.5	41.3	16.5	0.33	48
1952–53	1.2	7.2	12.2	16.4	22.4	41.8	16.8	0.34	48
1953–54	1.5	7.8	12.2	16.1	22.0	41.9	17.1	0.34	48
1954–55	1.4	8.3	11.5	15.8	22.2	42.2	17.5	0.33	50
1955–56	1.2	7.1	11.8	16.3	23.1	41.7	16.7	0.34	50
1956–57	1.7	8.5	12.3	15.4	21.8	41.0	17.0	0.31	46
1957–58	1.3	7.5	12.1	16.5	22.5	41.4	16.4	0.35	48
1958–59	1.4	7.7	12.1	16.0	21.6	42.6	17.9	0.34	48
1959–60	1.6	8.4	12.5	16.3	21.8	41.0	17.4	0.31	46
Average:									
Plan I	1.3	7.8	12.0	16.3	22.8	41.0	17.0	0.33	48
Plan II	1.4	7.8	12.2	16.3	22.2	41.5	17.1	0.33	48

SOURCE: See Table 4. Polynomial regression was used to derive shares of end-groups, using cumulated proportions.

TABLE 6

SIZE DISTRIBUTION OF CONSUMER EXPENDITURE
ALL INDIA, URBAN SECTOR: 1951–52 TO 1959–60
(Percentages of total expenditure in current prices)

Year	Percentiles of Households							Lorenz Ratio	Kuznets Index
	Lowest 5%	0–20%	20–40%	40–60%	60–80%	80–100%	Highest 5%		
1951–52	1.1	6.4	10.4	14.9	21.4	46.9	16.1	0.38	57
1952–53	1.3	7.1	11.2	15.3	21.8	44.7	16.4	0.36	53
1953–54	1.1	6.9	11.2	15.1	21.5	45.4	17.7	0.36	54
1954–55	1.2	8.6	10.6	14.8	21.4	44.7	19.6	0.37	56
1955–56	1.1	6.4	10.2	14.8	23.0	46.6	17.1	0.37	58
1956–57	1.1	6.5	10.4	14.4	20.6	48.4	21.2	0.40	57
1957–58	1.3	6.2	11.2	14.6	21.8	46.2	17.7	0.39	56
1958–59	1.3	6.5	11.9	15.6	21.2	44.8	17.3	0.35	52
1959–60	1.2	6.6	11.4	15.3	21.5	45.2	17.2	0.36	54
Average:									
Plan I	1.1	7.7	10.8	15.0	21.6	45.9	17.0	0.37	55
Plan II	1.2	7.0	11.0	14.9	21.6	46.2	17.9	0.38	57

SOURCE: See Table 4.

"stretching" witnessed in the all-India distribution did not occur in the urban sector. Rather, the widening of the distribution in the urban sector as indicated by the Lorenz ratio (and by the coefficient of variation or the Kuznets index) came about by the worsening of the position of the ordinal groups representing the so-called "working class." Thus the share of the bottom 20% declined from 7.7% to 7.0%.

Comparing the intra-sectoral distribution, we find some expected results. The share of the top 5% is generally higher in the urban sector. The ratio of the share of the top 5% to that of the bottom 5% is 12.2 in the rural sector and 14.9 in the urban sector (compared with 23.8 for all-India). Two interesting conclusions also follow. First, the difference in shares of ordinal groups between rural and urban sectors are most marked for the top 20%. Second, the all-India inequality is more than either the rural or the urban inequality. Even though the national distribution is a weighted linear sum of the intra-sectoral distributions, the national inequality would generally be larger than the intra-sectoral inequality because of inter-sectoral inequality. Thus, by equation (1), $C > C_1$, and $C > C_2$ because $\lambda > \lambda_0$ (λ_0 is some constant). And the larger λ, the greater will be the difference between C and C_1, and between C and C_2. This fact can be used to test the consistency of estimates.[22]

3. Structural Shifts in the All-India Distribution

The ratio of the urban Lorenz ratio to the All-India Lorenz ratio declined from 1.05 in 1951–52 to 0.92 in 1959–60, or from 0.99 to 0.96 over the Plan periods. Over the same periods, the ratio for the rural sector also declined, from 0.90 to 0.82, or from 0.89 to 0.82 respectively. This indicates that the widening of the national distribution must also be assigned to other factors, these other factors being *inter-sectoral inequality* and *weights of the sectors*. In this section we propose to calculate the quantitative contribution of these various factors. To do this, we need an accounting identity, and this is obtained from equation (2), repeated in slightly different form below:

$$(2a) \qquad \dot{C}/C = \frac{\partial C}{\partial C_1}(\dot{C}_1/C) + \frac{\partial C}{\partial C_2}(\dot{C}_2/C) + \frac{\partial C}{\partial W_2}(\dot{W}_2/C) + \frac{\partial C}{\partial \lambda}(\dot{\lambda}/C)$$

In Tables 7 and 8 we have summarized the trends in the various factors, over the two Plans; and from this table, we calculated the estimates presented in Table 9 giving the contribution of each factor.[23]

The most significant finding from Table 9 is that 85% of the widening in the national size distribution in India over the decade 1951–60 was due to structural changes in the distribution, and only 15% due to intra-sectoral distribution.

22. See S. Swamy: "Comment," *Op. cit.*, for an illustration.

23. The intra-sectoral estimates of inequality are in Lorenz ratios. However, to calculate equation (2), we calculated the coefficient of variation from raw data. If any distribution is assumed, there is a one-to-one mapping from one coefficient to the other.

TABLE 7

COMPONENTS OF INEQUALITY OF THE SIZE DISTRIBUTION OF CONSUMER EXPENDITURE
ALL INDIA, 1951–52 TO 1959–60
(Current Prices)

	Intra-Sectoral Inequality Coefficient (Lorenz Ratios)		Inter-Sectoral Inequality Ratio	Sectoral Weight, Urban Sector
	C_1 Rural	C_2 Urban	λ	W_2
1951–52	0.33	0.39	1.27	0.18
1952–53	0.34	0.36	1.39	0.18
1953–54	0.33	0.36	1.39	0.18
1954–55	0.33	0.37	1.65	0.19
1955–56	0.34	0.37	1.57	0.19
1956–57	0.31	0.40	1.49	0.19
1957–58	0.35	0.39	1.43	0.20
1958–59	0.34	0.35	1.44	0.20
1959–60	0.31	0.35	1.51	0.21
Plan I	0.33	0.37	1.43	0.18
Plan II	0.33	0.38	1.49	0.20

TABLE 8

THE PATTERN OF INEQUALITY IN CONSUMER EXPENDITURE
ALL-INDIA, 1951–52 TO 1959–60

	1951–52 to 1954–55 (Plan I Period)	1955–56 to 1959–60 (Plan II Period)	Percentage Change, Plan I to Plan II
Intra-sectoral Inequality			
Rural	0.33	0.33	0.0
Urban	0.37	0.38	2.4
Inter-sectoral Inequality	1.43	1.49	4.2
Sectoral Weights			
Urban	0.18	0.20	11.1
Rural	0.82	0.80	−2.5
Total Inequality in the Size Distribution	0.37	0.39	4.8
Per Capita Consumer Expenditure (Rs.)	241	254	5.4

4. Size Distribution of Income

We have argued that the concept of income is not appropriate for rural India. If one were to brush aside these arguments, it would be an interesting (but not conclusive) exercise to construct the income distribution. The central problem is that while a distribution of consumer expenditure is available, only aggregate (not distributed) savings estimates are available. Thus the problem of constructing the income distribution involves postulating a distribution of

TABLE 9

SOURCES OF INCREASED INEQUALITY, 1951–52 TO 1959–60, IN THE SIZE DISTRIBUTION OF CONSUMER EXPENDITURE, ALL-INDIA

Source	Percentage Share
Intra-sectoral Inequality	15.4
Rural	0.0
Urban	15.4
Inter-sectoral Inequality	47.5
Sectoral Weights	37.1
Total increase (%)	100.0

SOURCE: Derived from Table 8.

savings; and the real problem is the choice of a realistic assumption[24] which allows for dissaving.[25] But suppose we chose an assumption which erred[26] by assuming zero savings for the 0–80% group instead of dissaving in this group, and allocated the entire aggregate saving to the top 20%. Then on balance we would be under-estimating income inequality. The results are shown in Table 10.

Estimates in the above table indicate that the national size distribution of income "stretched"; the position of all ordinal groups except the top 20% worsened (in percentage shares). Also the Lorenz ratio rose from 0.40 to 0.54;

TABLE 10

SIZE DISTRIBUTION OF PERSONAL INCOME[a], ALL-INDIA, 1951–52 TO 1959–60
(Percentages of total income in current prices)

Ordinal Group (Percentiles)	Plan I Period: 1951–52 to 1954–55	Plan II Period: 1955–56 to 1959–60	Percentage Change, Plan I to Plan II
0–20%	4.3	3.0	−30
20–40%	7.7	5.8	−25
40–60%	11.5	8.6	−25
60–80%	16.3	13.1	−20
80–100%	60.2	69.5	+15
Lorenz ratio	0.40	0.54	+35

[a]Excluding direct taxes and including subsidies.

24. Some authors seem to have regarded this choice as a mere accounting problem and have adopted what must seem to an economist untenable assumptions; e.g., Iyengar, N. S., and M. Mukherjee, "A Note on the Derivation of the Size Distribution from a Given Distribution of Consumer Expenditure," quoted in *Report of The Committee on Distribution of Income*, *op. cit.* The authors assume that if k is the serial number of the k-th ordinal group, then $s_k/c_k = \alpha k$, where s and c are saving and consumer expenditure respectively, and α is a constant. It is a simple algebraic exercise to show that then the Lorenz ratio is an increasing function of the number of ordinal groups. Witness then their conclusion that the inequality in the income distribution is less than the inequality in the distribution of consumer expenditure, a result that is inconsistent with Indian data on savings, and almost all available results on income distribution in the literature.

25. The importance of dissaving is numerically brought out in an interesting paper by Mahfooz Ahmed, "Size Distribution of Personal Income and Saving," *3rd Indian Council of Research on National Income Conference* (1961).

26. The private organization, National Council of Applied Economic Research, estimates that the bottom 60% in the rural sector save nothing, while the top 15% in the urban sector save 237% of average per capita saving in that sector.

income inequality in the All-India distribution widened considerably to a level above developed countries. Before we present estimates to support this latter assertion, we will seek an alternative and perhaps sounder basis to establish the trend of increasing inequality.

Let us assume that the inequality *intra-sectorally* is the same whether we use the income concept or the concept of consumer expenditure—an assumption fashionable amongst certain consumption function theorists. Then the following table summarizes the position in India.

TABLE 11

TRENDS IN THE COMPONENTS OF THE SIZE DISTRIBUTION OF PERSONAL INCOME, 1950–51 TO 1959–60
(Current Prices)

Source	Plan I Period: 1950–51 to 1954–55	Plan II Period: 1955–56 to 1959–60	Percentage Change, Plan I to Plan II
1. Intra-Sectoral Lorenz Ratios:			
(a) Urban	0.33	0.33	0.00
(b) Rural	0.37	0.38	2.40
2. Inter-Sectoral Ratio in Personal Incomes	1.55	1.72	14.20
3. Sectoral Weight (Urban)	0.18	0.20	11.10

From this table it is clear that the direction of movement in all three factors is towards widening national inequality; this finding apparently supports the conclusion that the size distribution of income widened in India.

TABLE 12

SIZE DISTRIBUTION OF INCOME OF SELECTED COUNTRIES
(Percentage Shares)

	Date	Percentiles of Income Recipients					Coefficient of Inequality (Kuznets Index)
		0–20%	20–40%	40–60%	60–80%	80–200%	
India*	1951–52 to 1959–60	3.7	6.8	10.1	14.7	64.7	89.4
Ceylon	1952–53	4.3	8.4	12.2	18.5	56.6	73.3
Mexico	1957	4.4	6.9	9.9	17.4	61.4	72.8
Barbados	1951–52	3.6	9.3	14.2	21.3	51.6	65.8
Puerto Rico	1953	5.6	9.8	14.9	19.9	49.8	59.6
Italy	1948	6.1	10.5	14.6	20.4	48.5	57.7
Australia	1954–55	5.6	12.5	17.8	22.4	41.7	48.2
Great Britain	1951–52	5.4	11.3	16.6	22.2	44.5	54.4
West Germany	1950	4.0	8.5	16.5	23.0	48.0	62.0
Netherlands	1950	4.2	9.6	15.7	21.5	49.0	61.0
Denmark	1952	3.4	10.3	15.8	23.5	47.0	61.0
Sweden	1948	3.2	9.6	16.3	24.3	46.6	61.8
United States	1950	4.8	11.0	16.2	22.3	45.7	56.0

SOURCE: Kuznets, S., "Quantitative Aspects of Economic Growth—Distribution of Income by Size," *Economic Development and Cultural Change*, 1963, p. 13. The starred row is based on underlying data in S. Swamy, "Economic Growth . . .", *op. cit.*

Finally, the size distribution of income in India is more unequally distributed than in any of the developed countries, as Table 12 demonstrates.

4. Concluding Comments

1. With sparse data, and with few observations, it was possible to establish consistent trends to reach some interesting conclusions about India in the decade 1951–60.

2. The interrelations between the industrial structure and the size distribution were especially recognized which helped to support trends within the components of the size distribution.

3. One general conclusion that appears to have considerable support from independent data is that the size distribution of income or consumer expenditure widened over the decade of the fifties.

4. Of this increase in the size distribution of consumer expenditure 85% was due to structural changes, and only 15% due to intra-sectoral changes.

5. International evidence suggests that inequality in the sectoral and size distribution will widen in intial phases of growth, then stabilize and finally decline. India is at present at the earlier end of this range and inductively one would expect further periods of widening inequality. Agriculture is still predominant, with a 50% share in product and 70% in the working force. Further declines in shares will inevitably result, causing inter-sectoral inequality to widen; and by implication the size distribution will also widen, unless major intra-sectoral institutional changes take place.

Appendix

TABLE 1-A

RELATIVE PRODUCT PER WORKER BY SECTORS
ALL-INDIA, 1950–52 TO 1959–60, CURRENT PRICES

Year	Sector				Kuznets Index (5)	Ratio (2)/1) (6)
	Agriculture (1)	Manufacturing and Services (2)	Manufacturing (3)	Services (4)		
1950–51	0.85	2.65	3.01	2.41	26.76	3.12
1951–52	0.84	2.71	3.05	2.46	29.19	3.23
1952–53	0.83	2.88	3.55	2.44	31.03	3.47
1953–54	0.84	2.76	3.54	2.28	29.62	3.29
1954–55	0.79	3.32	4.26	2.73	39.29	4.20
1955–56	0.78	3.39	4.28	2.85	40.78	4.35
1956–57	0.80	3.15	4.16	2.54	37.20	3.94
1957–58	0.76	3.36	4.73	2.76	42.86	4.42
1958–59	0.79	3.07	3.87	2.59	37.41	3.89
1959–60	0.78	3.23	4.20	2.65	40.24	4.14
Decade averages:						
(1) Share in Product	48.50	15.50	8.40	7.10	—	—
(2) Share in Working Force	72.80	5.90	2.70	3.20	—	—
(3) Relative Product per Worker	0.81	3.05	3.86	2.57	35.43	3.81

SOURCES: Cols. (1)–(4) are ratios of shares in product to shares in working force. These shares are derived for sectors with acceptable estimates of income and labor force. Col. (1) includes all agricultural activities. Col. (2) excludes "small scale industries". Col. (4) excludes "other transport and communications," "professional and domestic service," and "house property." The coefficients of relative product per worker are calculated using adjusted Srikantan estimates of the working force from "Working Force Estimation for National Income Compilation," *Monthly Abstract of Statistics* (1960), Central Statistical Organization, New Delhi, and national income estimates from *Estimates of National Income of the Indian Union*, Central Statistical Organization, New Delhi.

TABLE 2-A

RELATIVE PRODUCT PER WORKER WITHIN SUBDIVISIONS OF MANUFACTURING AND SERVICE SECTORS

ALL-INDIA, 1950–51 TO 1959–60

Year	Mining	Factory Establishments	Railways and Communications	Organized Banking and Insurance	Public Administration
1. 1950–51	1.62	3.30	2.90	8.62	2.00
2. 1951–52	2.03	3.28	3.12	9.46	1.97
3. 1952–53	2.10	3.90	3.05	8.54	2.02
4. 1953–54	2.16	3.90	2.75	8.92	1.92
5. 1954–55	2.26	4.77	3.37	10.15	2.26
6. 1955–56	2.43	4.73	3.69	11.66	2.31
7. 1956–57	2.48	4.54	3.33	12.14	2.01
8. 1957–58	2.94	5.21	3.69	13.50	2.15
9. 1958–59	2.60	4.13	3.35	12.95	2.06
10. 1959–60	2.59	4.54	3.28	13.86	2.15
Averages:					
11. Plan I Period, Rows (1)–(5)	2.03	3.83	3.04	9.14	2.03
12. Plan II Period, Rows (6)–(10)	2.61	4.63	3.47	12.82	2.14
13. Percentage Change, Plan I to Plan II	+28.6	+20.9	+14.1	+40.3	+5.4

SOURCE: See Table 1-A.

TABLE 4-A

RATIO OF URBAN TO RURAL SECTOR IN PER CAPITA CONSUMER EXPENDITURE, SAVINGS, AND PERSONAL DISPOSABLE INCOME: ALL-INDIA, 1951–60

	Consumer Expenditure (1)	Personal Savings (2)	Personal Disposable Income (3)	Relative product per worker[a] (4)
1. 1951–52	1.27	2.88	1.31	2.56
2. 1952–53	1.39	3.95	1.45	2.71
3. 1953–54	1.39	6.71	1.50	2.53
4. 1954–55	1.65	14.56	1.95	3.13
5. 1955–56	1.57	19.13	1.88	3.13
6. 1956–57	1.49	15.86	1.82	2.71
7. 1957–58	1.43	11.26	1.62	3.00
8. 1958–59	1.44	11.76	1.65	2.55
9. 1959–60	1.51	13.49	1.67	2.73
Averages:				
(1) to (4)	1.43	7.03	1.55	2.73
(5) to (9)	0.49	14.30	1.72	2.82
(1) to (5)	1.45	11.07	1.65	2.77

[a]Ratio of non-agricultural to agricultural sector.

SOURCE: Column (1): See Table 4. Column (2): "Saving and Investment in the Indian Economy, 1950–51 to 1962–3," *Reserve Bank of India Bulletin*, March 1965. Column (3) derived from cols. (1) and (2). Column (4): See Table 1.

TABLE 3-A

INEQUALITY IN THE SIZE DISTRIBUTION OF CONSUMER EXPENDITURE, BY RURAL AND URBAN SECTORS 1951–52 TO 1959–60

(Current prices)

Year	Lorenz Ratio					Kuznets Index				
	All India (1)	Rural (2)	Urban (3)	Ratio (2):(1)	Ratio (3):(1)	All India (1)	Rural (2)	Urban (3)	Ratio (2):(1)	Ratio (3):(1)
1951–52	0.366	0.330	0.385	0.90	1.05	53.2	47.6	56.6	0.89	1.06
1952–53	0.361	0.336	0.358	0.93	0.99	52.5	48.4	52.9	0.92	1.00
1953–54	0.369	0.335	0.363	0.91	0.98	53.2	47.8	53.7	0.90	1.00
1954–55	0.390	0.329	0.367	0.84	0.94	57.3	50.8	56.1	0.89	0.97
1955–56	0.370	0.344	0.369	0.93	0.99	54.0	49.6	58.2	0.92	1.07
1956–57	0.407	0.314	0.398	0.77	0.98	59.5	45.6	57.4	0.76	0.97
1957–58	0.398	0.347	0.386	0.87	0.97	58.2	47.8	56.0	0.82	0.96
1958–59	0.383	0.335	0.350	0.87	0.91	56.2	48.4	52.2	0.86	0.93
1959–60	0.385	0.314	0.353	0.82	0.92	55.6	45.6	53.4	0.82	0.96
Plan I Average	0.371	0.330	0.368	0.89	0.99	54.0	48.8	54.8	0.90	1.01
Plan II Average	0.389	0.330	0.377	0.84	0.96	56.7	47.4	55.5	0.83	0.97

SOURCE: Derived from Tables 4, 5, and 6.

Cette étude examine les relations mutuelles entre les changements de la structure économique, c'est-à-dire la répartition industrielle des revenus et de la main d'oeuvre, et la répartition du revenu (size distribution of income) dans le cas de l'Inde (1951–1960).

Les changements dans la répartition du revenu sont la somme des changements dus (1) aux facteurs inter-sectoriels et (2) aux facteurs intra-sectoriels. La nécessité de cette distinction est soulignée par les résultats obtenus pour l'Inde, où 85% des changements dans la répartition du revenu peuvent être attribués aux facteurs inter-sectoriels et 15% seulement aux facteurs intra-sectoriels. Etant donné que les facteurs inter-sectoriels sont influencés de façon significative par les changements dans la distribution industrielle des revenus et de la main d'œuvre, nos résultats dégagent une relation entre la croissance économique et la répartition qui est très souvent négligée dans les études de répartition.

Les résultats de cette étude confirment plusieurs résultats du Professeur Kuznets. On relevera en particulier: (a) l'inégalité inter-sectorielle existant dans la structure économique s'est élargie avec la croissance économique, (b) l'inégalité de la répartition s'est élargie en Inde, (c) le niveau de l'inégalité est plus élevé en Inde que dans chacun des huit pays développés examinés.