

Understanding the Income Redistribution Effect through using Relative Poverty Measurements (2)*

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III. The Income Redistribution Effect on All Households

As mentioned in Chapter II, the necessary data for the use of relative poverty measurement in this paper are the initial and the redistributed income that appear in the distributional statistics on every income bracket below the poverty line. For the sole purpose of calculating the degree of poverty, it might be said that information about middle and high income brackets are not necessary. But the primary aim of this paper is not only to calculate the degree of poverty, but also to analyze poverty in relation to the entire distribution of income. Therefore, in this section we will try to analyze and examine income redistribution with respect to all households.

So far, the bulk of the statistics on income distribution announced in Japan has been concerned with pretax income. So we need to measure to what degree income redistribution is influenced by taxation and how much increase in income is brought about by redistribution; and measure the effect of redistribution on each type of household, and on each item of expenditure. Unfortunately, we do not have much statistical data about the above issues in

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Japan, hence the need for this report.

The data employed in this paper are *Shakaiiryō oyobi Shotoku Saibunpai Chōsa* (*Social Medical and Income Redistribution Survey*), which was conducted in 1952 and *Shotoku Saibunpai Chōsa* (*Income Redistribution Survey*) in 1962, 1967, 1972, 1975, 1978, 1981, 1984, 1987, 1990, 1993, 1996, 1999, 2002, 2005 and 2008, all of which were conducted by the Ministry of Health and Welfare¹⁾. The concept of the initial income in these surveys consists of employment income, the income from the business activities, the interest income, the dividend income, rent. In redistributed income, the following three elements are reckoned in, i) the direct taxes, such as the income tax, the property tax, ii) social security taxes such as health insurance, pension, iii) long-term benefits such as the accident and sickness benefits, social aid (welfare), in-kind medical care benefits.

In *Shotoku Saibunpai Chōsa* (*Income Redistribution Survey*), in addition to the distributional statistics about each income bracket, the compound ratio of the initial income per decile and that of the income redistributed per decile are shown for ease of comparison along a time series. The shifts of the effect along a time series by these data are shown in Table VI. In the left column, the component ratio of the initial income is indicated; in the middle, that of the income redistributed; in the right, the component ratio of the initial income minus that of the income redistributed; and at the bottom line, the Gini coefficient and Redistribution Effect of Gini coefficient with respect to the entire households are illustrated. Here, Redistribution Effect of Gini coefficient is obtained by the following equation:

$$\text{Redistribution Effect of Gini coefficient} = \frac{\text{Gini coefficient of the initial income} - \text{Gini coefficient of the income redistributed}}{\text{Gini coefficient of the initial income}}$$

It can be taken as an indicator of the redistribution effect as a whole. According to this, although Redistribution Effect of Gini coefficient of 1952 is not calculable due to the fact that the Gini coefficient of the redistributed income was not announced, the propensity of Redistribution Effect of Gini coefficient after 1962 is at the peak in 1967 and shows a remarkable decrease after that, particularly in 1975, although there is an increase in 1981.

The transitions exhibited by decile hierarchy are more complicated: the increase of the component ratio of the redistributed income, concerning the first and the second decile, is mainly due to the increase of the transfer income of social security, etc. Therefore, the decrease of the redistribution effect in these deciles may be taken as a sign considerable

1) On January 6, 2001, this ministry was reorganized into the Ministry of Health, Labour and Welfare.

decrease in the redistribution effect of social security. Specifically, the effect is least in 1952, becomes much larger in 1962 and 1967, and goes down in 1978, to a degree which is comparable to that of 1952.

Next, we will analyze the redistribution effect into the tax system and the social security system and compare the degrees of contribution with each other. Unfortunately, Shotoku Saibunpai Chousa (Income Redistribution Survey) by the Ministry of Health and Welfare does not divide redistribution into tax and social security benefits. But Ishizaki [6] goes back to the original statistics of the survey and makes such an estimate, the result of which is shown in Table VII. Accordingly, we can see that the tenth decile, the highest income bracket, is most influenced by the tax system. By comparison, with regards to the redistribution effect of the social security system, the component ratio of the middle and low income brackets is augmented naturally. Particularly, that of the first and the second deciles is largely augmented, while that of the tenth decile, is not much influenced, compared with the case of tax.²⁾

Finally, let us sketch out the income redistribution effect on each household type by using the Gini coefficient item by item, and preparing them for comparison with the results of the relative poverty measurement in the next chapter. In the business type section in Table VIII, the value 0.5440 of "other households" (the households where the householders are not working, excluding the households of full-time worker, contingent worker, casual worker, self-employed person, and farmers) is highest and the value 0.3195 of the full-time households is lowest. As for the items of expenditure, the public redistribution item shows the largest effect (Redistribution Effect of Gini coefficient = 4.82 %), followed by the item of tax and social insurance premiums and medical expenses (Redistribution Effect of Gini coefficient = 4.21 %). On the other hand, the redistribution item of the private insurance and that of the corporate pension and the retirement allowance show to be unequal (Redistribution Effect of Gini coefficients are -1.4% and -1.1% respectively). In the section of the household by its characteristic, Gini coefficient of the initial income of the households on welfare is highest and the redistribution effect of all the redistribution items of expenditure is highest (Redistribution Effect of Gini coefficient = 25.2%). But again, in the redistribution item of expenditure of the private insurance and the item of the corporate pension and the retirement allowance, the redistribution is not equalized, and what is worse, it shows a greater disparity (Redistribution Effect of Gini coefficients are -0.01% and -0.02% respectively).

2) The social security benefits in Table VII exclude the medical care benefits, so they differ a little from the ones in *Income Redistribution Survey*.

IV. The Evaluation of the Income Redistribution Effect by Means of the Relative Poverty Measurement

The fact made clear through the analyses of the income redistribution effect on the entire households (including the middle and high income brackets) in the preceding chapter can be summarized with the following three points. First, Redistribution Effect of Gini coefficient, on the whole, decreases after its peak in 1972. If we see it in terms of each decile, then increase in income of the first and the second deciles, which are susceptible to influence of transfer income such as social security, etc. shows a large decrease in 1978, putting the case of 1952 aside. Secondly, the influence of income transfer being analyzed into tax and social security, the fact that shifts in the tenth decile, with respect to tax, and those in the first and the second deciles with respect to social security are largely transparent. Finally, by the analysis of each household type, the fact that the Gini coefficient of the households on welfare is highest and that their leveling coefficient is also the highest became clear, which is a fairly natural result.

Taking these facts into consideration, we will use relative poverty measurement and compare various calculations of the income redistribution effect in the low income bracket, and the results analyzed on all the income distribution, in the following order. We will first take as an example the entire households³⁾ of 1978 in order to know what procedure was followed to actually apply relative poverty measurement. Then we also show the time series of Redistribution Effect of Gini coefficients that shows the degree of poverty and its degree of improvement, with respect to the same households as above. Then as in Chapter III, with the data of 1978, we will calculate the poverty degree of both each household type and each item of expenditure, and then make a comparison and examination against the previous chapter.

Specific Examples of Poverty measurement: Table IX is a calculation exemplified by using Sen's measurement where the poverty line is set as 1.27 million yen, which equals the monthly sum of welfare criterion multiplied by 12. We indicated the arithmetic mean of class upper limit and class lower limit as a class median in parentheses in the first column. In doing so, we assumed that the intra-class distribution was uniform in the case where the poverty line should cut inside the class and, accordingly, we proportionally distributed the number of households. The figures in the parentheses in and after the second column are the respective cumulative values. So the poverty range H^B in the initial income is the value obtained by dividing the total, 1,066 in the second column by the number of the entire households, 7,117, and the aggregate gap Q^B of the initial income is the value obtained by dividing the total amount, 55,964 in the seventh column by 135,382, which is the product of the poverty line, 1.27 million yen and the

3) "The entire households" here means that they include all the types of households and does not mean that they also include the middle and high income brackets as meant in Chapter III

number of the households within the poor, 1,066.

Concerning the method of calculating Gini coefficient G within the poor, various devices are employed in order to improve the precision of the method.⁴⁾ In fact, the 1978 edition of the original statistical data *Shotoku Saibunpai Chousa Houkoku* (Income Redistribution Survey Report) displays nineteen divisions of all the income classes, which leads us to expect that G will be easily calculable by the formula for Gini coefficient and that its result will be fairly accurate. But if we limited the range within the low income bracket which is truncated by the poverty line, then the number of classes would be six as in the first column of Table VIII, by which the Gini coefficient would be much underestimated. So taking advantage of the close relation that the Gini coefficient has with the Lorenz curve, we drew directly on the Lorenz diagram, interpolated it freehand, and substituted the area which is measured by a planimeter. A planimeter is widely used in the field of designing, drafting and radiography because it can measure the area of complicated diagrams in relative proportion. It has a measurement error of about four to three decimal places. So it seems that the device is sufficient to find the area demarcated by the Lorenz curve in such a case where the classification is rough. The Lorenz diagram actually used in computation of the Gini coefficient is printed in reduced size at the bottom right under Table IX.

The Trend of the Poverty Degree of the Entire Households: Table X and XI are the results and Redistribution Effect of Gini coefficient by Sen's and Takayama's measurement respectively. Figure II only shows the transitions and the comparison of Redistribution Effect of Gini coefficients. In Figure II, only Redistribution Effect of Gini coefficients are taken up and the transitions of them are shown and compared. Here, there are similarities between the two. At this point, one may find it difficult to say that differences of the axiom system between the two measurements has surfaced. Although P_S appears to reflect the shifts in poverty degree more sensitively, it is not so different.

It is worth noting the following two points concerning the movements of both Redistribution Effect of Gini coefficients. The first point is that although we compare before and after the income redistribution by the social security, etc., Redistribution Effect of Gini coefficient in 1952 records the negative value. Making a comparison between the elements for the purpose of seeking the cause behind this phenomenon, we find that the figures of H , Q and G (before and after) redistribution show the opposite move to that of the other years. As for each element in P_T , μ_z after the redistribution is smaller than the initial income, μ_z . But ϕ and $1-\phi$ hardly change, which means that H , Q and G in P_S which are used in the calculation of P_T have a strong effect.

4) See Chapter 7 : "A New Coordinate System for the Lorenz Curve", in Kakwani [7].

The next characteristic to point out is the fact that Redistribution Effect of Gini coefficient decreased considerably from 1972 to 1975. In order to find out the cause, we calculated the improvement degree of each element in P_S , the result of which is as in Table XII. There, the value of H in 1975, 2.2 % is conspicuously small, compared to the other years. Also, Q , which is somewhat related to H , shows a small value next to 1962. Redistribution Effect of Gini coefficient dropped around 1975 and seems to have been most influenced by H . And the cause of the upturn in Redistribution Effect of Gini coefficient in 1981 should be the high improvement degree of Q and G that more than supplemented the improvement degree of H , 6.8% .

Poverty Degree by the Type of the Household (Table XIII and XIV): First we will examine the column of H . The households that have a high value for it are those of the aged people and those on welfare. Particularly, the households on welfare that include the aged people show 100% for H^B and it only improves by 22 points in H^A . However, the households of the aged people and those on welfare respectively show high improvement ratios, 31.3% and 50% . On the other hand, concerning the other households, the households covered by the national health insurance, those by both the national health insurance and the employee insurance, and those by the employee insurance, there is almost no improvement in H . Generally, the higher the households' level of H is, the higher their improvement ratio tends to be. This tendency also holds true for Q and G : in the case of Q , the households of the aged people improve by 55.7 percentage point from 42.7% to 18.9% and even in the case of the households on welfare including the aged people, the degree of improvement shows 37.4 percentage point. The highest degree of improvement in G is of the single-parent households' followed by the other households'. Regarding the values of P_S and P_T , as in the shifts in the time series of the entire households, P_S displays a little higher value and wide dispersion, but in contrast, Redistribution Effect of Gini coefficient obtained by P_T shows wider dispersion. There, we find that the three types of households: those of the aged, of the single parent and those on welfare, are remarkably superior to others. On the other hand, we cannot help being surprised by the fact that Redistribution Effect of Gini coefficients of the households on welfare including the aged people are 38.7% in P_S and 21.8% in P_T , in spite of the high levels of 100% in H^B and 78% in Q^B . This fact seems to be influenced by the relatively low level of the improvement ratios, 22% for H and 7.5% for G .

Condition of Each Item of Expenditure Redistributed: As is mentioned above, in order for both measurements to calculate Redistribution Effect of Gini coefficient, the information on the initial and the redistributed income as well as subdivision of the low income bracket into many classes is necessary. Additionally, the redistributed income is necessary to be arranged

by each item of expenditure. But unfortunately, we do not find such available data in *Shotoku Saibunpai Chousa Houkoku* (Income Redistribution Survey Report) or in any other income distribution statistics. So in this section we will substitute the average amount of money of the initial income per household and the redistribution coefficient which are investigated, case by case, in *Shotoku Saibunpai Chousa Houkoku* (Income Redistribution Survey Report). Data for each case is presented in Table XV. According to it, the redistributed income comes to run below the initial income for the first time within 2.8-3.2 million-yen class in Case I, within 1.2-1.4 million-yen class in Case II, and within 0.4 million-yen class, which is the lowest income class, in Case III. As for the redistribution function of public distribution in Case I, the benefits operate predominantly up to a rather high 2.4-2.8 million-yen class. In Case II, the remittance-receiving effect is nullified at a relatively low level where the initial income is less than 1.2 million yen. In Case III one may say that the redistribution effect is canceled on the whole. Concentrating only on the classes with the initial income that is less than 0.4 million yen, we find the redistribution effect approximately three times as high as the initial income in Case I, and more than four times as high as the initial income in Case V, which means there is a large effect of redistribution on the low income bracket.

Finally, let us compare the shifts of Redistribution Effect of Gini coefficient obtained by using the Gini coefficient concerning the whole income distribution, and those obtained by using the two measurements, P_S and P_T . (see Figure II). With respect to the data of 1952, the Gini coefficient of the redistributed income is not announced so its leveling coefficient is not calculable. As a tendency after 1962, Redistribution Effect of Gini coefficient largely goes down after 1975 (particularly in 1978). This again proves to show that P_S and P_T have close relation with the redistribution effect on all. Judging from the fact that its level is high in general and that its oscillation is great, the influence of H , Q and G (especially H) turns out to be strong.

Conclusion

In this paper we have measured and analyzed the income redistribution effect on the low income bracket in Japanese society, while paying attention to the statistical problem mentioned in Chapter I, with making recourse to Sen's (P_S) and Takayama's (P_T) measurements which are representative of the relative poverty measurements based on the axiomatic system of the Gini coefficient that have often been proposed since the latter half of 1970's. The intensity of poverty on which P_S and P_T base being derived from the recognition that, at least in the developed countries, poverty should be captured relatively. We examined in Chapter II the poverty line which is the basis for calculating H which probably has the strongest effect on both measurements. In order to pursue the relativity, we attempted to take as the poverty

line the value whose ratio to the consumer spending concerning the household in general is constant. Then we compared it with a similar trial calculation done in Britain, the result of which was consequently examined.

In Chapter III after the brief explanation for P_S and P_T in the first half, the income redistribution effect on the entire income distribution was examined in the latter half. As a result, Redistribution Effect of Gini coefficient was computed in preparation for Chapter IV. Furthermore, the redistribution effect on each decile being presented, we saw that its tendency generally went downward. Then we analyzed its effect into each item of expenditure redistributed and each type of household, and compared each of them with others.

Chapter IV is the core of this paper, where on the basis of the results of Chapter II and III, the specific methods of calculating P_S and P_T were shown, with a way of finding the Gini coefficient being devised in the case where the classification is rough. Then with respect to both measurements, P_S and P_T , the poverty degree of 1952 and after were calculated and each leveling coefficient was obtained. However, there was not a large difference between the values found by both of the measurements. Concerning each improvement degree of H , Q and G , analyses were made as to which element has the most influence on Redistribution Effect of Gini coefficients of both measurements. Lastly, in comparison with Chapter III, the type of household and the item of expenditure were considered separately.

The remaining problems and the issues open to question will be summarized as follows: i) the relative poverty line which conforms to the idea of the relative poverty measurement should be established, ii) further economic study needs to be considered in regard to the fact that Redistribution Effect of Gini coefficient of the low income bracket in 1952 recorded the negative value, iii) in order to see the redistribution effect with using the poverty measurement by each item of expenditure, the location of the relevant statistical data should be confirmed.

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Table VI The shifts in the income component ratio and the leveling coefficient (decile hierarchy)

Income hierar-chy	The initial income													
	1952	1962	1967	1972	1975	1978	1981	1984	1987	1990	1993	1996	1999	2002
First decile	2.5	1.7	1.7	2.1	1.5	1.8	1.2	0.5	0.2	0.0	0.0	0.0	0.0	0.0
Second	4.5	3.6	3.8	4.0	3.4	3.8	3.9	2.9	2.5	1.8	1.7	1.4	0.8	0.3
Third	5.9	4.9	5.2	5.4	5.0	5.3	5.6	4.8	4.7	4.2	4.0	3.9	3.1	2.3
Fourth	7.0	6.1	6.3	6.6	6.4	6.5	6.9	6.5	6.4	6.1	5.9	5.9	5.4	4.7
Fifth	7.9	7.4	7.6	7.8	7.9	7.7	8.1	7.9	7.9	7.7	7.6	7.7	7.5	7.0
Sixth	9.2	8.7	8.9	9.1	9.3	8.9	9.4	9.4	9.4	9.3	9.4	9.5	9.3	9.1
Seventh	10.7	10.3	10.4	10.5	10.8	10.4	10.8	11.0	11.1	11.1	11.2	11.4	11.3	11.6
Eighth	12.5	12.3	12.3	12.3	12.8	12.3	12.8	12.8	13.3	13.4	13.6	13.7	13.9	14.5
Ninth	15.4	15.5	15.6	15.6	15.9	15.2	15.6	15.8	16.4	16.7	17.1	17.2	17.5	18.7
Tenth	24.4	29.5	28.2	27.0	27.0	28.0	25.7	28.4	27.9	29.7	29.5	29.3	31.3	31.7
Gini coefficient	0.3334	0.3904	0.3749	0.3538	0.3747	0.3652	0.3515	0.3975	0.4049	0.4334	0.4394	0.4412	0.4720	0.4983

Income hierar-chy	The redistributed income													
	1952	1962	1967	1972	1975	1978	1981	1984	1987	1990	1993	1996	1999	2002
First decile	2.8	3.1	3.1	2.9	2.6	2.4	2.6	2.2	2.3	1.6	1.7	1.8	1.4	1.7
Second	4.5	4.1	4.4	4.7	4.1	4.2	4.5	4.0	4.1	3.6	3.6	3.7	3.4	3.4
Third	5.9	5.4	5.6	5.8	5.5	5.6	5.8	5.4	5.4	5.1	5.1	5.1	4.9	4.8
Fourth	7.1	6.3	6.6	7.0	6.8	6.8	7.0	6.7	6.6	6.4	6.4	6.4	6.3	6.1
Fifth	8.3	7.6	7.9	8.0	8.0	7.9	8.1	7.9	7.9	7.8	7.7	7.8	7.6	7.4
Sixth	9.3	8.9	9.0	9.2	9.3	9.1	9.2	9.2	9.2	9.2	9.2	9.2	9.0	8.9
Seventh	10.8	10.3	10.5	10.5	10.7	10.4	10.7	10.7	10.8	10.8	10.8	10.8	10.7	10.7
Eighth	12.4	12.2	12.0	12.2	12.6	12.3	12.5	12.5	12.7	12.9	13.0	12.8	12.7	12.9
Ninth	15.0	15.0	15.1	14.8	15.3	15.1	15.3	15.3	15.6	15.9	16.0	15.8	15.8	16.3
Tenth	23.9	27.1	25.8	24.9	24.9	26.3	24.4	26.1	25.4	26.6	26.5	26.5	28.2	27.9
Gini coefficient	--	0.3442	0.3276	0.3136	0.3455	0.3476	0.3177	0.3426	0.3382	0.3643	0.3645	0.3606	0.3814	0.3812

Income hierarchy	the shifts of the income component ratio by redistribution													
	1952	1962	1967	1972	1975	1978	1981	1984	1987	1990	1993	1996	1999	2002
First decile	+0.3	+1.4	+1.4	+0.8	+1.1	+0.8	+1.4	+1.7	+2.1	+1.6	+1.7	+1.8	+1.4	+1.7
Second	0	+0.5	+0.6	+0.7	+0.7	+0.4	+0.6	+1.1	+1.6	+1.8	+1.9	+2.3	+2.6	+3.1
Third	0	+0.5	+0.4	+0.4	+0.5	+0.3	+0.2	+0.6	+0.7	+0.9	+1.1	+1.2	+1.8	+2.5
Fourth	+0.1	+0.2	+0.3	+0.4	+0.4	+0.3	+0.1	+0.2	+0.2	+0.3	+0.5	+0.5	+0.9	+1.4
Fifth	+0.4	+0.2	+0.3	+0.2	+0.1	+0.3	0	0	0	+0.1	+0.1	+0.1	+0.1	+0.4
Sixth	+0.1	+0.2	+0.1	+0.1	0	+0.2	-0.2	-0.2	-0.2	-0.1	-0.2	-0.3	-0.3	-0.2
Seventh	+0.1	0	+0.1	0	-0.1	0	-0.1	-0.3	-0.3	-0.3	-0.4	-0.6	-0.6	-0.9
Eighth	-0.1	-0.1	-0.3	-0.1	-0.2	0	-0.3	-0.3	-0.6	-0.5	-0.6	-0.9	-1.2	-1.6
Ninth	-0.4	-0.5	-0.5	-0.3	-0.6	-0.1	-0.3	-0.5	-0.8	-0.8	-1.1	-1.4	-1.7	-2.4
Tenth	-0.5	-2.4	-2.4	-2.1	-2.1	-1.7	-1.3	-2.3	-2.5	-3.1	-3.0	-2.8	-3.1	-3.8
Gini coefficient	--	-0.0462	-0.0473	-0.0402	-0.0292	-0.0176	-0.0338	-0.0549	-0.0667	-0.0691	-0.0749	-0.0806	-0.0906	-0.1171
The redistribution effect	--	11.83	12.62	11.36	7.79	4.82	9.62	13.8	16.5	15.9	17.0	18.3	19.2	23.5

Note; The data are compiled from Shakaïryou oyobi Shotoku Saibunpai Chousa Houkoku (Social Medicine and Income Redistribution Survey Report) [12] for 1952 and from Shotoku Saibunpai Chousa Houkoku (Income Redistribution Survey Report) [13] for 1962~.

Table VII Shifts of decile component ratio for the initial income, after-tax income and the social security benefits.

(%)

Income hierarchy	The initial income	After-tax income	Shifts of component ratio by tax	After-tax income + social security benefits (without the medical care benefits)	The shifts of the component ratio by the social security benefits	The redistribution effect of tax and the social security
First decile	1.6	1.7	0.1	2.9	1.2	1.3
Second	3.9	4.1	0.2	4.5	0.4	0.6
Third	5.3	5.5	0.2	5.6	0.1	0.3
Fourth	6.2	6.7	0.5	6.8	0.1	0.6
Fifth	8.0	8.2	0.2	8.1	Δ0.1	0.1
Sixth	9.2	9.5	0.3	9.2	Δ0.3	0.0
Seventh	10.6	10.5	Δ0.1	10.2	Δ0.3	Δ0.4
Eighth	12.6	12.7	0.1	12.3	Δ0.4	Δ0.3
Ninth	15.2	15.6	0.4	15.1	Δ0.5	Δ0.1
Tenth	27.4	25.5	Δ1.9	25.4	Δ0.1	Δ2.0

(Note) Social security tax is not deducted from the social security benefits but the (in-kind) medical care benefits are. This is done for ease of international comparison.

(Source) Cited from Ishizaki, T. (1983) *Nippon no Shotoku to Tomi no Bunpai (Distribution of Income and Wealth in Japan)*, p.131, Toyo Keizai Shinpousha (Toyo Economic Newspapers).

Table VIII The shifts in the Gini coefficient and the redistribution effect by each item of expenditure and household type

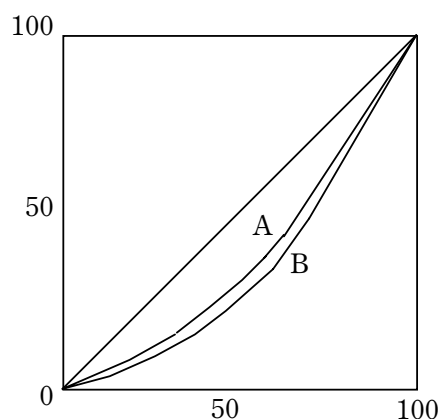
Household characteristics	The initial Income	All items of expenditure redistributed	Public item of expenditure redistributed	Tax, social security tax, medical expenses	The item of expenditure redistributed for private insurance coverage	Corporate pension, retirement allowance	Public pension	Social insurance premium, medical expense
The total	0.3685	0.3476 (5.7)	0.3396 (7.8)	0.3503 (4.9)	0.3738 (-1.4)	0.3726 (-1.1)	0.3647 (1.0)	0.3639 (1.2)
Households of fulltime worker	0.3195	0.3052 (4.5)	0.2994 (6.3)	0.3027 (5.3)	0.2335 (26.9)	0.3228 (-1.0)	0.3191 (0.1)	0.3176 (0.6)
Contingent worker	0.3525	0.3660 (-3.8)	0.3692 (-4.7)	0.3892 (-10.4)	0.3571 (-1.3)	0.3494 (0.9)	0.3368 (4.5)	0.3917 (-11.1)
Casual worker	0.3458	0.3430 (0.8)	0.3447 (0.3)	0.3592 (-3.9)	0.3476 (-0.5)	0.3458 (0)	0.3326 (3.8)	0.3636 (-5.1)
Selfemployed person	0.4542	0.4278 (5.8)	0.4165 (8.3)	0.4302 (5.9)	0.4630 (-1.9)	0.4560 (-0.4)	0.4509 (0.7)	0.4468 (1.6)
The other households	0.5440	0.4624 (15.0)	0.4592 (15.6)	0.5173 (4.9)	0.5515 (-5.4)	0.5737 (-1.4)	0.5173 (4.9)	0.5254 (3.4)
Farming households	0.3407	0.3398 (0.3)	0.3212 (0.3)	0.3334 (2.1)	0.3512 (-1.7)	0.3464 (1.5)	0.3356 (1.5)	0.3408 (0)
Below 30 years old	0.3387	0.3180 (6.1)	0.3338 (1.4)	0.3346 (1.2)	0.3418 (0.9)	0.3382 (0.1)	0.3406 (-0.6)	0.3420 (-1.0)
30-39	0.2817	0.2675 (5.0)	0.2660 (5.6)	0.2688 (4.6)	0.2865 (1.7)	0.2812 (0.2)	0.2836 (-0.7)	0.2787 (1.1)
40-49	0.3184	0.3071 (3.5)	0.2983 (6.3)	0.3014 (5.3)	0.3252 (-2.1)	0.3917 (-0.4)	0.3184 (0)	0.3153 (1.0)
50-59	0.3872	0.3771 (2.6)	0.3610 (6.8)	0.3665 (5.3)	0.3936 (-1.7)	0.3197 (-0.2)	0.3879 (-0.2)	0.3825 (1.2)
60-69	0.4385	0.3907 (10.9)	0.3706 (15.5)	0.4112 (6.2)	0.4449 (-1.5)	0.4513 (5.1)	0.4161 (3.2)	0.4244 (3.2)
Above 70	0.4889	0.3935 (19.5)	0.3994 (18.3)	0.4577 (6.4)	0.4908 (-0.4)	0.4890 (5.7)	0.4608 (5.7)	0.4622 (5.5)
Households on welfare	0.5803	0.4339 (25.2)	0.4374 (24.6)	0.5430 (6.4)	0.5806 (-0.1)	0.5817 (4.9)	0.5518 (6.4)	0.5429 (6.4)
Covered by national health insurance	0.4284	0.3956 (7.7)	0.3903 (8.9)	0.4087 (4.6)	0.4371 (-2.0)	0.4299 (1.8)	0.4207 (1.8)	0.4239 (1.1)
Covered by the employee insurance	0.3144	0.3031 (3.6)	0.2950 (6.2)	0.2980 (5.2)	0.3171 (-0.9)	0.3200 (-1.8)	0.3147 (-0.1)	0.3133 (0.3)
Covered by the national health insurance and the employee insurance	0.3132	0.3072 (1.9)	0.2961 (5.5)	0.3046 (2.7)	0.3195 (-2.0)	0.3173 (1.3)	0.3082 (1.6)	0.3122 (0.6)
The other households	0.4124	0.4236 (-2.7)	0.3731 (9.5)	0.3780 (8.3)	0.4044 (1.9)	0.4557 (-10.5)	0.4028 (2.3)	0.4156 (-0.8)

Note : All the figures in parentheses indicate the redistribution effect. The data are compiled from *Shakairyou oyobi Shotoku Saibunpai Chousa Houkou* (Social Medicine and Income Redistribution Survey Report) [12] for 1952, and from *Shotoku Saibunpai Chousa Houkou* (Income Redistribution Survey Report) [13] for 1962~.

Table IX Example of the poverty measurement

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Classification by the initial income (median) (10,000 yen)	The number of households in (1) (component ratio)	The number of households after redistribution (component ratio)	(1)×(2) (component ratio)	(1)×(3) (component ratio)	Median of 127-(1)	(6)×(2)	(6)×(3)
0~40 (20)	20.3 (19.0)	86 (9.3)	4,060 (5.1)	1,720 (2.2)	107	21,721	9,202
40~60 (50)	141 (13.2)	130 (14.1)	7,050 (8.9)	6,500 (8.5)	77	10,857	10,010
60~80 (70)	206 (19.3)	170 (18.4)	14,420 (18.2)	11,900 (15.5)	57	11,742	9,690
80~100 (90)	206 (19.3)	184 (20.0)	18,540 (23.3)	16,560 (21.6)	37	7,622	6,808
100~120 (110)	214 (20.2)	253 (27.4)	23,540 (29.6)	27,830 (36.3)	17	3,638	4,301
120~126 (123)	96 (9.0)	99 (10.8)	11,800 (14.9)	12,177 (15.9)	4	384	396
All households 7,117	1,066	922	79,410	76,687	--	55,964	40,407

	Results
z	127 (10,000) (yearly amount)
H^B	15.0(%)
H^A	13.0(%)
Q^B	41.3(%)
Q^A	34.5(%)
G^B	0.27
G^A	0.21
P_s^B	0.086
P_s^A	0.063
Redistribution effect	26.7(%)



Lorenz diagram (Within the poor)

$$P_s^B = .15[0.413 + (0.587) \times 0.27] = \underline{0.086}$$

$$P_s^A = 0.13]0.345 + (0.655) \times 0.21 = \underline{0.063}$$

$$\text{Redistribution effect} = \frac{P_s^B - P_s^A}{P_s^B} = \underline{26.7(\%)}$$

Table X The trend of the poverty of the entire households. (by Sen's measurement)

Results	z	H^B	H^A	Q^B	Q^A	G^B	G^A	P_S^B	P_S^A	Redistribution Effect of Gini coefficient
Fiscal year	Yearly amount (1,000 yen)									
1952	8.6	9.8%	11.5%	33.8%	34.2%	0.18	0.22	0.048	0.056	-24.4%
1962	15.0	12.9	12.2	57.8	56.4	0.38	0.25	0.096	0.080	16.7
1967	28.0	13.1	11.2	41.7	33.9	0.31	0.20	0.078	0.053	32.1
1972	53.0	12.7	11.8	39.7	32.2	0.29	0.19	0.073	0.053	27.4
1975	90.0	17.9	17.5	43.5	38.0	0.37	0.24	0.115	0.093	19.1
1978	127.0	15.0	13.0	41.3	34.5	0.27	0.21	0.086	0.063	26.7
1981	162.0	16.1	15.0	48.6	32.0	0.34	0.19	0.106	0.067	36.8
1984	184 (0.43)	21.8	17.8	52.6	34.5	0.38	0.24	0.154	0.089	42.2
1987	155 (0.33)	18.0	9.6	59.5	33.7	0.43	0.21	0.138	0.046	66.7
1990	164 (0.32)	20.0	12.1	63.8	41.1	0.42	0.19	0.158	0.063	60.1
1993	180 (0.30)	20.3	11.6	64.2	37.9	0.48	0.23	0.165	0.061	63.0
1996	189 (0.31)	21.3	11.0	66.5	37.1	0.45	0.24	0.174	0.057	67.2
1999	197 (0.34)	26.3	14.1	66.2	39.6	0.56	0.32	0.224	0.083	62.9
2002	197 (0.38)	31.6	15.5	67.1	35.9	0.48	0.22	0.264	0.078	70.5

Note:

Superscripts, B, A indicate before and after redistribution, respectively.

Here, the redistributed income is equal to the initial income - (tax + social security insurance premiums (tax)) + social security benefits.

In the social security benefits, the survey was conducted about the conditions during the period before the day of the survey with respect to the benefits of money and other articles by each system. For the in-kind medical care benefits, the state of affairs concerning the medical treatments for one month's for each year was researched. The benefit amount was estimated on the basis of the results.

Table XI The trend of the poverty degree of the entire households.(by Takayama's measurement)

Results	μ^B	μ^A	μ_z^B	μ_z^A	ϕ^B	ϕ^A	$1 - \phi^B$	$1 - \phi^A$	P_T^B	P_T^A	Redistribution Effect of Gini coefficient
1952	24.6	24.5	4.8	4.7	0.019	0.022	0.981	0.978	0.0329	0.0389	-18.2%
1962	43.4	43.2	9.0	9.6	0.0268	0.0271	0.973	0.973	0.0739	0.0678	8.25%
1967	117.6	117.6	16.3	18.5	0.0182	0.0176	0.982	0.982	0.0544	0.0377	30.7%
1972	135.9	131.7	31.9	36.0	0.0298	0.0322	0.970	0.968	0.0501	0.0374	25.4%
1975	228.6	215.8	50.9	55.8	0.0399	0.0453	0.960	0.955	0.0778	0.0654	15.9%
1978	328.0	320.7	74.7	83.4	0.0342	0.0338	0.958	0.966	0.0607	0.0443	27.0%
1981	419.8	415.7	74.5	83.2	0.0266	0.0338	0.958	0.966	0.0562	0.0378	32.7%

Note: μ indicate the average income in the entire income distribution and μ_z the one in the poor. Regarding the values, G and Q , which are necessary for calculating P_T , the values in P_S were employed.

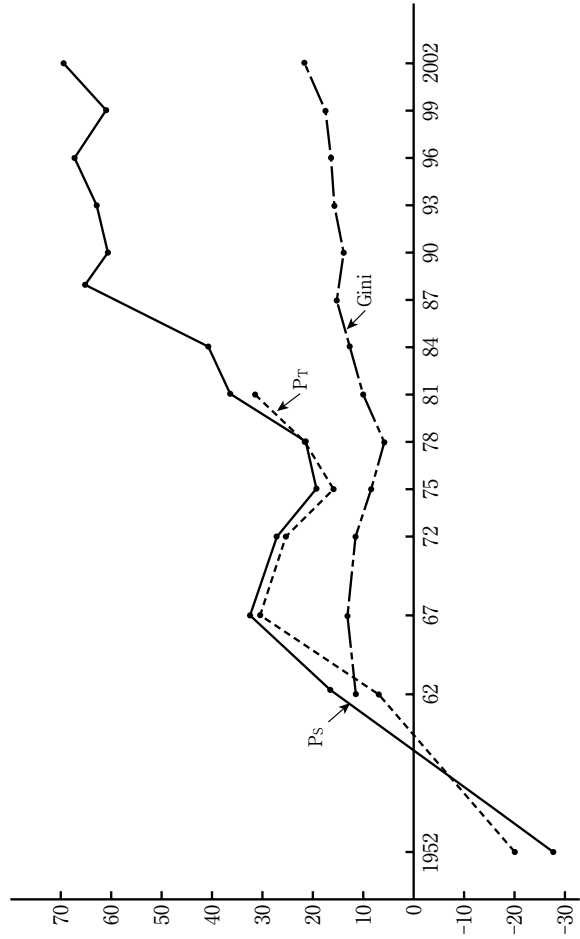


Figure II Shifts in the Redistribution Effect by both measurements.

Table XII The improvement degree of each element in P_s .

Element	$H(\%)$	$Q(\%)$	$G(\%)$
1952	-17.3	-1.2	-22.2
1962	5.4	2.4	34.2
1967	14.5	18.7	35.5
1972	7.6	18.9	34.5
1975	-2.2	12.6	35.1
1978	13.3	16.5	22.2
1981	6.8	34.2	44.2
1984	18.3	34.4	36.8
1987	46.7	43.4	51.2
1990	39.5	35.6	54.6
1993	42.9	41.0	52.1
1996	48.4	44.2	46.7
1999	46.4	40.2	42.9
2002	50.9	46.5	54.2

Note: The improvement degree meant here is: the initial income of each element minus the redistributed income which, in turn, divided by the initial income. Therefore, the same procedure as in the case of the leveling coefficient is followed. But in order to differentiate it from that of P_s and P_T , we use the term.

Table XIII The poverty degree by the type of household (by Sen's measurement)

	z	H^p	H^A	Q^p	Q^A	G^B	G^A	P_S^B	P_S^A	Redistribution Effect of Gini coefficient
The aged household	(yearly amount (mill. yen)) 1.27	% 69.6	% 47.8	% 42.7	% 18.9	0.36	0.24	0.441	0.183	% 58.5
(The households covered by the national health insurance and the employee insurance	1.27	8.16	7.67	34.3	30.6	0.22	0.17	0.0398	0.0325	18.3
By the national health insurance	1.27	29.8	28.8	41.6	34.6	0.26	0.21	0.169	0.139	17.8
By the employee insurance	1.27	6.4	6.2	37.4	27.1	0.29	0.16	0.0356	0.024	32.6
The single-parent households	1.27	57.5	42.5	27.4	14.4	0.35	0.21	0.304	0.138	54.6
The households on welfare (Case V: All the redistributed income)	1.27	73.8	36.9	65.4	45.1	0.39	0.24	0.582	0.215	63.1
The households on welfare (including the aged)	1.27	100	78.0	71.1	44.5	0.40	0.37	0.827	0.507	38.7
The other households	1.27	39.2	39.2	42.3	36.1	0.31	0.20	0.236	0.192	18.6

Note: Case V is one type of the redistributed income obtained by the following formula, by which we may see the overall distribution effect:

$$\begin{aligned} & \left[\begin{array}{l} \text{Tax} \\ \text{Social insurance premiums} \\ \text{Remittance sent} \\ \text{Corporate pension premiums} \\ \text{Nonlife insurance premiums} \\ \text{Life insurance premiums} \end{array} \right] + \left[\begin{array}{l} \text{Medical care benefits} \\ \text{Retirement allowance} \\ \text{Corporate pension} \\ \text{Nonlife insurance money} \\ \text{Contribution-paid pension} \\ \text{Welfare pension} \cdot \text{pension} \end{array} \right] \\ & \left[\begin{array}{l} \text{Benefits by the Livelihood Protection Law} \\ \text{Other social security benefits} \\ \text{In-kind benefits} \end{array} \right] \end{aligned}$$

The initial income -

Table XIV The poverty degree by the type of household (by Takayama's measurement)

	μ^B	μ^A	μ_z^B	μ_z^A	ϕ^B	ϕ^A	$1 - \phi^B$	$1 - \phi^A$	P_T^B	P_T^A	Redistribution Effect of Gini coefficient
The aged household	132.1	193.7	47.9	76.8	0.252	0.190	0.748	0.810	0.285	0.095	66.7%
(The households covered by the) national health insurance and the employee insurance	348.2	325.6	83.5	88.1	0.020	0.021	0.980	0.979	0.028	0.023	17.9%
By the national health insurance	226.8	225.1	74.1	83.1	0.097	0.106	0.903	0.894	0.119	0.095	20.2%
By the employee insurance	364.8	338.4	79.5	92.6	0.014	0.017	0.986	0.983	0.024	0.017	29.2%
The single-parent households	135.6	164.1	66.6	84.1	0.282	0.218	0.718	0.782	0.170	0.067	60.6%
The households on welfare (Case V: All the redistributed income)	101.4	208.0	44.0	69.7	0.320	0.124	0.680	0.876	0.420	0.157	62.6%
The households on welfare (including the aged)	36.7	73.3	36.7	54.3	1	0.578	0	0.422	0.400	0.313	21.8%
The other households	180.6	179.8	73.3	81.2	0.159	0.177	0.841	0.823	0.159	0.130	18.2%

Table XV The average initial income amount per class per household, etc.

The initial income class	The number of house-holds	The average number of house-holds	The average number of people working	The average initial income (mill.)	The redistributed income (100 yen)					The redistribution coefficient (%)				
					Case I	Case II	Case III	Case IV	Case V	Case I	Case II	Case III	Case IV	Case V
The total below 0.4 mill. yen	7,117	3.7	1.8	32,803.9	23,067.7	32,676.1	32,082.6	31,954.7	31,212.8	-2.2	-0.4	-2.2	-2.6	-4.9
0.4-0.6	203	1.8	0.7	2,109.4	8,664.0	3,853.7	2,553.2	4,297.5	10,846.3	310.7	82.7	21.0	103.7	414.2
0.6-0.8	141	2.2	1.2	4,867.4	8,624.1	5,419.9	4,572.3	5,124.7	8,877.3	77.2	11.4	-6.1	5.3	82.4
0.8-1	206	2.6	1.4	6,823.8	11,561.7	7,349.5	6,645.1	7,170.9	11,905.8	69.4	7.7	-2.6	5.1	74.5
1-1.2	206	2.9	1.5	8,883.0	12,472.3	9,019.9	8,845.1	8,982.0	12,561.7	40.4	1.5	-0.4	1.1	41.4
1.2-1.4	214	2.9	1.5	10,929.9	13,095.3	11,114.5	10,726.2	10,910.7	13,069.6	19.8	1.7	-1.9	-0.2	19.6
1.4-1.6	275	3.2	1.6	12,742.5	14,863.6	12,685.5	12,316.7	12,259.6	14,374.9	16.6	-0.4	-3.3	-3.8	12.8
1.6-1.8	285	3.3	1.6	14,942.8	16,755.4	14,898.9	14,257.2	14,213.0	16,018.6	12.1	-0.3	-4.6	-4.9	7.2
1.8-2	316	3.4	1.6	16,870.9	18,983.5	16,789.9	16,553.2	16,472.2	18,578.2	12.5	-0.5	-1.9	-2.4	10.1
2-2.4	366	3.4	1.7	18,797.0	20,156.3	18,724.6	17,936.9	17,863.9	19,222.1	7.2	-0.4	-4.6	-5.0	2.3
2.4-2.8	687	3.7	1.8	21,866.4	22,465.6	21,701.5	21,666.4	21,501.7	22,095.6	2.7	-0.8	-0.9	-1.7	1.0
2.8-3.2	704	3.7	1.7	25,890.6	25,891.1	25,722.0	25,223.0	25,054.3	25,047.7	0.0	-0.7	-2.6	-3.2	-3.3
3.2-3.6	612	3.9	1.7	29,787.4	29,577.0	29,716.5	28,621.6	28,550.7	28,333.5	-0.7	-0.2	-3.9	-4.2	-4.8
3.6-4	560	3.9	1.8	33,903.4	32,953.8	33,617.5	32,649.6	32,363.8	31,410.2	-2.8	-0.8	-3.7	-4.5	-7.4
4-5	432	4.0	2.0	37,813.4	36,669.7	37,548.8	36,633.1	36,368.8	35,219.2	-3.0	-0.7	-3.1	-3.8	-6.9
5-6	802	4.1	2.0	44,380.9	42,295.5	44,018.8	43,483.8	43,121.6	41,031.5	-4.7	-0.8	-2.0	-2.8	-7.5
6-7	456	4.2	2.2	54,509.4	50,907.9	53,971.1	52,939.0	52,400.7	48,791.0	-6.6	-1.0	-2.9	-3.9	-10.5
over 7 mill. yen	249	4.5	2.4	64,272.7	58,561.8	63,761.8	64,137.3	63,626.9	57,913.3	-8.9	-0.8	-0.2	-1.0	-9.9
	403	4.4	2.3	108,060.0	93,012.4	107,504.0	107,156.8	106,600.0	91,543.7	-13.9	-0.5	-0.8	-1.4	-15.3