The Impact of Changes in Family Structure on Income Distribution in Japan, 1989-1997 Rising Inequality of Household Income Reconsidered*

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Abstract

This paper investigates the factors to determine the income distribution in recent Japan and re-examines the causes of rising inequality by using micro data. Main findings are as follows. The primary factor for rising inequality is aging and the changes of family structure which are closely related with each other. When age and family structure are specified, the income distribution for the specified group has not been deteriorated. Separating a family into the unit of adult couple allows us to calculate an economic value of living together with other adult family members and to obtain the estimate at around a seventh of the average household income. And finally, Gini coefficient is reduced by 0.1 when elderly or young adults live together with their family.

1. Introduction

The paper investigates the factors behind income differentials in Japan in the 1990s from the viewpoint of changes in family structure and social security, and sorts out arguments over widening income gaps in recent years. The increasing income differentials have been indicated in various statistical sources since the late 1980s, and it became a problem in controversy in the mid 1990s[1]. It started as the argument by Tachibanaki [1997] that "income differentials in Japan have widened and are now on a similar level to those in the West." Views are roughly divided into two: some consider that the increase of household-based inequality indicators reflects the transition to more competitive economy in the 1990s; others argue that the inequalities are structural in association with population aging and are not serious problems. The gist and the problems associated with these views were discussed in detail in the *Monthly Journal of the Japan Institute of Labour*, Vol.42, No.7 [2000], and Funaoka [2001] reviews the problem and adds an further analysis to find that a decrease of "three generation family households" lies behind widening differentials[2]. This paper focuses on the problems not solved by these preceding studies and re-examines the structure of recent income gaps from the perspective of the diversification of households and the family's life security functions. In particular, it reviews the following three points using the micro data of the "Basic Survey of People's Life" for 1989 and 1998 conducted by the Ministry of Health, Labour and Welfare[3]. That is,

(1) Income did become more unequal, but this was caused by changes in age structure (progress of aging) and no new factors caused inequalities (Otake [2000]);
(2) Income did become more unequal, but the inequalities were not so great in the 1990s, and many people felt equalities instead (Umetani [2000]);
(3) Increasing inequalities in recent years are caused by a rapid change in the living style of elderly people, decrease in the elderly living together with their children (Funaoka [2001]).

The paper is organized as follows. In section 2 we investigate the factors for the rising inequality of the household income. At first we examine the relations between changes in household structure and income differentials. Then the effects of aging and diversified household structure on income inequality are evaluated. Section 3 reviews the changes in structure and income of households having elderly members aged sixty-five years old and over. After discussing the problem of measurement units of household income in section 4, we analyze the structure

and income differential for couple-only households in section 5. Then section 6 presents the decomposition of existing household into the unit of adult couple and we summarize our findings in section 7.

2. Factors in widening income differentials

2.1 Changes in household structure

It is indeed a fact that differentials in household income increased almost consistently in the 1990s, even when the effects of single-member student households are disregarded. As noted at the beginning, the main hypothesis explaining this trend is that it is a reflection of (1) population aging, (2) decrease in households composed of different generations, or (3) a market-oriented economy, including a shift from life-long employment and seniority wage system to a performance-based one. All of these factors seem to have contributed to the widening of income gaps, and a numerical evaluation is needed. It is also necessary to examine the statement that there are groups of people who feel that differentials have narrowed.

First, let us see to what extent the composition of various types of household attributes has changed and to what extent the income differentials of each household attribute have changed in the last decade, to check the connection between the factors behind income gaps and these attributes. This is a kind of exploratory data analysis through which attempts are made to discover factors behind differentials from the data. The method can be regarded as an especially effective approach because in the analysis of differentials-related problems, where the result tends to be affected by researchers' value judgments, efforts should be made to conduct it as objectively as possible[4].

At first let us summarize changes in the ratio of households by their attributes. Here we examine various household attributes such as household size, occupation of household head, and so on, to find that the following attributes has changed largely in 1988-1997.

(1) Household size: While single- and two-member households increased by 10 percent combined, households with four or more members decreased correspondingly.

(2) Number of working members: Households whose head were unemployed showed a 7 percent increase.

(3) Household structure: Households composed of couples and their unmarried children decreased by 7 percent, and those composed of three generations decreased by 4 percent, while single-member households and couple-only households increased by 10 percent combined.

(4) Age of household head: Households of members aged 65 or over showed a 7.6 percent growth, and those of members aged 38-46 declined by 7 percent.

(5) Occupation of household head: Professional and technical workers increased by 7 percent, while office workers and manual laborers decreased by 12 percent combined.

(6) No great changes are observed for other attributes such as household business type, household type, household category, and sex of household head[5].

(1) and (3) reflect a further increase in nuclear families and declining birth rates, while (2) and (4) suggest an increase of elderly people and resultant growth of households composed of retired people. (5) is the result of changes in economic structure, that is, expanding service industry and professional business. We will examine which of these three factors explain the rising inequality in recent Japan in the following sections.

Table 1 Change in the Theil coefficient by attribute: 1988-1997

Attribute	1988	1997
Total	0.2610	0.2886
Household Size	0.0471	0.0674
Working members	0.0514	0.0716
Household Structure	0.0479	0.0689
Household Business Type	0.0232	0.0276
Household Category	0.0665	0.0778
Household Type	0.0282	0.0412
Gender of Household Head	0.0247	0.0316
Age of Household Head	0.0235	0.0358
Occupation of Household Head	0.0420	0.0504

2.2 Relations between changes in households and income differentials

Here we examine to what extent these changes in household attributes explain income differentials. In general, the indicators of differentials that can be decomposed into attribute groups are functions of three elements: (1) share of household attributes; (2) average income by household attribute; and (3) intra-household attribute differentials. The Theil coefficient, one of the decomposable inequality coefficients, can be decomposed in the following way[6]. That is, Theil coefficient for the whole households is equal to the sum of the inter-attribute Teil coefficient and the sum of income share of household attribute multiplied by intra-attribute Theil coefficient. Therefore, if Theil coefficient for the whole households mostly consists of the inter-attribute Theil coefficient, then we could say that almost all of the differentials can be explained only by the income difference among inter-household attributes. The ratio of the value of the inter-attribute Theil coefficient to the Theil coefficient for the whole households is called "explanatory power" here.

Table 1 shows the result of the decomposition of Theil coefficient for various household attributes. The attribute with the greatest explanatory power is "household business type", over 25 percent. The business types of households whose head are employees are divided into those of company officers, those of employees of different company scales and others, and those of households of self-employed people, into those hiring employees and those not, and those of other households, into those with and without working members. Because of this classification, they partly overlap with some other household attributes used here, for example., the number of working members or the occupation of household head, but they provide the most detailed classification[7].

Other attributes with great explanatory power are number of employees, household structure, and household size: a little less than 20 percent in 1988 and about 24 percent in 1997. The figures for the occupation of household head are 16-17 percent. The explanatory power of household structure and household size is increased by the fact that the group of single-member households is established as an independent category. That of household business type, the number of employees and the age of household head is increased by the fact that the group of households without any working members exists as an independent category. From these observations, it is clear that "single-member households" and "households without any working members" are the factors that widen differentials. This point is discussed in more detail later.

The following facts can be pointed out in the change of inter-attribute differentials during the period from 1988 to 1997. First, the differentials relating to household size, the number of working members, and household structure increased by 0.02 or more in terms of Theil coefficient. Differentials as to household business type, household type, and the ages of household head also grew by 0.01 or more in terms of Theil coefficient. Second, the fact that inter-attribute differentials, including attributes other than those mentioned above, widened can be pointed out as a characteristic. Third, as far as the inter-attribute Theil coefficient is concerned, inter-age cohort differentials do not become a major explanatory factor relative to the above-mentioned attributes relating to household structure. This does not appear to support the view that "population aging is the primary cause of widening income differentials in recent years." Changes observed in household structure are evidently a phenomenon associated with the progress of aging, and these two are closely connected with each other. Moreover, aging means an increase of households of elderly people and differs from widening inter-age differentials. Instead, it means increasing gaps as a result of a rise in the ratio of elderly households, where differentials are wider. Therefore, we should make evaluations using the decomposition of changes of inequality indicator to find out which attributes are main factors for rising inequality. Here, relying on the method used by Otake and Saito [1999] for logarithmic variance, changes in the Theil coefficient are decomposed as described below, and changes in differentials caused by changes in each attribute are evaluated. As already noted, the Theil coefficient is determined by three elements—(1) the share of attributes, (2) average income by household attribute, and (3) intra-household attribute differentials— so we calculate the Theil coefficient when only one of the elements is changed while the other two remain unchanged. For example, we estimate the coefficient in the case where the income distribution for 1988 is used as the basis and where only the component ratio of household structure attribute is changed to the value for 1997. This coefficient is expressed as T (1997, household structure, share). Similarly, the Theil coefficient, where only the average income by household structure is changed can be shown by T (1997, household structure, inter-attribute income ratio). The Theil coefficient, where only the Theil coefficient by household structure is changed into the value for 1997, can be expressed as T (1997, household structure, intra-attribute differen-

tials). Suppose the actual Theil coefficient to be T (1988) for 1988 and T (1997) for 1997, we can assess the impact of the change caused by changed household ratio (share), the change in inter-attribute income ratio and the change in intra-attribute differentials by observing the size of

{T (1997, household structure, share) - T (1988)},

{T (1997, household structure, inter-attribute income ratio) - T (1988)}, and

{T (1997, household structure, intra-attribute differentials) - T (1988)}

to change in the Theil coefficient, T (1997) - T (1988). Here, we call these three the "share effect," "inter-attribute income ratio widening effect," and "intra-attribute differentials widening effect," respectively. Because these decomposition formulas contain complex remainder terms, their total does not agree with the change in the Theil coefficient, T (1997) - T (1988)[8].

Table 2 shows the result from which the following three are observed as the main characteristics:

(1) The "inter-attribute income ratio widening effect" is not very great: its explanatory power is 20 percent or so for all attributes.

(2) Attributes with a great "share effect" are occupation of household head, household size, household structure, and the age of household head, having an explanatory power of 80 percent or more. The number of working members also has a great explanatory power of 76 percent.

(3) Attributes having great "intra-attribute differentials widening effect" are household category, household type, and sex of household head, with an explanatory power from about 50 percent to nearly 80 percent.

Table 2 Decomposition of change in the Theil coefficient

Attribute	T(1997, *, share)	T(1997, *,inequality within the attribute)	T(1997, *, income ratio of between-attribute)
Household Size	0.2871	0.2573	0.2660
Working members	0.2819	0.2647	0.2651
Household Structure	0.2857	0.2593	0.2663
Household Category	0.2677	0.2825	0.2620
Household Type	0.2667	0.2747	0.2684
Gender of Household Head	0.2703	0.2791	0.2611
Age of Household Head	0.2847	0.2586	0.2669
Occupation of Household Head	0.2893	0.2688	0.2569
	Share effect	Effect due to the changes of inequality within the attribute	Effect due to the changes of income ratio of between attribute
Household Size	0.0262	-0.0037	0.0050
Working members	0.0209	0.0037	0.0041
Household Structure	0.0248	-0.0016	0.0053
Household Category	0.0067	0.0215	0.0011
Household Type	0.0057	0.0137	0.0074
Gender of Household Head	0.0093	0.0182	0.0002
Age of Household Head	0.0237	-0.0024	0.0059
Occupation of Household Head	0.0283	0.0078	-0.0041
Explanatory power (percent)			
Household Size	94.6	-13.3	18.2
Working members	75.7	13.4	14.8
Household Structure	89.6	-5.9	19.1
Household Category	24.3	77.9	3.8
Household Type	20.8	49.6	26.8
Gender of Household Head	33.6	65.7	0.6
Age of Household Head	85.8	-8.6	21.5
Occupation of Household Head	102.4	28.3	-14.7

Note: Decomposition by Household business type is omitted because they are differently defined in 1989 and 1998. As for household type, publicly assisted households in 1988 are included in other households.

Of the three effects, the "intra-attribute differentials widening effect" requires no further discussion, because there seems to be common factors behind the widening of the entire differentials and the widening of the intra-attribute differentials. In addition, the "inter-attribute income ratio widening effect" does not have so great explanatory power that it is mentioned incidentally in the discussion of the number of working members later. Thus what remains to be done is an interpretation of factors behind great share effects. A detailed examination reveals that the share effects are all the results of an increase in the ratio of households having wider intra-attribute differentials. However, it can also be argued that the progress of aging may explain almost all of the widening of gaps in the 1990s and that changing the household structure in the form of declining multi-generation households is the chief cause of increasing differentials. But the progress of aging and the decline of multi-generation households are mutually connected each other. This means that we should inquire into the combinations of these attributes to determine the principal causes of widening gaps more accurately.

2.3 Effects of aging and diversified households on income differentials

First, let us look at the relations between age cohort of household head and household structure. A detailed statistical work shows that households whose head are 56 years or over and those composed of only one member and of a couple showed an increase, while all the other types of household decreased. It also suggests that the two elements (age group of household head and household structure) have a close relation with each other instead of changing independently: increased households of older people are single-member households, couple-only households, and households composed of a couple and their unmarried child or children. On the other hand, declining households with younger people are three-generation households and households of a couple and their unmarried child or children. The trend of households composed of a couple and their unmarried child or children clearly differs according to the age cohort of household head.

Table 3 Change in the Theil coefficient by age cohort and household structure: 1988-1997

Theil Coefficient, 1988								
Age	One Person: men	One Person: Women	Married Couple Only	Married Couple with Unmarried Children	One Parent with Unmarried children	Three Generation Family	Others	Total
Under 20	0.0847	0.0466	0.0000	0.0537	0.0000	0.0000	0.2224	0.0788
20-28	0.1242	0.1026	0.0971	0.0767	0.2072	0.1342	0.2328	0.1561
29-37	0.0817	0.1166	0.0945	0.0976	0.2532	0.1165	0.1861	0.1194
38-46	0.1876	0.2649	0.1915	0.1415	0.2963	0.1540	0.1801	0.1683
47-55	0.3369	0.2970	0.2213	0.1884	0.2186	0.1573	0.2617	0.2171
56-64	0.3396	0.3727	0.3137	0.1930	0.2368	0.1871	0.3150	0.2847
65-73	0.5517	0.3289	0.4250	0.2586	0.2022	0.1901	0.3178	0.3963
74 and over	0.4626	0.3844	0.5237	0.1772	0.2831	0.1895	0.3048	0.4889
Total	0.2822	0.3193	0.3173	0.1788	0.2544	0.1728	0.2836	0.2610
Changes of Theil Coefficient from 1988 to 1997								
Age	One Person: men	One Person: Women	Married Couple Only	Married Couple with Unmarried Children	One Parent with Unmarried children	Three Generation Family	Others	Total
Under 20	0.0229	0.0409	0.0145	-0.0437	0.0000	0.0000	-0.2224	0.0245
20-28	0.0355	0.0247	0.0316	0.0336	0.1017	0.0444	-0.0754	0.0478
29-37	0.0244	0.0389	0.0005	0.0066	0.0178	0.0054	-0.0196	0.0102
38-46	0.0042	-0.0107	-0.0753	-0.0208	-0.0605	-0.0294	0.0609	-0.0104
47-55	-0.0755	-0.0055	-0.0297	-0.0276	0.0211	0.0151	0.0267	-0.0036
56-64	0.0090	-0.0762	-0.0270	0.0244	0.0538	0.0024	-0.0202	0.0124
65-73	-0.2136	-0.0552	-0.1089	-0.0018	0.1116	-0.0147	-0.0145	-0.0392
74 and over	-0.0413	-0.0910	-0.2379	0.2634	-0.0016	-0.0214	0.1335	-0.0086
Total	0.0188	-0.0308	-0.0451	0.0068	0.0270	-0.0026	0.0270	0.0276

Next, Table 3 shows the situation of income differentials by age group and household structure. The Theil coefficient is used as a inequality indicator, but a similar result is obtained from the Gini coefficient, too. The changes in differentials in 1988-1997 shown in the lower half of Table 3 are almost all negative. This means that income gaps were narrowed in virtually all of the age and household structure categories. But, because the share of households with attributes of great income differentials rose, the gaps for the entire population widened. The increase in the inter-attribute income ratio can be regarded as another factor behind increasing differentials, but its impact was found to be not so great[9]. This is a reasonable result, because the investigation on the rise in the income ratio made for each attribute in the previous section actually shows that the rise did not have a very great effect . The above analysis finally confirmed that it can be said that the share effect is great even when two attributes are combined. This means that arguing that gaps in household income widen as a result of aging and suggesting that they are caused by changes in household structure are actually the same from a statistical viewpoint.

A result that is similar to that for household structure can also be obtained for the relations between the age group of household head and household size. That is, households with one person are single-member households and those with two members are almost all those of a couple. The greater part of three-member and four-member households comprises a couple and their unmarried child or children, while households having five or more members are mostly three-generation ones.

2.4 Age structure and income differentials

The author has pointed out that population aging means an increase in age cohorts with wider income gaps. In fact, when the Theil coefficient or the Gini coefficient is arranged according to the age group of household head, intra-age cohort income differentials consistently widen

Table 4 Changes of transfer income households by age cohort : 1988-1997

1988

Age	Transfer Income Household			* Non-Transfer Income Household		
	Household Ratio,percent	Average income	Theil coefficient	Household Ratio,percent	Average income	Theil coefficient
Under 20	64.3	1,134	0.0497	74.0	1,535	0.0918
20-28	11.5	1,246	0.0681	14.7	3,180	0.1320
29-37	0.7	2,108	0.0964	0.9	4,625	0.1181
38-46	1.0	2,416	0.3414	1.0	5,815	0.1654
47-55	1.7	1,585	0.1758	1.7	6,820	0.2100
56-64	9.9	1,883	0.1656	11.9	6,392	0.2535
65-73	30.5	1,721	0.1536	34.1	5,827	0.3126
74 and over	45.4	1,488	0.2071	52.8	5,622	0.3478
Between Age	-	-	0.0519	-	-	-
Total	**10.2**	**1,639**	**0.1807**	**11.9**	**5,832**	**0.2253**

Changes from 1988 to 1997

Age	Transfer Income Household			* Non-Transfer Income Household		
	Household Ratio,percent	Average income	Theil coefficient	Household Ratio,percent	Average income	Theil coefficient
Under 20	-7.0	-57	0.0443	8.9	33	-0.0138
20-28	3.8	58	0.0189	10.0	348	0.0378
29-37	0.0	-781	0.0366	1.6	1,189	0.0085
38-46	0.2	-617	-0.0597	1.6	1,424	-0.0126
47-55	-0.2	466	0.0083	1.3	1,932	-0.0033
56-64	-0.8	132	-0.0034	1.9	1,741	0.0090
65-73	4.0	617	-0.0160	6.2	1,497	-0.0391
74 and over	6.7	466	-0.0113	6.7	1,686	-0.0219
Between Age	-	-	0.0230	-	-	-
Total	**4.4**	**388**	**-0.0023**	**7.0**	**1,526**	**-0.0354**

Note1: * means Household without working members.

Note2: Average incomes are indicated in a thousand yen. The Theil coefficient for between age groups applies to the whole household.

in groups of people in their thirties or over. Those in the first half of their twenties are mostly composed of single-member households and are homogeneous, but in the age bracket of people in the latter half of their twenties, those who have a family increase and the differentials become wider as a whole because the age group contains heterogeneous units. Most people in their thirties have a family and thus this age cohort becomes homogenous with the income gaps being reduced. Therefore, we will mainly study age groups of 29 years or over below.

First, we look at the situation of income differentials according to whether or not households have working members. In addition, households are classified according to whether or not they have "primary income."[10] "Primary income" is defined here as the sum of earned income (e.g. employees' income and business income) and property income. The households that have no primary income and depend on pensions, social security benefits or remittances from parents are called "transfer income households" and are regarded as roughly corresponding with households with no working members.

Table 4 shows the income distribution of these transfer income households according to the age cohorts of household head and that of households without working members for reference. Firstly, the age-group pattern in terms of household ratio for transfer income households and households with no working members is roughly the same, except that the figures for the latter are higher than those for the former by about 2-4 percent. During the period from 1988 to 1997, the total number of transfer income households increased by 4.4 percent, and the increase was greater in age cohorts of 65 years or over. What should be noted here is that the increasing pattern by age cohort corresponds to the widening pattern of income gaps. As for average income, the income level of transfer income households is only about 20-40 percent of the level of non-transfer income ones, and the differentials are widening. Furthermore, the Theil coefficients for the transfer income and non-transfer income households begins to become rapidly higher in the cohorts of 56 years or over. This is mainly because an increase in transfer income households results in a widening of these households' in-

Table 5 Change in the Theil coefficient by age cohort and occupation: 1988-1997

Changes of Theil Coefficient from 1988 to 1997

Age	No occupation	Professional and Technical Workers	Administrative and Managerial Workers	Clerical Workers	Sales Workers	Service Workers	Policemen, Guards, and Related Workers
Under 20	0.0435	0.0936	-	-0.0556	-0.0325	-0.0464	0.0000
20-28	-0.0111	-0.0585	-0.0286	0.1233	0.0198	-0.0103	0.0367
29-37	0.0102	0.0054	0.0217	0.0283	0.0162	-0.0325	-0.0050
38-46	-0.0429	-0.0253	-0.0073	0.0157	-0.0196	-0.0897	-0.1070
47-55	0.0111	0.0284	-0.0548	0.0112	-0.0123	-0.0011	-0.1146
56-64	0.0267	-0.0035	0.0098	0.0029	0.0212	-0.0668	0.0135
65-73	-0.0358	-0.1039	0.0955	-0.0309	-0.0012	-0.0137	0.0228
74 and over	0.0028	0.3998	0.0192	0.0570	-0.0924	-0.1190	-0.2042
Total	0.0081	0.0013	-0.0110	0.0182	0.0026	-0.0261	-0.0616

Age	Farmers	Forestry Workers	Fishermen	Workers in Transport and Communication	Craftsmen and Production Process Workers	Occupation n. e. c.	Unidentified
Under 20	-	-	0.0733	-	-0.0716	-0.1473	0.0316
20-28	-0.0996	-	0.0668	0.0044	0.0468	0.0005	0.0662
29-37	-0.2335	-0.0379	-0.0520	0.0186	0.0099	0.0260	-0.0660
38-46	-0.0048	0.2122	0.0295	-0.0068	-0.0153	-0.0860	0.0206
47-55	-0.0068	-0.0146	0.0491	0.0232	-0.0017	-0.0216	0.1087
56-64	0.0067	-0.0789	0.1952	0.0746	0.0052	0.0962	0.0549
65-73	-0.0109	0.0233	-0.0472	-0.2046	0.0101	-0.0168	0.0507
74 and over	-0.0122	-0.0223	0.6928	0.1076	0.1317	-0.5216	-0.0352
Total	0.0061	0.0163	0.1793	0.0225	0.0155	-0.0561	0.0859

ter-age group differentials from non-transfer income households. The gap in the average incomes of the two groups became wider, although only a little. The income gaps among non-transfer income households also widen with age, but the degree is smaller than that of transfer income households.

Another point to be noted about Table 4 is that changes in the Theil coefficient of the two household groups indicate narrowing gaps in all cases. This is probably something that has not fully been proved quantitatively in the recent discussion about income differentials. Although it has been said that the Japanese economy is being globalized and the performance principle has increasingly been introduced into wage systems, this cannot be observed clearly at least on a household basis. In addition, this observation is also supported by another data that show virtually no trend of decile coefficients regarding "contractual cash earnings" in the "Basic Survey on Wage Structure" during the period from 1988 to 1997[11].

The result for the income gaps by age cohort and by the occupation of household head is briefly discussed here. It is basically the same as that of the above-mentioned case where households are divided into "transfer income households" and "non-transfer income households." "Unemployed, etc.," "Non-classifiable" and "Unknown" in Table 5 should be regarded as roughly equivalent to "transfer income households," and households belonging to one of the eleven occupations of the standard large occupation classification, to "non-transfer income households." The data of "non-transfer income households" are a little complicated because they are divided into the eleven types of occupation. Table 5 shows only intra-attribute changes in the Theil coefficient in 1988-1997. By age group and occupation, differentials narrowed in 44 of the 83 cells. The attributes with greatly widening gaps generally have lower household ratios, and this would probably be affected by sampling errors. Thus, it can be said that the trend toward a reducing of differentials is observed in each attribute, and this roughly agrees with the observation of "non-transfer income households" mentioned above.

In addition, it is confirmed that income gaps widen with age for all occupations[12]. While income differentials are greater in "services," "sales," "agriculture," and "professionals," all of these occupations, excluding "professionals," experienced a decline in the household ratio. The inter-attribute Theil coefficient rose from 0.0618 in 1988 to 0.0731 in 1997, which is also a similar result to that for the household classification according to "transfer income households." In any case, the conclusion that an increase in "unemployed households etc." is the primary cause of a widening of income differentials in recent years remains unchanged.

3. Changes in structure and income of households having elderly members aged 65 or over

The analyses in the preceding sections classified households according to the age of their head. But elderly people, who are considered to be the main factor of widening gaps, live with their child or children in many cases. While the ratio of three-generation households is steadily decreasing recently in Japan, the ratio of elderly people living with their child or children is still high by international standards. Therefore, there is also a need to investigate the problem of income differentials for all of the

Table 6 Income differentials among households having elderly members by household structure

Sources	Theil Coefficient		Mean Income	
	1988	1997	1988	1997
Between Household Structure	0.0880	0.1157	-	-
One-person: Men	0.5167	0.3778	209.8	262.0
One-person: Women	0.3554	0.2905	134.7	173.0
Married Couple Only	0.4534	0.3143	364.6	453.5
Married Couple with Unmarried children	0.2453	0.2907	558.2	749.7
One Parent with Unmarried children	0.2612	0.2648	393.7	465.8
Three Generation Family	0.1724	0.1676	716.7	983.7
Others	0.3006	0.2906	579.8	739.6
All Household with members at the age of 65 and over	0.3336	0.3515	526.9	633.5

elderly (who are here defined as those aged 65 or over). First, let us look at the household structure to which elderly people belong. The following three can be pointed out as noticeable changes during the period from 1988 to 1997:

(1) three-generation households decreased by 12 percent;

(2) couple-only households increased by 6 percent; and,

(3) households whose head are 65 years or over increased from 58.4 percent to 69.8 percent.

These changes apparently coincide with the general trend observed for the whole household. And the majority of the elderly live independently of their children, at least in economic terms; nearly 70 percent of the elderly maintain households as their head[13]. Next, we measure the income gaps of households with head aged 65 or over in Table 6. The following four facts would be observed by comparing this table to Table 3.

(1) The Theil coefficient of households of those aged 65 or over is higher by 0.05 or more than that of all the households, suggesting that their income gaps are wider.

(2) The inter-household structure Theil coefficient is very high: about 0.1. The average income of three-generation households is the highest and is over five times that of single-member households of women, which is the lowest.

(3) The income differentials of households of the elderly are much wider than those of all households, excluding three-generation ones. The Theil coefficient of the couple-only households, which have relatively high household ratios, is higher by 0.14 in 1988 and by nearly 0.05 in 1997 than that of all households.

(4) But, in 1988-1997, gaps were considerably narrowed in all types of households, excluding households of a couple and their unmarried child or children. In particular, they narrowed from 0.4534 to 0.3143 in couple-only households.

One factor behind the wide income differentials for this group is that single-member households and couple-only ones have wide income gaps. Because both of these households have a higher percentage of households with no working members, they have large income differentials. In terms of time-series change, there were shifts from three-generation households, whose household income is relatively uniform, to couple-only households, which have wider income gaps. Consequently, although gaps tended to narrow in some of household structures, they widened as a whole from 1988 to 1997. Summing up, factors similar to those observed in all the households are also seen in households having elderly members, and are shown in a more radical way.

4. Measurement units of household income

The analysis thus far shows that a substantial part of widening income differentials is explained by the fact that with the progress of aging, a number of elderly people who had lived in the households of their children have become to live independently of them. Living independently was not always a voluntary choice of the elderly, because there were some cases in which parents lived in the country and found difficulty living with their children in cities or because of other reasons, but it is closer to reality to consider that elderly people came to be able to secure a level of income, which might not be very high but allowed them to live without children's help, and to choose an independent life rather than living with their children. Where income gaps widen for such a cause, whether or not we need to introduce policies to narrow

Table 7 Decomposition of the Theil coefficient by age cohort (couple-only households)

Age	1988 Household Ratio,%	1997 Household Ratio,%	1988 Theil Coefficient	1997 Theil Coefficient	1988 mean income, thousand yen	1997 mean income, thousand yen
Under 28	5.89	4.56	0.0971	0.1287	429.1	538.1
29-37	7.41	7.41	0.0945	0.0950	492.6	682.1
38-46	5.79	4.66	0.1915	0.1162	556.0	731.7
47-55	13.44	10.94	0.2213	0.1916	554.8	774.5
56-64	31.23	26.87	0.3137	0.2867	502.5	657.1
65-73	22.81	30.14	0.4250	0.3161	394.4	492.5
74 and over	13.44	15.42	0.5237	0.2859	318.0	373.7
Between Age	-	-	0.0151	0.0255	-	-
Total	100.00	100.00	0.3173	0.2722	458.1	576.4

the gaps is a matter that demands careful consideration. At least we have to find out a correct figure of income distribution in detail. Now we proceed to measure gaps after removing the impact of changes in household structure. Several methods have been proposed for this purpose.

In the discussion of gaps in household income, how to deal with households and units of measurement is an important problem. In general, the larger a household is, the greater is the number of working members and the higher household income tends to become. However, the level of welfare each member of the household enjoys is not always proportional to household income, and each member's disposable income is not so large because all the members share household income. Therefore, in most cases, differentials are measured by the equivalence scale such as the income per member of the household or by income per person in terms of adult members[14]. Another approach is to observe change in income differentials, paying attention to couple households. Because these households are composed only of a couple, they contain no households with different household sizes, and the share of couple-only households is also rising.

One more approach is to divide households into minimum units and measure their income gaps. As already noted, multi-generation households, such as three-generation ones, still have higher ratios in Japan than in the West. Even survivors, separated or divorced people and unmarried adults (hereinafter referred to collectively as "unmarried adults etc."), who are regarded as independent adults, mostly live with others. But, according to the estimate of the National Institute of Population and Social Security Research (2000), household sizes in Japan will be further reduced to the present average level in the West within 20 years. Here, we attempt to study the lives of unmarried adults etc. who live with others, by looking at these groups as independent units.

5. Structure and income differentials of couple-only households

The analysis in Section 3 indicates that the change in household structure associated with population aging is the factor behind the widening income differentials observed from 1988 to 1997 and that income gaps are narrowed in many cases if household attributes are specified not only by age group but by household structure. It is true that aging is an element affecting the widening of differentials, but it should also be noted that widening gaps cannot be entirely explained by aging only. Let us take couple-only households as examples. This type of household is found in each age bracket, but aging occurred in the 1990s, and, as a result, the ratio of households of those aged 60 or over exceeds 50 percent. Except that they are composed of two members, couple-only households have many of the characteristics of households in general. In other words, as is evident from Table 7, the income differentials of these households widen as the ages of household head increase, and they have various income sources, such as the case in which only the husband works and in which both husband and wife work. The fact that the members of these households depend on pension benefits after retirement is the same as the cases of other household categories. In 1997, couple-only households reached 20 percent of the total. But, both the Theil coefficient and the Gini coefficient show that the income differentials of these households narrowed, despite aging from 1988 to 1997[15]. This results from the fact that the income gaps of each age cohort were reduced greatly. However, the problem of differentials should not be over-simplified as there are many elements, and it should also be noted that every element is not acting to widen gaps.

6. Unit of adult couples

In view of the trend in the West an increase in nuclear families and a reduction in family size seems to be unavoidable in the future. It can be imagined that all people will ultimately become independent and earn their own livings after they grow up. There will remain some cases in which adults live with their parents, but here we will examine, as material for considering the issue of income gaps, the situation of income differentials when all of these adults living with their parents are separated from the households of their parents. The basic statistics were prepared as follows: adults (couples) who live with the household head's family are separated from the household head's family and are regarded as maintaining different households, thus reorganizing existing households using adults (couples) as a unit. This method of dividing households according to the unit of adult couples was attempted by Terasaki [2000], and its procedure is as follows[16]:

By definition, "single-member households" and "couple-only households" of the categories for household structure are treated as they are. Those subject to separation are "households of a couple and their unmarried child or children," "households of a parent and his or her child or children," "three-generation households," and "other

households." Adults (couples) were separated from these households according to the following rules:

(1) from "households of a couple and their unmarried child or children" and "households of a parent and his or her child or children," unmarried children aged 20 or over are separated and regarded as maintaining independent households;

(2) all three-generation households are divided into the unit of a couple; they are first divided into parents' households and children's ones;

(3) where the household has no couples, each member is regarded as maintaining a household;

(4) married members of three-generation households are regarded as maintaining independent households even if they are under 20 years of age;

(5) other households are also divided into the unit of a couple; and,

(6) unmarried members under 20 years of age of other households are regarded as belonging to the household head's family.

Here we show the main result. Assume the actual number of households is 100, the number of households after the division is 153 both for 1988 and 1997. A similar trend is also observed in 1992 and 1995. But during

Table 8 Economic Value of Living Together: Equivalent income vs. income by the unit of adult couples (thousand yen)

Type of households by the unit of adults	Household income		Difference in terms of per capita household		Difference in terms of equivalent income (LIS)	
	1988	1997	1988	1997	1988	1997
Households of one person and married couple only	3,560	4,360	-	-	-	-
Households of parents and unmarried children without separated members	5,410	6,870	-	-	-	-
Other households without separated members	3,350	4,010	-	-	-	-
Households of household head for the household of parents with unmarried children to be separated	5,090	6,510	-460	-680	160	120
Households of household head for the three generation family	4,530	5,940	-460	-630	280	440
Households of household head for the other household with separated members	4,270	5,310	-560	-780	110	80
Households of adult children separated from the household of parents with unmarried children	1,320	1,610	710	1,020	2,490	3,270
Households of adult children separated from the three generation family	2,350	3,270	70	340	1,540	2,270
Households of adult children separated from the other households	2,120	2,650	160	350	1,550	2,050
Households of adult grand children separated from the three generation family	1,100	1,510	490	630	2,500	3,210
Households of adult grand children separated from the other households	1,460	1,440	-130	590	900	1,930
Households of parents of household head separated from the three generation family	810	1,170	690	970	2,310	3,280
Households of parents of household head separated from the other households	780	1,030	1,110	1,390	2,520	3,090
Households of parents of household head's spouse separated from the three generation family	760	1,110	820	1,190	2,600	3,590
Households of parents of household head's spouse separated from the other households	740	830	1,250	2,070	2,800	4,200
Households of grand parents separated from the three generation family	460	400	690	1,140	2,090	3,180
Households of grand parents separated from the other households	560	460	1,390	740	2,880	2,290
Households of other members separated from the three generation family	1,730	150	-620	1,420	800	4,060
Households of other members separated from the other households	840	1,220	620	830	2,060	2,500
Total	3,470	4,300	60	110	820	1,080

the decade, the distribution of household structures changed considerably: while single-member households increased by 6 percent and couple-only households by 4 percent, households of parents and unmarried child or children declined by as much as 7 percent. Three-generation households also diminished by 4 percent. On the other hand, the ratio of the households from which adults living together are separated is similar in 1988 (41 percent) and 1997 (40 percent). This is because there was an increase in the ratio of adults living with their parents in households of parents and their unmarried child or children. It is also found that an average income in nominal terms increased by 21 percent during the period from 1988 to 1997.

Table 9 Inequality coefficient of household income by the unit of adult couples

Inequality coefficient		1988		1997
Actual Gini Coefficient		0.3826		0.3954
Actual Theil Coefficient		0.2632		0.2886
Gini Coefficient by the unit of adults		0.4977		0.4865
Theil Coefficient by the unit of adults		0.4573		0.4724
Theil Coefficient between attributes		0.1220		0.1222
Type of households by the unit of adults	Theil coefficient	Explanatory power,%	Theil coefficient	Explanatory power,%
Households of one person and married couple only	0.3770	16.5	0.3456	19.6
Households of parents and unmarried children without separated members	0.1623	10.3	0.1657	7.5
Other households without separated members	0.2219	0.1	0.7858	0.4
Households of household head for the household of parents with unmarried children to be separated	0.3298	11.9	0.3216	13.1
Households of household head for the three generation family	0.3071	9.8	0.3088	8
Households of household head for the other household with separated members	0.3927	3.8	0.3979	4.1
Households of adult children separated from the household of parents with unmarried children	0.6773	8	0.7313	9.1
Households of adult children separated from the three generation family	0.4828	7.2	0.5619	7
Households of adult children separated from the other households	0.5857	1.3	0.6809	1.5
Households of adult grand children separated from the three generation family	1.5350	0	0.7493	0.4
Households of adult grand children separated from the other households	2.1231	0.1	0.7468	0
Households of parents of household head separated from the three generation family	0.8569	2.5	0.7191	0
Households of parents of household head separated from the other households	0.8439	0.6	0.6405	1.9
Households of parents of household head's spouse separated from the three generation family	1.1042	0.5	0.6442	0.6
Households of parents of household head's spouse separated from the other households	1.0377	0.1	0.6054	0.2
Households of grand parents separated from the three generation family	0.8593	0	0.8683	0
Households of grand parents separated from the other households	0.9425	0	0.3920	0
Households of other members separated from the three generation family	0.3655	0	1.9909	0
Households of other members separated from the other households	1.1868	0.8	0.8244	0
Within attributes total		73.3		74.1

Table 8 shows estimated average household income where households are divided according to the unit of adult couples. It indicates that growth of income during these years was similar to that of actual households on the whole. Whereas the income level of households from which no members are separated and that of households from which adult members are separated showed a substantial increase of 27 percent and 26 percent, respectively, the income rise of separated households was not very high. This is especially true for separated households of elderly people, such as "parents separated from three-generation households" and "parents separated from other households." The average income level of these separated households was less than one million yen in 1988 and one million yen or so in 1997, which is insufficient to support a family[17].

The hypothetical household of the separated members allows us to evaluate the economic value of living together. The difference of mean income between the original household and the separated unit of adult couple would imply a monetary value of living together. Table 8 also shows the values measured in terms per capita income and LIS equivalent income. Apparently they find the economic value of significant size in living together with other adult members of family. The value is around one million yen on the average in terms of LIS equivalent income, which is approximately a seventh of the average household income. It amounts to two or three million yen for the separated dependent members[18]. It is also observed that the estimated value would be higher in terms of LIS equivalent income than in terms of per capita income.

Table 9 shows the situation of income differentials for unit households of adult couples thus obtained. Firstly, the Theil coefficient and the Gini coefficient for adult couple households as a whole show somewhat different trends from each other. The latter declines a little, but the former shows the opposite trend. It implies that the trend for income inequality is not clearly directed on the basis of adult couple household, which gives striking contrast with rising inequality of household income distribution. Secondly, income distribution is improved for most of types of households by the unit of adult couple, except for the household of adult children separated from the household of parents with unmarried children and the household of adult children separated from the three generation family[19]. The tendency would coincide with that for the income distribution of the group with specified structure of household and specified age of household head. Thirdly, the comparison of Gini coefficient by the unit of adult couple with the actual one would reveal that income differentials are reduced by as much as 0.1 as a result of the life security function of the household[20]. Again all these observations shows a different picture from the observed rising inequality of income on a household basis

7. Conclusion

This paper has investigated the factors to determine the income distribution in recent Japan and re-examined the causes of rising inequality by using micro data. A detailed statistical work reveals that the main factor of rising inequality is aging and the changes of family structure which are closely related with each other and have the similar relation with heads and tails of the same coin. But when we look at the distribution for the group of specified age of household head and the specified category of family structure, most of it have not been deteriorated. This means that rising inequality is a matter of structural change of household and the changes of age structure. At present it does not seem to originate in such economic factors as introducing performance based wage system. A similar picture for the trend and structure of inequality was given by separating a family into the unit of adult couple. It also allow us to calculate an economic value of living together with other adult family members. The value is estimated at around a seventh of the average household income. Compared with the West, household ratio of the elderly living together with their children has been rather high in Japan, it must have contributed to the social stabilization to some extent. However, considering the tendency in the West, it appears inevitable that a reduction in family size leads to wider income gaps. Besides unemployment rate began to rise significantly in 1997 and after to bring about more unequal distribution. It will give somewhat different picture of income inequality in the twenty-first century. Therefore, more accurate information will be needed about the situation of not only the entire household but also its individual members in order to make correct policy judgments on people's lives.

Notes

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1. For example, see Economic Planning Agency, Bureau of Quality of Life Policy(1999).
2. Furthermore he pointed out that the ratio of single-member households comprising students was estimated higher than the real figure, and suggested that the student households should be excluded. But according to the estimate for income differentials after excluding single-member student households, reductions in differentials caused by excluding students are very small. The value of the Gini coefficient declines by 0.003 in 1988 and by 0.007 in 1997. But, the decrease rate in 1997 is over twice that in 1988, showing some effect of increasing student households among single-member households.
3. The survey covers incomes in the previous year.
4. A similar approach was adopted by Funaoka [2001], who used the data of the "National Survey of Family Income and Expenditure" to analyze changes in the period from 1984 to 1994. This paper examines changes in 1988-1997 using micro data of the "Basic Survey of People's Life."

5 The definitions for these household attributes are as follows. Household business type classifies households by their economic activities such as operating farm, doing business by themselves, or being employed. See the text for further details. Household category divides households into the following four categories; elderly, mother-child, father-child and other households. And household type is classified according to the social insurance program in which a household participates.

6. For further details, see Terasaki [1980]
7. In 1988, there was business types "Farming households," but because these types were integrated into one of the above-mentioned types in 1997, they can no longer be used for comparison.
8. Several decomposition formulas have been proposed and used to express changes in the inequality indicator, but all of them have some remainder terms.
9. Table with this data is omitted.
10. Because the income data of the Basic Survey of People's Life refer to the previous year, the data for employment situation does not coincide.
11. The survey is conducted annually for the workers of the private establishments with ten or more regular employees, by Ministry of Labor and Welfare. But there is a matter to be considered. It is that the unemployment rate was on the rise in 1997, but was not very serious yet. Because the unemployment of household head must clearly widen income differentials, the outcome would be somewhat different if survey data for 2001 are used for the analysis.
12. The table is omitted.
13. They consist of one person households, most of married couple only households and married couple with unmarried children, small part of three generation family and some of other households.
14. The equivalence scale by the LIS (Luxemburg Income Study) method, by which a division is made using the square root of household size, has been widely used. Here we do not attempt this method because it is discussed in another paper of this issue,
15. The Gini coefficient for married couple-only households falls from 0.4083 in 1988 to 0.3842 in 1997.
16. The "Basic Survey of People's Life" provides data an family members' relationships with the household head, their demographic attributes, and income.
17. Because these estimated personal income values might have measurement errors of some size, there would be a need to examine further the situation of employment, health, and other elements in detail.
18. Roughly it would correspond to an initial salary for a university graduate.
19. Here are indicated only for the dominant type of household by the unit of adult couple.
20. It is already stated in Terasaki[2000], but the new data has reconfirmed the similar result.

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