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Working Paper

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Center Discussion Paper, No. 315

Provided in Cooperation with:
Yale University, Economic Growth Center (EGC)

Suggested Citation: Kuznets, Simon (1979) : Size of Households and Income Disparities, Center Discussion Paper, No. 315, Yale University, Economic Growth Center, New Haven, CT

This Version is available at:
https://hdl.handle.net/10419/160242

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CENTER DISCUSSION PAPER NO. 315

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Simon Kuznets

June 1979

This research was supported by the Ford and Rockefeller Foundations.

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1. The Association Illustrated

In this paper we explore the relation between differentials in size of households, preponderantly family households including single person units, and disparities in income per household, per person, or per some version of consuming unit.[1] The relation is important, because in size-distributions of income among the population the most common unit is the household--a group of persons, usually family members related by blood, marriage, or adoption, residing together and sharing arrangements for living. Inequality in size of household may "produce", be associated with inequality in income per household, or in income per person, or in income per consuming unit, or in all three. Conversely, if we begin with inequality in income per person or per consuming unit, we shall observe association with size of household and with income per household. In either approach, one would find a connection between differentials in size of household and disparities in income, the latter being substantial components in the observed size-distributions of income among the population.

The treatment here can only illustrative, because of scarcity of relevant data and limitations of quality in the data available. Even the demographic data on the distribution of households by size are subject to undercount, differing for population subgroups with different household structure. The scarcer income data for households are far more defective. Most tests and comparisons (with the comprehensive national accounts for relevant totals) show that the available statistics on family income or

consumption understate the totals by substantial margins, and margins that differ for different income sources and hence for different economic groups. Furthermore, the data refer to annual income or consumption rather than to longer-term levels, of more interest for many analytical purposes. But we had to use the demographic and income statistics as they were available, and for this reason the findings are at best suggestive. This warning, while necessary, does not mitigate the difficulties; but these can be significantly overcome only with a large input of work on testing and revision with access to the original, unprocessed data--a task not feasible for an individual scholar.[2]

Table 1 provides a summary of data for six countries, bearing on the relation between size differentials among households and disparities in income per household and per person. The sample, while including both developed and less developed market economies, is small. Still the nature of the association between size-differentials among households and income disparities can be explored even with data for a small sample. We turn now to the findings suggested by Table 1.

(a) Inequalities among households in size as measured by number of persons are quite wide. A distribution like that for the United States in which the lower quintile of households, covered by the 1 person class, accounts for only 7 percent of the population of persons, while the top seventh (represented by households of 5 persons and over) accounts for a third of all persons, is clearly an unequal distribution. The same is suggested by the corresponding Gini coefficient of over 0.3 (see Panel B, line 46, col 4) and a TDM (a simpler measure, but yielding results quite similar to the Gini coefficients) of well over 40.[3] An

Table 1

Relatives of Income per Household and per Person by Size-Classes of Households, and Disparity Measures, Six Countries

A. Percentage Shares of Size-Classes, and Size- and Income Relatives

Classes of households by number of persons	% in Total: Households (H)	% in Total: Persons (P)	% in Total: Income (Y)	Relatives: Size (P/H)	Relatives: Income per HH (Y/H)	Relatives: Income per P (Y/P)
	(1)	(2)	(3)	(4)	(5)	(6)
			United States, Money Income, 1975 (2.89)			
1. 1 person	20.6	7.1	10.0	0.345	0.49	1.41
2. 2 "	30.6	21.4	29.5	0.70	0.96	1.38
3. 3 "	17.2	18.0	19.6	1.05	1.14	1.09
4. 4 "	15.7	21.6	19.9	1.38	1.27	0.92
5. 5 "	8.6	14.8	11.6	1.72	1.35	0.78
6. 6 "	4.1	8.4	5.4	2.05	1.32	0.64
7. 7 & over (7.78)	3.2	8.7	4.0	2.72	1.25	0.46
			Germany (FR), Total Income, 1970 (2.75)			
8. 1 person	22.6	8.2	11.6	0.36	0.51	1.41
9. 2 "	27.8	20.1	22.8	0.72	0.82	1.13
10. 3 "	22.2	24.2	24.6	1.09	1.11	1.02
11. 4 "	15.4	22.5	20.1	1.46	1.31	0.89
12. 5 "	7.2	13.2	11.3	1.83	1.57	0.86
13. 6 "	2.9	6.4	5.4	2.21	1.86	0.84
14. 7 & over (7.71)	1.9	5.4	4.2	2.84	2.21	0.80
			Israel, Urban, Total Gross Income, 1968-69 (3.65)			
15. 1 person	10.9	3.0	4.8	0.28	0.44	1.60
16. 2 "	23.0	12.6	19.8	0.55	0.86	1.57
17. 3 "	19.0	15.6	21.4	0.82	1.13	1.37
18. 4 "	21.4	23.4	27.9	1.09	1.30	1.19
19. 5 "	11.4	15.6	12.6	1.37	1.10	0.81
20. 6 & over (7.2)	14.3	29.8	13.5	2.08	0.94	0.45

Table 1--continued

Panel A--continued

		(1)	(2)	(3)	(4)	(5)	(6)
				Taiwan, Total HH Receipts, 1975 (5.27)			
21.	1 person	3.2	0.6	1.6	0.19	0.50	2.67
22.	2 "	5.2	2.0	4.1	0.38	0.79	2.05
23.	3 "	10.3	5.8	8.9	0.56	0.86	1.53
24.	4 "	16.8	12.7	16.0	0.76	0.95	1.26
25.	5 "	22.2	21.1	21.9	0.95	0.99	1.04
26.	6 "	19.0	21.6	19.6	1.14	1.03	0.91
27.	7 "	11.3	15.0	11.9	1.33	1.05	0.79
28.	8 "	5.9	9.0	7.2	1.53	1.22	0.80
29.	9 "	2.7	4.7	3.4	1.74	1.26	0.72
30.	10 & over (11.7)	3.4	7.5	5.4	2.21	1.59	0.72
				Philippines, Total Income, 1970-71 (5.77)			
31.	1 person	1.8	0.3	1.1	0.17	0.61	3.67
32.	2 "	6.9	2.4	4.6	0.35	0.67	1.92
33.	3 "	11.6	6.0	8.8	0.52	0.76	1.47
34.	4 "	14.9	10.3	13.6	0.69	0.92	1.32
35.	5 "	14.6	12.7	13.9	0.87	0.95	1.09
36.	6 "	13.5	14.0	13.2	1.04	0.98	0.94
37.	7 "	11.6	14.0	12.3	1.21	1.06	0.88
38.	8 "	11.0	15.4	13.1	1.40	1.19	0.85
39.	9 "	5.6	8.7	6.4	1.55	1.15	0.74
40.	10 & over (11.0)	8.5	16.2	13.0	1.91	1.53	0.80
				Thailand, Money Income, 1962-63 (5.53)			
41.	1 person	4.0	0.7	2.0	0.18	0.50	2.86
42.	2-3 (2.6)	18.3	8.6	13.3	0.47	0.73	1.55
43.	4-5 (4.5)	29.4	24.3	27.4	0.81	0.92	1.13
44.	6-7 (6.5)	27.1	31.9	29.4	1.18	1.08	0.94
45.	8 & over (9.2)	20.7	34.5	27.9	1.67	1.35	0.81

Table 1--continued

B. Measures of Disparity in Size of Household, and in Income per Household and per Person, Among Size-Classes of Households

		TDM			Gini Coefficient		
		Size (H-P)	Income per HH (H-Y)	Income per P (P-Y)	Size (H-P)	Income per HH (H-Y)	Income per P (P-Y)
		(1)	(2)	(3)	(4)	(5)	(6)
46.	United States, 1975	45.4	23.4	25.2	0.305	0.158	0.165
47.	Germany, 1970	44.2	32.0	13.0	0.297	0.213	0.088
48.	Israel, 1968/9	43.4	20.2	38.1	0.296	0.135	0.235
49.	Taiwan, 1975	31.0	10.4	20.6	0.221	0.082	0.139
50.	Philippines, 1970/1	36.2	16.2	20.6	0.251	0.119	0.133
51.	Thailand, 1962/3	37.2	19.9	18.2	0.242	0.127	0.118

Notes

Panel A.

Entries in parentheses in lines identifying the country refer to the average (arithmetic mean) number of persons per household.

Entries in parentheses in the vertical stub of lines 42-45 refer to the average number of persons per household in the given size-class (provided in the source).

The relatives in columns 4, 5, and 6 should equal ratios of the relevant percentage shares in columns 1, 2, and 3. The slight discrepancies are due to rounding. The relatives in column 6 should equal the ratio of the relatives in column 5 to those in column 4. The slight discrepancies are again due to rounding.

Lines 1-7: Taken or calculated from U.S. Bureau of the Census, Current Population Reports, Series P-60, no. 104, GPO, Washington 1977, Tables 3 and 15, pp. 13-20 and 48-57.

Notes--continued

Lines 8-20 and 31-40: Taken or calculated from Table 13, pp. 45-46 of my paper, "Demographic Aspects of the Size Distribution of Income," in Economic Development and Cultural Change, vol. 25, no. 1, October 1976. This paper provides detailed notes on the sources of data for these three countries (Germany, Israel, and the Philippines) as well as on United States and Taiwan, and discussion of related findings (referred to henceforth as Source I).

Lines 21-30: Taken or calculated from two sources, one covering Taipei City and the other covering Taiwan Province (the two comprising Taiwan). The former is by Bureau of Budget, Accounting and Statistics, Taipei City Government, Report on the Survey of Family Income and Expenditure and Personal Income Distribution of Taipei City 1975, 1976, Table 16, pp. 108-11. The latter is by Department of Budget, Accounting and Statistics, Taiwan Provincial Government, Report on the Survey . . . . Taiwan Province 1975, 1976, Table 25, pp. 538-49. The total and per household number of persons in the open-end, largest size group (line 30) was calculated from the other size-groups and the population totals for all households given in other tables.

Lines 41-45: Taken or calculated from National Statistical Office, Advance Report, Household Expenditure Survey, Whole Kingdom (Bangkok 1963), Table 9.0, pp. 66-7. Money income was estimated at 81 percent of total income, the latter including value of goods produced and consumed at home (see ibid., Table H, p. 32).

Panel B (lines 46-51) TDM is the sum of differences between percentage shares in the two relevant totals (households and persons, households and income, persons and income) signs disregarded. They are calculated directly from the percentage shares in columns 1-3 for the six countries in Panel A. The Gini coefficients are calculated directly from the percentage shares arrayed by the order of the relatives in the corresponding columns (col. 4 for households and persons, col. 5 for households and income, and col. 6 for persons and income), all again given in Panel A.

inspection of the percentage shares in columns 1 and 2 and the resulting size-relative in column 4 of Panel A and the disparity measures in columns 1 and 4 in Panel B reveals that the size-of-household differentials are substantial also in the other countries, although they are of somewhat narrower amplitude in the three less developed countries--all of them in East Asia--than for the three more developed countries. This latter difference is subject to check by the wider sample summarized in Section 3 below.

The size differentials just discussed are of interest to us in so far as they are associated with disparities in income per household, or per person, or per consuming unit; and we shall indicate below that the magnitude of the differentials in size is the minimum to which the magnitudes of disparities in income per household and income per person add out. If so, a wide amplitude of differentials in size of households, would mean, with the same associations with disparities in income per household and income per person, a wider amplitude of disparities in either income per household, or in income per person, or in both.

One other comment on the differentials in size of households in comparison with those in income. Size of household may be subject to short-term disturbances, whether stochastic or of a different order. Thus a family household may, in a given year, be reduced by the death of a child, to be compensated for by quick response in terms of an additional birth. But it seems plausible to assume that such short term changes are of lesser impact on the distribution of households by size than on their distribution by the current year's income. One tends to think of size of household as determined largely by long lasting life-cycle and institutional patterns, in which the household unit remains at a given

size for a number of years. If so, the amplitude of the size differentials is more clearly reflective of differences in longer term levels than is the amplitude of income disparities in the conventional grouping of households by the current year's income.

(b) The relatives of income per household for the successive size classes of households (col. 5 of Panel A) show for all countries a postitive association between total income of household and its size. In some cases, e.g. in the United States and particularly in Israel, the rise in the relative of income per household reaches a peak at a size class well below the top and then declines. But these can be viewed as only partial limitations of the conspicuous positive association in which the rise in the size of household is, by and large, accompanied by a substantial rise in the household's total income.

The impressive positive association between size of household and its income suggested in Table 1 is not an arithmetic necessity or tautology. It is quite possible for some socio-economic groups within a country, which are characterized by large households, to show an average income per household distinctly lower than that for other groups with a smaller average household (e.g. the households in the United States in 1975 with employed heads who are blue-collar workers compared with those whose employed heads are white collar workers; or, in Taiwan in 1975, farmer households compared with nonfarmer households). In fact, a negative association between average income per household in occupational groups and the size of the average household by occupation is not uncommon; and some of the relevant data will be cited and discussed in the next section. If it is possible for a variety of subgroups within a country to show larger average household size associated with lower average per

household income, the positive association for countrywide comparisons cannot be viewed as inevitable and obvious. It is rather the result of a balance of factors that make for a positive association dominating the factors that would otherwise make for a negative association--with outcomes that can differ among countries, or within countries over time, or at different ranges of the size of household differentials.

The disparity measures in columns 2 and 5 of Panel B reflect the magnitude of the component that size differentials among households contribute to the distribution of households by size of income per household. Thus within the total inequality among households by income per household in the United States in 1975 there is a component, measured by a Gini coefficient of 0.158, which reflects the inequality in the size of household in terms of number of persons--a component which presumably ought to be removed if households are to be used as comparable units in terms of persons. But the Gini coefficient just cited cannot be compared directly with that for the size-distribution of income among households by income per household, for two reasons. First, Gini coefficients (and the TDMs) are not additive so that the sum of two component measures may add out to more or less than that for the total distribution. Second, and even more difficult, the size-distribution of income is based on the size of annual income, with the transient and stochastic elements recorded in the income of each single household before it is classified in the size distribution. Such stochastic and other transient elements tend to be much reduced by cancellation for large groups of households that we average under the 1, 2... and person n person class. The Gini

for the total distribution of income among households by income per household would be substantially reduced with similar cancellation of stochastic and other transient components, were such cancellation possible. It is not feasible here to attempt a quantitatively meaningful comparison of the effects of size differentials among households on either income per household, or per person, or per consuming unit, with the total size distribution of income among households by income per household, or per person, or per consuming unit--the latter properly adjusted. We shall have to rely on a rough judgment resting on the absolute values of the disparity measures we derive.[4]

(c) Whatever factors limit the rise in per household income with increase in household size, or even make for negative association between total income and household size, the combination of the two results in the rise in household income falling substantially short of the rise in the number of persons as we move from the smaller to larger households. This can be observed in Panel A by comparing the levels and movements of the size-relatives in column 4 with those of income per household in column 5; and even better in the ratio of the two, which represents the relatives of income per person in the successive size-class of households, in column 6; This column reveals for each of the six countries a <u>decline</u> in per person income as we move from the smaller to the larger households, a decline that is quite substantial and continuous. In some cases, such as Taiwan and the Philippines, the two countries with the most detailed grouping by size at the large levels, the decline in per person slows down or ceases in the range of large households (above 7 persons); but this is a minor qualification of what is an impressive <u>negative</u> association between size of household and household income per person.

The corresponding measures of disparity are given in columns 3 and 6 of Panel B. As already indicated for those for income per household, these measures represent the magnitude of the component which the size differentials among households contribute to the total distribution of income among households by income per person. While the magnitudes differ among countries, and relative to those for income per household, those in columns 3 and 6 are, on the whole, no less substantial than those in columns 2 and 5.

A more significant finding associated with the one just stated is the difference in identity of the households at low and high level when we compare grouping by income per household with that by income per person.[5] As found in the paper cited, the higher levels of per household income are dominated by the larger households whereas the higher levels of per person income are dominated by the smaller households; and there is a similar contrast in identity at the lower levels, the latter dominated by smaller households in the distribution by income per household and by larger households in the distribution by income per person. Since for most purposes it is the distribution by income per person (or per consuming unit) that is the more significant, the use of income per household may lead to misleading identification of the better-off or the worse-off groups within total population.

(d) We come now to the relation between the measure of disparity for the size differentials among households, and those for disparities in income per household and income per person. A glance at these measures in Panel B of the table shows that the sum of the two income disparity measures is never smaller than the size disparity measure. Thus, in the

single case of Taiwan, the sum of the TDMs in columns 2 and 3, of 10.4 and 21.6, equals that in column 1, of 31.0; and the same is true of the two Gini coefficients in columns 5 and 6 relative to that in column 4. In most other countries, the sum of the disparity measures for income per household and income per person exceeds that disparity measure for the size differentials, but by relatively small margins (Germany, the Philippines, Thailand). For the United States, the excess in the sum of the disparity measures in columns 2 and 3 relative to 1 is of 48.5 to 45.4, with a similar excess in the sum of the Gini coefficients. This excess becomes striking in the case of Israel--the sum of the TDMs in columns 2-3 of 58.3 being over a third larger than that for size-differentials of 43.4; and there is a similar showing for the Gini coefficients.

Two comments are relevant. First, our finding that the disparity measure for household size is related to the sum of the measures for disparities in income per household and in income per person is dependent upon the finding of a positive response of household income to size but a response that falls short of the rise in household size and thus "leaves room," as it were, for the negative association between size and income per person. Were these two findings absent, the relation between the disparity measure for household size and the disparity measures for income per household and for income per person would have been different. Thus, if the association between size and household income remained positive, but the positive response of income were more than proportional to increase in size, the result would have been a measure of disparity in income per household alone greater than that for size, while the association between per person income and household size would have been positive. By contrast, were the

association between size of household and income per household to become negative, the disparity measure for income per person would become the largest of the three dispartiy measures, it alone exceeding that for size differentials among households. The summation in these two assumed cases, would then be adding the two smaller disparity measures to yield the largest of the three, it being for income per household in the former case and for income per person in the latter case.

Second, given a positive but incomplete response of household income to household size, the finding that the sum of the disparity measures for income per household and for income per person exceeds significantly the disparity for household size is presumably due to some additional factors that introduce elements affecting household income in ways not associated with size. In terms of the relatives and percentage shares shown in Panel A and related to TDM, one should view the size and income per household relatives as measures of proportional deviation from the countrywide average, so that 0.345 in line 1, col. 4 becomes a proportional deviation of -0.655, whereas that in col. 4 line 7 becomes +1.72 (being the relatives as entered, minus 1.00). It will then be noted that for the United States, the deviations in col. 5 (income per household) are for each size class of the same sign as in col. 4 (size of households); and that for all size classes the proportional deviation for household income is of smaller absolute magnitude than that for size, with one important exception. The exception is for the size-class of 3 person (line 3) for which the positive deviation for income per household (+0.14 in col. 5) is much greater than that for size (+0.05 in col. 4). If we remove this exception by setting the per household income

relative for this size-class at 1.025, thus reducing the income share in col. 3 from 19.6 to 17.6 percent; and compensate by adding 2 percentage points to the income share of 1 person class in line 1, col.3 (thus making it 12.0, with resulting shifts in income relatives for this class), the new TDM for income per household becomes 19.4, that for income per person becomes 26.0 and the sum is now identical with TDM for size of 45.4. A different allocation of the 2 percentage points will yield a different pair of TDMs for income per household and income per person, but so long as the signs of the proportional deviations represented by the relatives in columns 4 and 5 are the same, and those in col. 5 are all absolutely smaller than in col. 4, the sum of the TDMs for income per household and income per person will be identical with the TDM for size differentials among households.

Even larger disturbances in the association between size and household income are observed for Israel. For the 3 person class (line 17), with a share of 19.0 percent of all households, a negative deviation for size, of -0.18, is combined with a positive deviation for income, of +0.13. For the 6 and over class (line 20), with a share of 14.3 percent of all households, a positive deviation of size, of +1.08 is associated with a negative deviation for household income, of -0.06. Clearly, there are elements of heterogeneity in the structure of Israel's household population that disturb the positive association between size and household income; and we are aware of them from other sources because of the mixture of Jews and non-Jews, of immigrant and native populations, of the presence of different continent-of-origin stocks among the Jews, and different religious groups among the non-Jews.

In the next section we consider some of the factors relevant to the associations between size of household and income disparities of the type observed in Table 1. But before doing so we should note, briefly, two other variants of size differentials among households.

The first is suggested by the large proportions in the developed countries today of 1-person households, as illustrated in Table 1 for Germany and the United States--contrasted with the far more moderate proportions of 1-person households in the less developed countries (e.g., Taiwan in Table 1). This contrast is observed also for the larger number of countries for which we have data on size of households but no data on income. Since the 1-person households may be viewed more easily as members of a larger family with which they may be associated than is true of larger households, one may ask what would be the effect on the size differentials and their association with income disparities if 1-person households were excluded, or transferred to the larger multiperson units.

An illustrative answer to this question is provided in Table 2, in which we use the data for the United States and Taiwan to perform the needed calculations. The effect of exclusion of 1-person households, thus limiting the distributions to family households of 2 or more persons, naturally raises the average size of household and reduces both the size differentials and associated disparities in income per household (Panel I, and cols 2 and 5 and of Panel III). Since we are eliminating one source of diversity among households with respect to size, the TDMs and the Gini coefficients for the size of household differentials and disparities in measure per household should decline--and they

do, appreciably more for the United States than for Taiwan. But the more significant finding is that the decline in per person income with rise in the size of household is still quite marked in Table 2, Panel I. The exclusion of 1-person household leaves the TDMs and the Gini coefficients for the disparities in income per person about the same as they were for the complete size-distributions of households in Table 1 (see Panel III of Table 2, columns 1 and 2, lines 33 and 36; and columns 4 and 5, lines 33 and 36).

If we try to transfer 1-person households and their income to multiperson households, we need to have a reasonable scheme for allocating the former among the latter. One hesitates to claim that the schemes embodied in the two assumptions used for Panel II of Table 2 are realistic, but they are of interest as illustrations. In assumption 1 we allocate the 1-person households to the other size classes proportionately to their relative weight, i.e., to their percentage proportion in the total of all households of 2 or more. This means e.g. that for the U.S., 0.385 of the 1-person households (which accounted for 20.6% of the total of all HHs) are assigned to the 2 person household class. In assumption 2, we follow a procedure that allocates the 1-person households first to the largest size class in the distribution--with one 1-person household assigned to each household of the largest size class; then, of the remaining 1-person households, one is assigned to each household of the size-class just below the top; and so on down, until all of the 1-person households have been allocated. One should note that in assumption 1, the additions of 1-person households to the 2 person size class yields a new group of 3-person households, which is subtracted from the former

Table 2

Effects of Exclusion of Transfer of 1-Person Households, United States and Taiwan, 1975

I. Exclusion of 1-Person Households

Classes of HH	% in Total H (1)	% in Total P (2)	% in Total Y (3)	Relatives H/P (4)	Relatives Y/H (5)	Relatives Y/P (6)
			United States, 1975 (3.38)			
1. 2 persons	38.5	23.0	32.8	0.60	0.85	1.43
2. 3 "	21.7	19.4	21.8	0.89	1.00	1.12
3. 4 "	19.8	23.3	22.1	1.18	1.12	0.95
4. 5 "	10.8	15.9	12.9	1.47	1.19	0.81
5. 6 "	5.2	9.0	6.0	1.73	1.15	0.67
6. 7 & over	4.0	9.4	4.4	2.35	1.10	0.47
			Taiwan (5.41)			
7. 2 persons	5.4	2.0	4.2	0.37	0.78	2.10
8. 3 "	10.6	5.8	9.1	0.55	0.86	1.57
9. 4 "	17.3	12.8	16.3	0.74	0.96	1.27
10. 5 "	23.0	21.2	22.2	0.92	0.97	1.05
11. 6 "	19.6	21.8	19.9	1.11	1.02	0.91
12. 7 "	11.7	15.1	12.1	1.29	1.03	0.80
13. 8 "	6.1	9.1	7.3	1.49	1.20	0.80
14. 9 "	2.8	4.7	3.4	1.68	1.21	0.72
15. 10 & over	3.5	7.5	5.5	2.14	1.57	0.73

II. Transfer of 1-Person HH to Multiperson HH

	Assumption 1 % in Total H (1)	P (2)	Y (3)	IR,Y/P (4)	Assumption 2 % in Total H (5)	P (6)	Y (7)	IR,Y/P (8)
				United States (3.64)				
16. 2 persons	28.6	15.7	21.9	1.39	38.5	21.2	29.5	1.39
17. 3 "	26.0	21.4	25.9	1.21	21.7	17.9	19.6	1.09
18. 4 "	20.2	22.3	22.0	0.99	13.9	15.3	13.9	0.91
19. 5 "	13.2	18.2	15.8	0.87	5.9	8.1	8.3	1.02
20. 6 "	6.6	10.8	8.1	0.75	10.8	17.9	15.8	0.82
21. 7 & over	5.4	11.6	6.3	0.54	9.2	19.6	12.9	0.66

Table 2--continued

Panel II--concluded

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
		Taiwan (5.44)						
22. 2 persons	5.2	1.9	4.0	2.11	5.4	2.0	4.1	2.05
23. 3 "	10.5	5.8	8.8	1.52	10.6	5.9	8.9	1.51
24. 4 "	17.1	12.5	15.9	1.27	17.3	12.7	16.0	1.26
25. 5 "	22.8	21.0	22.1	1.05	23.0	21.0	21.9	1.04
26. 6 "	19.7	21.7	20.1	0.93	19.6	21.6	19.6	0.91
27. 7 "	11.9	15.3	12.4	0.81	11.7	15.0	11.9	0.79
28. 8 "	6.3	9.2	7.6	0.83	6.1	9.0	7.2	0.80
29. 9 "	2.9	4.8	3.6	0.75	2.8	4.6	3.4	0.74
30. 10 & over	3.6	7.8	5.5	0.71	3.5	8.2	7.0	0.85

III. Disparity Measures

	TDM				Gini Coefficients			
	Table 1	Excl.	Transfer		Table 1	Excl.	Transfer	
			Ass1	Ass2			Ass1	Ass2
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
United States								
31. H--P	45.4	35.6	35.0	42.2	0.305	0.230	0.230	0.266
32. H--Y	23.4	11.4	13.6	22.2	0.158	0.073	0.110	0.138
33. P--Y	25.2	24.4	21.4	20.4	0.165	0.166	0.147	0.138
Taiwan								
34. H--P	31.0	29.0	28.8	29.4	0.331	0.203	0.202	0.207
35. H--Y	10.4	9.0	9.6	10.8	0.082	0.067	0.071	0.082
36. P--Y	20.6	20.6	19.2	18.6	0.139	0.136	0.131	0.125

Notes

All calculations use the percentage shares for households (H), person (P) and income(Y) shown for the two countries in Table 1.

The entries in parentheses following the name of the country are the arithmetic mean numbers of persons per household associated with the distributions by size given in the panel.

In both assumptions in Panel II, the allocation of the 1-person households and their income uses the average income per household. In Assumption 1, the 1-person households are allocated by the percentage shares in column 1 of Panel I. In Assumption 2, 1-person households are allocated to the larger multiperson HHs, assuming that each of them is assigned 1 extra person. This allocation, beginning at the top size-end of the distribution, is followed until all of the 1-person households have been transferred.

2-person class and added to the former 3-person class. In other words, transfer may mean shifts of the distribution along the full range from the earlier 2 person household class to the top size class.

A glance at Panel II and the relevant parts of Panel III of Table 2 show that the assumed transfers have different effects on the size differentials among households and on the disparities in income per household--the latter particularly marked for the U.S. in assumption 2. But, while raising the average size of the household even further (to 3.64 in U.S. add 5.44 in Taiwan), the transfers, on both assumptions, reduce the disparity in income per person. Thus, the TDMs in lines 33 and 36 tend to drift down in columns 3 and 4, and so do the Gini coefficients in columns 7 and 8. The reason is that the high per person income in the 1-person household class is transferred to larger size households with originally lower income per person. The effect, however is limited, and the substantial disparity in income per person, negatively associated with size of household, tends to persist even with the experimental transfers of 1-person households and their income to larger size households.

Another variant of size-differentials among households, different again from that used in Table 1, is suggested by the question whether the unweighted number of persons is a true measure of household size. As already noted, our interest is more in inequalities revealed by the relatives of income per person, not by those in the relatives of income per household with the latter so dominated by inequalities in size of household. But is the shift from per household to per person bases the proper adjustment for inequalities in size of household? If we are concerned with equivalent consuming units, the fact that the proportions

of children are greater in the larger size households suggests the possibility that division by the number of person over-corrects for inequality in size of households. This possibility flows from the realistic hypothesis that the consumption needs of children are, on a per head basis, distinctly lower than those of adults. And there is the additional argument that suggests economies of scale in the larger household, even if all its members are adults.

The issues raised are complex, and indeed are part of two wider group of issues--of differences in "needs" among members of the household, distinguished by age and sex (and possibly other demographic and socio-economic characteristics) and of differences in living-working conditions which may produce price differentials in the costs of a similar bundle of goods among groups of households. It is not feasible to explore these issues further here, nor do I feel competent to undertake the exploration. But in the present connection it may suffice to use whatever limited data on the topic could be assembled in Table 3 to proceed on an assumption (for three of the four countries) that persons under 18 should be viewed as half-weight consuming units compared with a full weight for those 18 years of age and over.[6] This is a crude assumption that probably over-corrects for difference in "needs", even including an allowance for economies of scale. For Israel, for lack of relevant data on age structure by size classes of households, we adopted the conversion coefficients to "standard person" units derived in the Israeli statistics from the country's data on consumption patterns for households of different size. There is no full comparability between the results for Israel and for the three other countries; but the estimates are notional for all four.

TABLE 3

Shift from Income per Capita to Income per Consuming Unit or per Standard Person, Four Countries

Household by Number of Persons	A. Shift to Income per Consuming Unit						
	Person per Household			Ratio col. 2/3	% Shares in		Income relat.
	Under 18 (1)	18 and over (2)	Cons. Units(C) (3)	(4)	C (5)	Y (6)	C (7)
United States, 1975							
1. 1 Person	0	.00	1.00	1.00	8.4	10.0	1.19
2. 2 Person	0.06	1.94	1.97	0.98	24.7	29.5	1.19
3. 3 Person	0.70	2.30	2.65	0.87	18.7	19.6	1.05
4. 4 Person	1.61	2.39	3.20	0.75	20.6	19.9	0.97
5. 5 Person	2.49	2.51	3.76	0.67	13.2	11.6	0.88
6. 6 Person	3.34	2.66	4.33	0.61	7.3	5.4	0.74
7. 7 Person	4.81	2.97	5.38	0.55	7.1	4.0	0.56
8. Average	0.89	2.00	2.45	0.82			
Taiwan, 1975							
9. 1 Person	0	1.00	1.00	1.00	0.8	1.6	2.00
10. 2 Person	0.16	1.84	1.92	0.96	2.3	4.1	1.78
11. 3 Person	0.77	2.23	2.61	0.85	6.5	8.9	1.37
12. 4 Person	1.51	2.49	3.24	0.77	13.2	16.0	1.21
13. 5 Person	2.24	2.76	3.88	0.71	20.9	21.9	1.05
14. 6 Person	2.86	3.14	4.57	0.69	21.0	19.6	0.93
15. 7 Person	3.40	3.60	5.30	0.68	14.5	11.9	0.82
16. 8 Person	3.73	4.27	6.13	0.70	8.8	7.2	0.82

Table 3 (con't)

Household by Number of Persons	Person per Household: Under 18 (1)	Person per Household: 18 and over (2)	Person per Household: Cons. Units(C) (3)	Ratio col. 2/3 (4)	% Shares in C (5)	% Shares in Y (6)	Income relat. C (7)
Taiwan							
17. 9 & over	4.74	5.79	8.16	0.71	12.0	8.8	0.73
18. Average	2.27	3.00	4.14	0.73			
Philippines, 1970-71							
19. 1 Person	0	1.00	1.00	1.00	0.4	1.1	2.75
20. 2 Person	0.20	1.80	1.90	0.95	3.1	4.6	1.48
21. 3 Person	0.95	2.05	2.52	0.81	6.9	8.8	1.28
22. 4 Person	1.86	2.14	3.07	0.71	10.3	13.6	1.26
23. 5 Person	2.75	2.25	3.63	0.62	12.5	13.9	1.17
24. 6 Person	3.51	2.49	4.25	0.59	13.5	13.2	0.98
25. 7 Person	4.18	2.82	4.91	0.57	13.4	12.3	0.92
26. 8 Person	4.58	3.42	5.71	0.60	14.8	13.1	0.89
27. 9 & over	5.64	4.57	7.39	0.62	24.6	19.4	0.79
28. Average	3.06	2.71	4.24	0.64			

B. Shift to Standard Person (SP)

Household by Number of Persons	SP per HH (1)	% Shares in SP (2)	% Shares in Y (3)	Income relative, SP (4)
Israel, Urban HHs, 1968-69				
29. 1 Person	1.25	4.7	4.8	1.02
30. 2 Person	2.00	15.9	19.8	1.25
31. 3 Person	2.65	17.3	21.4	1.24
32. 4 Person	3.20	23.6	27.9	1.18

Table 3 (con't)

Households by Numbers of Persons	SP per HH (1)	% Shares in SP (2)	% Shares in Y (3)	Income relative, SP (4)
Israel, Urban HHs, 1968-69				
33. 5 Person	3.75	14.7	12.6	0.86
34. 6 & over (7.2)	4.84	23.8	13.5	0.57

C. Measures of Disparities (in Panels A and B)

	TDM			Gini Coefficient		
	Size (H-C or H-SP) (1)	Income per HH (H-Y) (2)	Income per C, SP (C, SP-Y) (3)	Size (H-Cor H-SP) (4)	Income per Hl (H-Y) (5)	Income per C, SP (C, SP-Y) (6)
35. United States	37.0	23.4	14.6	0.244	0.158	0.090
36. Taiwan, 1975	28.0	10.4	17.6	0.200	0.082	0.120
37. Philip-pines, 1970/1	32,2	16.2	16.2	0.223	0.119	0.108
38. Israel, 1968/69	30.0	20.2	24.8	0.204	0.135	0.146

Notes

For the sources of underlying data see the notes in Table 1 relating to the four countries covered here.

Panel A (lines 1-28)

The ratios in col. 4, lines 8, 18, and 28 are computed from the arithmetic means in columns 2 and 3 of the same lines.

Lines 1-8, cols 1-2:

The estimates are based on 1970 Census data on proportions of children under 18 in families of two to seven and over (see U.S. Bureau of

Notes on Table 3 (con't)

the Census, 1970 Census of Population, Subject Report PC(2) 4A, Family Composition (May 1973), Table 3, pp. 7-8. These proportions were applied to size-classes of households used in Table 1 here (for March 1976, income for 1975); and the results were adjusted proportionately so that the totals of under 8 and 18 and over checked with the totals in the source used for Table 1.

Lines 1-8, col. 3:

Calculated from columns 1 and 2 by weighting the numbers aged below 18 by half. For discussion of this weighting see Source I cited for Table I above (Table 9, p. 31, and discussion, pp. 30-2).

Lines 1-8, cols 4-7:

Calculated from cols. 1-3 or taken directly from sources used for Table 1.

Lines 9-18, cols 1-2:

The proportions given directly are for persons under 21 and 21 and over (see my paper, "Size and Structure of Family Households: Exploratory Comparisons," Population and Development Review, vol. 4, no. 2, June 1978, Table 1, pp. 190-1). For end of 1974, it is possible to estimate the ratio of total population under 21 to that under 18, which is 1.161 (see Taiwan Demographic Fact Book 1974, Taipei, Dec. 1975, Table 1, pp. 54). We applied this ratio to the total numbers in the successive size-classes of households to approximate the distribution in cols 1-2.

Lines 9-18, cols. 3-7:

See the notes above on lines 1-8, cols 3-7.

Lines 19-28, cols 1-2:

The averages in line 28 are from the original Source I (Table 13).

Notes on Table 3 (con't)

The distribution of members under 18 and of those 18 and over used here follows the pattern established for Taiwan in lines 9-17 cols 1 and 2. This seemed a more plausible pattern than the one used in Table 13 of the 1976 paper (Source I).

Lines 19-28, cols 3-7:

See the notes above on lines 1-8, cols. 3-7.

Panel B, Lines 29-34:

For discussion of the scale of standard persons used in Israel for households of increasing size, see Source I (Table 9, p. 31 and discussion. Columns 2-4 are calculated using col. 1 and the relevant data in Table 1.

Panel C, lines 35-38:

See the notes on the measures of disparity, to Panel B of Table 1.

Since the larger households have usually a higher proportion of children than the smaller households, and there may be a greater economy of scale in satisfying consumption needs for the former than for the latter, we would expect that the size differentials among households in terms of consuming units or "standard" persons would be the narrower than in terms of persons. In addition, since we are not regrouping the households by the consuming unit or standard person equivalent of each household, but retain size classes by number of persons, we are underestimating the full range of size differentials in terms of consuming units (or standard persons): the spread in any variable is reduced if the data are classified by a criterion of size not directly reflecting the given variable. And, indeed, for these reasons, the size disparity measures in Table 3 for the four countries are all lower than the corresponding disparity measures in Panel B of Table 1. To use the TDMs for illustration: the measure drops from 45.4 to 37.0 for the United States; from 43.4 to 30.0 for Israel; from 31.0 to 28.0 for Taiwan; and from 36.2 to 32.2 for the Philippines.

The conversion to consuming units in the United States reduces the size differentials more sharply than either in Taiwan or the Philippines, the comparison with Taiwan being of most interest. This is despite the fact that for the household population as a whole, the proportion of persons below 18 is about 30 percent in the United States and over 40 percent for Taiwan. The explanation lies in differences in patterns of rise of the proportion of children in the larger households, combined with differences in distributions of household by number of persons. As Table 1 shows, in the United States over 51 percent of all households

are in the 1 and 2 persons class so that the population under 18 years of age is far more concentrated in what for that country are the larger households; whereas in Taiwan, with the shares of 1 and 2 person households small, no such concentration occurs. This can be seen by comparing the proportions of under 18 in the United States and Taiwan beginning with the class of 4 persons and more: in the 4 person class, the entries for the United States (line 4 col. 1) at 1.61 is already in excess of that for the same class in Taiwan of 1.51 (line 12, col. 1). This greater proportion of members under 18 years of age in the United States than in Taiwan will be found also for the 5, 6, and 7 and over size-classes. Such differences in pattern, and in relative reduction of size differentials among households in the shift from per person to per consuming unit, may be found in other comparisons between the more and the less developed countries.

With the reduction in size differentials among households, and the disparities in income per household remaining unaffected, there is a reduction in the disparities in income per consuming unit, when we compare them with disparities in income per person. The change, in TDMs, is from 25.2 to 14.6 in the United States, relatively the largest; from 38.2 to 24.8 in Israel; and from 20.6 to 17.6 in Taiwan; and from 20.6 to 16.2 in the Philippines. Yet the disparities, even in income per consuming unit, remain substantial; and what is most of interest, the negative correlation persists, this time between size of household as measured in consuming units and income per consuming unit. A glance at the relevant income relatives in Table 3 shows that with exception of movement from the 1- to 2- person class in Israel, there is a marked

and consistent decline in income per consuming unit as we move from the smaller to the larger households.

2. Some Factors Relevant to the Association

We may now ask why income per household increases with rise in household size; and why this increase falls so short of the rise in numbers (either of persons or consuming units) as to yield a marked decline in income per capita or per consuming unit when we shift from smaller to larger households.

In considering the factors relevant to answers to the double question just posed, we may start at the beginning of the sequence--size, income per household, income per person or consuming unit; or reverse it, proceeding from income per person or per consuming unit to size and hence to income per household. In the first sequence we begin with differences in size, taking them as given; and then attempt to suggest the factors that, given the size differences, yield the observed disparities in income per household, and in income per person or per consuming unit. But in this attempt, we must indispensably consider the demographic and socio-economic characteristics of households of differing size; and so come to view size differentials, in turn, as determined in part by other demographic and socio-economic groupings within the country (or within any other relevant total). In the second sequence we begin with, and take as given, disparities among households in income per person or per consuming unit; and then attempt to suggest the factors that, given the income disparities, account for a negative association between the latter and size differentials among households, and in such a way as to make for a positive association between size and total income of households. But in

this attempt we must indispensably consider the associated demographic and socio-economic characteristics of households at low and high levels of income per person or per consuming unit. In this way we come to view the income disparities, in turn, as determined in part, by other demographic and socio-economic groupings within the relevant total of household population. While the analytical emphases will differ somewhat between the two sequences, the several demographic and socio-economic groupings whose different responses will be used to account for the association between size-of-household differentials and income disparities will be the same.

The presentation in this section follows the first sequence, because the available data all center on the household as a unit (not on the person or consuming unit) while those that center on the person or consuming unit are scarce. But it should be possible toward the end to revert briefly to some aspects of the second sequence, referring to the illustrative findings in our discussion relating to those demographic and socio-economic groupings that we found to be of interest.

(a) In proceeding now from size of household to its income, one may suggest that the first and obvious reason for the positive association between size and income of household is that the larger number of members will, most likely, mean more members of working age. The latter can participate in earning activity, thus adding to the household's income; and may be induced to do so by the greater needs that a larger number of members represents. And, indeed, we find in Panel A of Table 2 that the number of adults per household increases with the rise in size of household, in each of the three countries covered.

Two comments are relevant to the just suggested factor in the

positive association between size and income per household. First, for the present purpose the distinction between children and adults should not be with an eye to consumption needs as it was for the conversion in Table 3. The distinction should be between those too young or too old to be able to contribute to income as it is defined in the data, and those who are of working age, i.e., capable of so contributing. This division line will differ among countries at different stages of economic development, and even among socio-economic groups within a country. The effective application of such a criterion requires data on income earning capabilities at different ages in different situations. No such data are at hand; and as Table 3 indicates, even data on age distribution of members of families or households within the size-classes of 2 members and above are extremely scarce. The approximations in Table 3 are, for the present purposes, extremely crude indeed.

Second, the activities in which the properly defined working age members are assumed to be capable of engaging should be among those the returns on which are included in the income data. This requirement of consistency between the definition of income recipients within the household and the income covered in the data (or, still better, the income that should be covered), is obvious. Yet it needs to be noted, with the restriction of the United States and Thailand distributions to money income; and the bearing is even wider when we consider the variety of productive activities within the household (by the housewife and other members) that are excluded from the accepted definition of personal income of households in the standard economic accounts. Clearly, a wider definition of productive activity and income can significantly affect the

pattern of relatives of income per household, perhaps making the rise with increasing size of household more substantial than it is now in column 5 of Panel A of Table 1 and thus moderating the associated decline in the relatives of income per person in column 6.

If we accept the crude approximations in Table 3, the rise in number of adults per household with increasing size of household provides one factor that makes for a rise in the total income of household as its number of members increases. But the moderate magnitude of the rise in total income thus attained, relative to increase in persons or consuming unit is also revealed. As already observed, the table shows a rapid rise in the proportion of children in total membership of household once we pass the 2 person level, in both the United States and Taiwan patterns. Hence in all countries covered the proportion of persons of working ages to total number of persons or of consuming units declines markedly, beginning with the size-class of three persons and reaching a trough in the larger size households. It follows that unless income per person of working age were to rise sharply to offset the decline in the proportion of potential workers to total of persons or consuming units, there would be a drop in household income per person or per consuming unit.

This finding of the rising proportion of children and declining proportion of adults as the size of the household increased beyond two persons is likely to be observed with a lower division line, say of 15 years of age; and the evidence on the importance of the children factor in explaining differentials in size of households (largely countrywide averages in cross-section and time comparisons) in the 1978 paper referred to note 1 supports this inference. But in the present connection one should stress

that marriage and children mean not only a decline in the larger families of the proportions of members of working ages: it is likely to mean also the absorption of some of these members of working ages in activities within the household needed to take care of children and of living arrangements, activities the substantial returns on which bypass the markets and are not included in the personal income (or consumption) of the households in the data on size-distributions. If we assume that the absorption of work-time of working age adults is greater the larger the number of children in the household (particularly if the dividing line is set at a young age), the proportion of adults <u>available</u> for income securing pursuits in the total membership of the households declines even more sharply with the rise in household size--so long as the rise is due to increase in the number of children below a relevant age.

(b) Another reason for the positive association between size of household and its income may be that size is associated with other characteristics that bear upon income. Assume that in both the countrywide total of households and within each size class we distinguish two subgroups, A and B; and that the proportions of A are smaller among the smaller households and greater among the larger households--whereas the opposite is true of the proportions of subgroup, B. Assume further than within each size class (or the overwhelming majority of them), the average income per household in subgroup A is significantly above than in subgroup B. This combination of a rising proportion of A households, with a significantly higher income per household for the A households within each or most size-classes, would produce a rise in income per household, as we shift from smaller to larger size classes. The result

would be a positive association between size and income of household, even if the number of adults of working age per household failed to rise in the shift from smaller to larger households.

An illustration of demographic characteristics associated with size, of the A-B type just conjectured, is provided in Table 4, the characteristics being sex of head of household, age of head of household, and a closely related (to sex and age of head) economic characteristics of participation or lack of participation of the head in the labor force. The illustration is limited to the data for the United States, even though similar data are available for the same year for Taiwan Province (i.e. Taiwan, excluding Taipei City). But the proportions of households with female heads or with the head not participating in the labor force, are quite small in Taiwan Province; and the data would yield only insignificant contributions to the positive association between size of household and its income. Likewise, income differentials, within size-classes, by age of head are far narrower in Taiwan Province than in the United States.

Table 4 provides for each of three sets of characteristics of head the needed information: on differences in percentage proportions of A and B within each size class, and on the ratio of the lower income per household of the B subgroup to that of the higher income of the A subgroup (see lines 4,8, and 12 on the percentage shares of the A subgroup, male heads, heads aged from 35 through 54, and heads in the labor force; and lines 5, 9, and 13, on the ratio of average household income of the B group to that of the A group--the B subgroup being female head households, households headed by persons under 35 or over 54 years of age, and households whose heads were not in the labor force). A glance at

Table 4

Effect of Differences in Structure within Size Classes of Households on Income Relatives and Disparities, Structure by Sex, Age, and Labor Force Participation of Heads, United States, 1975.

	Size-Classes of Households							All HHs
	1 p. (1)	2 p. (2)	3 p. (3)	4 p. (4)	5 p. (5)	6 p. (6)	7 & over (7)	(8)
Countrywide Measures as Given								
1. % Shares in all HH	20.6	30.6	17.2	15.7	8.6	4.1	3.2	45.4 (H-P)
2. Income relative, per HH	0.49	0.96	1.14	1.27	1.35	1.32	1.25	23.4 (H-Y)
3. Income relative, per P	1.41	1.38	1.09	0.92	0.78	0.64	0.46	25.2 (P-Y)
Male and Female Head Households								
4. % of male head HHs within size-class	36.9	83.4	83.2	90.2	93.8	89.4	86.4	75.8
5. Ratio, income per HH, female head to male head	0.64	0.64	0.56	0.49	0.50	0.46	0.49	
6. Income relative per HH, constant % in line 4	0.59	0.96	1.13	1.21	1.27	1.24	1.20	19.0 (H-Y)
7. Income relative per P, assumption of line 6	1.72	1.38	1.08	0.88	0.74	0.61	0.44	29.4 (P-Y)
Age of Head (35-54 age group vrs the rest)								
8. % of 35-54 year head HHs	17.0	19.7	37.1	48.7	63.1	69.6	77.7	34.2

Table 4 (con't)

	Size-Class of Households							All HHs
	1 p.	2 p.	3 p.	4 p.	5 p.	6 p.	7 & over	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Age of Head (35-54 age group vrs the rest)								
9. Ratio, income per HH, "other" age head HH to 35-54	0.63	0.79	0.81	0.78	0.74	0.73	0.81	
10. Income relative per HH, constant % in line 8	0.53	1.01	1.14	1.24	1.24	1.20	1.13	19.2 (H-Y)
11. Inc. rel. per P ass. of line 10	1.55	1.44	1.09	0.90	0.72	0.58	0.41	29.8 (P-Y)
Head in Labor Force (L) and not in Labor Force (N)								
12. % of L	49.2	64.6	83.3	90.5	91.8	88.0	84.8	72.7
13. Ratio, income per HH, N/L	0.46	0.54	0.63	0.59	0.54	0.47	0.50	
14. Inc. rel. per constant % in line 12.	0.58	1.02	1.10	1.18	1.24	1.22	1.16	17.4 (H-Y)
15. Inc. rel. per P ass. of line 14	1.68	1.45	1.06	0.86	0.72	0.60	0.43	31.0 (P-Y)

Notes

Lines 1-3:

The entries in columns 1-7 are from Panel A of Table 1, lines 1-7, columns 1, 5, and 6. Those in column 8 are the TDMs, from Panel B of Table 1, line 47, cols 1-3.

Lines 4-5, 8-9, and 12-13:

Calculated from the source for the United States referred to in the notes to Table 1 (Table 15, pp. 48-57).

Notes on Table 4 (con't)

Lines 4, 8, and 12, refer to the percentage within each size class and for all households of households with male heads, with heads aged 35-54, and with heads in the labor force. The complementary percentage to 100 is then of households with female heads, with heads aged below 35 and above 54, and with heads not in the labor force.

Lines 5, 9, and 12 refer to the proportion within each size class, of the income per household with female heads to income per household with male heads; of the income per household with heads aged 35-54 to income per households with either younger or older heads; and of the income per household with heads not in the labor force to income per household with heads in the labor force.

Lines 6-7, 10-11, and 14-15:

Calculated by assuming that within the size-classes, percentages of male and female head households are held constant at the countrywide proportions (i.e. of 75.8 and 24.2 percent); that a similar assumption is made with respect to percentages within each size class of households with heads aged 35-54 and of households with heads at younger or older ages (at 34.2 and 65.8 percent respectively); and that within size class percentages of households with heads in the labor force and with heads not in the labor force are the same (at 72.7 and 27.3 percent respectively).

Given these assumptions and the within size class averages of income per household for the three comparisons of two groups each, it was possible to compute the average income per household for each size class. Then, having the common distribution in line 1 of households by size classes, it was possible to calculate the relatives of income per household in lines 6, 10, and 14; and the relatives of income per person in lines 7, 11, and 15.

Notes on Table 4 (con't)

The entries in col. 8 of lines 6, 10, and 14 are the TDMs for inequality of income per household; those in col 8 of lines 7, 11, and 15 are for inequality in income per person--both sets resulting from size inequalities under the assumptions used.

these lines show that the A-B shares differ substantially among the size-classes, the A shares rising markedly from low shares, in the 1 person class to much higher shares in the larger households; while the average household income for the A subgroup exceeds substantially that of the B subgroup, within each of the several size classes of households.

Given the subgroup differentials in income per household, it is the pattern of differences in A-B shares in the successive size classes that are important--in contributing to the rise in income per household; and then also in limiting that rise. The contribution of the differing A-B structure can be observed if we assume away these structural differences, posit the same A-B shares in the successive size classes, and then compare with the result for the countrywide picture. The income relatives per household resulting from that assumption are in lines 6, 10, and 14, cols 1-7, and the disparity measures for income per household are in the same lines, col. 8. These can be compared with the actual countrywide relatives of income per household, reflecting variable structure by size class, in line 2. The comparison shows that the differences in structure by A-B subgroups resulted in raising the positive response of income per household to size, shown by the finding that the TDM reflecting the differences in structure, of 23.4, exceeds those based on assumption of the same A-B structure in each of the size classes, of 19.0 in line 6, 19.2 in line 10, and 17.4 in line 14. The same result is observed when we compare the range of rise in the income per household from the lowest (at 1 person class) to the highest (at the 5 person class). For the observed countrywide relative the range is 0.49 to

1.35 or 2.8; with exclusion of differences in A-B structure, it is reduced to 2.2 for the subgroups by sex of head; to 2.3 for the subgroups by age of head; and 2.1 for the subgroups by participation and non-participation of head in the labor force.

The assumptions used in lines 6, 10, and 14 imply that for the hypothetical distributions, the share of the size classes in total of all households are the same as in line 1, the one observed with variable structure of A-B subgroups. Hence, the TDM for size-differentials among households in line 1, of 45.4, is also the one for the hypothetical distributions implied in lines 6, 10, and 14. From what we learned of the TDM for size differentials as the minimum to which the TDMs for income would add, we should infer that lower TDMs for income per household in lines 6, 10 and 14 than in line 2 would mean higher TDMs for income per person in lines 7, 11, and 15 than in line 3. In other words, the diversity of A-B structure which made for stronger positive response of per household income to size made also for a weaker negative response of per person income to size of household. And, indeed, the TDM in line 3, at 25.2, is significantly smaller than those close to 30 in lines 7, 11, and 15. This is of interest since it indicates that the demographic and economic groupings used here would be of relevance in the alternative, second sequence that would begin with households at different levels of per person (or per consuming unit income), and work back to size differentials and income per household disparities.

If the diversity in A-B structure of the type revealed in lines 4, 8, and 12, contributes to the positive response of household income to household size, this contribution is limited if such diversity is

reduced once the percentage share of A reaches high levels and leaves less room for further increases. It is therefore of interest that for the structure by sex of head, a share of male head households as high as 83 percent is reached already in the 2 person class (see line 4, col. 2) and that for the structure by labor force participation, the share of households with heads in the labor force reaches 83 percent already in the 3 person class (see line 12, col. 3). Only for the structure by age of head do we find (in line 8) that the rise in the share of households with heads in the ages of 35-54 is fairly continuous through the range of size classes, although even here the rise in the share is moderate beyond the 5 person class. Given variations in the A/B income per household ratios among the several size classes of relatively moderate range, (see lines 5, 9, and 13) the diversity in A-B structure that diminishes rapidly as we pass to size classes beyond two or three persons can make only limited contribution to sustaining the positive response of income to household size.

Illustrations of the effects of A-B structures, similar to those provided in Table 4 can probably be found in a number of other countries; and what we know of the effects of sex and age of head on household income directly and through influence on participation in labor force, would lead us to expect results in the economically developed countries similar to those we found in the United States. We now turn to another kind of grouping in which the combination of diversity in structure within the successive size classes with per household income differentials between the subgroups within these size-classes produces effects on the positive association between size of household and its income, and on the negative

association between household size and its income per capita, that are opposite in direction from those illustrated for the A-B type structure in Table 4.

(c) Assume another pair of subgroups, C and D, with the average income per household of C significantly larger than that of D, in each or most of the size-classes and with the percentage proportions of C households greater among the smaller households and declining substantially as we move towards the larger size-classes. Thus, the major difference between the A-B and C-D structures is that in the former the percentage proportions of the higher income households rise as we move from the smaller to the larger households, whereas in the latter the percentage proportions of the higher income households decline as we move from the smaller to the larger households. One implication of this contrast is that in the A-B structure, the higher income households (A) are, on the average, larger in size than the lower income (B) households--revealing, for the averages, a positive correlation between household income and size. Thus, to refer back to Table 4, the higher income households, with male heads, average 3.2 persons per household, while those with female average 2.0; those with heads between 35-54 average 3.8 persons per household, while those with heads below 35 or over 54 average 2.4 persons; those with heads in the labor force average 3.2 persons per household, compared with 2.1 persons for households with head not in the labor force. For the C-D type of structure we will find the opposite, viz. that the higher income, C, households will, on the average, be smaller than the lower income, D, households.

Two illustrations of the C-D type structure are presented in Table 5, one for the United States and the other for Taiwan. The illustration for the United States (Panel A) distinguishes, among households with employed heads, those with white-collar worker heads from those with blue-collar worker heads, and treats the sum of the two (which excludes households with heads employed in agriculture or are service workers) as the total (in columns 1-3). White collar households, the heads being professionals, administrators, sales, or clerical workers, are characterized by a per household income that is between 30 to 50 percent higher than that of blue collar households, whose heads are craftsmen, operatives, or laborers (excl. those in agriculture, see col. 5): The percentage shares of the white collar households in the combined total declines from 70 percent in the 1 person class to less than 40 in the 7 and over person class (col. 4). It follows also that the average white collar household is smaller than the average blue-collar household, the averages being 3.0 and 3.4 respectively.

With this somewhat negative association between income and size of household, it is not surprising that our assumption, for columns 6 and 7 of Panel A, viz. that the percentage proportions of C and D households are the same for each size class (at the 55.1 and 44.9 percent respectively indicated in line 8, col. 4) shows that the diversity in the C-D structure among the size classes <u>reduced</u> the positive association between size of household and its total income. Without such diversity the TDM for disparity in income per household would have been 13.2; with the diversity, it drops to 12.0 (see line 8, cols. 6 and 2). The effect on disparity in income per person is opposite: the diversity in structure <u>magnifies</u> this disparity, yielding a TDM of 29.8 compared to

Table 5

Effects of Differences in Structure within Size-Classes of Households on Income Relatives and Disparities, Structure by Economic Subgroups, United States and Taiwan, 1975.

A. United States, White-Collar Worker Heads (WW), Blue-Collar Heads (BW), and Combined Total (WBW)

Size Classes	% HH	Inc. Rel. per HH	Inc. Rel. per P	% of WW in WBW HH	Ratio of Y/H BW/WW	Income Rel. Derive by Assumption	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
1. 1 Person	13.0	0.58	1.85	70.3	0.77	0.56	1.78
2. 2 Person	27.1	0.98	1.57	57.2	0.72	0.97	1.55
3. 3 Person	19.9	1.03	1.10	52.7	0.73	1.03	1.10
4. 4 Person	20.0	1.10	0.88	52.9	0.71	1.10	0.88
5. 5 Person	11.3	1.17	0.75	50.4	0.68	1.16	0.76
6. 6 Person	5.1	1.18	0.63	44.5	0.67	1.22	0.65
7. 7 Person & over	3.6	1.17	0.51	39.2	0.63	1.25	0.54
8. Total or TDM	40.8 (H-P)	12.0 (H-Y)	29.8 (P-Y)	55.1		13.2 (H-Y)	28.6 (P-Y)

B. Taiwan, Nonfarmer (NF) and Farmer (F) Households

	Countrywide			% of NF in total	Ratio, Y/H, F to NF	IR, H	IR, P
	% HH	IR,HH	IR,P			by assumption	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
9. 1 Person	3.2	0.50	2.67	79.2	0.75	0.47	2.50
10. 2 Person	5.2	0.79	2.05	78.1	0.42	0.79	2.05
11. 3 Person	10.3	0.86	1.53	81.9	0.60	0.83	1.48
12. 4 Person	16.8	0.95	1.26	82.5	0.59	0.91	1.20
13. 5 Person	22.0	0.99	1.04	79.9	0.64	0.96	1.01

Table 5 (con't)

Size Classes	Countrywide %HH	Countrywide IR,HH	Countrywide IR,P	% of NF in total	Ratio, Y/H, F to NF	IR,H by assumption	IR, P by assumption
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
14. 6 Person	19.0	1.03	0.91	72.3	0.67	1.04	0.92
15. 7 Person	11.3	1.05	0.79	65.0	0.70	1.08	0.81
16. 8 Person	5.9	1.22	0.80	56.9	0.66	1.29	0.84
17. 9 Person	2.7	1.26	0.72	52.4	0.68	1.37	0.79
18. 10 & over	3.4	1.59	0.72	42.9	0.73	1.74	0.79
19. Total or TDM	31.0 (H-P)	10.4 (H-Y)	20.6 (P-Y)	73.9		13.8 (H-Y)	17.2 (P-Y)

Notes

For both panels see the notes on the data and assumptions in Table 4.

The data for Panel A are from the source used for Table 4. Note that the countrywide total here (in cols 1-3) includes only households whose heads are employed white collar and blue collar workers, accounting for 49.0 million households out of a total of 72.9 million. The white-collar groups includes professional and technical workers; managers and administrators, except farm; sales workers; and clerical and kindred workers. Blue-collar workers include craft and kindred workers; operatives, including transport workers (given separately); and laborers, except farm. All terms used here are from the source.

In Panel B, the entries in columns 1-3 are directly from our Table 1 above. The additional data, needed to secure entries in columns 4 and 5 are from the two sources for Taiwan cited for Panel A of Table 1.

For the nature of the assumptions (constant percentage shares within

Notes on Table 5 (con't)

size classes of the two components, white and blue collar worker households for the United States and nonfarmer-farmer households in Taiwan) used to derive the income relatives in columns 6 and 7 in both Panels here, see the notes to similar assumptions in Table 4.

one without the diversity of 28.6 (see line 8, cols. 3 and 7).

The illustration for Taiwan distinguishes farmer households, those whose head is substantially engaged in farming or related pursuits (fishing, hunting and the like), even though income from agriculture may not be the dominant source of household income, from nonfarmer households. The countrywide proportions of nonfarmers households is 74 percent (this includes a tiny group of farmers in Taipei City), of farmer households- 26 percent. As column 4 of Panel B shows, the proportions of nonfarmers are at high levels of about 80 percent in the households of 1 to 5 persons, but then decline rapidly in the larger size-classes, down to 43 percent among households of 10 and over. The countrywide average size of non-farmer households, at 5.1 persons, is substantially below that of farmer households, at 6.0 persons. But as one might have expected, the income per farmer household, within each size class, is distinctly below that per nonfarmer household, as is revealed, with some erratic disturbances, in col. 5 of Panel B. The relative excess of the income of C type household (nonfarmer) is between 30 and 60 percent.

The results of diversity here in the C-D structure can again be observed by comparing columns 6 and 7 with columns 2 and 3. The diversity results in moderating the positive response of household income to its size, TDM being reduced from 13.8 to 10.4, a relatively substantial reduction. It also results in magnifying the negative response of per person income to increasing size of household, with the TDM rising from 17.2 to 20.6. In terms of what we set out to discuss, viz. why the income per household rose with increasing size and why it rose so moderately so as to yield a negative association between size of household and

per person income, the C-D illustration for Taiwan, like that for the United States, helps to answer largely the second part of the double question.

The concentration on socio-economic subgroups in illustrating the C-D type of structure in Table 5, contrasted with the concentration on demographic subgroups of the A-B type in Table 4, is a matter of choice. One could find socio-economic subgroups that would be of the A-B type; and demographic subgroups that would be of the C-D type. And yet there is substance to the contrast. Size differentials among households are, realistically, associated with sex of head, given the concentration of a preponderant majority of households, at least in the statistical reporting, under male headship; and given the female headship largely as result of the "broken" status of the unit or of widowhood. Likewise, the larger households do tend to occur when the head is in the "central" rather than extreme age phases of the typical lifecycle. It is not easy to find demographic characteristics, that would distinguish significant subgroups of the C-D type, unless one considers some (like urban vrs. rural residence) that are greatly affected by associated economic and social groupings.

Likewise, in recent times, when even the less developed countries have substantial modern economic and social components, the major socio-economic groupings do tend to be of the C-D type. With size differentials among households, preponderantly family households, reflecting differences in proportions of children and in the propensity of adults to live together or apart, it is the more modern components in society and economy that tend to reflect first the lower birth rates and the greater tendency to live apart that are the demographic hallmark of modern economic development,

particularly under conditions of free markets and effective consumer sovereignty. But it is also the same modern groups that will be characterized by higher income per household, for comparable size and on the average. The C-D type of structure is then associated with the contrast between the more modern, economically more advanced, groups in society and those less "modern" less advanced in the direction along which economic growth proceeds. This statement clearly applies to the nonfarmer-farmer distinction in the illustration for Taiwan, but, to a lesser degree, also, to the distinction between white collar and blue collar households in an economically developed country like the United States. While the bearing of it is particularly relevant to societies in process of transition from less to more modern modes of production and life, one would argue that every society is in transition at the boundaries of some of its sectors and classes, even if the phases of major transition may already have been completed.

We are now at the end of a brief, illustrative discussion of the factors relevant to the positive association of size differentials among households with disparities in income per household, and the negative association of the same size differentials with household income per person (and, implicitly, per consuming unit, although we had no adequately cross-classified data at hand). Before concluding this discussion, two general aspects of the analysis should be commented upon.

First, while we followed here the first sequence--from size differentials to disparities in income per household to those in household income per person, much of what was said of the effects of diversity of structure within size classes by the A-B and C-D types of subgroups would be relevant also to the second sequence. Were the data available to begin with a distribution of households by income per person, with the associated size and demographic and socio-economic characteristics, we would first observe the

negative association between income per person (or per consuming unit) and size of household. Then, considering the factors relevant to this association, we would argue that low income per person is connected with large household size because of the large proportions of children and because of the propensity of adults to live separately in so far as income and absence of direct obligations to children permit. And we would be illustrating this by the C-D types of socio-economic groups that are covered in Table 5 and discussed briefly above. To proceed further, given the combination of disparities in per person or per consuming unit income with size differentials among households, revealed in the negative association between the two, the question would arise why it still allows room for a positive association between size and per household income; and here the arguments about the greater absolute numbers of members of working ages, and the effects of A-B types of largely demographic subgroups within size classes illustrated in Table 4, would be brought into play. In short, the second sequence, while placing initial emphasis on the association between income per person (or per consuming unit) and size via propensities toward more children at the lower income levels and income limits on adults living apart (if desired), would, in the process of establishing the links, rely also on the characteristics of the several demographic and socio-economic groups within the population, characteristics that would explain, if illustratively, the ties between size differentials and income disparities.

Second, the illustrations in Tables 1-5 refer to countrywide measures and to subgroups that comprise the countrywide household population (with the single exception of the white-blue collar dichotomy

for the households in the United States). But the factors found relevant apply not only to countrywide household populations, but also to connections between size differentials and income disparities within sub-country groups, whether they be distinguished by demographic economic, regional, ethnic or similar criteria. So long as a subnational group includes households that differ substantially in size, the differences in size will be associated with differing proportions of children and adults; with differing structures within the size classes by sex and/or age of head; by further subdivisions with different economic and social characteristics that bear on income; and so on. And much of what was said of the factors relevant to the positive association between size differentials and disparities in income per household, and to the negative association between size differentials and household income per person (or per consuming unit) could be repeated, changing the identity of some of the subgroups, or about findings of such associations for each of a wide variety of subnational groupings. This must be the case since the classifications that we can establish for the countrywide population are never so exhaustive of size differentials among households as to remove such differentials within the subnational groups themselves.

This last statement is true even of much finer classifications than the ones we used in Tables 4 and 5. But we illustrate it for the large subgroups, demographic and other, distinguished in Tables 4 and 5. In Table 6 we provide for each of five dichotomies used (three of the A-B type and two of the C-D types, the minimum of data needed to reveal the size-differentials in association with the relatives of income per household and income per person; and to provide the basis for

calculating the TDMs, analogous to those used for the countrywide totals in Table 1 (for the two countries, United States and Taiwan).

Table 6 shows for all of the ten subgroups size-differentials among households of substantial magnitude, as revealed by TDMs ranging from about 30 to 54 (which would correspond to Gini coefficients ranging from about 0.2 to somewhat less than 0.4). Most of these measures of size-disparities within the subgroups are somewhat below those for the countrywide populations of households (at 45.4 for the United States and 31.0 for Taiwan), but some, e.g. that for female head households in the United States is substantially greater (see line 9 col. 6). This probably reflects the greater heterogeneity within the female head households with the contrast between the large group of 1 person units headed mostly by a widow and the various groups of larger households headed by female in absence of a resident husband.

In each subgroup, income per household shows positive association with size, as reflected in the relative income indexes in columns 3 and 7. In each subgroup, income per person is negatively correlated with size, as shown in the relative income indexes in columns 4 and 8. The magnitudes of the income disparities, whether in positive or negative correlation with size, are substantial. An one would expect that the negative relation would also be found between size measured in consuming units and income per consuming unit--although the magnitudes of size differentials and of disparities in income per consuming unit would be somewhat narrower than those shown now in columns 2 and 6, and 4 and 8 respectively.

There are some interesting differences among the subgroups in

TABLE 6

Size Differentials and Income Disparities Within the Demographic and Economic Subgroups Distinguished in Tables 4 and 5

Size Classes Totals, Average TDMs	Higher Income Per HH Subgroup: % shares in total HHs	Size relative	Income per HH relative	Income per P relative	Lower Income Per HH Subgroup: % shares in total HHs	Size relative	Income per HH relative	Income per P relative
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
I. United States: Male Head and Female Head								
1. 1 Person	9.8	0.32	0.55	1.74	54.3	0.50	0.77	1.56
2. 2 Person	33.7	0.63	0.89	1.42	21.1	1.01	1.26	1.25
3. 3 Person	18.8	0.94	1.07	1.14	12.0	1.52	1.31	0.86
4. 4 Person	18.6	1.26	1.16	0.92	6.3	2.02	1.27	0.63
5. 5 Person	10.5	1.57	1.21	0.77	2.6	2.54	1.35	0.53
6. 6 Person	4.9	1.90	1.20	0.63	1.8	3.06	1.22	0.4
7. 7 and over	3.7	2.38	1.16	0.49	1.9	4.37	1.24	0.28
8. Total or Average	55.3	3.18	15.9	4.99	17.6	1.98	7.6	3.64
9. TDM		40.6 (H-P)	16.2 (H-Y)	27.0 (P-Y)		53.8 (H-P)	25.2 (H-Y)	39.2 (P-Y)
II. U.S., HHs with heads aged 35-54 and HHs with heads aged below 35 or over 54.								
10. 1 Person	10.2	0.26	0.55	2.07	26.0	0.41	0.52	1.25
11. 2 Person	17.6	0.53	0.90	1.69	37.5	0.82	1.08	1.32
12. 3 Person	18.6	0.80	1.01	1.26	16.5	1.23	1.23	1.00
13. 4 Person	22.2	1.07	1.12	1.05	12.2	1.64	1.31	0.80
14. 5 Person	15.8	1.33	1.16	0.88	4.8	2.04	1.29	0.63
15. 6 Person	8.3	1.60	1.11	0.69	1.9	2.47	1.22	0.49

TABLE 6 (con't)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
II. U.S., HHs with head aged 35-54 and HHs with heads aged below 35 or over 54.								
16. 7 and over	.7	2.05	1.01	0.49	1.1	3.45	1.23	0.36
17. Total or Average	25.1	3.75	17.7	4.71	47.8	2.44	11.7	4.81
18. TDM		38.8 (H-P)	12.6 (H-Y)	28.6 (P-Y)		44.2 (H-P)	25.2 (H-Y)	24.8 (P-Y)
III. U.S., HHs with heads in and not in the labor force.								
19. 1 Person	13.9	0.31	0.57	1.84	38.2	0.47	0.58	1.23
20. 2 Person	27.2	0.63	0.98	1.56	29.6	0.95	1.17	1.23
21. 3 Person	19.7	0.94	1.03	1.10	10.5	1.42	1.45	1.02
22. 4 Person	19.5	1.26	1.12	0.89	5.5	1.90	1.46	0.77
23. 5 Person	10.9	1.57	1.19	0.76	2.6	2.37	1.44	0.61
24. 6 Person	5.0	1.88	1.19	0.63	1.8	2.84	1.25	0.44
25. 7 and over	3.8	2.35	1.14	0.49	1.8	4.29	1.25	0.29
26. Total or Average	53.0	3.18	16.2	5.09	19.9	2.11	7.3	3.46
27. TDM		41.6 (H-P)	13.0 (H-Y)	29.8 (P-Y)		44.2 (H-P)	32.0 (H-Y)	26.4 (P-Y)
IV. U.S., Households of White-Collar and Blue-Collar Workers								
28. 1 Person	16.6	0.33	0.56	1.70	8.6	0.29	0.57	1.97
29. 2 Person	28.1	0.66	0.99	1.50	25.8	0.58	0.95	1.64
30. 3 Person	19.0	0.99	1.04	1.05	21.0	0.87	1.01	1.16
31. 4 Person	19.2	1.32	1.14	0.86	21.0	1.16	1.08	0.93
32. 5 Person	10.4	1.66	1.23	0.74	12.4	1.45	1.12	0.77
33. 6 Person	4.1	1.99	1.29	0.65	6.3	1.74	1.14	0.66
34. 7 and over	2.6	2.43	1.31	0.54	4.9	2.20	1.12	0.51
35. Total or Average	23.5	3.02	19.7	6.51	19.2	3.44	14.7	4.27

TABLE 6 (con't)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
IV. U.S., Household of White-Collar and Blue-Collar Workers.								
36. TDM		41.4 (H-P)	15.4 (H-Y)	27.6 (P-Y)		39.2 (H-P)	10.0 (H-Y)	29.8 (P-Y)
V. Taiwan, nonfarmer and farmer households								
37. 1 Person	3.4	0.21	0.47	2.29	2.4	0.17	0.50	3.00
38. 2 Person	5.4	0.41	0.85	2.09	4.3	0.33	0.49	1.50
39. 3 Person	11.5	0.60	0.86	1.43	7.2	0.50	0.72	1.44
40. 4 Person	18.8	0.80	0.95	1.19	11.4	0.67	0.77	1.15
41. 5 Person	24.0	1.00	0.98	0.99	17.2	0.83	0.88	1.06
42. 6 Person	18.5	1.20	1.05	0.88	20.0	0.99	0.99	1.00
43. 7 Person	9.9	1.39	1.09	0.78	15.1	1.16	1.06	0.91
44. 8 Person	4.6	1.59	1.33	0.84	9.9	1.32	1.21	0.92
45. 9 Person	1.9	1.84	1.37	0.73	4.1	1.49	1.29	0.87
46. 10 Person and over	2.0	2.25	1.75	0.78	7.6	1.96	1.78	0.91
47. Total or Average	2.25	5.01	119.9	23.9	0.79	6.03	86.1	14.3
48. TDM		28.8 (H-P)	11.2 (H-Y)	18.2 (P-Y)		30.6 (H-P)	20.6 (H-Y)	10.2 (P-Y)

Notes

All the entries for the United States are taken or calculated from the source for the United States given in the notes to Tables 4 and 5. All the entries for Taiwan are taken or calculated from the two sources given for that country in the notes to Table 5.

The entries in lines 8, 17, 26, and 35 are as follows: columns 1 and 5--total of households, in millions; columns 2 and 6--persons per household; columns 3 and 7--income per household, U.S. $, 000s; columns 4 and 8--household income per person-- $ U.S., 000s. The entries in line 47 are: cols 1 and 5--total of households, in million; cols 2 and 6--persons per household;

Notes on Table 6 (con't)

cols 3 and 7--income per household, $NT, 000s; cols 4 and 8--household income per person--$NT, 000s.

The entries for TDM, lines 9, 18, 27, 36 and 48 are: in columns 2 and 6--for differentials among households in size, i.e. number of persons; in columns 3 and 7--income disparities in income per household among size-classes; in columns 4 and 8--in disparities in household income per person, among household size-classes.

the relative magnitudes of the disparities in income per household and in income per person. A good illustration is in the comparison of the nonfarmer and farmer households in Taiwan (lines 37-48, particularly the TDMs in line 48). The size-differentials, in columns 2 and 6, are about the same for the two subgroups of households, the TDMs being 29 and 31 respectively. But the magnitude of the positive response of income per household to size of household is much more moderate among the nonfarmer households, with a TDM of 11.2, compared with that among the farmer households, with a TDM of 20.6 (see line 48, col. 3 and 7). It may well be that influence of the C-D type of subgroups, which limits the rise in per household income with increase in size of household, is greater for the more heterogeneous population in nonfarmer households than for that of farmer households. But because of this difference in the magnitudes of the positive response of income per household, there is an opposite difference in the magnitudes of the negative response of income per person. The TDM for disparities in per person income for the nonfarmer households, at 18.2, is almost twice that for the farmer households, at 10.2 (line 48, cols 4 and 8). The size differentials among households thus contribute a larger component of inequalities in income per person to the population of nonfarmer households than they do to that of farmer households.

The number of such illustrations of different combinations of size differentials among households with disparities in income per household and in income per person, <u>within</u> demographic and socio-economic, intranational groups, could easily be multiplied. But the ones shown

in Table 6 should suffice to indicate that a fuller study of the associations under discussion requires observing them not only for countrywide populations but for significant subnational groups--in cross-section and over time.

3. Distributions of Households by Size: International Comparison for Recent Years.

The discussions so far of the connection between size-differentials among households and disparities in income per household or per person is based on data for a small number of countries. While the observations yield conclusions similar for all the countries covered, an obvious way of testing the findings would be to expand the number and widen the variety of countries examined, while subjecting the data, particularly those on income, to critical scrutiny and possible revision.

Of the several tasks so envisaged, the only one feasible here is to extend observation of size-differentials among households, but without the needed and scarce data on income, to a much larger number of countries than the six covered in the tables so far. This task is feasible because in its various Demographic Yearbooks, and in some related publications, the United Nations has assembled, for a large number of countries, the distributions of households and of population in households by size-classes--in detail that permits deriving disparity measures of the simple type used by us (we limited them to the TDMs, since their orders of magnitude are so closely related to the slightly more sensitive Gini coefficients, as to serve our purpose adequately). The main question that we sought to answer was whether there were systematic differences among countries in the inequality in the distributions of their households by

size, systematic in the sense of being associated with average size of household and thus also with differences among countries in the degree of their economic and demographic development.

The definitions of households differ somewhat among countries; the data are incomplete for some, and we had to resort to adjustments (of no great magnitude) to complete them by estimating the difference between total population and population in households, or by deriving distribution of population among size classes of households from the size distributions of households.[7] And, as we shall see, the coverage of the United Nations data is inadequate for some major regions of the world. But the sample is large enough to cover a variety of regions, and the data seem adequate to suggest some major findings.

A summary of the data on the size of the average household (arithmetic mean number of persons) and on the TDM measure of disparities in size for all but a few of the countries covered by the data is provided in Table 7. In view of the bearing of size differentials among households on the disparities in income per household and per person, our main interest here is in the amplitudes of inequalities in the distributions of households by size for the different groups of countries. A reference to the identity of the countries included, listed in the notes to Table 7, reveals that data for the populous countries of South Asia (Mainland China, India, Indonesia and a number of others) and for Subsaharan Africa (with absence of data for Nigeria, Ethiopia, and a large number of others) are lacking. One should note the omission of such major Communist countries as the USSR, the data for which do not distinguish the 1 person household class. Nevertheless, the coverage is sufficiently varied to suggest

TABLE 7

Average Size of Household and TDM, Economic and Regional Groupings, 1960s and 1970s

Grouping	Number of Countries (1)	A.M. Size (persons) (2)	TDM A. Mean (3)	TDM Av. Deviat. (4)
Developed Market Economies				
1. Europe, A	12	2.96	44.8	1.6
2. Europe, B	4	3.67	44.15	4.45
3. Europe, A+B	16	3.14	44.7	2.4
4. Overseas offshoots	4	3.22	44.45	0.75
5. Japan	1	3.45	38.8	-
6. DC combined (see notes)	-	3.23	43.4	-
Less Developed Market Economies				
7. East and SE Asia	8	5.45	37.4	3.3
8. Middle East	7	5.50	41.9	2.1
9. Subsaharan Africa	7	4.59	51.4	5.2
10. Caribbean	6	4.36	53.5	2.0
11. Latin America	12	5.00	43.4	1.3
Communist Countries				
12. All Covered	8	3.49	42.2	1.5

Notes

Except for entries for United States and Taiwan, taken from earlier tables, the underlying data for all countries are either from the United Nations Demographic Yearbooks (for 1962, 1963, 1971, 1973, and 1976) or

Notes on Table 7 (con't)

from UN files for more recent years. The data in the UN Demographic Yearbook for 1955 were not used here since they related to years well before the 1960s.

For two or three countries we had to estimate the difference between total population and population in private households, on the basis of such ratios for neighboring sets of countries. The adjustment was also made in the population for upper, open-end size class (of households with 10 or more members).

In averaging for regional groups we assigned equal weight for each country. For line 6, we weighted lines 3, 4 and 5 by 2, 2, and 1 respectively.

The following countries and years were covered in each grouping:

Europe-A: England and Wales, 1971; Scotland, 1971; France, 1968; West Germany, 1970; Italy, 1971; Switzerland, 1970; Austria, 1971; Netherlands, 1960; Denmark, 1965; Norway, 1975; Sweden, 1975; Finland, 1970.

Europe-B: North Ireland, 1966; Eire, 1971; Spain, 1970; Portugal, 1960.

Overseas Offshoots: United States, 1975; Canada, 1976; Australia, 1971; New Zealand, 1966.

Line 5: Japan, 1975.

ESE Asia: South Korea, 1960; Taiwan, 1975; Philippines, 1970; Thailand, 1970; Federation of Malaya, 1957; Khmer (Cambodia), 1962; Pakistan, 1968; Nepal, 1971.

Middle East: Iran, 1966; Kuwait, 1975; Iraq, 1965; United Arab Republic (Egypt), 1960; Libya, 1973; Tunisia, 1966; Morocco, 1971.

SubSaharan Africa: Lesotho, 1956; Liberia, 1962; Sierra-Leone, 1963; Southern Rhodesia, 1962; Zambia, 1969; Reunion, 1967; Mauritius, 1962.

Notes on Table 7 (con't)

Caribbean: Barbados, 1960; Bahamas, 1970; Guadeloupe, 1967; Martinique, 1967; Trinidad and Tobago, 1970; British Guiana, 1960.

Latin America (line 11): Costa Rica, 1973; Dominican Republic, 1970; Ecuador, 1962; Mexico, 1970; Argentina, 1970; Brazil, 1970; Chile, 1970; Colombia, 1964; Peru, 1972; Uruguay, 1963; Paraguay, 1962; Venezuela, 1961.

Communist Countries (line 12): Mongolia, 1969; Cuba, 1970; Bulgaria, 1965; Czechoslovakia, 1970; Hungary, 1970; German Democratic Republic, 1971; Poland, 1970; Yugoslavia, 1971.

some intriguing similarities and differences.

The first and striking finding in Table 7 is that the average TDM is roughly the same for a number of economic and regional groupings that otherwise differ substantially in the level of their economic development, in the size of their average household, and in their geographical location. A range of TDM from 42 to 45 includes the averages for the 16 countries of Europe (and the two subgroups among them), the 4 overseas offshoots, the 7 countries in the Middle East, the 12 countries of Latin America, and the 8 communist countries--a total of some 47 countries, market and command economies, economically developed and less developed, with average size of household ranging from barely above 3 to well over 5. And the average deviations in column 4 suggest that, for these groups, there is but limited variation around the arithmetic mean TDM for each group.

Second, the similarity in the average TDMs for these various groups of countries, characterized by wide differences in size of average household, strongly suggests the absence of significant association between size of average household and inequality in the distribution of households by size. This implication is confirmed by a simple calculation. If to the 47 countries, comprised in the groups listed in the preceeding paragraph, we add the data for Japan (1975) and for Israel (1972), array the 49 countries in increasing order of the average household for each country, and then strike unweighted averages (arithmetic means) of the size of household and TDM for five large groups (with 10 countries in each of the first four and 9 countries in the last, the results are as follows:

Successive groups	Persons per household	Arithmetic mean TDM	Av. Deviation TDM
I	2.81	44.7	1.7
II	3.20	42.9	2.0
III	3.80	43.9	2.8
IV	4.88	42.4	1.8
V	5.66	43.3	1.8

The comparison shows that despite the rise in size of average household by a factor of over two, the average TDM barely changes; and the average deviations indicate limited variation around the group means. Within the limits of the universe covered by these countries, the absence of significant association between size of household and extent of inequality in the size-distribution would suggest the absence of trends in inequality in this size distribution over time as the average size of household declines--that is, if cross-section comparisons can be taken as a safe guide to the trends over time.

Third, there is one regional group in Table 7 for which the average TDM is distinctly below the range of 42 to 45 observed for so many other groups--that for eight countries in East and Southeast Asia, with an average TDM of 37.4 (line 7); and one could add to it Japan, with its TDM of 38.8 (line 5). Inspection of the measures for each of the 8 countries included reveals that the TDM for all, except Federation of Malaysia, is either 40 (Pakistan and Nepal) or well below it (the other 5 countries). We should note that we excluded Hong Kong and Singapore, the TDMs for which were 48.4 and 49.0, for 1966 and 1971 respectively--on the argument that these are city-enclaves with a structure bound to be different from that of other countries. The suggestion is that the countries in East

Asia exhibit a distinctive structure of size-distribution of households. If this finding is confirmed by additional data and is not due to some distinctive aspects of the definition followed in statistical practice, one would have to search for the institutional characteristics that would account for a size structure among households so different from that in most other regions.

Finally, there are two regions, Subsaharan Africa and the Caribbean, in which the inequality in the distribution of households by size, is also distinctive, this time unusually wide with average TDM above 50 (lines 9 and 10). As already indicated, the sample for Subsaharan Africa is rather poor and all we can say is that for the seven countries covered, the TDM ranged from a low of 44.2 for Mauritius in 1972 to high of 64.2 for Sierra-Leone in 1963, with 5 out of the seven countries characterized by TDMs of 49 or over. The case is somewhat strengthened by the finding that for Kenya's urban households in 1962, the TDM is as high as 54.8; but data for many more countries are needed to provide an adequate coverage of this large region.

The difference between the disparity measures for the Caribbean group and those for Latin America suggests the distinctiveness of the former with 5 out of the 6 countries showing TDMs well over 50. The distinctiveness of this group is emphasized also by comparison with the measure for 5 islands in the Pacific (Solomon Island, 1976; Samoa, 1971; Gilbert Islands 1973; Pacific Islands, 1958; and New Caledonia, 1963), which, with an average household of 5.60 persons show an average TDM of 44.4. Here again, as in the case of East Asia, specific explanations would be required to account for the different size structure of households.

Table 8 presents size-distributions of households in a small number of countries, chosen to illustrate the full range between the very low and the very high TDMs found among the less developed market economies; and the narrower central range of these measures found in a wider variety of countries. Added to similar measures of size-disparities among households for the six countries covered in Table 1, the distributions, while excluding the communist countries, provide sufficient variety of the international similarities and differences. One should note that here again the additional measure of disparity, the Gini coefficients, indicate the same orders of difference among the countries, as do the crude TDMs.

Two observations are relevant. First, the countries with the widest disparities among households by size, with the TDMs significantly above 50, Sierra Leone and Guadeloupe, are characterized by two modal values of size--with peaking at the very low sizes and then a secondary peak at the larger sizes. This is in contrast to the preponderant majority of countries with TDMs well below 50 (and Gini coefficients below 0.35), which are characterized by a single peak size class, even though the distribution is skewed to the right. There is a suggestion in the high-disparity size-distributions of <u>two</u> subdistributions imposed on each other--one centering on the small size households, the other with a far higher mean size.

Second, Panel II of Table 8 indicates a significant range in size-disparity even for the group of developed (and less developed) market economies the <u>average</u> size of which varied narrowly around a TDM of 43 to 45. The spread between the TDM of 40 for Italy and one of

almost 49 for Austria is over 20 percent, and may have a significant effect on associated disparities in income. The suggestion is that while our major finding in Table 7--the combination of widely different sizes if average household with roughly similar measures of relative disparity indicated absence of significant association between the size of a country's average household and the relative inequality in the size-distribution of households, it does not mean that even within the central range international differences in size-inequality are so minor as to be negligible.

However, in concluding this preliminary discussion of international differences in size-inequalities in the distribution of households, we may return to a brief exploration of the main finding suggested by Table 7 and just stated. If we have two countries differing substantially in size of household, what realistic model can be proposed to help trace the connection between the size of the average household and the inequality in the distribution of households by size? Why do we find, for such a large number of developed and less developed countries, market economies and Communist countries, a wide range in the size of the average household combined with a roughly similar magnitude of the TDMs (and would, most likely, find it for the Gini coefficients, or other measures of relative inequality)?

An attempt to answer the first of the two questions just posed would involve starting with a single cohort of households over a given life cycle of formation, increase in size, contraction, and eventual dissolution, with some allowance for intra-cohort variance with respect to the assumed life-cycle pattern; repeat this series of assumed parameters for earlier and later cohorts; and then interpret the current size

TABLE 8

Distributions of Households by Size, Illustrative Sets of Countries

		Country 1		Country 2		Country 3		Country 4	
		% in:		% in:		% in:		% in	
		HH	Pers.	HH	Pers.	HH	Pers.	HH	Pers.
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	I. Illustrating full range of TDMs, LDCs								
1.	Country and year	S. Korea, 60		Colombia, 64		Guadeloupe, 67		S.-Leone, 63	
	HH Size Class								
2.	1 Person	2.5	0.4	4.5	0.8	19.5	4.4	22.7	5.7
3.	2 Person	7.2	2.6	7.9	2.7	15.5	7.1	23.4	11.8
4.	3 Person	11.4	6.2	10.6	5.5	12.6	8.6	14.4	10.9
5.	4 Person	14.5	10.6	12.3	8.4	11.1	10.2	9.9	10.0
6.	5 Person	16.3	14.8	13.5	11.5	9.3	10.6	7.1	9.0
7.	6 Person	15.3	16.6	13.1	13.4	8.2	11.2	5.3	7.9
8.	7 Person	12.6	16.0	11.5	13.8	6.8	10.9	4.0	7.0
9.	8 Person	8.7	12.7	9.4	12.8	5.4	9.8	3.0	6.1
10.	9 Person	5.6	9.1	6.7	10.3	4.2	8.5	2.3	5.3
11.	10 and over	5.9	11.0	10.5	20.8	7.4	18.7	7.9	26.3
12.	Average size, TDM, and Gini coef.	5.51	34.6 / 0.238	5.85	41.8 / 0.278	4.39	56.8 / 0.378	3.98	64.2 / 0.426
	II. Illustrating Central Range of TDMs, DCs								
13.	Country and year	Italy, 71		Engl. & Wales, 71		France, 68		Austria, 71	
	HH Size Class								
14.	1 Person	12.9	3.9	18.2	6.3	20.3	6.6	24.6	8.4
15.	2 Person	22.0	13.1	31.9	22.3	26.9	17.6	26.5	18.3

Table 8 (con't)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
II. Illustrating Central Range of TDMs, DCs								
	Italy, 71		Engl. & Wales, 71		France, 68		Austria, 71	
16. 3 Person	22.4	20.1	19.1	20.0	18.6	18.3	17.9	18.5
17. 4 Person	21.2	25.3	16.9	23.6	15.0	19.6	14.2	19.6
18. 5 Person	11.8	17.7	8.1	14.1	9.2	15.1	8.0	13.7
19. 6 Person	5.3	9.5	3.5	7.4	4.9	9.6	4.3	8.9
20. 7 Person	2.3	4.8	1.3	3.1	2.5	5.7	2.2	5.4
21. 8 Person	1.1	2.5	0.6	1.6	1.3	3.2	[	[
22. 9 Person	[1.0	[3.1	0.2	0.8	[1.3	[4.3	[2.3	[7.2
23. 10 and over	[	[	0.2	0.8	[	[	[	[
24. Average Size, TDM, and Gini	3.35	40.4 / 0.276	2.86	43.0 / 0.291	3.06	46.6 / 0.321	2.90	48.8 / 0.331

Notes

The data are from the sources noted for Table 7. The entries in lines 12 and 24, cols 2, 4, 6 and 8, below the line are the Gini coefficients, with the TDMs above the line.

structure of households as the combination of the findings for the several cohorts with appropriate weights reflecting the growth trends (and possible temporal changes in the life cycle and its variance) in the population. The difficulty with such complex simulation is that to be even roughly realistic, it requires data on cohort patterns and variance that are exceedingly scarce. Indeed, given the picture of the current household population as an amalgam of several cohorts with different and possibly changing life cycle patterns and variances around the latter, one may seriously doubt that adequate data can be found. It may be possible, with better knowledge of the factors involved than can be mustered here, to simplify the model sufficiently to make it operational; but this alternative does not appear feasible to me.

We turn to the second of the two questions, which suggests an examination of the empirical data involved in a comparison of two countries, in which a substantial difference in size of average household is combined with near equality of the TDMs i.e. of the measures of relative disparity. A closer examination of such a binary comparison may reveal aspects of the connection that, while not in themselves adequate explanations, point in the direction where such an explanation can be sought.

An illustration of such a binary comparison is provided in Table 9, the two countries being Brazil and Argentina, with data for both for 1970. The average household in Brazil, of 5.10 persons is larger than that for Argentina, of 3.79 persons, by over a quarter of the larger average. But the TDMs for the two countries, of 42.8 and 41.0 respectively, differ less than by 3 percent of the larger measure. The detail in column 5 of Panel

I indicates that the near equality of the two TDMs is due to the near cancellation of rises and declines in the absolute values of the components entering the two measures. In other words, as we move from Brazil to Argentina, the shifts in the percentage shares of households in the comparable size classes, and in the relative deviation of the class-size number of persons from the countrywide arithmetic mean number of persons per household, raise relative disparity in some size classes and lowers it in others, the net balance being a reduction in TDM from 42.8 to 41.0.

Can we envisage a way of shifting from the average size household of Brazil to a smaller average household of magnitude roughly that of Argentina, while at the same time producing a significant change in TDM? We are concentrating our single illustration here on conditions of a decline in size of average household, for that is the direction of the longer-term trends in household size in the course of economic growth.

Two such ways are suggested in Panels II and III of Table 9. In Panel II we assume that the reduction in the size of the average household is attained by lowering the percentage shares of the larger households, i.e. those of 6 and over, by variable fractions, the reduction coefficient being largest in the share of the top size-class and then smaller as we move down to the six person household. At the same time, the original percentage shares of the smaller households in Brazil remain unaffected except for the proportional rise (by division by 0.739) needed to convert the truncated size-class percentage distribution to add to 100. It will be seen from Panel II that such concentration on the reduction in the shares of the larger households, while lowering the size

Table 9 Binary Comparisons Illustrating Combination of Differences in Size of Average Household with Similar TDMs

I. Comparison of Observed Size Structures, Brazil and Argentina, 1970

Size-Class of Households	Brazil, 1970		Argentina, 1970		Col 4, signs disreg. minus col. 2, signs disregarded
	% in all HHs	% of P minus % of H	% in all HHs	% of P minus % of H	
	(1)	(2)	(3)	(4)	(5)
1. 1 Person	5.2	-4.2	10.2	-7.5	+3.3
2. 2 Person	12.1	-7.4	18.6	-8.8	+1.4
3. 3 Person	14.9	-6.1	20.3	-4.2	-1.9
4. 4 Person	15.7	-3.4	20.7	1.2	-2.2
5. 5 Person	14.2	-0.3	13.5	4.3	+4.0
6. 6 Person	11.1	2.0	7.3	4.3	+2.3
7. 7 Person	8.5	3.2	4.6	3.8	+0.6
8. 8 Person	6.3	3.6	2.0	2.2	-1.4
9. 9 Person	4.4	3.4	1.3	1.7	-1.7
10. 10 & over	7.6	9.2	1.5	3.0	-6.2
11. Averages, TDMs, and sums	5.10	42.8	3.79	41.0	+11.6 -13.4 - 1.8

II. Brazil, Modified by Assumed Decline in % Shares of the Larger Households

	Modified % Shares in HHs	Col. 1 adj. to add to 100	Pers. % in per HH pers.		Col. 4 min. col. 2	Col. 4 SD minus col 2, Panel I,
	(1)	(2)	(3)	(4)	(5)	(6)
12. 1 Person	5.2	7.0	1.0	1.8	-5.2	+1.0

Table 9 (con't)

Size-Class of Households	Modified % of Shares in HHs	Col. 1 adj. to add to 100	Pers. % in per HH pers.		Col. 4 min. col. 2	Col. 4 SD minus col 2, Panel I SD
	(1)	(2)	(3)	(4)	(5)	(6)
13. 2 Person	12.1	16.4	2.0	8.5	-7.9	+0.5
14. 3 Person	14.9	20.2	3.0	15.7	-4.5	-1.6
15. 4 Person	15.7	21.2	4.0	21.9	0.7	-2.7
16. 5 Person	14.2	19.2	5.0	24.8	5.6	+5.3
17. 6 Person	(6.7)	9.1	6.0	14.1	5.0	+3.0
18. 7 Person	(3.4)	4.6	7.0	8.3	3.7	+0.5
19. 8 Person	(1.3)	1.8	8.0	3.7	1.9	-1.7
20. 9 Person	(0.4)	0.5	9.0	1.2	0.7	-2.7
21. 10 & over	(0)	0	11.3	0	0	-9.2
22. Averages, TDMs, sums	73.9	100.0	3.87	100.0	35.2	+10.3 -17.9 - 7.6

III. Brazil, Modified by Assumed Rise in % Shares of the Smaller Households

Size-Classes of HHs.	Modified % shares in HHs	Col. 1 adj. to add to 100	Pers. per HH	% in pers.	Col. 4 minus col. 2	Col. 4, S minus col. Panel I,
	(1)	(2)	(3)	(4)	(5)	(6)
23. 1 Person	(26.0)	15.0	1.0	3.9	-11.1	+6.9
24. 2 Person	(42.3)	24.3	2.0	12.7	-11.6	+4.2
25. 3 Person	(29.8)	17.2	3.0	13.4	- 3.8	-2.3
26. 4 Person	(23.5)	13.5	4.0	14.1	0.6	-2.8
27. 5 Person	14.2	8.2	5.0	10.7	2.5	+2.2
28. 6 Person	11.1	6.4	6.0	10.0	3.6	+1.6
29. 7 Person	8.5	4.9	7.0	8.9	4.0	+0.8
30. 8 Person	6.3	3.6	8.0	7.5	3.9	+0.3

Table 9 (con't)

Size-Classes of HHs	Modified % shares in HHs (1)	Col. 1 adj. to add to 100 (2)	Pers. per HH (3)	% in pers. (4)	Col. 4 minus col. 2 (5)	Col. 4, S minus col 2 Panel I SD (6)
31. 9 Person	4.4	2.5	9.0	5.9	3.4	0
32. 10 & over	7.6	4.4	11.3	12.9	8.5	-0.7
33. Averages, TDMs, and sums	173.7	100.0	3.84	100.0	53.0	+16.0 - 5.8 +10.2

SD--signs disregarded

Notes

Panel I:

Entries in cols. 1-4 are calculated from the sources cited in the notes to Table 7. The entries in line 11, columns 1 and 3, are the arithmetic mean numbers of persons per household; those in columns 2 and 4 are the TDMs. Column 5 shows the difference between the entries for Brazil and Argentina in cols. 2 and 4, signs disregarded in these columns. The net balance, in col. 5, line 11, is necessarily the difference obtained by subtracting the TDM for Argentina from that for Brazil.

Panel II:

The entries in parentheses in col. 1, lines 17-21, shows the shares modified by assumption. The assumption reduces the percentage shares of the larger households for Brazil, as follows: reduction coefficient for the largest size class (10 & over)--1.0; for next largest size class (of 9 persons)--0.9; for the 8 person size class--0.8; for the 7 person size class--0.6; for the 6 person size-class--0.4. The shares of the size-classes below that of 6 persons are then retained as they were in col. 1 of Panel I.

Notes on Table 9 (con't)

Given the results in col. 1, lines 12-22, and number of persons per household in col. 3 (taken from the original distribution for Brazil in Panel I), we can derive the other components of the structure in cols. 2-5. Line 22, col. 3 shows the average number of persons per household; col. 5--the new TDM.

Panel III:

The entries in parentheses in col 1, lines 23-26, show the shares modified by assumption. The assumption raises the original percentage shares of the smaller households, by the following factors: 1 person class--a factor of 5.0; 2 person class--a factor of 3.5; 3 person class--a factor of 2.0; 4 person class--a factor of 1.5. Like the reduction ratios for the shares of large households in Panel II, the parameters are notional. But they conform to two criteria: modifications are differentiated by size, and they are chosen so as to bring the average size of the household to the desired level of about 3.8 persons. The shares of all classes above the 4 person class are left as they were in col. 1 of Panel I.

Given the results in col. 1, lines 23-33, and number of persons per household in col. 3, we can derive the other components of the modified size-structure in cols 2-5. As in Panel II, line 33, col. 3 shows the derived average number of persons per household; col. 5--the new TDM.

of the average household to 3.87 persons (quite close to the average for Argentina of 3.79 persons per HH), also reduces the TDM substantially, from 42.8 before modification to 35.2 after, well below even the TDM of 41.0 for Argentina. A comparison of the distribution in col. 2 of Panel II, with that of Argentina, in col. 3 of Panel I, suggest the reason for the reduction in the TDM. It lies partly in the sharp differential lowering of the shares of the larger households; partly in the failure to introduce fully compensatory and differentiated rises in the shares of the smaller households. As a result, the distribution in col. 2 of Panel II shows smaller shares at the extremes--in the shares of the 1 and 2 person households and in those of the 9 and 10 person households--than in the distribution for Argentina in col. 3 of Panel I.

The assumption in Panel III of Table 9 is that the reduction in size of average household in Brazil is attained by raising the original shares of the smaller households below the five-person class by substantial factors, ranging from one of 5 for the share of the 1-person class to 1.5 for the 4-person class; and leaving the shares of the larger households unaffected, except as they are reduced proportionately (by dividing by 1.737) in the conversion of the modified shares to add out to 100 (see notes to Table 9, Panel III). The result is to reduce the size of average household in Brazil to 3.84, again close to the average of 3.79 for Argentina; but the TDM rises sharply to 53.0, by almost a quarter of the original TDM of 42.8. Incidentally, the TDM and the size structure of the distribution in Panel III are quite similar to those found in the Caribbean and a few countries in Subsaharan Africa (see Tables 8) suggesting a combination of peaking of shares at the lower size classes,

with a secondary high level at the top size-classes.

The reasons for the sharp rise in TDM in Panel III can again be seen in a comparison of the shares in col. 2 of Panel III with those for Argentina in col. 3 of Panel I. Here, the shares of the extreme size-classes--one and two person households, and those with 6 or more person--are distinctly higher in Panel III, partly because of the insufficient lowering (compensatory) of the shares of the larger households, partly because of excessive differentiation in the upward adjustment of the shares of the several classes of smaller households.

It need hardly be stressed that the adjustments assumed in Panels II and III are notional, and governed by criteria that still allowed for much possible variation in specific parameters. The criteria were that the adjustments yield an average household of a magnitude roughly that for Argentina; and that the two separate ways, reducing the shares of the larger households and raising the shares of the smaller households with a clear non-overlapping between "larger" and "smaller" be differentiated in making the adjustment associated with differences among specific size classes within the two broader groups. That Panel II yielded a smaller TDM and Panel III a larger one were likely but far from necessary outcomes; and the same can be said of the finding that a value of TDM midway between those in Panels II and III would, at about 44, be close to the TDM for Brazil (with an average household of 5.1 persons), of 42.8. And the illustration is, after all, limited to two countries, and concentrates on the movement from the larger average household to the smaller, not vice versa.

Yet there may be some value in the illustration in its suggestion, perhaps otherwise easily acceptable, that the key to stability (or rough

stability) of the TDM (or other measures of realtive disparity) with substantial changes in size of average households may lie in the inter-connectedness of the larger and smaller households within a country's (or a region, or similar large entity) size-distribution of households. It is this inter-connectedness that is broken by the assumptions in Panels II and III. In Panel II we assume reductions in shares of larger households, but no effects of this process and of the underlying factors on shares of the smaller households, except through a proportionately uniform rise associated with the conversion of the truncated distribution to add to 100. Yet, if proportions of larger households decline, either because of reduction in number of children and/or rising propensity of adults to live separately, the underlying processes are bound to have effect also on the smaller households, and greater effects probably on the shares of the smaller households within the range of the lower size-classes. It is, therefore, unrealistic in Panel II to raise the shares of the households below the 6-person by a uniform ratio and retain the relations between the shares of the 1-, 2-, 3-, 4- and 5-person classes as they were before the reduction of the proportions of larger households in the total. Likewise, it is unrealistic in Case III to assume no connection between the rise of the proportions of the smaller households, the ones below the 5 person class, and the probable <u>differential</u> reduction in the proportions of the larger households, from the 5- person through the 10 and over persons size-class. In short, it is the inter-connectedness of the changes in proportions within the size-distribution of households that may minimize the changes in TDM, while the average size of household changes.

Yet the hypothesis of inter-connectedness of changes in the proportions of households of differing size in the movement in average household from one size level to another remain a vague notion--so long as the specific lines of the interconnections have not been identified and, at least, illustrated by relevant empirical data. For the present we are left with the broad findings of Tables 7 and 8, without an adequate explanation.

Our interest in the relative disparities in the distributions of household by size is, as noted, because of the bearing of such size-disparities on associated disparities in income per household and in income per person (or per consuming unit). If the relative size disparities among households are roughly the same for a wide variety of countries (or of other large collectives), it follows that the minimum sum of relative disparities in income per household (positively associated) and of the relative disparities in income per person or consuming unit (negatively associated) will also be the same. Under these conditions, comparative magnitudes of say the TDMs or Gini coefficients in the size-associated disparities in income per household and in income per person (or consuming unit) will be inverse to each other. Thus, if for two countries the TDM for size disparities is both 43, and there are no factors except size affecting income per household by size classes, a larger TDM for disparities in income per household will mean a smaller TDM for disparities in income per person or per consuming unit--and vice versa.

A realistic illustration of such a case is provided in Panel V of Table 6 above, in the comparison for nonfarmer and farmer households in Taiwan in 1975. The size-disparity is roughly the same for the two groups, with the TDMs being 28.8 and 30.6 respectively. But the associated disparity

in income per household is measured by a TDM of only 11.2 for the nonfarmer group and almost double, 20.6, for the farmer group; with the result that the associated disparity in income per person, with a TDM of 18.2, is appreciably wider among non-farmers than among the farmers (TDM of 10.2). If, for obvious reasons, it is distribution by income per person rather than that by income per household that is meaningful to us, the conventional size distribution by income per household would tend to be, under conditions illustrated, most misleadingly affected by the component reflecting the effects of size-differentials among households. By analogy, the same would be true if, in trends over time, we found rough stability in the relative disparity of size-of-households distributions despite possibly major changes in size of average household.

4. Summary

It should be useful, in conclusion, to summarize, in general terms unencumbered by specific qualifications, the main findings illustrated and discussed in the preceding sections. They are, of course, subject to such qualifications, arising out a narrow empirical base, deficient data, and incomplete analysis.

(i) Intra-country differences in size of households, whether size is measured by number of persons or of consuming units, are quite substantial. There is usually a positive association between income per household and size of household, in that larger households are found to secure larger total income. There is usually a negative association between size of household and household income per person or per consuming unit, because

the rise in per household income with increasing size is not sufficiently large to compensate for the increase in persons or in consuming units.

(ii) Given the associations noted under (i), it follows that size-differentials among households contribute to disparities in income per household, and in household income per person or per consuming unit. Such income disparities, traceable to size-differentials among households, may constitute substantial components in the over-all inequalities in the countrywide (or other large collective-wide) distributions of income among households by income per household, and in those of income among household population by household income per person or per consuming unit.

(iii) The magnitude of the size-differentials among households, the measure of inequality in the size-distribution of households, is the minimum to which the measures of inequality in associated disparities in income per household and in income per person (or per consuming unit) add out. (It is the minimum because the distribution of income per household or per person by size classes of households may also contain variance not associated with household size). Given this relation between say the Gini coefficient of the size-differentials among households and those for associated disparities in income per household and in income per person (or per consuming unit), the following inference is suggested. With the signs of the association as observed, the larger the Gini coefficient (or a similar measure of inequality) for the distribution of households by size, the larger should be the Gini coefficients either for the associated disparities in income per household, or for those in income per person (consuming unit), or for both.

(iv) Since the distributions of households by size differ between developed and less developed market economies by the strikingly

larger proportions in the former of 1-person households, experimental calculations for the United States and Taiwan dealt with the effects of either omitting 1-person households, or shifting them under variant assumptions into the larger household size classes. The results, while indicating the reduction in size-differentials appreciably greater among the U.S. than among Taiwan households, still reveal substantial magnitude of associated disparities in income per household, and particularly in income per person.

(v) The positive response of total household income to the size of the household is due partly to the inclusion of more work-and-earnings-capable adults in the larger households; and partly to the greater preponderance among heads of larger households of heads with characteristics that make for higher income, e.g. of male rather than female heads; and of heads in the mature, higher earning ages rather than of heads too young (before their prime) or too old (after their prime). But the effects of these factors, which tend to raise over-all income for the larger households, diminish rapidly as we rise above the small size-classes. The larger the household, the lower the proportion of income earning adults to children, and the smaller the rise in the proportion of household with male heads or with heads in the more favorable ages.

(vi) The resulting shortfall in the increase of household's total income with rise in size, and the consequent negative association between size and household income per person (or per consuming unit) is sustained by effect of socio-economic or ethnic characteristics of heads. In general, in developed as well as in modernizing and developing countries, the socio-economic groups that are more advanced, more modern, and hence

with a higher per person income tend to show a smaller average size of household (e.g. among professional white collar employees) than the less modern, lower income groups (e.g. farm workers or lower skill blue collar employees). Such negative correlation between average household size and per person household income of the diverse socio-economic (or ethnic) groups would tend to contribute, within a country, to the negative association between size of household and its income per person (or per consuming unit).

(vii) While the associations between size-differentials among households and disparities in income per household and per person were noted for countrywide distributions, and the relevant factors discussed in terms of the latter, such associations and the relevant factors would be observed also for sub-national units (regions, socio-economic groups, and the like). So long as we observe for a given group or collective substantial size-differentials among the households, the effects on disparities in income per household and income per person are also likely to be found and sustained by demographic and socio-economic subgroupings of households within the given group or collective.

(viii) It was possible to survey size-differentials among households, without concurrent data on household income, in a large number of countries in recent years--developed and less developed market economies, and a few Communist countries. The preliminary finding is that excepting a few special regions (Eastern Asia with quite low disparity measures, and Subsaharan Africa--a small sample--and the Caribbean, with high disparity measures), the measures of disparity in the households distribution by size tend to vary within a fairly narrow range (TDMs from about 40

to 48). This means that roughly similar amplitudes of disparity in distributions of households by size are found in countries with larger and smaller average household; in economically developed and less developed market economies; in market economies and in Communist countries. No adequate explanation of this finding, which implies absence of significant association between size of a country's average household (and whatever other characteristics are connected with average household size) and the disparity in the size-distribution of the country's households, is at hand.

FOOTNOTES

[1]This paper is a sequel to two earlier papers that touch upon this topic, among others bearing on demographic components in the size distribution of income: (1) "Size and Age Structure of Households: Exploratory Comparisons," Population and Development Review, vol. 4, no. 2, June 1978, pp. 187-223; and of more direct bearing, (2) "Demographic Aspects of the Size Distribution of Income: An Exploratory Essay," Economic Development and Cultural Change, vol. 25, no. 1, October 1976, pp. 1-94

[2]The difficulties have grown with the sharp rise in recent decades in the supply of basic socio-economic statistics, from different population subgroups and from countries at widely different levels of development. In the nature of the relation between the individual scholar and the data producing institutions, the results of scholarly analysis in the preponderant majority of cases are bound to be tentative subject to revision with the needed improvements in the data base. One can only hope that the explorations by the individual analyst serve to call attention to some important connections, and thus lead to greater attention to the testing and improvement of the supply and quality of the relevant data.

[3]For a discussion of this measure see the 1976 paper listed in footnote 1 above, pp. 12-13. TDM, as expressed here, is best viewed as the total of deviations, signs disregarded, in relative size per unit (whether the size is number of persons, or income, or consumption, etc.) in the several classes, from the arithmetic mean, such deviations weighted by the percentage share of each class in the relevant total. Thus, in line 1

of Table 1, the entry for the TDM for size differentials among households by number of persons, would read 7.1% - 20.6% = -13.5% on the latter in turn being equal to (0.35 - 1.00) x 20.6%, i.e. the relative deviation for the 1 person class of households, from the country wide mean weighted by the percentage share of this class in the total of all households. Expressed as a proper fraction (for United States, size of household inequality), it would then read 0.454), it is the ratio of class deviations, properly weighted, from the arithmetic mean, to that mean.

Both TDM, and the slightly more sensitive Gini coefficients, tend to understate the full range of differences in the distribution. But there are advantages of simplicity and ease in identifying the particular classes that are the major sources of inequality. We use them on the premise that they are adequate for rough comparisons of order of magnitude -- in that substantial differences so revealed would be even greater relatively with more sensitive measures.

[4]This means, to illustrate, that Gini coefficients of 0.1 and over and TDMs of well over 15, may be viewed as sufficiently large to assume that they contribute significantly to the inequality in the total distribution to whose component the cited disparity measures refer.

The non-addivity difficulty could be overcome by converting the underlying distribution to near normal shapes (perhaps by taking logs of size or of income) and using variance measures that can then be assumed to be additive While this requires elaborate calculations, the results will still be affected by inclusion in the measures for the total distribution by size of income of transient disturbances in their full magnitude -- let alone the deficiencies in the income data referred to above.

Under the circumstances it seemed best to explore the topic here, using simple and undemanding measures, applying them to as large a number of countries or subgroups as feasible, and tracing the relations to the specific size or other classes that could be more easily observed in these simple measures. The hope is that significant associations will be suggested that then may call for the application of the more elaborate measures to cases where the availability of reliable data warrants it.

[5]See the 1976 paper cited in footnote 1 above, Table 7, p. 25 and Table 17, pp 57-8, and related discussion in the text.

[6]See in this connection the 1976 paper referred to in note 1 above, particularly Table 9, p. 31 and discussion, pp. 30 and 32.

[7]For definitional problems see United Nations, Methods of Projecting Households and Families, Manual VII, New York 1973, Chapter I, pp. 5-11; and also the technical notes on Table 42, pp. 51-3, in UN Demographic Yearbook, 1976, New York 1976. We could not use the summary table 3, pp. 12-15 in the earlier source because the detail by size-class of households was insufficient to allow measuring the full range of inequality in size. I am indebted to the Statistical Office of United Nations for providing me with data on the subject received after the last publication in the Demographic Yearbook for 1976.