The Factors of Income Inequality and the Coordination between Income Distribution Policy and Social Security

Yoshihiro KANEKO*

Abstract   Recently social security reform in Japan has advanced so that the relationship between its cost and benefits would be adjusted to satisfy the intergenerational equity in the rapid aging of the Japanese society. However, as several empirical studies on Japanese income distribution revealed that the expansion of income inequality has occurred since the latter half of 1980s, we re-recognized the importance of the income redistribution policy in the social security system.

In this paper, we investigate the influence of the cost and the benefits of social security by decomposing the Gini coefficient into those of total earnings, the redistributed income, taxes, social security contributions and social security benefits. Although the social security plays a role of income redistribution compared with the distribution of total earnings, the relative Gini coefficient of pension benefits and medical services tend to be larger than that of total earnings. Furthermore, the estimated result of social insurance contribution rate function suggested that it does not have any progressive structure like the individual income tax. Hence, we should reconsider the structure of cost and benefits of social security and the role of income redistribution policy so that we can achieve for the coordination between intergenerational equity and intragenerational equity in our social security system.

1. Introduction

Recently in Japan a variety of social security reforms that place a premium on the notion of intergenerational fairness have been advanced. In the pension reform in 1999, the government approved legislation that will affect a 5% reduction of the pension benefit for a typical recipient, whose insured period is 40 years, and also reduce the final rate of contribution from 34% to 26.5%. Moreover, since the health system for the elderly is financed by government subsidy and the contributions of Blue Cross, in order to manage the burden on the government and Blue Cross, the co-payment paid by the elderly has been increased every two years since 1994. It is expected that this increase in the co-payment acts to decrease the demand for medical treatment on the part of senior citizens and thus forestall the need for further increases in Blue Cross premiums to finance the contributions of Blue Cross toward the health system for the elderly.

---

*   Senior Researcher, National Institute of Population and Social Security Research.

However, the purpose of social security should include not only the achievement of equity between generations, but also the correction of extreme income inequality and an assurance of income protection for the poor. In the income redistribution policy by which the inequality of income distribution is corrected, there is a progressive tax system, contribution rates that exempt low-income insured persons, and public assistance financed by government expenditure, etc. The reason why we should now take into account not only equity between the generations but also equity in terms of income distribution is, as a lot of Japanese economists have pointed out, the expansion of income inequality that has occurred since the latter half of the 1980s. It has been said that, after economic growth, income inequality in Japan had been slight up until now according to Kuznets's reverse-U shaped income distribution hypothesis. However, Tachibanaki (1998) made a comparison between the income distribution of Japan and that of the United States for the period from the 1980s to the first half of the 1990s which suggested that the magnitude of income inequality in Japan was as advanced as that of the United States. The recent trend of expanded income inequality in Japan is confirmed by the research of Otake (1997) and Ooishi (1999) who compared the Gini coefficient of income based on time series data from the "Family Expenditure Survey," "Survey of Employment Structure and Working Status," and "Basic Survey of Life Conditions and Welfare." In particular, Ooishi (1999) noted that the measure of income used in Tachibanaki was not necessarily common between Japan and the United States, and argued that the magnitude of income inequality in Japan was smaller than that of the United States. Moreover, by using data from the "National Consumption Survey," Otake and Saitou (1998) clarified that the recent expansion of inequality in consumption was decomposed by the effect of aging in each cohort and the cohort inherent effect that the inequality of one generation is bypassed by the next generation through the inheritance, etc. Furthermore, both Iwamoto (1999), using data from the "Basic Survey of Life Conditions and Welfare" from 1989 to 1995, and Otake and Saitou (1999), drawing on data from the "Income Redistribution Survey" of 1981 and 1993, confirmed that income inequality has expanded due to the combined effects of aging in each cohort and the cohort inherent effect as Otake and Saitou (1998) mentioned with regard to consumption distribution.

In the wake of these empirical studies, the Ministry of Health and Welfare (MHW) realized the importance of informing citizens about the recent expansion of inequality in income distribution and the role of income redistribution. But the government position toward income redistribution policy seems to be contradictory. The MHW presented Table 1 in the 1999 White Paper on Health and Welfare. The White Paper's authors highlighted the fact that the Gini coefficient of public redistributed income was smaller than that of household

Table 1 The recent trends of Gini coefficients of household income
(total earnings) and the public redistributed income

	Initial income	Income after redistribution		Income after redistribution through taxation		Income after redistribution through the social security systems	
	Gini coefficient	Gini coefficient	Improved by (percentage)	Gini coefficient	Improved by (percentage)	Gini coefficient	Improved by (percentage)
1981	0.3491	0.3143	10.00%	0.3301	5.40%	0.3317	5.00%
1984	0.3975	0.3426	13.80%	0.3824	3.80%	0.3584	9.80%
1987	0.4049	0.3382	16.50%	0.3879	4.20%	0.3564	12.00%
1990	0.4334	0.3643	15.90%	0.4207	2.90%	0.3791	12.50%
1993	0.4394	0.3645	17.00%	0.4255	3.20%	0.3812	13.20%
1996	0.4412	0.3606	18.30%	0.4338	1.70%	0.3721	15.70%

Source: The 1999 White Paper on Health and Welfare (Ministry of Health and Welfare of Japan)

total earnings, and suggested that the income redistribution measures provided by the public pension system and public assistance played a role to some extent, despite the apparent trend toward expanding income inequality. However, the "Expert Meeting on Social Security Reform for the 21st Century" suggested that the burden for financing social security should be weighted toward those with higher incomes. At the same time, the Expert Meeting affirmed that pension reform should be continued in order to achieve inter-generational equity, as extended by the 1999 pension reform. As a result, the Expert Meeting proposed the importance of achieving the harmonization between inter-generational equity and inter-household equity through pension reform.

Hence, the purpose of this paper is to examine the ideal means by which social security reform and income redistribution policy can be coordinated to address the expansion of income inequality occurring in the context of the aging of Japanese society. In particular, I shall present a detailed analysis of the relationship between the pension system and the income redistribution policy since the 1999 pension reform was executed, based upon the principle of intergenerational equity. For this purpose, the next section investigates the expansion of inequality in income distribution by estimating Gini coefficients based on the "Income Redistribution Surveys" of 1981 and 1993. An examination of why income inequality has expanded recently is considered by way of decomposing an individual income, down to the level of income source, and by analyzing income composition before and after income distribution. In section 3, a survey of the change in income distribution for the period from 1981 to 1993 is presented, together with a comparison of the redistributive effect of the contribution rate schemes and personal income tax, by means of regression analysis using data from the "Income Redistribution Surveys." The final section of the paper brings the results of the analysis together in considering the problem of how a future income distribution policy might be framed.

2. Inequality in Income Distribution and Decomposition of Income Sources

In order to investigate the factors behind the expansion of income inequality, we can decompose household income and individual income not only according to age and cohort (that is year of birth), but also according to income source, working status, and industry status of household heads (Takayama 1980). As previously mentioned, recent empirical studies on income distribution have used an approach by which the factor of expanded inequality of income is decomposed into the effect of aging and the cohort inherent effect. However, when we consider income redistribution policy in connection to pension reforms, it is also important that we decompose household income according to both income source and working status, and then compare household income or total earnings with income after redistribution. This is because the elderly who are receiving pension benefits have a variety of life conditions: some retire and depend on pension income as a major part of their income, while others continue to work and earn salaries and consequently receive reduced pension benefits because of their low wage rates.

In the pension reform of 1999 there were three guiding policies. First of all, there are two policies to consider the principle of fairness between generations: (i) not to make the burden of future generations overweight, and (ii) to suppress the increase in contribution rates for the future generations and set the total expenditure on pension benefits within such a range that can be funded by the increase in pension revenues. The third policy is related to protecting income security at old age, that is, (iii) that pension benefits will be reduced by up to 5%, allowing ample time for piece-wise reduction, but total benefits will be kept at a level that provides for a secure standard of living for the elderly.

Based on such a policy, the 1999 amendment of the Employee Pension Insurance Law stipulated the following guidelines: (1) Average pension benefits for fully insured persons will be decreased by 5%. (2) Pensions provided to those over the age of 65 years will be generally adjusted in accordance with changes in the Consumption Price Index and real wages only when the difference between real wage change and real pension benefits are judged to be substantial. (3) The age at which pension benefits will be paid to men and women will be postponed from 60 to 65 years of age, in one-year steps every three years from 2013 (2018) to 2025 (2030). (4) The tax base for EPI contribution is extended to annual labor income (i.e., monthly salary plus bonus) in 2003 (In this year the contribution rate will be reduced from 17.35% to 13.58% because the current tax base does not include the bonus). The final pension contribution rate of the employees' pension insurance becomes 25.2% and the final insurance of the national pension insurance becomes 18,200 yen a month, when treasury load is improved in 1/2. (5) The increase in contribution

rates will be phased in, so as to avoid its negative effect on economic growth, and a ceiling on the ultimate contribution rate on annual labor income will be set at 20%.

Item (5) corresponds to policy (i) in the pension reform and the items from (1) to (4) are based on policy (ii). But under policy (iii) the replacement ratio of average pension benefits is expected to be not less than 60% of the average monthly wage by combining (1) with (2). Thus, in the pension reform of 1999, the revision items are proposed and organized in a manner such that the pension system can satisfy the principle of fairness between generations and at the same time fulfill the role of the system as a safety net for the elderly.

However, we have to pay attention to the relation between the income redistribution policy and pension reforms in light of the expectation of a further increase in the pension insurance premium to finance the increase in the number of recipients and the amount of pension benefits in the near future. Because the current scheme of contribution rates is proportional to the employee's monthly salary, and a fixed amount for the self-employed, it does not play any role in income redistribution policy. But the personal income tax system combines progressive tax rates with tax exemption and tax deductions for low-income groups. Under these circumstances, we have to be wary of an increase up to a rate above the personal income tax rate, for example, an increase in the vicinity of 20% in the contribution rate, because such a move could counterbalance the redistributive effect of personal income tax if the share of gross wage in total earnings remains as high in the future as it is now. In order to run the public pension system as a social insurance system that transfers income from the workers and the self-employed to people on low incomes (because of their retirement), we should build some redistributive function into the system. It is understood that one of the ways to secure income after retirement while achieving fairness between generations is to establish a funded system, such as an individual account system in the public pension.

Hence, if we run the public pension as a social insurance system, it is important to retain a redistributive function within the system. One way to do so is to provide a progressive scheme of contribution rates, such as personal income tax; and another way is to make the pension benefit formula more progressive, like that of the Old-Age and Survivors Insurance and Disability Insurance (OASDI) system in the United States. In the next section, I shall examine household and individual incomes on which contribution rates are levied by decomposing these into a variety of income sources.

2.1. Complementarity between Husband's and Wife's Income and the Distribution of Household Income

An increase in the share of employees in the population of working age and the

Table 2 Amount of average income classified by income source

(Thousand yen)	Sample Size	Average Amount	Std Dev	Share of Total Earnings
1981				
Total earnings	7035	3938.68	3036.79	
Wages and salaries	6017	3228.45	2394.82	0.68319
Self-employment income	1179	3292.91	3493.54	0.14467
Farm self-employment income	995	1649.47	1333.98	0.07965
Cash property income	852	2474.54	4141.88	0.03666
Other income	520	1252.27	1232.82	0.05580
1993				
Total earnings	7776	6609.37	5555.11	
Wages and salaries	7025	6307.59	4895.62	0.83990
Self-employment income	1088	4069.73	4877.82	0.09292
Farm self-employment income	624	1123.71	1578.89	0.02276
Cash property income	963	1878.82	3480.09	0.00676
Other income	178	816.10	823.09	0.03763

Source: Author's tabulation based on 'Income Redistribution Survey' in 1981 and 1993.

aging of the self-employed household, independent farmers, and those farmers with a side-line business influence income distribution classified by the source of income. Table 2 shows the average amount of income classified by the source of income and the share of each income source (nominal amount). From 1981 to 1993, agricultural income decreased while average gross wages and salaries for employees and average income for the self-employed increased greatly. The fact that the average cash property income decreased, despite an increase in the number of people receiving such income reflects the recession conditions after 1991. As a result, the percentage of gross wages and salaries in total earnings (gross wages and salaries + self-employed profit income + agricultural income + cash property income + other income) has increased remarkably from 1981 to 1993.

First of all, I shall examine whether or not there is a possibility for an increase in the proportion of such gross wages and salaries in the total earnings to explain the expanded variation in household income. I shall make an empirical analysis based on the following hypotheses utilized in empirical studies from the United States: in the couple household, wife's average working income decreases, because the wife adjusts her labor force participation so as to supplement her husband's income. This supplementary relationship between the incomes of the couple is based on the assumption that the husband and wife who form the couple household jointly make decisions on their consumption behavior without placing any restrictions on the wife's choices (or decision-making) in regard to labor market participation. As a result of this hypothesis, the household income

distribution is expected to be smaller than that of the husband (household head).

The following expressions are used to measure the relations between the income distribution of the household and that of the married couple. By denoting the variations of married couple's household income, husband's income, and wife's income by σ_T, σ_H, σ_W, respectively, and by expressing the covariation between husband's income and wife's income by σ_{HW}, we have:

(1) $\sigma_T = \sigma_H + \sigma_W + 2\sigma_{HW}$

For the purpose of comparison of the income distribution, we shall rewrite Eq. (1) in order to exclude the influence of the income level by using the coefficient of variation, as below:

(2) $C_T = C_H + C_W + 2\rho C_H C_W a_H a_W$

In Eq.(2), C_T, C_H, and C_W represents the coefficient of variation for the household income of the married couple, husband's income and wife's income respectively; a_H and a_W are the ratio of husband's average income and wife's average income to the average household income respectively; ρ is the correlation coefficient of husband's income with wife's income. Therefore, because the correlation coefficient of (2) is negative when the wife decides her labor market participation and her working hours, so as to supplement her husband's income, the change in husband's income might be counterbalanced and the coefficient of variation of household income is expected to be smaller than that of husband's income.

In order to investigate the relations between these coefficients of variation for the Japanese households, we calculated these parameters using data from the "Income Redistribution Survey" of 1993. Table 3.1 summarizes the results of calculation classified by age group for the employee's household and Table 3.2 shows those results for the self-employed household.

According to Table 3.1, for the self-employed household, since the correlation coefficient between husband's and wife's incomes is negative (excluding the age group younger than 25 years of age), the distribution of husband's income measured by its coefficient of variation is counterbalanced by wife's income distribution. As a result, the correlation coefficient of the self-employed household income is smaller than that of husband's income.

On the other hand, both husband's income and wife's income show a positive correlation in the employee's household for the age groups between 20 and 40 years of age (See Table 3.2, under Ratio of Decrease in CV of Household Income). We can understand that this result comes from the fact that in those age groups, the ratio of married couples who have double incomes and that of couples in which the

wife is working as a full-time housewife (to concentrate on child care) are higher than that of the other age group households. Consequently, in those age groups, the husband's income distribution is not counterbalanced according to the change in the wife's working behavior and her income and it thus leads to a larger variation of household income against the husband's income. However, for those age groups of persons aged 45 or over, the correlation coefficients in Table 3.2 are negative which implies that the variation of employee's household income is influenced by

Table 3.1 Supplementary effect of wife's income to the variation of household income (male householders)

Classified by age group: self-employed households, 1993

Age Group	Sample Size	Household Income	Husband's Income	Wife's Income	CV of Husband's Income	CV of Wife's Income	Share of Wife's Income	Correlation Coefficient	CV of Household Income	Ratio of Decrease in CV of Household Income
20	7	338.429	302.714	35.714	26.986	264.575	0.105	0.525	39.820	0.475
25	18	507.278	444.889	62.389	69.453	181.630	0.122	−0.135	68.265	−0.017
30	35	530.486	425.200	105.286	115.928	172.778	0.198	−0.247	104.240	−0.100
35	72	440.889	343.500	97.389	100.954	202.116	0.220	−0.379	96.662	−0.042
40	158	553.304	449.475	103.829	79.214	128.796	0.187	−0.211	72.391	−0.086
45	199	652.985	505.141	147.844	89.657	127.891	0.226	−0.130	79.464	−0.113
50	210	645.652	493.110	152.543	99.243	133.146	0.236	−0.558	86.746	−0.125
55	221	563.240	451.516	111.724	108.793	130.188	0.198	−0.285	94.970	−0.127
60	199	483.025	365.930	117.095	133.757	228.910	0.242	−0.363	123.333	−0.077
65	143	476.881	388.832	88.049	161.214	201.310	0.184	−0.274	142.406	−0.116
70	205	250.688	209.010	41.678	174.685	389.520	0.166	−0.371	168.913	−0.033

Source: Author's tabulation based on 'Income Redistribution Survey' in 1981 and 1993.

Table 3.2 Supplementary effect of wife's income to the variation of household income (male householders)

Classified by age group: employees' households, 1993

Age Group	Sample Size	Household Income	Husband's Income	Wife's Income	CV of Husband's Income	CV of Wife's Income	Share of Wife's Income	Correlation Coefficient	CV of Household Income	Ratio of Decrease in CV of Household Income
20	40	340.625	290.800	49.825	49.787	205.849	0.146	0.029	56.013	0.125
25	223	454.148	365.933	88.215	33.438	139.649	0.194	0.047	41.279	0.234
30	480	544.854	456.185	88.669	40.652	157.959	0.162	0.038	45.927	0.129
35	587	639.116	558.859	80.257	59.308	185.142	0.125	0.023	60.246	0.015
40	727	713.021	618.428	94.593	42.275	176.940	0.132	0.089	46.698	0.104
45	739	801.227	679.970	121.257	63.499	142.017	0.151	−0.032	61.236	−0.035
50	584	855.616	734.014	121.603	76.973	152.547	0.142	−0.010	72.835	−0.053
55	577	800.236	694.523	105.712	88.029	167.986	0.132	−0.048	83.014	−0.056
60	371	555.442	466.288	89.154	98.227	178.145	0.160	−0.054	91.645	−0.067
65	139	420.014	355.950	64.065	112.655	251.166	0.152	−0.390	108.604	−0.035
70	108	566.111	464.046	102.065	119.296	260.119	0.180	−0.198	115.246	−0.033

Source: Author's tabulation based on 'Income Redistribution Survey' in 1981 and 1993.

the income change of the wife's income. This is because, in those age groups, the task of bringing up a child may be finished, and the wife may recommence part-time or full-time work in order to supplement her husband's income. When we look at the effect of wife's income variation that reduces the variation of husband's income for all households, we can detect this effect only for those households in which the household head is aged 45 or over because the ratio of the self-employed household is lower than the ratio of the employee's household.

If we pay attention to the supplementary relation between husband's income distribution and wife's income distribution, we can expect that the extension of the income distribution of the employee's household grows because the double income household with no child is becoming more prevalent now with the tendency for couples to postpone starting a family. In the 1999 pension reform, the exemption of the contribution rate during childcare leave was extended to exempt payments from both the worker and the employer (before 1999 only the worker's payment for the premium was allowed to be exempted). This extended exemption of contribution rates could reduce the difference in household income between married couples with double income and no child and those households in which the wife is not working during childcare leave. Hence, it can be understood that the 1999 pension reform has some influence on the distribution of household income, even for the working age group, because it exerts an influence on a woman's working behavior and her income, which are related to the household income distribution.

In this analysis, I decomposed the household income into only two income sources by taking into account the income earners in the couple household. But the criteria of decomposing household income are not limited to this classification. It may be composed of wages and salaries, the self-employment profit income, agricultural income, cash property income and so on. Furthermore, household income could be decomposed into income before and after government income transfer. In order to investigate how these income sources influence income distribution and inequality, I shall proceed with an analysis using the factor decomposition of the Gini coefficient.

2.2. Factor Decomposition of the Gini Coefficient According to Income Source

The factor decomposition of the Gini coefficient that I shall use in this section was presented by Lerman and Yitzhaki (1985, 1989, 1994). Following their method, I shall first express the Gini coefficient by using covariance of income of the sample households. The household income is denoted by $y \in$ [a, b], where a and b are the minimum and the maximum of household income in the sample households respectively. F(y) is assumed to be a uniform distribution with mean $1/2$ and to be defined over the interval between 0 and 1. The Gini coefficient is then defined as follows:

(3) GINI = 2cov[y,F(y)]/m,

Where m is the average household income.

Since the covariance in Eq. (3) can be expressed by the weighted average of covariance of each income source, we can derive the factor decomposition of the Gini coefficient. If there are k kinds of income source that yield one household income, the decomposition of the Gini coefficient is expressed as follows:

(4) GINI = $2*\Sigma_{k=1}^{K}cov(y_k,F(y_k))/m$,

where y_k is a k-th income source of household income, $cov(y_k,F(y_k))$ is a covariance between the cumulative frequency of k-th income source and the amount of k-th income. Furthermore, by using $S_k = m_k/m$, the ratio of k-th income source to the average household income and $R_k = cov(y_k,F(y))/cov(y_k,F(y_k))$ the correlation coefficient between the amount of k-th income source and the household income, we can rewrite Eq. (4) as follows:

(5) GINI = $\Sigma_{k=1}^{K}[cov(y_k,F(y))/cov(y_k,F(y_k))]*[2covcov(y_k,F(y_k))/m_k]$ $[m_k/m]$,
  = $\Sigma_{k=1}^{K}R_kG_kS_k$,

In this expression, $G_k=2cov*cov(y_k,F(y_k))/m_k$ is called a relative Gini coefficient concerning the income distribution in k-th income source. Because mk is an average amount of k-th income only within those households that have k-th income source, the summation of m_k/m over all households in the sample does not necessarily become one. Moreover, the contribution level of the income distribution in k income source to household income's Gini coefficient is expressed by:

(6) $I_k = R_kG_kS_k/GINI$,

From definition Eq. (6) is one. If the measurement of I_k is positive, k-th income source is considered to be a factor that expands income inequality among household incomes. On the other hand, if this measurement I_k is negative, k-th income source is considered to be a factor that decreases inequality in household income distribution.

Table 5 presents the result of the decomposition of household income calculated by using Eq. (5). The data source for this calculation is the "Income Redistribution Survey" from 1981 and 1993. We employ total earnings in the "Income Redistribution Survey" as household income. The total earnings are the summation of gross wages and salaries, self-employment income, farm self-employment income, cash property income, and others.

The Gini coefficient of household income (total earnings) increased from 0.34448 in 1981 to 0.37897 in 1993. Judging from $S_k (=m/m_k)$ that is the ratio of average income classified by income source to average household income, gross wages and salaries is the largest component of the Gini coefficient in each year, self-employment income is the second, and cash property income which attracts notice recently in the extension of property differentials is the third. The ratio of cash property income declined heavily in 1993 after the collapse of the bubble economy as compared with that in 1981. As for the contribution to the Gini coefficient, however, the gross wages and salaries made a greater contribution than the cash property income because the ratio of cash property income to household income is small. Therefore inequalities in cash property income have relatively less influence on the Gini coefficient of household income than that of gross wages and salaries despite the observation that decomposed the Gini coefficient of cash property income in 1993 was greater than it was in 1981 owing to the extension of property differentials. The time series change of the Gini coefficient of household income is relevant not only to the ratio S_k of average income from number k income source to household income or decomposed Gini efficient, but also to a correlation between income from number k income source and household income. This is because the change of the Gini coefficient (ΔGini) from time t_0 to time t_1 is expressed as follows:

(7) $\Delta GINI = GINI1 - GINI0$
$= \Sigma_{k=1}^{K}(S_{k1} - S_{k0})G_{k1}R_{k1} + \Sigma_{k=1}^{K}(R_{k1} - R_{k0})S_{k1}G_{k1}$
$+ \Sigma_{k=1}^{K}(G_{k1} - G_{k0})S_{k1}R_{k1} +$ a stochastic error term.

Table 4 shows that the Gini coefficient increased by 0.034489 from 1981 to 1993. On the other hand, a variation (estimate) of the Gini coefficient decomposed by income source using equation (7) is 0.038345, and so the error is only -0.0038557. The phenomenon that we call the extension of property differentials in the increment of the Gini coefficient of household income means that the relative Gini coefficient of cash property income increased from 1981 to 1993 (DG 4 = 0.097; Table 4). The change of distribution of cash property income, however, makes a stronger contribution to the increment of the Gini coefficient than to the increment of the relative Gini coefficient because the correlation between cash property income and household income is lowering and so is the ratio of the average household income to average cash property income. With regard to self-employment income, the variance increased and the relative Gini coefficient increased a little (DG 2 = 0.082), as the bubble economy was over in 1993, but the correlation between the distribution of self-employment income and the distribution of household income is lowering and the ratio of average self-employment income to average household income is also lowering. That is why

the contribution to the increment of the Gini coefficient is smaller than to that of the relative Gini coefficient. On the contrary, the relative Gini coefficient of gross wages and salaries decreased a little from 1981 to 1993, though inequalities in gross wages and salaries became more influential with inequalities in household income because the correlation between gross wages and salaries' distribution and household income's distribution got bigger and the ratio of average gross wages and salaries to average household income rose.

As mentioned above, the rise of inequalities in household income (Gini coefficient) from 1981 to 1993 was affected by property differentials to some extent, but the trend of gross wages and salaries had more effect than cash property income or self-employment income. Disposable income is determined by total earnings minus such taxes as progressive income tax, inheritance tax,

Table 4 Decomposition of factors of Gini coefficient classified by income sources

Year	GINI	R1	R2	R3	R4	R5
1981	0.34448	0.76047	0.12974	0.030166	0.13667	0.023393
		G1	G2	G3	G4	G5
		0.38893	0.41098	0.40709	0.56741	0.48514
		S1	S2	S3	S4	S5
		0.81968	0.83604	0.41879	0.62827	0.31794
		I1	I2	I3	I4	I5
		0.70377	0.12940	0.014929	0.14143	0.010474
Year	GINI	R1	R2	R3	R4	R5
1993	0.37897	0.94442	0.10417	0.013992	0.11012	0.0022842
		G1	G2	G3	G4	G5
		0.36083	0.49334	0.60754	0.66456	0.47787
		S1	S2	S3	S4	S5
		0.95434	0.61575	0.17002	0.28427	0.12348
		I1	I2	I3	I4	I5
		0.85815	0.083503	0.0038135	0.054891	0.00035565
ΔYear		GINI	DGINI	TDGINI	DTGINI	
1993–1981		0.37897	0.034489	0.038345	−.0038557	
		DS1	DS2	DS3	DS4	DS5
		0.13466	−0.22029	−0.24877	−0.34400	−0.19446
		DR1	DR2	DR3	DR4	DR5
		0.18394	−0.025562	−0.016175	−0.026549	−0.025677
		DG1	DG2	DG3	DG4	DG5
		−0.028099	0.082365	0.20045	0.097145	−.0072691

Source: Author's tabulation based on 'Income Redistribution Survey' in 1981 and 1993.

Note 1: R_k is the correlation coefficient between the amount of k-th income source and the household income, G_k is a relative Gini coefficient concerning the income distribution in k-th income source, S_k (=m/m_k) is the ratio of average income classified by income source to average household income.

Note 2: The number of suffix k indicates each of the following income sources. 1: wages and salaries, 2: self-employee profit income, 3: self-employment farming income, 4: cash property income, 5: other income.

Note 3: DS, DR, and DG indicate the differentials of S, R, G between 1981 and 1993 respectively.

indirect tax and social insurance contributions plus the set of redistribution income provided by the government through social security and private income transfer. The redistributed income is defined by the disposable income minus private income transfer. Now that the portion of self-employment household has been decreasing and the mechanism that equalizes income distribution between husbands and wives has lost an effect, it is necessary to equalize the distribution of the redistributed income to rectify the inequalities in household income. Taking into account the situation that the change in gross wages and salaries has had an increasing influence on inequalities in household income, it is impossible to plan an income redistribution policy which deals with the inequalities properly without verifying the effect that progressive taxation on gross wages and salaries, or that of a contribution rate scheduled to be raised, have on the distribution of household income.

In the next section, I decompose household income into tax burden, social insurance contributions and social assistance, that is, pension benefits, sick pay, etc., and measure how each of them affects the change in the Gini coefficient. In particular, by measuring the progressivity of taxes and the social insurance premium to gross wages and salaries, I consider what relation should exist between tax policies and a social insurance system in income redistribution policy.

3. Income Distribution and Social Insurance Burden after Income Redistribution

3.1. The Decomposition of Income Distribution After Income Redistribution

Public redistributed income and redistributed income are mentioned in the "Income Redistribution Survey." Public redistributed income comprises total earnings, deducted taxes and social insurance contributions, added pension benefits, sick pay and other social assistance such as public assistance or child allowance; redistributed income comprises public redistributed income, deducted private contributions that includes corporate pension contribution rate, added private (income compensation) benefits. Based on the recognition of existing inequality, I examine how the trend of public redistributed income, and the burdens and benefits contained, influence the income distribution in order to enable a useful insight into income redistribution policies.

Table 6 shows averages of public redistributed income for each component, calculated across all ages. Taxes include objective taxes on households such as automobile weight tax, as well as income tax, residents' tax, and inheritance tax. Social insurance contributions include public health insurance premium, public

Table 5 Components of public redistributed income (all households and age groups)

(Unit: ten thousand yen per year)

| | 1981 | | | 1993 | | |
	Sample Size	Mean	Std Dev	Sample Size	Mean	Std Dev
Redistributed income	7141	377.45	241.48	8709	589.00	453.76
Total earnings	7141	388.25	305.15	8709	589.37	553.35
Taxes	7141	370.12	1026.16	8709	63.10	129.39
Social insurance contributions	7141	246.95	173.44	8709	45.52	33.64
Pension benefits	7141	137.10	365.55	8709	57.54	102.36
Medical treatment supply	7141	264.56	904.26	8709	47.67	150.76
Other social security benefits	7141	109.71	305.89	8709	3.04	20.72

Source: Author's tabulation based on 'Income Redistribution Survey' in 1981 and 1993.

Table 6 Components of public redistributed income classified by age group
(all households)

(Unit: ten thousand yen per year)

| | 20–29 Age Group | | | 30–39 Age Group | | |
	Sample Size	Mean	Std Dev	Sample Size	Mean	Std Dev
Redistributed income	610	338.66	198.66	1232	506.93	309.70
Total earnings	610	369.25	205.46	1232	553.79	336.13
Taxes	610	24.66	23.41	1232	43.14	52.81
Social insurance contributions	610	28.95	18.79	1232	45.28	22.80
Pension benefits	610	4.07	32.84	1232	8.26	32.89
Medical treatment supply	610	17.13	85.87	1232	28.74	99.03
Other social security benefits	610	1.82	16.43	1232	4.55	24.05
	40–49 Age Group			50–59 Age Group		
	Sample Size	Mean	Std Dev	Sample Size	Mean	Std Dev
Redistributed income	1990	649.60	391.78	1975	714.03	544.86
Total earnings	1990	718.33	459.76	1975	797.65	647.46
Taxes	1990	71.27	107.35	1975	88.72	141.73
Social insurance contributions	1990	55.23	28.03	1975	62.66	36.60
Pension benefits	1990	17.54	51.82	1975	19.67	53.12
Medical treatment supply	1990	38.00	139.43	1975	45.83	147.71
Other social security benefits	1990	2.23	19.77	1975	2.25	17.99
	60–69 Age Group			70 Years +		
	Sample Size	Mean	Std Dev	Sample Size	Mean	Std Dev
Redistributed income	1746	586.42	474.14	1124	505.18	487.89
Total earnings	1746	485.30	601.59	1124	328.23	573.67
Taxes	1746	63.76	170.80	1124	46.98	150.15
Social insurance contributions	1746	35.63	33.39	1124	23.92	32.25
Pension benefits	1746	134.87	131.28	1124	159.42	116.74
Medical treatment supply	1746	61.66	180.62	1124	84.93	187.61
Other social security benefits	1746	3.98	24.85	1124	3.50	17.86

Source: Author's tabulation based on 'Income Redistribution Survey' in 1993.

pension contribution rate, unemployment insurance premium, and so on. Pension benefits include employees' pension, national pension, mutual aid pension, and others.

Income taxation is progressive and low-incomes are exempted from pension contributions. Moreover, public assistance and child allowance are covered by general expenditure, and pension benefits and medical care are paid partly by national treasury. This is how the income is redistributed from workers households or high-income households to low-income households, households with children, households receiving medical services, and retired elderly households. Workers contribute a higher personal income tax burden according to age, the seniority wage practice, and the progressive taxation system. Meanwhile, the contents of social security benefits vary according to age: child allowance in the young period, pension benefits or health insurance for the elderly in the elderly period. Table 6 shows that the burdens and benefits of redistributed income vary according to the age of the household head, on the basis of the survey in 1993.

The burdens of tax and social insurance on household income (total earnings) increase as the age of the household head rises. The peak of these burdens is at 50–59 years, because it is during this period that the wage profile tends to reach the highest level of lifetime wage for employees. These burdens decrease for those in the group aged over 60.

The average amount of public pension benefits is 170,000 yen for those recipients younger than 60 years of age because they can receive disability insurance and survivors insurance upon reaching eligibility. Public pension payments are much higher to recipients in those age groups over 60 years of age, than payments to younger recipients since the old age pension insurance is provided from 60 years of age. The average annual pension amount for the group between 60 and 69 years of age is 1,390,000 yen, and that for the group aged 70 years and over is 1,590,000 yen. There are two age groups in which the medical expenditure from insurance increases rapidly as householder's age rises: the group between 60 and 69 years of age that reach the retirement age, and the group aged 70 years and over which is covered by the elderly persons' medical expenditure system. On the other hand, the amount of those social security income transfers, including public assistance and child care allowance, increases most markedly for the group between 30 and 39 years of age and decreases a little bit for the group between 40 and 59 years of age. But income transfers rise again for the groups aged 60 years and over. However, because the entitlement for receiving public assistance is very restrictive, and the amount of child care allowance is relatively small compared with the average amount of that in European countries, the benefit provided by these social security income

transfers is far smaller than that provided by the pension and the medical treatment benefit.

The public redistributed income functions as a safety net so as to decrease inequality in total earnings. As is evident, the provision of pension benefits supplements either the loss of, or the decrease in, labor income and self-employed profit income incurred at retirement. From Table 4 and Table 7, we can compare the Gini coefficient of total earnings with that of public redistributed income. These two Gini coefficients are 0.37897 and 0.36406 in 1981 and 0.34448, 0.31654 in 1993 respectively. The Gini coefficient of the public redistributed income indicates a lower value than the Gini coefficient of total earnings, although both Gini coefficients increased from 1981 to 1993. It is understood that the income distribution was made equal by public redistribution.

Table 7 shows the change in each component of decomposed Gini coefficient of the public redistributed income from 1981 and 1993. The reason why public redistributed income increases from 1981 to 1993, together with household income, is that the percentage of total earnings to public redistributed income is the largest of the income components to its Gini coefficient. Since the relative Gini coefficient of taxes is negative, taxes have the function to reduce inequality in household income distribution.

Whether or not the pension system contributes to income redistribution can be judged by comparing the two relative Gini coefficients of pension benefit and social insurance contributions. There is a factor contributing to income inequality in the public pension system because there is an earnings-related portion of the employee welfare pension (EWP). The amount of benefits in the earnings-related portion of the EWP depends on the level of gross wages and salaries that the recipient earned before retirement and this leads to some inequality of income after retirement. Hence, the relative Gini coefficient of pension benefits takes a positive value. On the other hand, because social insurance contributions are levied on working generations who have earned income and not levied on those pension recipients whose earned income is zero after retirement, social insurance contribution plays a role in reducing the inequality of household income. Consequently, the relative Gini coefficient of public insurance contribution takes a negative value. According to Table 11, the net relative Gini coefficient that is calculated by subtracting the relative Gini coefficient of social insurance contributions from the relative Gini coefficient of pension benefit is 0.08790 (= 0.41033 − 0.32243) in 1981 and 0.02520 (0.38742 − 0.36222) in 1993 respectively. The public pension system is expected to be a system that transfers income from working generations who have earned income to the elderly who have retired and receive only a relatively small amount of income. But the positive values of net relative Gini coefficient imply that the public pension system dose not play a

satisfactory role in income redistribution because the public pension system in Japan has an earnings-related portion.

However, it is medical treatment supply (I4 and I5 in Table 7) that has exerted a bigger influence as a factor in the expansion of inequality of the public redistributed income since 1981. The reason for this is that the relative Gini coefficient of medical treatment is the largest in the component of the public redistributed income and its correlation coefficient with the distribution of the public redistributed income remains large after total earnings. The explanation for this observation seems to lie in the current health insurance system and the

Table 7 Decomposition of factors of Gini coefficient for public redistributed income (all households and age groups)

Year	GINI	R1	R2	R3	R4	R5	R6
1981	0.31654	0.93474	−0.80770	−0.68794	0.10871	0.41612	0.045542
		G1	G2	G3	G4	G5	G6
		0.34475	−0.60008	−0.32243	0.41033	0.68974	0.49889
		S1	S2	S3	S4	S5	S6
		1.04305	−0.10354	−0.068607	0.17421	0.12325	0.11753
		I1	I2	I3	I4	I5	I6
		1.06188	−0.15854	−0.048076	0.024550	0.11175	0.0084362
Year	GINI	R1	R2	R3	R4	R5	R6
1993	0.36406	0.95126	−0.80572	−0.77442	0.025784	0.41146	−.0097958
		G1	G2	G3	G4	G5	G6
		0.38029	−0.59403	−0.36222	0.38742	0.66970	0.63967
		S1	S2	S3	S4	S5	S6
		1.11510	−0.11850	−0.083016	0.27112	0.13958	0.078275
		I1	I2	I3	I4	I5	I6
		1.10802	−0.15579	−0.063964	.0074391	0.10565	−0.0013472
ΔYear		GINI	DGINI	TDGINI	DTGINI		
1993–1981		0.36406	0.047525	0.047497	.000027542		
		DS1	DS2	DS3	DS4	DS5	DS6
		0.072052	−0.014964	−0.014409	0.096919	0.016330	−0.039257
		DR1	DR2	DR3	DR4	DR5	DR6
		0.016525	.0019746	−0.086480	−0.082929	−.0046603	−0.055338
		DG1	DG2	DG3	DG4	DG5	DG6
		0.035534	.0060570	−0.039794	−0.022906	−0.020038	0.14078

Source: Author's tabulation based on 'Income Redistribution Survey' in 1981 and 1993.

Note 1: R_k is the correlation coefficient between the amount of k-th income source and the household income, G_k is a relative Gini coefficient concerning the income distribution in k-th income source, $S_k(=m/m_k)$ is the ratio of average income classified by income source to average household income. The negative sign indicates that tax and social insurance contribution are subtracted from the total earnings.

Note 2: The number of suffix k indicates each of the following income sources. 1: total earnings = wages and salaries + self-employment profit income + self-employment farming income + cash property income + other income, 2: taxes, 3: social insurance contribution, 4: pension benefits, 5: medical treatment supply, 6: other social security income transfer including public assistance.

Note 3: DS, DR, and DG indicate the differentials of S, R, G between 1981 and 1993 respectively.

elderly health system. Under the current systems, the co-payment is a fixed amount, which is very small, compared with the actual medical expenditure for patient's medical treatment. Furthermore, the amount of co-payment is common to both the rich and the poor.

Although it was positive in 1981, the correlation between total earnings and other social security transfers, including public assistance and childcare allowance, becomes negative in 1993. This change implies that the other social security transfer now has an effect of reducing inequality of total earnings (R6 in Table 7). However, the magnitude of this effect is relatively small because the size of the contribution level to the relative Gini coefficient of the other social security transfer to public redistributed income is very small compared with contributions toward taxes and social insurance.

The result that the Gini coefficient of the public redistributed income is smaller than that of the household income (total earnings) implies that public redistribution through social security benefits financed by taxes and social insurance plays an important role in reducing income inequality amongst Japanese households. However, pension benefits and the co-payment scheme for medical treatment, which is independent of actual medical cost and patients' income distribution, are factors influencing the expansion of inequality in the public redistributed income. If we want to maintain the public pension and health insurance as a social insurance system, we have to give these two systems some redistributional effect. Without any redistributional effect, there would be no need to run these two systems as a social insurance system because in order to improve economic efficiency, the pension system and health care supply should be managed by a funded system such as an individual account.

In order to investigate how such a problem is related to the expansion of inequality brought about by aging, we made a decomposition of the factors of public redistributed income by age group (Table 8).

The contribution level of the total earnings to the Gini coefficient of the public redistributed income shows large increases during working periods and peaks by the 50–59-years age group. However, this contribution level begins to decrease for the 60–69-years age group, and the contribution level decreases further still for the 70 years and over age group. Therefore, the inequality in public redistributed income dose not expand by aging of household head so far as the total earnings expands as householder's age rises.

The contribution level of taxes is negative and this implies that taxes have an effect of reducing inequality in total earnings. The absolute value of the contribution level of taxes rises as householder's age goes up because progressive tax rates are applied to wages and salaries which rise in line with the length of service before the age of 59 (Refer to Ishikawa (1985) for a discussion

Table 8 Decomposition of factors of Gini coefficient for public redistributed
income classified by age group (all households)

Age Group	GINI	R1	R2	R3	R4	R5	R6
20–29	0.30898	0.95648	–0.81957	–0.79813	0.042707	0.27812	0.024990
		G1	G2	G3	G4	G5	G6
		0.30003	–0.38948	–0.29402	0.50623	0.68490	0.74566
		S1	S2	S3	S4	S5	S6
		1.09750	–0.083830	–0.094821	0.43180	0.16863	0.084494
		I1	I2	I3	I4	I5	I6
		1.01935	–0.086606	–0.072016	0.03021	0.10396	.0050957
30–39	0.26595	R1	R2	R3	R4	R5	R6
		0.96310	–0.80440	–0.73856	0.062595	0.37953	–0.038410
		G1	G2	G3	G4	G5	G6
		0.2709	–0.47268	–0.25715	0.35050	0.62703	0.67052
		S1	S2	S3	S4	S5	S6
		1.10408	–0.089688	–0.091626	0.19496	0.11108	0.054784
		I1	I2	I3	I4	I5	I6
		1.08349	–0.12822	–0.065431	0.016084	0.099391	–.0053054
40–49	0.29178	R1	R2	R3	R4	R5	R6
		0.95327	–0.81291	–0.73424	0.10699	0.37402	–0.010408
		G1	G2	G3	G4	G5	G6
		0.30293	–0.52489	–0.26086	0.40171	0.67637	0.67117
		S1	S2	S3	S4	S5	S6
		1.11760	–0.11468	–0.086996	0.16236	0.11163	0.081441
		I1	I2	I3	I4	I5	I6
		1.10607	–0.16771	–0.057107	0.023914	0.096779	–.0019498
50–59	0.33662	R1	R2	R3	R4	R5	R6
		0.95924	–0.81171	–0.78044	0.053693	0.38266	–0.015471
		G1	G2	G3	G4	G5	G6
		0.35362	–0.55689	–0.30738	0.40426	0.65565	0.55915
		S1	S2	S3	S4	S5	S6
		1.13844	–0.12984	–0.089393	0.14513	0.11239	0.087856
		I1	I2	I3	I	I5	I6
		1.14720	–0.17436	–0.063705	.0093584	0.083768	–.0022577
60–69	0.40029	R1	R2	R3	R4	R5	R6
		0.88542	–0.77417	–0.69827	0.14352	0.50558	.0032667
		G1	G2	G3	G4	G5	G6
		0.45755	–0.65866	–0.44281	0.35464	0.67985	0.58801
		S1	S2	S3	S4	S5	S6
		1.02332	–0.12201	–0.067584	0.31820	0.15250	0.11182
		I1	I2	I3	I4	I5	I6
		1.03569	–0.15542	–0.052204	0.040459	0.13095	.00053660
70 +	0.46677	R1	R2	R3	R4	R5	R6
		0.71212	–0.68051	–0.72415	0.33062	0.57383	–0.0039964
		G1	G2	G3	G4	G5	G6
		0.53264	–0.74123	–0.56553	0.36574	0.65523	0.45493
		S1	S2	S3	S4	S5	S6
		0.14287	–0.12938	–0.059946	0.33782	0.21924	0.10670
		I1	I2	I3	I4	I5	I6
		0.92872	–0.13982	–0.052594	0.087513	0.17660	–.00041560

Source: Author's tabulation based on 'Income Redistribution Survey' in 1981 and 1993.

Note 1: R_k is the correlation coefficient between the amount of k-th income source and the household income, G_k is a relative Gini coefficient concerning the income distribution in k-th income source, $S_k (=m/m_k)$ is the ratio of average income classified by income source to average household income.

Note 2: The number of suffix k indicates each of the following income sources. 1: total earnings = wages and salaries + self-employment profit income + self-employment farming income + cash property income + other income, 2: taxes, 3: social insurance contribution, 4: pension benefits, 5: medical treatment supply, 6: other social security income transfer including public assistance.

Note 3: DS, DR, and DG indicate the differentials of S, R, G between 1981 and 1993 respectively.

on long service pay and the wage profile). However, the contribution level of taxes decreases greatly for those in the age groups of 60 years and over since the ratio of the people who lose labor income at retirement may increase. On the other hand, the contribution level of social insurance contributions is negative and its absolute value is within some constant range instead of aging of the householders. The reason for the latter fact is that the social insurance contributions are proportional and not as progressive as the personal income tax. The contribution levels of pension benefits and medical treatment supply increase greatly for those in the 60–69-years age group when individuals in that group become eligible to receive public pension benefits. And these contribution levels rise further for those in the group aged 70 years and over when an individual in this group gains coverage under the elderly health system.

3.2. Factor Decomposition of the Changing Gini Coefficient of Public Redistributed Income

The result of the factor decomposition of the changing Gini coefficient of the public redistributed income is shown by ΔYEAR in the lower column of Table 7. According to this result, the Gini coefficient of public redistributed income increased from 1981 to 1993, though the redistributional effect of public redistributed income has come into effect for this period. The Gini coefficient was 0.36406 in 1993, and it increased by 0.047525 from 1981 to 1993. The difference between an increase in the Gini coefficient that is decomposed into the factors (estimated value) and an increase in the Gini coefficient calculated by household income is 0.00002754. According to Table 7, the components of public redistributed income that increased their relative Gini coefficients from 1981 and 1993 are total earnings, taxes, and other social security benefits. For social insurance contributions that are subtracted from the total earnings, their relative Gini coefficient is expected to increase in the event that their absolute values go up (DG3 in Table 7). On the other hand, the relative Gini coefficient of pension benefit and medical treatment supply has decreased (DG4 and DG5 in Table 7). The reason for the relative Gini coefficient of pension benefits decreasing is that the ratio of the earnings-related portion to pension benefits decreased by the change in the benefit scheme, and the insured period was extended to get the entitlement of the provision of pension benefit.

The components that increase the ratio of their average amount to the average amount of public redistributed income are total earnings, taxes, social insurance contributions, pension benefits, and medical treatment supply (Refer to DS in Table 7). But the ratio of the average amount of other social security transfers decreased against the average amount of public redistributed income from 1981 to

1993. However, the redistributional effect decreases though both the contribution level of taxes and the ratio of average amount of taxes to average amount of public redistributed income increased because the correlation between tax payment and the public redistributed income decreased (DR2 is a positive value). Hence, we can conclude that the reasons why the public redistributed income increased from 1981 in 1993 are that the relative Gini coefficient of total earnings increased and it influenced the expansion of inequality in income distribution and that the redistributional effect of taxes decreased.

3.3. Difference in Redistributive Effect of Income Tax and Social Insurance Contributions: Examining the Difference in the Progressivity of Tax and Contribution Rates

In order to make the distribution of household income (or total earnings) more equal through public income redistribution, we have to reduce the effect of current pension benefit and medical treatment supply schemes on the expansion of inequality in income and improve the rates of income tax and social insurance contributions so that they have much more redistributive functions.

Because the taxes include income tax, residents' tax, and inheritance tax that have progressive tax rates, we can expect that taxes can exert some redistributional effect even under their current tax rate structure. On the other hand, it is thought that the redistributional effect through the social insurance contribution is small because it is a proportional sum to wages and salary income, and a lump sum to the self-employed profit income in spite of the fact that it exempts to the low-income people. In order to examine the difference in progressivity between tax rates and social insurance contributions, we shall estimate the tax functions and the social insurance contribution functions by using data from the "Income Redistribution Survey" of 1981 and 1993. The functional forms that we use here are the quadratic form as follows:

(8) $T_i = a_0 + a_1 INC_i + a_2 (INC_i)^2 + u_i$,

Here, T_i is the amount of taxes (the amount of social insurance contribution) on i-th household, INC_i is the amount of total earnings of i-th household and u_i is a stochastic error term. Since Eq. (8) is a quadratic form, the marginal tax rate (marginal social contribution rate) is given by $a_1 + 2a_2$. If a_2 is zero, the marginal tax (social insurance contribution) rate is constant, which means that the tax rate is proportional to the tax base or total earnings. But if a_2 is positive, the tax (social insurance contribution) rate increases as income or total earnings rises, which means that it is progressive. I estimated these functions by using a least

Table 9 Estimated results of the tax rate function and social insurance
contribution function (households, 1981 and 1993)

Regressors	Tax Payments of Household		Social Contribution Payments of Household	
	1981	1993	1981	1993
Constant term	−291.560950*** (−25.807)	−36.898279*** (−24.091)	69.969856*** (2.94394729)	9.957494*** (26.216)
Total earnings	0.141316*** (50.958)	0.166468*** (66.175)	0.049542*** (3.12264)	0.069310*** (111.104)
Total earnings^2	0.000004652*** (63.128)	0.000002904*** (5.323)	−0.000000626*** (4.01792)	−0.000007203*** (−53.246)
R-square	0.7566	0.5720	0.4214	0.6266
Adj R-sq	0.7565	0.5719	0.4213	0.6265
Sample size	7140	8709	7140	8709

Source: Author's estimation based on 'Income Redistribution Survey' in 1981 and 1993.
Note: The estimation method is OLS. The value in the parenthesis is the T value.

square method and summarized the results in Table 9.

In the estimated result of tax functions, the constant term was negative and a marginal tax rate became positive for all income levels. This shows that the structure of the tax rate is progressive. However, the term a_2 in the estimated result of 1993 is smaller than that of 1981. Since this term a_2 shows the progressivity in the tax rate structure, this observation is explained by the fact that the 1988 tax reform made progressive tax rates flatter than they had been prior to the reform. On the other hand, because the constant term in the estimated results of social insurance contribution functions is positive and the term of a_2 takes a negative value, there is a possibility that social insurance contributions may have a greater burden on the lower income people. However, the relation between total earnings and social insurance contributions might be different between the Employee Pension Insurance (EPI), for which contributions are channeled into a withholding system utilized for gross wages and salaries, and the national pension, for which contributions are set at a fixed amount and levied on the profit income of the self-employed. In order to confirm this, we estimated the social insurance contribution functions classified by household working and business conditions (Table 10). Because the social insurance contribution is a fixed amount in the national pension that is mainly targeted to the self-employed and farming households, the constant term in the estimated results of the functions for these households are larger than that in the estimated result of the function for employees.

According to Table 10, the third term a_2, which expresses the progressivity of social insurance contributions, was negative in 1981 for the employee's

Table 10 Estimated results of the tax function and social insurance contribution
function classified by household working and business conditions
(all age groups, 1981 and 1993)

1981					
	Employee Household	Self-employed Household	Farm Self-employed Household	Executive's and Manager's Household	Unemployed Household
Constant term	0.573714 (0.134)	76.069280*** (7.988)	70.288886*** (6.353)	89.370061 (1.854)	8.889098* (1.861)
Total earnings	0.077730*** (52.039)	0.045226*** (17.614)	0.074532*** (16.774)	0.047213*** (7.151)	0.064831*** (28.346)
Total earnings^2	−0.0000027*** (−24.067)	−0.00000079*** (−9.404)	−0.0000031*** (−8.70)	−0.0000005*** (−5.762)	−0.0000019*** (−14.714)
R-square	0.5549	0.2639	0.3982	0.2571	0.6601
Adj R-sq	0.5547	0.2628	0.3969	0.2474	0.6588
Sample size	4326	1240	891	155	528
1993					
	Employee Household	Self-employed Household	Farm Self-employed Household	Executive's and Manager's Household	Unemployed Household
Constant term	4.051333*** (7.907)	14.305287*** (10.332)	17.924868*** (9.178)	21.12176*** (7.265)	5.88589*** (13.697)
Total earnings	0.083059*** (101.146)	0.060146*** (22.890)	0.065385*** (18.911)	0.049717*** (17.708)	0.066097*** (34.247)
Total earnings^2	−0.0000091*** (−50.248)	−0.0000097*** (−12.70)	−0.0000057*** (−5.442)	−0.0000040*** (−10.669)	−0.0000139*** (−15.345)
R-square	0.7025	0.4075	0.4924	0.4904	0.5287
Adj R-sq	0.7024	0.4065	0.4910	0.4881	0.5280
Sample size	4850	1204	781	432	1442

Source: Author's estimation based on 'Income Redistribution Survey' in 1981 and 1993.

household, the self-employed household and the farmer's household, and the
term then rose to a positive value in 1993. This implies that social security
contribution rates had a redistributive effect in 1981 but this effect was lost in 1993.
For households in which the household head is a director or a manager, the third
term a_2 was negative in 1981 and 1993, which shows that the social insurance
contribution rate exerted a non-redistributive effect. The reason why the recent
structure of social insurance contribution rates did not have any progressivity is
that the redistributive function in social insurance contributions was not as
seriously focused as income tax.

According to the pension reform of 2000, the tax base for EPI contribution is
extended to annual labor income (monthly salary plus bonus) in 2003. In this
year, the contribution rate will be reduced from 17.35% to 13.58% because the

current tax base does not include salary bonus. But because of the aging of Japanese society, it is expected that the pension contribution will be increased again after 2005, from 13.58% to 27.6% in 2025 (where the statutory government expenditure on EPI is a third of total benefit expenditure). At the same time, the contribution rate for the national pension is expected to increase after 2005, from 13,000 yen per month to 24,800 yen per month.

Of course, the schedule of increases in the EPI contribution rate and the national pension contribution is reasonable for the purpose of maintaining stable long-term pension finance. Now, however, it is necessary for the government to achieve harmonization between intergenerational equity and intra-generational equity (redistribution of income) so that all sectors of society can accept the increase in the burden of the public pension system in the twenty-first century. Therefore, it is important to understand that even if income redistribution is about to be achieved by social security benefits, this redistribution could be counterbalanced by the structure of contribution rates without considering its influence on the distribution of household income. In this sense, it might be appreciable that the 2000 pension reform introduced a 50% exemption for national pension contribution for those persons below a certain amount of income in addition to a full exemption for those persons who are exempted from paying residents' tax. However, it would be necessary to do a careful evaluation about the effects of extending the tax base of the EPI and the further increase in pension contributions on intra-generational equity (redistribution of income) based on future empirical study.

4. Coordination between Income Redistribution Policy and Social Security

Recently, several economists have made empirical studies in which they have pointed out the expansion of inequalities in household income and in household consumption against the backdrop of the aging of Japanese society. The findings presented in section 3 of this paper indicated that the magnitude of negative correlation between husband's and wife's income distributions appears to be smaller for employee households than for self-employed households. Combining this result with the fact that the share of employee households to all households has increased now implies that a reduction in the variation of household income distribution through the effect of negative correlation between husband's and wife's income distributions will become weak in the future.

A continuing investigation of how and to what extent income redistribution policy influences economic efficiency and economic incentives in the context of

an aging society in Japan, based on empirical and theoretical studies, is imperative. Income redistribution through social security policy will become an important policy problem in the future if it is assumed that securing social impartiality will be included as a goal of social security policy. The analysis of social security benefits and contribution rates based on the "Income Redistribution Survey" in 1981 and 1993 clarified the following results. (1) The redistributional effect that was achieved through the progressive structure of income tax rates was comparatively large while the pension contribution rates had some complementarity of the burden to household income. (2) The extent to which the pension benefits and the medical treatment supply contributed to reducing income inequality was low. (3) An income redistributional effect was found for social security benefits that included public assistance and childcare allowance, however, the magnitude of this effect was small.

The reasons for (1) and (2) are thought to be as follows. The medical treatment supply tends to be supplied independently of income distribution and its contributing degree to reducing income inequality is low. Though the public pension system is expected to achieve income redistribution through income transfers from the working generation to retired persons, its effectiveness is hindered by the structure of pension contribution rates and the benefit scheme which includes an earnings-related portion.

Since the current social security system in Japan has these influences on income distribution, it is suggested that there is a need to design an appropriate social insurance contribution rate structure and benefit scheme in order to achieve the harmonization between inter-generational and intra-generational equity. Given the recent expansion of inequality in household income, the later target has become increasingly important. Hence, from this point of view, if the significant role of the earnings-related portion of the public pension system is to be maintained, in order to retain some incentives to cover working people, it would be preferable to introduce a progressive structure of social insurance contribution rates. On the other hand, if a benefit scheme that has a redistributional effect on pension benefits for those in the same generation is introduced, such as the OASDI in the United States, and such a system should be differentiated from the private pension schemes, it would be possible to create a structure of pension contribution rates proportional to household income which would provide economic incentives for contribution.

Note of Thanks

"Income Redistribution Survey" micro data from 1981 and 1993. I would also like to express my gratitude to Prof. Yuji Genda, Gakushuin University, who headed the study group, as well as to all of the other members of the group. Finally, I would like to inform the reader that the opinions in this text are those of the author, and remaining errors in the paper are the author's responsibility.

References

Ishikawa, T. 1985. *Income And Wealth*, Tokyo: Iwanami Shoten.

Otake, F., 1994. "Distributions of Income and Wealth in 1980s," *Economic Studies Quarterly*, 45(5), 385–402,

Otake, F. and Saito, M. 1996. "Aging of the Population and The Induced Inequality of Consumption," *Nihon Keizai Kenkyu*, No.33, 11–35.

Otake, F. and Saito, M. 1999. "Aging of the Population and The Induced Inequality of Household Income," Kikan Shakaihoshou Kenkyu.

Ministry of Health and Welfare, 1999. White Paper On Health And Welfare in 1999. Tokyo: Gyousei.

Department of Pension, Ministry of Health and Welfare, 1999. *White Paper On Pension Reform: The Ground Design of Pension System in 21st Century* (Shakai Hoken Junpou Sha, Tokyo).

Tajika, E., and Kaneko, Y. 1990. "Measuring the Dead Weight Loss of Labor Income Tax and Consumption Tax: The Case for the Japanese Typical Family," *Financial Review*, Research Institute of Ministry of Finance.

Takayama, N. 1984. *Economic Analysis of Income Inequality*, Tokyo: Toyo Keizai Shinpou Sha.

Takayama, N., and Arita, F. 1996. *Savings and The Accumulation of Assets*, Tokyo: Iwanami Shoten.

Bunpei Nishizaki, Yasushi Yamada and Hiroshi Ando. 1997. "The Variation of Japanese Household Income," *Keizai Bunseki: Seisaku Kenkyu no Shiten,* No.11, Economic Planning Agency.

Hatta, T. and Oguchi, N. 1999. *On The Pension Reform Toward Funded System*, Tokyo: Nihon Keizai Shinbunsha.

K. Matsuura and Y. Shigeno. 1996. *Female Labor Supply and the Distribution of Income*, Tokyo: Nihon Hyoron Sha.

Yashiro, N., Oshio, T. and Ii, M. 1997. "The Economic Analysis of Aging," *Economic Analysis*, No.151, Research Institute of Economics, Economic Planning Agency.

Lambert, p. J. 1993. *The Distribution and Redistribution of Income*, Manchester: Manchester University Press.

Lerman, R. and S. Yitzhaki. 1985. "Income Inequality Effects by Income Source: A New Approach and Applications to the United States," *Review of Economics and Statistics*, Vol. 67, 151–156.

———. 1989. "Improving the Accuracy of Estimates of Gini Coefficients," *Journal of Econometrics*, Vol.42, 43–47.

Karoly, L. A. 1994. "Trends in Income Inequality: the Impact of, and Implications for, Tax Policy," in *Tax Progressivity and Income Inequality,* edited by J. B. Slemrod, Cambridge: Cambridge University Press.