Title	Some Analysis of Income Inequality and Individual Health in Japan
Author(s)	Oyama, Masako
Citation	国際公共政策研究. 2017, 22(1), p. 49-56
Version Type	VoR
URL	https://doi.org/10.18910/65092
rights	
Note	

Some Analysis of Income Inequality and Individual Health in Japan[*]

Masako OYAMA[**]

Abstract

The effects of area-level income distribution on individual health and happiness are estimated using nationwide micro-data in Japan. Three measures of income inequality and three measures of health are used in the logit and ordered logit estimations. The estimation results showed that higher income inequality is not associated with health or better health. Also, schooling, marital status, age, gender, smoking and drinking habit, household income, unemployment and trust in others, affected individual health statistically significantly.

Keywords: Income Distribution, Health, Japan

JEL Classification numbers: I14, C2

[**] Associate Professor, Faculty of Economics, Ryukoku University, 67 Tsukamoto-cho, Fukakusa, Fushimi-ku, Kyoto, Japan 612-8577

1. Introduction

In this research, we investigate how area income distribution is associated with individual health and happiness in Japan.　Some existing researches such as Maio (2007, p849) showed that people who live in more unequal area tend to have lower health, and some other researches such as Kawachi and Kennedy (1997, p1121) showed that correlation between income distribution and health is not statistically significant.

In addition, it is also pointed out that in countries other than the U.S., the relationship between income inequality and health is not very clear.　Also, the meta-analysis in Kondo et al. (2009, p1) showed that income inequality was associated with poor self rated health, but studies reviewed were highly heterogenous, which may be due to the existence of a threshold effect of income inequality (Gini≥0.3). or lag effect.

As for the empirical researches in Japan, Oshio and Kobayashi (2009, p.317; 2010, p1358) have shown that regional inequality is associated with poor health.　However, Shibuya et al. (2002, p1) found no significant relationship between inequality and health, and individual income has a stronger association with self rated health at the prefecture level.　The latter finding is more consistent with the results of this research, because the data used in this research does not confirm the negative association between income inequality and health.

This research adds new evidence from analyzing country level micro data in Japan, on the topic of income distribution and health.　The income inequality in Japan has been increasing lately.　Income distribution can affect various economic aspects, including economic growth, individual health and happiness.　In addition, the government can take redistributive policies by changing taxes or subsidies.　Therefore, analyzing the effects of income distribution is important in order to improve people's utility and country's welfare.

2. Data

We utilize the micro data from a nationwide Survey on Decision Making conducted by Kansai University in 2014.　In addition, data of income distribution is obtained from "the National Survey of Family Income and Expenditure, 2009."　From data in 2009, the Gini index of the yearly household pretax income (Gini2009[1]), the Gini index of housing and residential land assets (GiniAsset2009), and the ratio of the pretax income share of the top income decile and the bottom income decile in prefectures (D90_10_2009) are obtained.　These three measures of income distribution are calculated for 47 prefectures in Japan by the Statistics Bureau of the Ministry of Internal Affairs and Communications.

Table1 shows the summary statistics of the data.　Following the research by Oshio and Kobayashi (2009, p319), other variables are as follows.

health

The main dependent variables are the variables on health of individuals in micro data.　We use three variables on self rated health, which is the same as Oshio and Kobayashi (2009, p319).　Kenko5Level takes variable 1(poor) to 5(excellent) about self rated health.　Then, two dichotomous variables are made, which are different in how to categorize the five choices into two.　Kenko2Wide is a dichotomous variable which takes

---

[1] The Gini index has some problem that it cannot distinguish some types of income distributions.　However, it is the most widely used measure income distribution, and used in this research.

1 if self rated health is 3 to 5(excellent), and takes 0 if self rated health is 1(poor) or 2.   Kenko2Narrow is another dichotomous variable which takes 1 if self rated health takes 4 or 5(excellent), and takes 0 if self rated health takes 1(poor) to 3.

Household income

The respondents are asked their own income, their spouse's income, and the income of the other family members, including taxes for the previous year.   These three incomes are added up as the household's income. Then, the household's income is transformed into log, because the relationship between the income and health is non-linear.   These procedure makes a variable called LogHHIncome.

Age, gender, and marital status

Age are categorized into group of 30-49(age30), 50-59(age50), 60 or above(age60).   The base category is age younger than 30.   As for gender, we use a female dummy for one if the respondent is a female.   married is a dummy variable for one if the respondent is married.

Education

We made a dummy variable HighSchool for high school graduates, and another dummy variable College for the graduates from college or beyond.

Prefecture mean income

Another control variable is the mean of the prefecture income, called AverageIncome.

Population aging

The variable Old shows the share of the people who are older than 65 years old in each prefecture.

Smoking and drinking

The variable smoke takes value from 0 to 1, 0 means that the respondent does not smoke, and 1 means that the respondent smokes.   The variable Inshu3Level takes value of 0 to 2, 0 means that the respondent does not drink or seldom drinks, 1 means that the respondents drink less than or equal to 3 days a week, and 2 means that the respondent drinks more than or equal to 4 days in a week.

3. Estimation methods and results

In this research, ordered logit model estimations and logit model estimations are made.   In table2, estimation results with various health variables and the Gini index from "the National Survey of Family Income and Expenditure, 2009" are shown.   In most of the estimation results, the Gini index is not correlated with individual health statistically significantly.   In some estimation results, inequality is weakly and positively correlated with individual health at 10% significance level.

As for the other variables, age, smoking habit and logHHIncome is correlated with individual health statistically significantly.   Particularly, log of the household income is strongly correlated with good health,

measured with Kenko5Level and Kenko2Wide.　　These results that health is more strongly correlated with income levels rather than income inequality is similar to that of the results of the analysis on another Japanese cross-sectional micro data in Shibuya et.al. (2002).

The estimation results in table3 used the Gini indices of household assets.　　Again, in most of these estimations, GiniAsset2009 is not correlated with individual health.　　However, in some estimations with Kenko5Level, inequality of asset is positively correlated with individual health at 5% significance level.

Lastly, table4 shows the estimation results with the ratio of the income share of top 10% people and the income share of the bottom 10% people.　　In most of these estimations, inequality measured by the income share ratio is strongly and positively correlated with individual health.

4.　Conclusion

In this paper, the effect of income inequality on health is estimated.　　Three measure of income inequality and three measures of health are used in estimations.　　In most estimation results, income inequality in prefectures is not associated with individual health, but in some estimation more inequality is associated with better health.　　Individual health is also significantly associated with age, smoking habit, and household income.

References

Kawachi and Kennedy (1997). The relationship of income inequality to mortality: does the choice of indicator matter?, Social Science and Medicine, 45(7): 1121-7.

Kondo, N., Sembajwe G, Kawachi, I, *et al.* (2009). Income inequality, mortality, and self rated health: meta-analysis of multilevel studies, British Medical Journal, 339: b4471

Maio (2007). Income inequality measures, Journal of Epidemiology and Community Health, 61(10), 849-852.

Ohtake, F., Shiraishi S., and Tutui Y. (2010) *Happiness in Japan*. Nihon Hyoronsha. [in Japanese]

Oshio, T. (2014). *How happiness is determined*. Nihon Keizai Shinbun shuppansha, [in Japanese].

Oshio, T. and Kobayashi, M. (2009). Income inequality, area-level poverty, perceived aversion to inequality and self-rated health in Japan, Social Science and Medicine, 69, 317-326.

Oshio, T. and Kobayashi, M. (2010). Income inequality, perceived happiness, and self-rated health: Evidence from nationwide surveys in Japan, Social Science and Medicine, 70, 1358-1366.

Oshio, T. and Urakawa, K. (2014) The Association Between Perceived Income Inequality and Subjective Well-being: Evidence from a Social Survey in Japan. Social Indicator Research,116:755–770.

Shibuya, K., Hashimoto, H., & Yano, E. (2002). Individual income, income distribution, and self rated health in Japan: cross sectional analysis of nationally representative sample. British Medical Journal, 324, 16-19.

Tachibanaki, Toshiaki, 2004, *Sealed Inequality*, Toyo-Keizai-shinposha.

Tachibanaki, Toshiaki, 2006, *Unequal Society – what the problems are－*, Iwanami-shoten

Wilkinson, R. G. (1992). Income distribution and life expectancy. British Medical Journal, 304, 165-168.

Table1: Summary Statistics

	Obs.No.	Mean	Std.Dev.	Min	Max
Gini2009	2172	0.306	0.014	0.274	0.339
GiniAsset2009	2172	0.479	0.067	0.307	0.588
D90_10_2009	2172	6.695	0.907	5.071	8.829
Kenko5Level	2172	2.629	0.986	1	5
Kenko2Wide	2172	0.487	0.500	0	1
Kenko2Narrow	2172	0.206	0.404	0	1
age30	2172	0.394	0.489	0	1
age50	2172	0.205	0.404	0	1
age60	2172	0.231	0.421	0	1
Old	2172	25.740	2.542	19	32
female	2172	0.513	0.500	0	1
married	2172	0.676	0.468	0	1
HighSchool	2172	0.309	0.462	0	1
College	2172	0.462	0.499	0	1
Smoke	2172	0.183	0.387	0	1
Inshu3Level	2172	0.708	0.842	0	2
LogHHIncome	1429	6.379	0.949	1.386	15.538
AverageIncome	2172	3109	603	2102	4508

Table2:Association of Gini and Health variables

VARIABLES	(1) Kenko5Level	(2) Kenko5Level	(3) Kenko5Level	(4) Kenko2Wide	(5) Kenko2Wide	(6) Kenko2Wide	(7) Kenko2Narrow	(8) Kenko2Narrow	(9) Kenko2Narrow
Gini2009	3.681*	3.774*	3.400	4.340*	4.570*	3.880	4.235	3.871	4.252
	(2.079)	(2.086)	(2.434)	(2.483)	(2.492)	(2.914)	(2.803)	(2.811)	(3.292)
age30	-0.397***	-0.396***	-0.414***	-0.356***	-0.355***	-0.371***	-0.580***	-0.583***	-0.598***
	(0.106)	(0.106)	(0.107)	(0.130)	(0.130)	(0.130)	(0.130)	(0.130)	(0.131)
age50	-0.610***	-0.608***	-0.633***	-0.644***	-0.641***	-0.661***	-0.706***	-0.712***	-0.739***
	(0.114)	(0.114)	(0.115)	(0.139)	(0.139)	(0.139)	(0.143)	(0.143)	(0.144)
age60	-0.565***	-0.564***	-0.586***	-0.567***	-0.564***	-0.585***	-0.737***	-0.742***	-0.763***
	(0.112)	(0.112)	(0.112)	(0.136)	(0.136)	(0.136)	(0.139)	(0.140)	(0.141)
Old	-0.0104	-0.00577	0.00701	0.000930	0.0127	0.0268	-0.00878	-0.0246	-0.00502
	(0.0119)	(0.0146)	(0.0182)	(0.0142)	(0.0175)	(0.0218)	(0.0160)	(0.0195)	(0.0248)
female	-0.0391	-0.0397	-0.0477	-0.0374	-0.0390	-0.0458	-0.0188	-0.0164	-0.0299
	(0.0637)	(0.0637)	(0.0638)	(0.0759)	(0.0760)	(0.0763)	(0.0856)	(0.0857)	(0.0862)
married	1.183	1.176	1.218						
	(0.835)	(0.835)	(0.840)						
HighSchool	-0.0909	-0.0908	-0.0875	-0.0426	-0.0426	-0.0389	-0.142	-0.143	-0.138
	(0.0795)	(0.0795)	(0.0796)	(0.0948)	(0.0949)	(0.0952)	(0.108)	(0.108)	(0.108)
College	-0.0188	-0.0195	-0.0314	0.0367	0.0345	0.0201	-0.0315	-0.0291	-0.0456
	(0.0765)	(0.0765)	(0.0769)	(0.0913)	(0.0913)	(0.0919)	(0.101)	(0.101)	(0.102)
Smoke	-0.172**	-0.173**	-0.171**	-0.138	-0.141	-0.139	-0.157	-0.152	-0.151
	(0.0773)	(0.0773)	(0.0776)	(0.0919)	(0.0920)	(0.0924)	(0.107)	(0.108)	(0.108)
Inshu3Level	0.0280	0.0282	0.0250	0.0385	0.0390	0.0364	0.0149	0.0147	0.00574
	(0.0342)	(0.0342)	(0.0344)	(0.0408)	(0.0408)	(0.0409)	(0.0463)	(0.0463)	(0.0466)
LogHHIncome	0.0900***	0.0894***	0.0916***	0.0959***	0.0951***	0.0977***	0.0595	0.0612	0.0624
	(0.0307)	(0.0307)	(0.0307)	(0.0365)	(0.0367)	(0.0368)	(0.0404)	(0.0403)	(0.0403)
AverageIncome		3.29e-05	6.45e-05		8.26e-05	0.000101		-0.000114	-8.39e-05
		(6.06e-05)	(6.63e-05)		(7.24e-05)	(7.94e-05)		(8.03e-05)	(8.75e-05)
Tohoku			-0.182			-0.0939			-0.235
			(0.177)			(0.211)			(0.243)
Kanto			0.0692			0.154			0.0750
			(0.149)			(0.177)			(0.201)
Chubu			-0.0960			-0.0278			-0.269
			(0.145)			(0.173)			(0.201)
Kinki			0.101			0.179			-0.0254
			(0.147)			(0.175)			(0.201)
ChugokuShikoku			0.0551			0.0952			0.0438
			(0.167)			(0.199)			(0.226)
Kyushu			0.156			0.175			0.0971
			(0.172)			(0.205)			(0.230)
Constant				-1.489	-2.110*	-2.408*	-1.576	-0.716	-1.376
				(0.988)	(1.128)	(1.272)	(1.114)	(1.266)	(1.438)
Observations	1,429	1,429	1,429	1,427	1,427	1,427	1,427	1,427	1,427

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table3. Association of GiniAsset2009 and Health variables

VARIABLES	(1) Kenko5Level	(2) Kenko5Level	(3) Kenko5Level	(4) Kenko2Wide	(5) Kenko2Wide	(6) Kenko2Wide	(7) Kenko2Narrow	(8) Kenko2Narrow	(9) Kenko2Narrow
GiniAsset2009	1.182**	1.180**	0.343	0.974	0.879	0.545	1.274	1.546*	1.218
	(0.576)	(0.586)	(0.847)	(0.688)	(0.700)	(0.866)	(0.784)	(0.799)	(0.999)
age30	-0.412***	-0.412***	-0.417***	-0.368***	-0.367***	-0.379***	-0.597***	-0.602***	-0.609***
	(0.107)	(0.107)	(0.107)	(0.130)	(0.130)	(0.130)	(0.130)	(0.130)	(0.131)
age50	-0.622***	-0.622***	-0.634***	-0.654***	-0.652***	-0.665***	-0.720***	-0.730***	-0.747***
	(0.114)	(0.114)	(0.115)	(0.139)	(0.139)	(0.139)	(0.143)	(0.143)	(0.144)
age60	-0.582***	-0.582***	-0.589***	-0.580***	-0.578***	-0.591***	-0.757***	-0.767***	-0.777***
	(0.112)	(0.112)	(0.113)	(0.136)	(0.136)	(0.136)	(0.140)	(0.140)	(0.141)
Old	0.00298	0.00313	0.0118	0.00948	0.0154	0.0275	0.00504	-0.0107	0.00654
	(0.0149)	(0.0163)	(0.0217)	(0.0178)	(0.0195)	(0.0259)	(0.0202)	(0.0218)	(0.0296)
female	-0.0433	-0.0434	-0.0482	-0.0406	-0.0413	-0.0465	-0.0230	-0.0210	-0.0321
	(0.0637)	(0.0637)	(0.0638)	(0.0759)	(0.0760)	(0.0762)	(0.0857)	(0.0858)	(0.0861)
married	1.256	1.255	1.219						
	(0.831)	(0.831)	(0.840)						
HighSchool	-0.0824	-0.0824	-0.0870	-0.0323	-0.0319	-0.0339	-0.131	-0.133	-0.134
	(0.0794)	(0.0794)	(0.0797)	(0.0946)	(0.0947)	(0.0950)	(0.108)	(0.108)	(0.108)
College	-0.0182	-0.0183	-0.0324	0.0394	0.0386	0.0207	-0.0308	-0.0297	-0.0493
	(0.0765)	(0.0765)	(0.0769)	(0.0912)	(0.0912)	(0.0919)	(0.101)	(0.101)	(0.102)
Smoke	-0.170**	-0.170**	-0.171**	-0.132	-0.133	-0.131	-0.156	-0.153	-0.147
	(0.0772)	(0.0772)	(0.0776)	(0.0918)	(0.0918)	(0.0922)	(0.107)	(0.108)	(0.108)
Inshu3Level	0.0267	0.0268	0.0248	0.0374	0.0379	0.0361	0.0130	0.0121	0.00469
	(0.0342)	(0.0343)	(0.0344)	(0.0408)	(0.0408)	(0.0409)	(0.0463)	(0.0464)	(0.0466)
LogHHIncome	0.0877***	0.0877***	0.0912***	0.0937**	0.0932**	0.0966***	0.0568	0.0591	0.0600
	(0.0307)	(0.0307)	(0.0307)	(0.0366)	(0.0366)	(0.0368)	(0.0404)	(0.0403)	(0.0404)
AverageIncome		1.46e-06	5.09e-05		5.53e-05	7.79e-05		-0.000152*	-0.000132
		(6.14e-05)	(7.42e-05)		(7.34e-05)	(8.61e-05)		(8.11e-05)	(9.54e-05)
Tohoku			-0.145			0.0562			-0.0388
			(0.199)			(0.195)			(0.226)
Kanto			0.106			0.260			0.239
			(0.175)			(0.184)			(0.210)
Chubu			-0.0546			0.0868			-0.0867
			(0.178)			(0.184)			(0.213)
Kinki			0.124			0.286*			0.106
			(0.157)			(0.162)			(0.184)
ChugokuShikoku			0.0711			0.188			0.152
			(0.172)			(0.188)			(0.212)
Kyushu			0.178			0.295			0.237
			(0.181)			(0.187)			(0.210)
Constant				-0.825	-1.101	-1.524	-1.213	-0.478	-0.925
				(0.764)	(0.848)	(1.067)	(0.863)	(0.947)	(1.211)
Observations	1,429	1,429	1,429	1,427	1,427	1,427	1,427	1,427	1,427

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table4. Association of the Deciles Share and Health Variables

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
VARIABLES	Kenko5Level	Kenko5Level	Kenko5Level	Kenko2Wide	Kenko2Wide	Kenko2Wide	Kenko2Narrow	Kenko2Narrow	Kenko2Narrow
D90_10_2009	0.0878***	0.0910***	0.0915	0.0857**	0.0923**	0.0612	0.118***	0.111**	0.100*
	(0.0336)	(0.0339)	(0.0908)	(0.0402)	(0.0406)	(0.0473)	(0.0448)	(0.0452)	(0.0533)
age30	-0.407***	-0.407***	-0.422***	-0.366***	-0.365***	-0.377***	-0.594***	-0.595***	-0.605***
	(0.106)	(0.106)	(0.107)	(0.130)	(0.130)	(0.130)	(0.130)	(0.130)	(0.131)
age50	-0.618***	-0.617***	-0.639***	-0.652***	-0.650***	-0.666***	-0.718***	-0.723***	-0.746***
	(0.114)	(0.114)	(0.115)	(0.139)	(0.139)	(0.139)	(0.143)	(0.143)	(0.144)
age60	-0.579***	-0.578***	-0.596***	-0.579***	-0.578***	-0.592***	-0.757***	-0.760***	-0.775***
	(0.112)	(0.112)	(0.113)	(0.136)	(0.136)	(0.136)	(0.140)	(0.140)	(0.141)
Old	-0.00652	-3.81e-05	0.00645	0.00336	0.0169	0.0253	-0.00219	-0.0161	-0.00234
	(0.0119)	(0.0149)	(0.0183)	(0.0143)	(0.0178)	(0.0215)	(0.0161)	(0.0198)	(0.0245)
female	-0.0414	-0.0424	-0.0488	-0.0397	-0.0417	-0.0466	-0.0224	-0.0202	-0.0314
	(0.0637)	(0.0637)	(0.0638)	(0.0760)	(0.0760)	(0.0763)	(0.0858)	(0.0858)	(0.0862)
married	1.175	1.165	1.207						
	(0.835)	(0.835)	(0.839)						
HighSchool	-0.0920	-0.0920	-0.0878	-0.0417	-0.0418	-0.0382	-0.147	-0.148	-0.142
	(0.0795)	(0.0795)	(0.0796)	(0.0948)	(0.0948)	(0.0951)	(0.108)	(0.108)	(0.108)
College	-0.0238	-0.0248	-0.0336	0.0332	0.0304	0.0191	-0.0424	-0.0399	-0.0509
	(0.0766)	(0.0766)	(0.0769)	(0.0913)	(0.0914)	(0.0919)	(0.101)	(0.101)	(0.102)
Smoke	-0.174**	-0.176**	-0.168**	-0.138	-0.141	-0.136	-0.163	-0.158	-0.152
	(0.0772)	(0.0773)	(0.0776)	(0.0919)	(0.0920)	(0.0923)	(0.108)	(0.108)	(0.108)
Inshu3Level	0.0260	0.0263	0.0237	0.0365	0.0369	0.0355	0.0116	0.0116	0.00383
	(0.0343)	(0.0343)	(0.0344)	(0.0408)	(0.0408)	(0.0410)	(0.0464)	(0.0464)	(0.0467)
LogHHIncome	0.0908***	0.0900***	0.0911***	0.0964***	0.0955***	0.0973***	0.0611	0.0625	0.0625
	(0.0307)	(0.0307)	(0.0307)	(0.0365)	(0.0367)	(0.0368)	(0.0404)	(0.0404)	(0.0403)
AverageIncome		4.47e-05	6.42e-05		9.29e-05	0.000101		-9.79e-05	-8.35e-05
		(6.09e-05)	(6.63e-05)		(7.28e-05)	(7.94e-05)		(8.06e-05)	(8.74e-05)
Tohoku			-0.128			-0.0431			-0.219
			(0.185)			(0.198)			(0.229)
Kanto			0.0755			0.165			0.0620
			(0.149)			(0.175)			(0.199)
Chubu			-0.0511			0.0100			-0.241
			(0.152)			(0.167)			(0.194)
Kinki			0.0934			0.186			-0.0680
			(0.147)			(0.174)			(0.200)
ChugokuShikoku			0.0916			0.131			0.0516
			(0.171)			(0.192)			(0.218)
Kyushu			0.155			0.188			0.0576
			(0.172)			(0.202)			(0.226)
Constant				-0.787	-1.458*	-1.601*	-1.227*	-0.527	-0.793
				(0.599)	(0.798)	(0.874)	(0.668)	(0.881)	(0.982)
Observations	1,429	1,429	1,429	1,427	1,427	1,427	1,427	1,427	1,427

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1