

income of the head of household had an especially high degree of contribution, explaining 58.7% of the income difference. The contribution of business income and property income was 22.6% and 13.4%, respectively. That of social security benefits and direct taxes/social insurance premiums was -0.5% and -28.3%, respectively, the latter being a large negative contribution. Employment income had a high degree of contribution in 1994 (80.3%), 2000 (84.3%), and 2003(96.9%) too. For other types of income sources, while the contribution of property income tended to be in stable (14.4% in 1994; 13.4% in 2003), the negative contribution to SCV has been showed in direct taxes and social insurance premiums (-30.9% in 1994; -25.7% in 2003). The contribution to SCV of it would vary considerably with the changes in the tax and social security schemes.¹³

By age group, those from 18 to 64 show a similar tendency to all the age groups, but a unique trend can be observed for those from 65 years and over. While employment income plays the most important role as in other age groups, its degree of contribution in 2006 was 68.0%, which is lower than that of all the age groups by about 25 percentage points. For property income and business income, the degree of contribution in 2006 was 23.9% and 26.8%, respectively, which were higher than those of all the age groups. The contribution of social security benefits and taxes/social insurance premiums was 8.6% and -27.3%, respectively. While the latter has a smaller negative figure than all the age groups by several points, the former is higher than all the age groups by about 9 points. In addition, social security benefits tended to have higher degrees of contribution with other year's data. Behind this is probably the fact that the elderly's main income source is social security benefits, such as public pensions; these benefits have the effect of lessening income difference, but because employees' pension (Kosei Nenkin) has a part of the scheme based on wage during working age, it would increase the difference in the amount of the benefits payment¹⁴.

[Table 3 Decomposition of SCV by type of income in Japan]

(2) Which age group does contribute to income difference in Japan? (From the point of population aging)

The population in Japan has been aging, and elderly people have greater income difference than all the age groups. From these facts, we would be able to say that the elderly has contributed for increasing the income difference considerably. To examine this degree of it quantitatively, we decomposed the MLD, one of the indicators of income difference, into three age groups (0-17, 18-64, 65 and over) and calculated the degree of contribution for each of these age groups.

¹³ In 1986 (before the drastic taxation reform in 1987), the rates of income tax and individual inhabitant tax were divided into 15 and 14 classes, respectively, and the highest rate for the two tax types was 88%. At present, these taxes have 4 and 3 classes, and the highest rate has been reduced to 50%. Reductions in income tax at a fixed rate have also been made, lessening the burden of direct taxes.

¹⁴ The distribution of the amount of the elderly's pensions has a peak in the ¥400 - 600 thousand class, but there are many who receive ¥3 million or more, too (See Ministry of Health and Welfare (2000)).

In the results for 2006, the contribution of those of 65 and over was 29.1% of the MLD, which is greater than the percentage of those aged 65 and over to household members (26.4%). Because that for this age group in 1994 was 20.7% (the percentage of this group in the household: 16.0%), we could say that the more the population aging, the more the income difference in Japan.

By contrast, those between 18 and 64 had the highest degree of contribution in 2006 (56.1%), but it was 61.7% in 1994, showing that the contribution of this age group was on a downward trend. That for those below 18 years declined from 15.9% in 1994 to 12.3% in 2006, reflecting declining birth rates. The reason for this is probably the fact that as the elderly with large income difference increased, their contribution to the entire income difference became greater. Thus, we estimated the degree of contribution of aging and changes in the elderly's income difference to changes in the entire income difference. Of the change in the MLD from 1994 to 2006 of -0.000, 0.013 can be attributed to the population structure (aging) and -0.012, to other factors, including income difference itself. Income difference in Japan has been a stable trend from 1994 to 2006 in MLD, but population aging has some power to increase income difference. We also could get the same results from the decomposition of MLD from 2000 to 2006.

[Figure 3 Decomposition of MLD and Population by age group in Japan]
[Table 4 Decomposition of change in income difference in Japan]

6. Poverty rate in Japan

The existence of income difference means that some of people will fall into poverty. While we have some definitions in measuring poverty, we would examine the trend of the poverty rate with the "poverty rate" defined earlier in this paper. The poverty rate (poverty line = 50% of the median of equivalent adjusted disposable income for each year) in 2006 was 15.7% based on disposable income, which is little higher than 14.9% in 2003, but it has a stable trend from 2000. On the other hand, the poverty rate based on market income (poverty line is the same as above: 50% of the median of equivalent adjusted disposable income for each year) was 28.7% in 2006. The rate was on an upward trend in this case, too: 19.0% in 1994, 23.9% in 2000, and 26.9% in 2003. The results on market income were greater than those on disposable income, and the difference in 2006 was as large as about 13 percentage points. Without the income transfers by taxation and social security schemes, those who would fall into poverty will increase. From another point of view, we could say that taxation and social security schemes have the function to reduce poverty.

The poverty rate was higher among the elderly. The rate on disposable income in 2006 was 13.4% for those from 18 to 64 and 21.7% for those of 65 years and over. They were 11.9% and 23.0% in 1994 and 13.6% and 21.2% in 2000, and 12.3% and 22.0% in 2003, respectively. As these data show, the elderly had higher poverty rates, which was consistent in these years. One

characteristic of the elderly's poverty rate is that there were remarkable differences between the rate on market income basis and that on disposable income. In 2006, the former was 61.5% and the latter, 21.7%, with a difference of about 40 percentage points. Considerable gaps were observed in other year's results, too: 48.8% vs. 23.0% in 1994, 55.4% vs. 21.2% in 2000, and 61.9% vs. 22.0% in 2003. These large differences indicate that the poverty-reducing function of taxation and social security schemes has worked well, especially among the elderly in Japan.

[Table 5 Poverty rate in Japan]

7. Income difference by type of household

In Japan, most of the elderly live together with their son's (or daughter's) family, which is one of the characteristics of the living arrangement of the elderly in Japan.¹⁵ This means that the household structure in Japan has a greater variety than that in other countries. Such household structures will have some influence on the economic status and income difference. Thus, we would like to outline the state of income difference by type of household. We classified the type of household according to the age of the head of household (whether or not the head was 65 and over), the age of household members (whether or not they were 18 and over), and whether or not the household had working members. For example, the household having a head below 65, no child and one working person is one-person household of a young working person¹⁶.

(1) Income levels and the distribution of income by type of household

We can find remarkable differences in income levels by household type. Among the households whose head was younger than 65, equivalent adjusted disposable income per capita was high in the households having an adult, no child and one working person (equivalent to the one-person household of a young working person), in the households having two or more adults, no child and two or more working persons, and in the households having two or more adults, no child and one working person (equivalent to the households of a married couple and to those of a married couple and their parent(s)). Among the households whose head was 65 and over, those having two or more adults and two or more working persons (equivalent to three-generation households having two or more employed persons) had high equivalent adjusted disposable income per capita. The

¹⁵ The "Annual report on Aging Society 2002" describes in a column the results of special tabulation of the data of the "International Comparison Study on the Life and Opinions of the Elderly," conducted in 2001 by the Cabinet Office, for international comparison of the elderly's living arrangement in Japan, South Korea, U.S., Germany and Sweden. According to the column, Japan and South Korea had many three-generation households, but these households were rare in the other countries.

¹⁶ In this paper, working status of the persons was based on the survey items about the working status between employed or self-employed ("Tsutome Ka Jiei ka"). In "one adult and children household", most of them in this household type would be the household member of the one-parent household. But, some of them would be other type of household (eg, the household of the brothers and sisters only).

disposable income of these types of households was ¥2,781 thousand, ¥3,362 thousand, ¥2,705 thousand and ¥2,954 thousand, respectively.

On the other hand, among the households headed by younger than 65, income was low in the households having an adult, no child and no working person (one-person household of a young person without job), in the households having an adult, a child or children and working person (one parent household with job), and in the households having an adult, a child or children and an no working person (one parent household without job). Among the households headed by 65 and above, those having an adult and no working person (equivalent to, for example, one-person household of an elderly without working person, the households composed of an elderly not working person and a child or children (younger than 18)) had low equivalent disposable income per capita. The disposable income of these types of households was ¥1,210 thousand, ¥1,201 thousand, ¥1,085 thousand and ¥1,347 thousand, which are about a half the income of the high-income earning households mentioned above.

Next we would like to look at the distribution of household members according to their income levels by type of household. To describe the results simply, the income levels are classified as follows. Three deciles from the first to third ones of income were regarded as those belonging to the low-income group, those from the fourth to seventh deciles, as those belonging to the medium-income group, and those from the eighth to tenth deciles, as those belonging to the high-income group. Because the deciles of income were divided based on all the age groups, the percentage of the household members is 30% for the low-income group (three deciles), 40% for the medium-income group (four deciles), and 30% for the high-income group (three deciles).

The results show that there are the household structures having many members belonging to the low-income group and those not. Among the households whose head was younger than 65, the households with many low-income members were those having an adult, no child and no working person (one-person household of a young no working person), those having an adult, a child or children and no working person, those having an adult, a child or children and a working person (one parent household), and those having two or more adults, a child or children and no working person (households of not working persons having a child or children). Among the households whose head was 65 years and over, the households with many low-income members were those having an adult and a working person (one-person household of an elderly person or those composed of an elderly person and a child or children (younger than 18)) and those having an adult and no working person (one-person household of no working elderly person or those composed of no working elderly and a child or children (younger than 18)). The percentage of low-income members in these households was about 50-90%.

On the other hand, many high-income members were distributed in the households having two or more adults, no child and two or more working persons and those having two or more adults,

no child and two or more working person (e.g., households of a couple, those of a couple and the husband's (or the wife's) parent or parents) among the households with the head younger than 65, and those having two or more adults and two or more working persons (e.g., three-generation households with two or more working persons) among the households with the head 65 years and above. Thirty to fifty percent of the members of these households belong to the high-income group.

As described above, there are remarkable differences between household types in the income level and income distribution.

[Table 6 Income difference by type of household in Japan (2000)]

(2) Poverty rate by type of household

The poverty rate by type of household based on the poverty line (50% of the median of equivalent adjusted disposable income for each year) of all the age groups is as follows: among the households whose head was younger than 65, the poverty rate on disposable income was very high in the households having an adult, no child and no working person (one-person household of a young not working person), those having an adult, a child or children and no working person, those having an adult, a child or children and one working person (one parent household), and those having two or more adults, a child or children and no working person (households having a child or children and no working person). Among the households whose head is 65 and over, the rate was high in those having an adult and no working person (one-person household of an elderly not working person or households composed of an elderly not working person and a child or children (younger than 18)). The ratio was 61.0%, 54.6%, 52.4%, 37.8% and 49.6%, respectively, suggesting that many members of these households were below the poverty line.

In terms of the poverty rate on market income, poverty rates are more than 50% in many household types. Among the households with the head younger than 65, they were those having an adult, no child and no working person (one-person household of a young not working person), those having an adult, a child or children and no working person, those having an adult, no child and one working person (one parent household), and those having two or more adults, no child and no working person (households having a child or children and no working person). Among the households whose head is 65 years and over, they were all households except for those having two or more adults and two or more working persons (e.g., three-generation households having two or more working persons).

The comparison between the poverty rate on disposable income and that on market income allows us to observe to what degree the poverty-reducing effect of taxation and social security

benefits has worked on each household type. When this effect was measured by checking the difference between the two types of the poverty rate, the difference was negative for all the households whose head was 65 or over, indicating that taxation and social security schemes had the poverty-reducing effect. By contrast, some of the households headed by householder younger than 65 remained to have a high poverty rate on disposable income. They were those having an adult, no child and no working person (one-person household of a young working person), those having two or more adults, with or without child and working person (households having a child or not and working person). This probably suggests that the taxation and social security schemes on cash base has effects in poverty-reduce but to some extent in such households and working persons contribute with paying tax and social security premiums in low income households (Table 7).¹⁷

[Table 7 Poverty rate by type of household in Japan (2000)]

8. Conclusion

The conclusions of this paper could be summarized as follows:

- (1) The Gini coefficient in Japan has increased from 0.321 in 2003 to 0.329 in 2006, and income differences was on a stable trend from 1994 and a little upward trend from 2003. By age group, those aged 65 and over had large income difference than those younger than 65, but their income difference were on a decreasing trend from 1994.
- (2) On the other hand, taxation and social security benefits had the function of income redistribution. This income redistribution function seen from the degree of improvement of the Gini coefficient became higher from year to year from 1994 to 2003 and had a stable trend from 2003. Also, those aged 65 and over had a higher degree of improvement than all the age groups and those younger than 65.
- (3) By the type of income, employment income made the greatest contribution to income difference. The degree of this contribution is large, but that of social transfer is about 10% only for those aged 65 and over. The decomposition of the degree of contribution to income difference by age group shows that the degree of contribution of those aged 65 years and over was over 20%, which was higher than the ratio of this age group to the total number of household members.
- (4) The poverty rate on disposable income was about 15.7% for all the age groups, but was more

¹⁷ "Poverty rate" in this paper is on cash base without in-kind social services from social welfare scheme. Especially, it does NOT include the in-kind social services like childcare, medical services, which are offered well to the one-parent households, non-working households. Some countries offer such services by cash benefit. Therefore, it seems that the level of the poverty rate would be different when in-kind benefit were converted on cash base and included as income. The same would be true in the case of the voucher like "Food Stamp" in the United States. As for these points, there were some arguments in the OECD Joint Conference with University of Maryland "Measuring Poverty, Income Inequality, and Social Exclusion Lessons from Europe" on March in 2009.

than 20% for those aged 65 and over. It has a stable trend from 2000 and a little increase from 2003. On the other hand, the poverty rate on market income was substantially higher than that on disposable income, which indicates that taxation and social security benefits had the poverty-reducing function.

- (5) The observation of income levels by type of household reveals the remarkable differences in income existing between different household types. In particular, one-person households, non-working households and elderly households have higher poverty rates than other type of households. But, the poverty rates on market income in those types of households are higher than those on disposable income. It might mean that taxation and social security scheme (cash benefit only) have poverty reduction on those households to some extent.

This study has found that income difference in Japan tend to become larger from 1994 to 2000, and a stable trend from 2000 to 2006, but a little increase trend from 2003 to 2006. We need to collect and analyze carefully using future data, of course. It also shows that backgrounds of this conclusion are (1) the fact that by the type of income, employment income makes a greater contribution to income difference, and (2) the fact that by age group, the contribution of those aged 65 and over increases with the aging of the population. Many studies have showed that population aging is a background of income difference increase. From 2000 to 2006, it still has a power to increase income difference. We have to note that income difference among the elderly in Japan has been on downward trend from 1994, but it was in a stable trend from 2003 to 2006. So, it is necessary for us to watch a future trend carefully.

While the poverty rate has increased by little from 2003 to 2006, taxation and social security benefits perform the poverty-alleviating function, which works more on the elderly.

However, some types of households (households of not working young generations and those of one parent) are benefited by this function only to some extent. It is because that the benefits from social policy are provided mainly by in-kind scheme to such households, while the main benefits to the elderly are cash benefits like old age pension. As for the elderly cash benefits are included to their income. But, in-kind benefits like childcare service are not included to the income of such households (some countries provide such benefit by cash benefits). If we have seen this result without paying attention to the fact that in-kind social services are is not included, we would like to make evaluation based on the features far from the reality in policy and society in Japan. In that case, we should to use other data relating to in-kind services in addition to the data in this paper.

It is important to promote income guarantee policies for the elderly who have large income difference. But it will also become a more important problem in the future to promote income guarantee and employment policies for the types of people mentioned above. Especially relating to the child poverty, the effectiveness of the new scheme of child allowance system that would be

planned to implement in 2010 by the present government have been discussing now. We might expect the poverty reduction effect at some degree, but it would have other function in addition to the poverty reduction. So, we need many indicators and data to monitor the policy effect from many points of views in the future with it.

Lastly, the economic situation in Japan would not be good in the years to come; we would need the policy scheme to cope with it in the area economic growth, employment creation and protection of living standard of the persons, we suppose.

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ANNEX Figures and Tables

Table 1 Basic Results of the data

	1994	2000	2003	2006	1994-2006
Age structure					
Percentage of the elderly	16.0%	21.0%	24.4%	26.4%	10.4%
Average Household Size	3.03	2.87	2.71	2.66	-0.37
Percentage of those who belonged to the household headed by the elderly	20.5%	26.8%	30.2%	33.1%	12.5%
Equivalent disposable income(Ten thousand Yen, Annual, 1985 Price)					
All ages	291.8	279.2	263.1	260.3	-31.5
18-64	309.9 (106.2%)	298.2 (106.8%)	284.5 (108.2%)	282.1 (108.4%)	-27.8
65+	258.9 (88.7%)	250.5 (89.7%)	227.9 (86.6%)	225.3 (86.6%)	-33.6

Source: The tabulation of the micro-data of "Comprehensive Survey of Living Condition of the People on Health and Welfare (income questionnaires)" by authors under the permission of the Statistic Law.

Note: In the parenthesis, the numbers are the indexes when equivalent disposable incomes of all ages are 100)

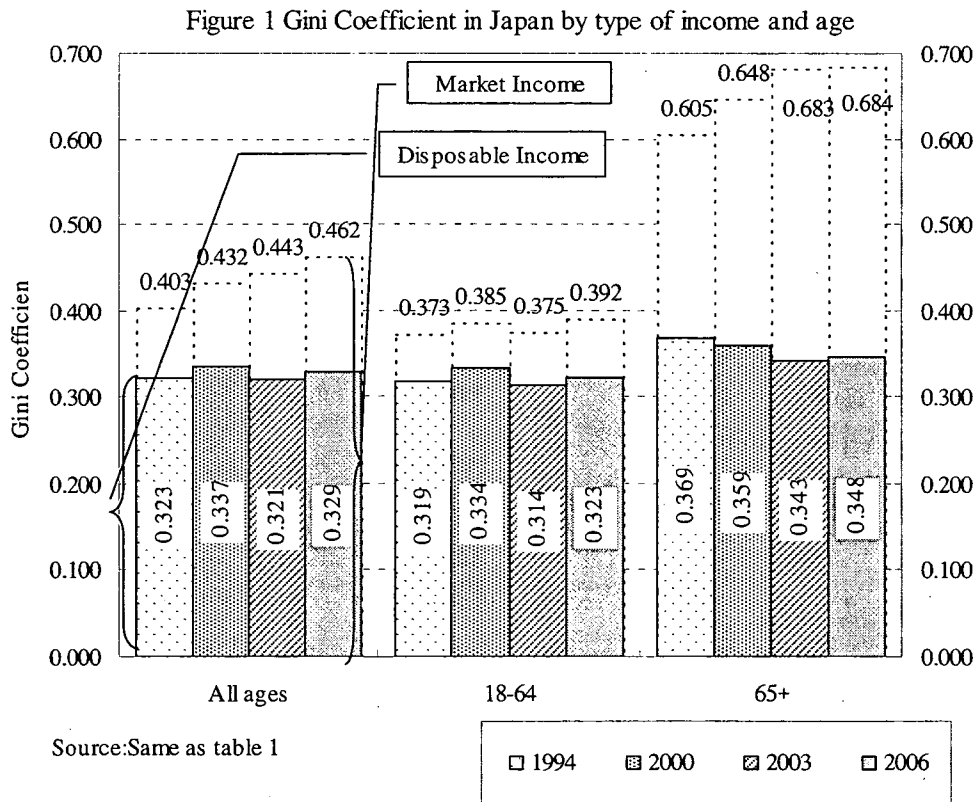
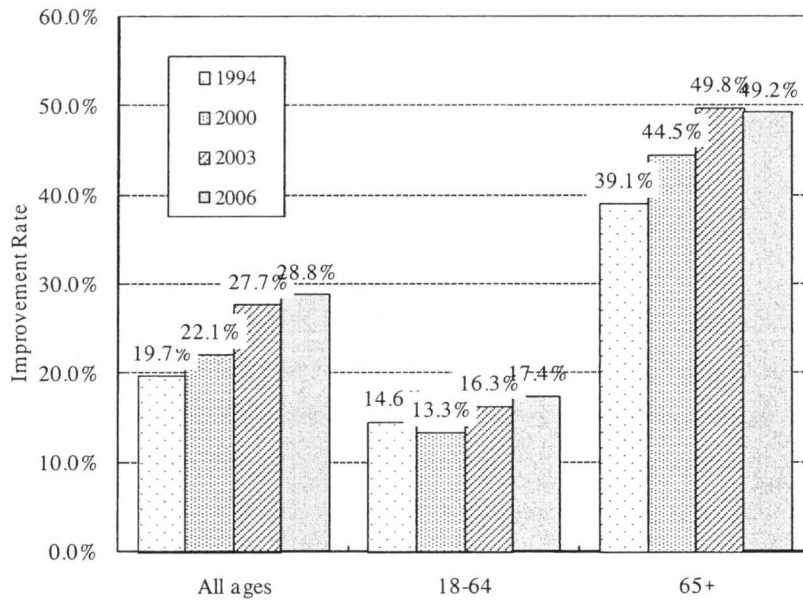


Table 2 MLD & SCV in terms of disposable income in Japan

	1994	2000	2003	2006	1994-2000	2000-2006
MLD						
All ages	0.201	0.227	0.199	0.202	0.025	-0.025
18-64	0.196	0.225	0.193	0.198	0.028	-0.027
65+	0.260	0.253	0.224	0.222	-0.007	-0.031
SCV						
All ages	0.517	0.598	0.412	0.453	0.080	-0.145
18-64	0.506	0.593	0.389	0.428	0.086	-0.165
65+	0.660	0.669	0.507	0.556	0.008	-0.113

Source: Same as table 1

Figure 2 Income redistribution effect in Japan (Improvement rate by age)



Source: Same as table 1

Note: "Improvement Rate" is defined as the rate of change between the Gini index in terms of market income and the index in terms of disposable income.

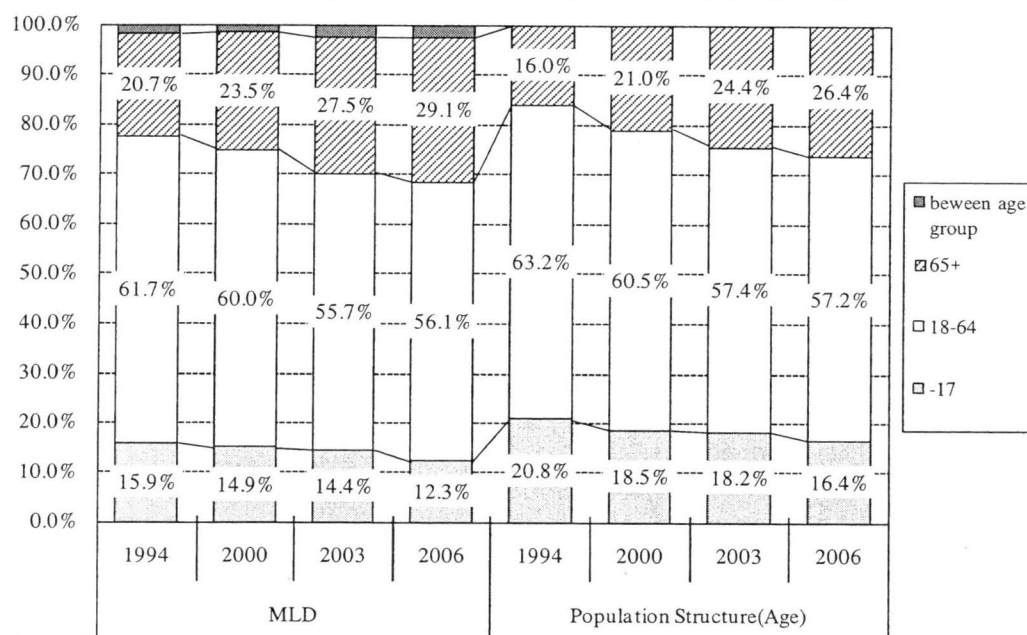
Table 3 Decomposition of SCV by type of income in Japan

		SCV		Employment income			Property income	Business income	Social security benefits	Direct taxes and social insurance premiums	
				Household head	Spouse of head	Others					
All ages	1994	0.517	100.0%	80.3%	50.3%	14.4%	15.7%	14.4%	35.7%	0.5%	-30.9%
	2000	0.598	100.0%	84.3%	56.1%	13.4%	14.8%	14.3%	17.8%	1.0%	-17.4%
	2003	0.412	100.0%	96.9%	61.8%	17.9%	17.2%	13.4%	15.2%	0.2%	-25.7%
	2006	0.453	100.0%	92.7%	58.7%	16.3%	17.7%	13.4%	22.6%	-0.5%	-28.3%
18-64	1994	0.506	100.0%	81.0%	51.3%	14.8%	14.9%	13.4%	36.3%	0.3%	-31.1%
	2000	0.593	100.0%	85.5%	57.3%	13.8%	14.4%	13.7%	17.1%	0.6%	-16.9%
	2003	0.389	100.0%	98.9%	64.9%	18.4%	15.6%	11.6%	15.4%	0.4%	-26.3%
	2006	0.428	100.0%	95.4%	61.5%	17.4%	16.5%	10.8%	22.3%	-0.1%	-28.4%
65+	1994	0.660	100.0%	69.9%	39.0%	11.2%	19.7%	22.7%	33.0%	4.7%	-30.3%
	2000	0.669	100.0%	69.4%	40.5%	11.0%	17.9%	21.9%	22.0%	6.9%	-20.1%
	2003	0.507	100.0%	73.6%	39.1%	12.3%	22.2%	21.7%	17.4%	10.2%	-22.9%
	2006	0.556	100.0%	68.0%	36.5%	10.5%	20.9%	23.9%	26.8%	8.6%	-27.3%

Source: Same as table 1

Note: Numbers of the each type of income is the decomposition analysis result when SCV of the disposable income is 100%.

Figure 3 Decomposition of MLD and Population by age group in Japan



Source: Same as table 1

Table 4 Decomposition of change in income difference in Japan

	Change of MLD	Population structure change	Income difference change
1994→2006	0.000	0.013	-0.012
		2925.5%	-2825.5%
2000→2006	-0.025	0.006	-0.031
		-22.6%	122.6%

Source: Same as table 1

Note: % is the number when total change of MLD is 100%

Table 5 Poverty rate in Japan

	Disposable income				Market income			
	1994	2000	2003	2006	1994	2000	2003	2006
All ages	13.7%	15.3%	14.9%	15.7%	19.0%	23.9%	26.9%	28.7%
-17	12.1%	14.5%	13.7%	14.2%	11.3%	12.9%	12.8%	13.3%
18-64	11.9%	13.6%	12.3%	13.4%	14.0%	16.3%	16.4%	17.9%
65+	23.0%	21.2%	22.0%	21.7%	48.8%	55.4%	61.9%	61.5%

Source: Same as table 1

Note: Poverty rate is the percentage of those whose income below the given income level (poverty line) to the population.

Table 6 Income difference by type of household in Japan (2006)

Age of head	Type of household		Disposable income	% to all members	distribution household members			
	Number of adult and child	working			1st to 3rd decile	4th to 7th decile	8th to 10th decile	
Below 65 years	One adult	No child	With worker	278.1	3.2%			
		No child	No worker	121.0	1.0%			
		With child	With worker	120.1	1.4%			
		With child	No worker	108.5	0.2%			
	Two or more adults	No child	Two or more workers	336.2	19.6%			
			One worker	270.5	6.9%			
			No worker	196.0	1.4%			
		With child	Two or more workers	269.7	20.8%			
			One worker	234.3	12.3%			
			No worker	212.6	0.1%			
65 years and over	One adult	With worker	223.3	0.6%				
		No worker	134.7	3.4%				
	Two or more adults	Two or more workers	295.4	11.8%				
		One worker	221.6	7.7%				
		No worker	188.2	9.5%				

Source: Same as table 1

0% 50% 100%

Table 7 Poverty rate by type of household in Japan(2006)

Age of head	Type of household			Poverty rate		
	Number of adult and child		working	Market income(1)	Disposable income(2)	(2)-(1)
Below 65 years	One adult	No child	With worker	17.4%	18.7%	1.3%
			No worker	77.4%	61.0%	-16.4%
		With child	With worker	58.6%	54.6%	-4.0%
			No worker	79.2%	52.5%	-26.7%
	Two or more adults	No child	Two or more workers	8.1%	8.7%	0.5%
			One worker	22.9%	15.7%	-7.2%
		With child	No worker	70.6%	29.8%	-40.9%
			Two or more workers	7.3%	9.5%	2.3%
		One worker	8.4%	11.0%	2.7%	
		No worker	40.0%	37.8%	-2.2%	
65 years and over	One adult	With worker	61.9%	33.5%	-28.4%	
		No worker	94.2%	49.6%	-44.7%	
	Two or more adults	Two or more workers	27.1%	12.9%	-14.1%	
		One worker	54.6%	19.3%	-35.3%	
		No worker	90.0%	22.1%	-68.0%	

Source: Same as table 1

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「所得・資産・消費と社会保険料・税の関係に着目した
社会保障の給付と負担の在り方に関する研究」
分担研究報告書

**「Income inequality, area-level poverty, perceived aversion to inequality, and
self-rated health in Japan」**

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研究要旨

本研究では、個人レベルの健康に関する主観的評価（SRH：self-rated health）が都道府県レベルの所得格差や貧困とどのような関係にあるかを、「国民生活基礎調査」及び「日本版総合的社会調査」の個票データを用いて実証的に分析した。その結果、所得格差が大きい、あるいは貧困の度合いが高い地域に住む個人ほど、SRH が悪くなる傾向が確認された。なお、所得格差や貧困と SRH との関係は、低所得層の所得分配に敏感な格差指標や、貧困の度合いをより深刻に反映する貧困指標を用いた場合に、より明確に現れる傾向があることも分かった。

A. 研究目的

所得格差と健康の関係をめぐる社会疫学の実証研究は、米国を中心として 1990 年代以降盛んに行われている。しかし、日本では、「国民生活基礎調査」（1995 年）に基づく Shibuya *et al.* (BMJ, 2002) を除けばほとんど行われてこなかった。本研究では、Shibuya *et al.* では明確な形で確認できなかった、所得格差と健康の間のマイナスの関係を、最新のデータに基づいて分析することを目的としている。

(倫理面への配慮)

個票データの扱いについては、細心の注意を払った。特に、「国民生活基礎調査」については、本研究における実証分析及びその基礎となったデータ処理は小塩だけが排他的に行った。さらに、再集計した同調査のデータは回帰計算にのみ用い、その値は一切公表していない。

B. 研究方法

「国民生活基礎調査」（2004 年）〔所得データは 2003 年〕及び「日本版総合的社会調査」（2003 年）をマッチングさせて、個人レベルの SRH と都道府県レベルの所得格差や貧困との関係を分析する。

C. 研究結果

SRH について健康でない場合を 1 とする従来型のロジット分析では、SRH とジニ係数との間には有意な関係は認められないが、順序ロジット分析ではマイナスの有意な関係が認められた。また、その関係は、低所得層の所得分配に敏感な格差指標や、貧困の度合いをより深刻に反映する貧困指標を用いた場合に

より明確に現れる傾向があることも明らかになった。

D. 考察

上記の結果に加えて、格差指標や貧困指標の代わりに、アトキンソン型の社会的厚生指標を用いて、SRH とのマイナスの相関が最も明確となり、しかも回帰式の尤度が最大になる不平等回避度（リスク回避度）を大まかに逆算すると、2 を幾分上回るという結果も得られた。こうした結果は、地域の所得格差そのものが心理的なストレスを高め、それが自らの健康感にマイナスの影響を及ぼすという経路を示唆するものである。

E. 結論

本研究では、日本においても、個人レベルのSRHと都道府県レベルの所得格差や貧困の間にマイナスの相関があることが確認された。この結果は、人々の健康には、平均的な所得・生活水準だけでなく、税や社会保障などを通じた所得再分配の見直しも重要なインパクトを与えることを示唆するものである。

F. 健康危険情報

なし

G. 研究発表

1.論文発表

“Income inequality, area-level poverty,

perceived aversion to inequality, and self-rated health in Japan,” *Social Science & Medicine*, Vol. 69, No.3, pp.317-326, 2009.

2.学会発表

なし

H. 知的所有権の取得状況の出願・登録状況

1.特許取得

なし

2.実用新案登録

なし

3.その他

なし

Income inequality, area-level poverty, perceived aversion to inequality, and self-rated health in Japan

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1. Introduction

The relationship between income inequality and health has been one of the central issues in social epidemiology, and a rich literature examines it empirically. Following an influential paper by Wilkinson (1992), who showed that a more uneven society has a shorter life expectancy, ecological studies pointed out a relationship between income inequality and poor health.

More recently, however, it has become widely recognized that an analysis based solely on area-level data likely fails to disentangle the effects of individual income, gender, education and other factors from the pure effects of area-level income inequality. To address this issue explicitly, many attempts at multilevel analyses have used multilevel data in the form of individual-level health outcomes, sets of individual-level socioeconomic predictors, and area-level income inequality measures.

As comprehensively surveyed by Subramanian and Kawachi (2004) and Wilkinson and Pickett (2006), previous multilevel studies have obtained mixed results, and it is difficult to identify which factors explain their differences. Indeed, a substantial number of studies conducted in the United States point to an association between wide income inequality and poor health, while the results of studies conducted outside the United States tend not to support the income inequality hypothesis.

More generally, there has been no consensus as to why regional inequalities affect health status. In fact, a wide variety of control variables have been used, and it is difficult to distinguish genuine confounders and mediators (Wilkinson & Pickett, 2006). One interpretation emphasizes the stratified access to tangible material conditions, while another interpretation emphasizes the effects of stress stemming from living in an unequal society (Kawachi, Subramanian, & Almeida-Filho, 2002). These two interpretations are not mutually exclusive, nor is it possible to distinguish their effects from one another.

When it comes to empirical studies in Japan, Shibuya, Hashimoto, and Yano (2002) offered the first attempt to perform a multilevel analysis using nationwide data to our knowledge.

Using micro-data from the 1995 Comprehensive Survey of Living Conditions of People on Health and Welfare (CSLCPHW), they found no significant relationship between regional income inequality and self-rated health. It is premature, however, to conclude that income inequality is not a factor in health assessment in Japan, because the authors did not control for various factors which are potentially important but not available from the CSLCPHW. In addition, to our knowledge there has been no multilevel analysis in Japan since Shibuya et al. (2002), making it impossible to conduct any cross-country comparison.¹

Japan may be considered a relatively homogeneous society, with small levels of inequality. In reality, however, the Gini coefficient for Japan is now higher than the OECD average, and the ratio of people with income below the poverty line, which is half of the mean income, ranks in the highest group among the OECD member countries (Förster & Mira d'Ecorle, 2005). In addition, many researchers raise concerns about Japan's trend of widening income inequality (Fukawa & Oshio, 2007; Tachibanaki, 2005). An empirical analysis of the relationship between income inequality and health will potentially have important implications for health care policy as well as income redistribution.

In this paper, we conduct a multilevel analysis in Japan. We basically follow the initial analysis of Shibuya et al. (2002), but extend it in three ways, not only to make the Japanese case more comparable with those of other developed countries, but also to provide new aspects of multilevel analysis.

First, we control for a broad set of factors at both individual and prefecture levels and examine how they affect the observed association between regional income inequalities and self-rated health. In particular, we include individual- and area-level social capital and area-level health capital, both of which can be considered either confounders or mediators. Indeed, there is no rigorous theory that can identify their characteristics, which must be examined by empirical analysis.

To this end, we present estimation results based on one-by-one and step-by-step modeling from non-adjusted to fully adjusted models, as illustrated by Subramanian and Kawachi (2004). This is important because the results have been heterogeneous among studies using various data, variables, and modeling strategies. We examine changes in the value and statistical significance of the odds ratio for reporting poorer health with a sequentially cumulative inclusion of different factors.

Second, we attempt to provide a more precise measurement of income inequality. Most previous studies used the Gini coefficient. This measure is easy to understand intuitively, and Kawachi and Kennedy (1997) showed that the choice of inequality measures does not affect the relationship between income inequality and health. It might be the case, however, that what matters for self-rated health is inequality at the lower end of income distribution or the degree of area-level poverty, rather than overall inequality. We attempt to determine the effect of the choice of inequality measures on the results.

Specifically, we assess six inequality and poverty measures: (i) Gini coefficient, (ii) mean log deviation (MLD), (iii) squared coefficient of variation (SCV), (iv) 90P/10P ratio, (v) 50P/10P ratio, and (vi) 90P/50P ratio. It is widely known that the Gini coefficient is especially

sensitive to the middle of the distribution, while the SCV and the MLD are more sensitive to the top and bottom ends of the distribution, respectively. The 50P/10P and 90P/50P ratios capture income disparity among lower income and higher income individuals, respectively. In addition to these measures, we use some conventional poverty indices (Foster, Greer, & Thorbecke, 1984) and examine how self-rated health is sensitive to area-level poverty as opposed to overall inequality.

Third, we apply the notion of inequality aversion to the association between income inequality and self-rated health. Most of the literature discusses the health effects of income inequalities; however, the attitudes toward inequalities seem to be equally important. While both interpretations are consistent with data, we attempt to examine explicitly how the people's concern regarding inequalities affects self-rated health instead of using the inequality measure as an explanatory variable.

The problem is that we do not have any aggregated indicator that measures people's inequality aversion at a prefecture level. Hence, we construct a synthetic measure of *social welfare*, as proposed by Atkinson (1970), based on an assumed degree of inequality aversion, and search for its most plausible value, maintaining consistency with observed self-rated health. Social welfare, which is a key concept in welfare economics, is assumed to be determined by both levels and distribution of income (see for example, Atkinson & Stiglitz, 1980, Ch.11; Cowell, 2000, for the theoretical background). A higher level of mean income enhances social welfare per se. At the same time, the more inequality averse individuals are, the lower they evaluate a society of unequal distribution. This means that the social welfare function is concave in terms of income; the degree of concavity corresponds to the degree of inequality aversion. We roughly estimate the degree of inequality aversion, based on the observed association between income distribution at a prefecture level and self-rated health.

2. Data and analytic strategy

Data

We utilize two nationwide surveys, the 2004 CSLCPHW and the 2003 Japanese General Social Survey (JGSS). CSLCPHW includes a large sample, and is suitable for calculating regional income distribution; however, it does not contain detailed information about the socioeconomic background of each respondent. JGSS is a relatively compact survey, but provides comprehensive and detailed information about the attitudes and behavior of each respondent. Thus, these two nationwide surveys complement one another.

From the CSLCPHW, we calculate inequality and other measures related to prefecture-level income distribution and poverty in 2003, one year before the survey year. The CSLCPHW is one of major official nationwide surveys and compiled by the Ministry of Labour, Health and Welfare of the Japanese government. It has been used not only by the Japanese government, but also by the OECD as a main data source to calculate income inequality and poverty measures in Japan.

The CSLCPHW randomly selected 2,000 districts from the Population Census divisions, which were stratified in each of 47 prefectures according to population size. Then, all

households in each district were interviewed, and asked questions about the household and its members. The original sample size of the 2004 Survey was 72,485 individuals, who were members of 25,091 households (with a response rate of 70.1 percent).

In this survey, we collected information on household income to calculate income inequality measures and median income for each of 47 prefectures. While both pre-tax and post-tax household incomes are available from the CSLCPHW we focus on pre-tax household following Shibuya et al. (2002).² As in most previous studies, we equalize household income by dividing household income by the root of the number of household members. We use 47 prefectures as regional units and aggregate income and inequality data at prefecture levels. The prefecture is the smallest unit for calculating the Gini coefficient and other contextual indicators using CSLCPHW because the sample size in each municipality, which is one step lower than a prefecture, in the survey data is too small for calculation purposes.

The CSLCPHW includes basic information on each individual—such as household income (for 2003), age, gender, marital status, and self-rated health—which were utilized by Shibuya et al. (2002); however, there is a problem in that it does not provide other important information about each individual. To compensate for this drawback of the CSLCPHW, we also utilize the JGSS, which is conducted by the Institute of Regional Studies at the Osaka University of Commerce in collaboration with the Institute of Social Science at the University of Tokyo.

The JGSS divided Japan into six blocks, and subdivided those according to the population size into three groups: largest cities, other cities, and towns/villages. Next, the JGSS selected 489 locations from each stratum using the Population Census divisions. Then, the JGSS randomly selected 12 to 15 individuals from each survey location. Data are collected through a combination of interviews and self-administered questionnaires. The 2003 survey had 3,633 respondents in total (with a response rate of 60.5 percent), but we focus on the 1,957 of them who were randomly selected to answer *Question Form A*.³ This question form included the questions that were relevant to our analysis. After excluding respondents with missing key variables such as household income, we used the responses of 1,305 individuals.

From this survey, we obtain self-rated health, educational background, smoking and drinking, and subjective assessments about individuals' relationships with the community and other people in 2003. However, the sample size is too small to calculate reliable inequality measures for each prefecture, so we rely on the CSLCPHW to obtain these data. The summary statistics of all variables are presented in Table 1. In what follows, we explain dependent and independent variables used in our empirical analysis.

Self-rated health. Self-rated health is the key dependent variable. The JGSS asks respondents to choose from among 1 (=good), 2, 3, 4 and 5 (=poor) in response to the question: "How would you rate your health condition?" As discussed in the following subsection, we consider three cases: (i) using the original five categories, (ii) dichotomizing the categories into (3, 4, 5) versus (1, 2) and (iii) dichotomizing the categories into (4, 5) versus (1, 2, 3).

Income inequality and area-level poverty measures. We calculate six inequality measures: (i) Gini coefficient, (ii) mean log deviation (MLD) (which is the mean of the difference