Measuring the rural-urban disparity with GDP, ISEW and subjective well-being: A case study in Japan

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Abstract

Japan, often have been regarded as one of the most equal societies, now faces increasing rural-urban disparity. However, even if the wages and income level of rural populations are lower than that of urban, people remain in the rural areas or, in some cases, return. These facts imply that some factors other than economic ones like income influence on peoples' migration behaviour. Therefore it is necessary to measure the rural-urban disparity in Japan and that an alternative indicator other than an economic one is required to measure this disparity. Recent research has shown that SWB, elicited in survey, can serve as an empirical proxy for people's experienced utility. Additionally, the Index of Sustainable Economic Welfare (ISEW) is also regarded as an alternative indicator to GDP. However, their application to rural-urban disparity issues is as yet rather limited.

This paper aims to measure rural-urban disparity in Japan with three different indicators: GDP, Index of Sustainable Economic Welfare (ISEW) and SWB, and analyse how the results differ. The analysis of this study contributes to provide useful information on rural and urban divide from multiple points of view. Also it can help to understand the characteristics of each indicator.

The results show that (1) rural-urban disparity is observed when measured by GDP and ISEW, it is not observed by looking at SWB. (2) the volume of the disparity heavily depends on the indicator applied, and (3) various factors other than economic one affect to SWB particularly for rural residents. From these results, we conclude that the rural-urban disparity measured only by economy based indicators like GDP and ISEW can provide incomplete information on rural-urban divide: it should be measured by not only these indicators also by SWB. These findings imply that once the effects of SWB promotion policies are measured by objective indicator like ISEW, it may cause misunderstanding of the effects.

Keywords

Rural-urban disparity, GDP, ISEW, Subjective well-being, Japan

1. Introduction

In according to the classical theory of economic growth, income gap between rural and urban enlarges as economic grows, and workforce migrates from rural to urban, and then the disparity between rural and urban enlarges. Many studies have proved its evidence with various points of view such as economics, demography, and sociology (Kuznets, 1955, Tsui, 1998, Sahn, et al., 2003). Japan, often regarded as one of the most equal societies, now faces increasing rural-urban disparity as a result of the collapse of the so-called "bubble economy" of the early 1990s and "Abenomics" (economic policies in Japan named after the prime minister), started in 2012, which mainly focuses on large firms and urban economy. However, even if the wages and income level of rural populations are lower than that of urban, people will remain in the rural areas or, in some cases, return. The amenity of rural areas is now being recognized once again, and some people in urban area turnover to rural area looking for good living environment. These facts imply that it is necessary to measure the rural-urban disparity in Japan and that an alternative indicator other than an economic one is required to measure this disparity.

So far, there have been many studies which evaluate well-being of specific areas (Di Tella and MacCulloch, 2008, Alesina, et al., 2004), but these objective indicators are often criticized that they are not reflecting residents' subjective well-being (SWB) properly (Neumayer, 1999, 2000, Dasgupta, 2009). In addition, most of these studies mainly focus on interregional comparison of the well-being. Little attention has been given to rural and urban comparison and disparity between these two areas. While traditional economic models make the assumption that utility is equivalent to consumption, that is, income is an adequate measure of well-being, recent research has shown that stated happiness- or SWB, elicited in survey, can serve as an empirical proxy for people's experienced utility. However, their application to rural-urban disparity issues is as yet rather limited. The Index of Sustainable Economic Welfare (ISEW) is also regarded as an alternative indicator to GDP. The ISEW takes into account income inequality, cost of environmental damage and resource depletion as negative contributions to welfare, and the value of unpaid household and volunteer work as positive contributions. The ISEW is considered a more relevant indicator than the GDP for measuring national or regional welfare. However, their application to rural-urban disparity issues is also rather limited.

This paper aims to measure rural-urban disparity in Japan with three different indicators: GDP, Index of Sustainable Economic Welfare (ISEW) and SWB, and analyse how the results differ. To clarify the difference of the results can provide important implication on the design of SWB promotion policy. The analysis of this study contributes to provide useful information on rural and urban divide from various points of view. Also it can help to understand the characteristics of each indicator.

2. Three different indicators

GDP is an indicator in the System of National Accounts (SNA) to measure the volume of economic activity to produce goods and services in a nation or a region during a specific period (normally one or a half or a quarter year). It is regarded as an adequate indicator to understand the size of economy. However, GDP is not suitable for capturing economic welfare because GDP neglects some factors. Clarke and Lawn (2008) point out following five drawbacks of GDP (Clarke and Lawn, 2008, p.574):

- GDP ignores many of the benefits from economic activities
- Although manmade capital enjoyed in future years, GDP counts it as current benefit
- GDP counts some of the costs of economic activity as benefits
- GDP does not take cost of natural resource depletion into account
- GDP fails to take into account the impacts on welfare by change in income distribution, unemployment, and foreign debt level

To overcome these problems, the ISEW was originally developed by Daly and Cobb (Daly and Cobb, 1989) for the purpose of understanding economic welfare, which is neglected by the GDP (Cobb and Cobb, 1994). The ISEW is based on private final consumption, and some expenditures and costs are added or subtracted depending on whether they contribute to welfare positively or negatively. The ISEW takes into account income inequality, cost of environmental damage and resource depletion as negative contributions to welfare, and the value of unpaid household and volunteer work as positive contributions. The ISEW is considered a more relevant indicator than the GDP for measuring national or regional welfare. In this study, ISEW is regarded as an adjusted economic indicator to measure rural-urban disparity.

On the other hand, there are some indicators to measure people's SWB. Nonetheless, the use of subjective indicators of well-being as measures of utility can help clarify the relationships between income and other variables such as living environment (natural capital and social capital), individual's behavioural attitudes and several experience/knowledge in relation to rural environment, so that they may be used in designing policy measures. There are indeed studies that provide evidence that individuals with higher income have higher average levels of SWB (Diener et al., 1995; Inglehart, 1990). On the other hand, once basic needs have been satisfied as higher income is no longer associated with higher in SWB (Di Tella and MacCulloch, 2008). We assess the validity of this claim in comparisons of rural and urban residents to understand the determinants of individual's happiness.

In this study, GDP is regarded as an economic indicator and ISEW as welfare-adjusted economic indicator. As these indicators are estimated by national or regional statistics and data, they do not necessarily reflect individual's SWB. Therefore, we will compare the results from GDP and ISEW with SWB to understand how they differ. But, one should note that the GDP and ISEW can be observed over time, but SWB is only observed at a time when a survey was conducted.

3. Analysis

3.1 ISEW

To estimate ISEW in rural and urban in this study, all areas in Japan have to be classified into rural and urban. Classification of rural is always controversial. Particularly in Japan, border between rural and urban is quite unclear because there are urban sprawl phenomena in all over Japan. Distinguishing rural and urban areas strictly should be done at the community level or, at least, the town or village level. According to the Japanese “Classification of Agricultural Area” by MAFF (Ministry of Agriculture, Forestry and Fisheries) statistics, “rural areas” refer to areas which are not “urban areas”. For the MAFF methodology, the former municipalities are used as a unit for classification (prior to the “Heisei Municipalities Merger”, there were approximately 3300 municipalities in Japan). However, in most cases, as data and information required for ISEW estimation can only be obtained at a much higher level, such as county or prefecture, it is quite difficult to estimate the ISEW at the community, town, or village level. According to the previous study (Clarke and Lawn, 2008, Posner and Costanza, 2011), ISEW is applicable to until a county level. Therefore, in this analysis, the distinction between rural and urban is made at the prefectural level considering data availability. All 47 prefectures were investigated, whether categorized as rural or urban, using specific criteria.

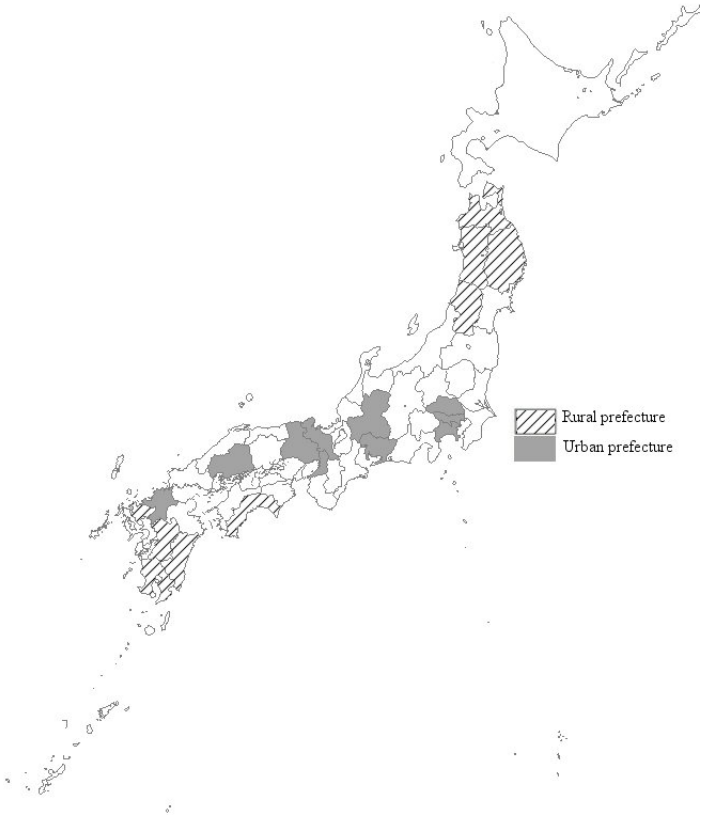

Fig. 1. Rural and urban prefectures

To take locality, chronology, and data availability into account, we use shares of both the GDP and the primary sector's workforce (agriculture, forestry, and fisheries) for distinction. The GDP share is the most appropriate because time series GDP data is available, which allows me to consider time series variation. Also, the workforce share is useful because the data is available for each year since the 1970's at the prefectural level. All of Japan's 47 prefectures are grouped into three areas: rural, urban, and intermediate. We used the following steps in our classification:

(1) The GDP and workforce share of the primary sector for each prefecture were estimated for every five years from 1975 to 2005 (1975, 1980, 1985, 1990, 1995, 2000, and 2005), and all prefectures were listed in ascending order respectively.

(2) The highest 15 prefectures in both shares were selected at each time point.

(3) The prefectures selected in the highest 15 at all seven time points were grouped into the rural prefectures and the lowest 15 prefectures at all seven time points were grouped into the urban prefectures.

As a result, nine (Aomori, Akita, Iwate, Yamagata, Kochi, Saga, Kumamoto, Miyazaki, and Kagoshima) out of the 47 prefectures were categorized as rural and ten (Saitama, Tokyo, Kanagawa, Gifu, Aichi, Kyoto, Osaka, Kobe, Hiroshima, and Fukuoka) were urban (Figure 1). The OECD also conducted the classification of rural and urban area in Japan. For the OECD methodology, prefectures are used as a unit for classification. Both methodologies are mainly based on the population density of the unit area (OECD, 2009). The OECD's classification is quiet similar to those of us: 14 Prefectures are categorised into rural, 12 into urban and 21 into intermediate.

The ISEW of the selected 19 prefectures were individually estimated and then aggregated with the nine rural and ten urban prefectures, respectively. The estimated period was from 1975 to 2008. The items taken into account in ISEW are chosen based on the Belgic ISEW study (Bleys, 2008), in addition, in order to consider data availability in Japan, we also refer to the Japanese study of ISEW (Makino, 2008, Table 1).

Methodologies and data sources used for the calculation are summarized in Table 2. The Annual Report on Prefectural Accounts published by the Cabinet Office of the Government of Japan contains household final consumption expenditure data from 1975 to 2008 for each prefecture. Figures are adjusted to 2000 values. These expenditures are weighted by income inequality measured by the Atkinson Index (Atkinson, 1970), which is the current dominant methodology for adjusting income inequality (Bleys, 2008, Pulselli et al., 2006, Clarke and Islam, 2005).

Table 1 Items evaluated in the ISEW

Items	Welfare contributio	This study	Bleys(2008)	Makino(2008)
Private final consumption	+	✓	✓	✓
Welfare loss caused by income inequality	−	✓	✓	✓
Value of household labour	+	✓	✓	✓
Value of volunteer work	+	✓		✓
Service from consumer durable goods	+	✓	✓	✓
Expenditure on consumer durable goods	−	✓	✓	✓
Public expenditure on medical and education services	+	✓	✓	✓
Benefit from governmental infrastructure services	+	✓		✓
Private expenditure on medical and education services	−	✓	✓	
Cost of commuting	−	✓	✓	
Cost of private pollution control	−		✓	
Cost of car accidents	−	✓	✓	
Cost of un- and under employment	−			✓
Cost of overtime work	−			✓
Cost of crime	−			✓
Cost of family breakdown	−			✓
Cost of water pollution	−		✓	✓
Cost of air pollution	−		✓	✓
Cost of noise pollution	−		✓	
Cost of farmland loss*	−	✓	✓	✓
Cost of nonrenewable resource depletion	−		✓	✓
Cost of climate change	−	✓	✓	✓
Cost of ozone depletion	−		✓	
Net capital growth	+/−	✓	✓	
Change in net international position	+/−		✓	✓

*Methodology of estimation of cost of farmland loss is revised from Bleys (2008) and Makino (2008).

Table 2 Summary of calculation methodologies for rural and urban ISEW

Items	Welfare contribution	Methodology	Data source
Private final consumption	+	Use original data	Economic and Social Research Institute (2011a)
Welfare loss caused by income inequality	−	Apply Atkinson Index (Atkinson, 1970).	Data on share of household by income-class is obtained from the "Comprehensive survey of living conditions" conducted by the Ministry of Health, Labour and Welfare
Value of household labour	+	Time spent for household labour and volunteer work multiplied by average wage (2000 value)	"Basic survey of society and living" conducted by Statistics Bureau
Value of volunteer work	+		
Expenditure on consumer durable goods	−	Straight-line depreciation method with five years duration Figures are adjusted to 2000 value	Economic and Social Research Institute (2011b)
Service from consumer durable goods	+		

Table 2 Summary of calculation methodologies for rural and urban ISEW (Cont'd)

Items	Welfare contribution	Methodology	Data source
Public expenditure on medical and education services	+	According to Bleys (2008), 50% of public expenditure on education and medical services is subtracted regarding defensive expenditure	"Survey on regional education cost" conducted by the Ministry of Education, Culture, Sports, Science and Technology "Survey on national medical cost" conducted by the Ministry of Health, Labour and Welfare
Benefit from governmental infrastructure service	+	Road service (except toll roads), schools, and social education facilities are considered public services	"Estimation of stock of social infrastructure" conducted by the Cabinet Office
Private expenditure on medical and education services	−	Cost of medical services and cost of commuter passes for railroads and buses	Ministry of General Affairs and Communications (2011)
Cost of commuting	−		
Cost of car accidents	−	Number of fatalities and injuries caused by car accidents multiplied by value of loss caused by car accidents per dead/injured person	CAO (2011a) and Police Department (2011)
Cost of farmland loss	−	The volume of arable lands multiplied by monetary value of multifunctionality of arable land	MAFF (2011), Science Council of Japan (2001)
Cost of climate change	−	Cost of greenhouse gas emission estimated from amount of CO_2 emission multiplied by price of CO_2	Price of CO_2 is assumed to be 2000 JPY/ton at 2000 value The amount of CO_2 emission is originally estimated in this study according to IPCC methodologies
Net capital growth	+/−	Change in per capita capital formation is subtracted from the value of new investment	Economic and Social Research Institute (2011a)

3.2 GDP

Along with ISEW, GDP is also calculated in 9 rural and 10 urban prefectures. Estimation period is also the same as ISEW (1975-2008). The GDP data was referred from the Annual Report on Prefectural Accounts (Economic and Social Research Institute, 2011a), and figures are adjusted to 2000 values.

3.3 SWB

For the empirical analysis, we conducted an internet survey where data on individual SWB plus information on demographic and socio-economic characteristics are asked. Japanese consumer monitoring company, whose total number of registered subjects is around 2.3 million, conducted the survey. The survey randomly selected respondents on the basis of demographics of each prefecture by noting the population, sex, and age ratios mirrored the Japanese census statistics. This survey was

carried out in October 2014, with a total of 1,500 observations involving persons aged 20 to 64 in overall Japan. Information on SWB is obtained by asking individuals the following question: “how satisfied would you say you are with your life these days?” Respondents can choose from an ordinal scale of 0 to10, where 0 means very dissatisfied and 10 means very satisfied. Only data of residents in 9 of rural and 10 of urban prefectures, defined in earlier mentioned ISEW analysis, are used, and the results are aggregated to rural and urban prefectures respectively. The explanatory variables at the individual level include demographic and socio-economic characteristics that have been found in previous studies to have an impact on SWB (cf. household income, age, children gender, marital status, health status, future prospect and economic preference).

In addition to these fundamental questions on SWB and socio-economic elements, there are several specific questions in relation to rural characteristics to capture the difference in the elements which affect SWB for rural and urban residents, which include engagement with the conservation of multifunctionality (natural capital) and degree of social capital. Engagement with natural capital includes question of knowledge/conservation attitude for multifunctionality and frequency to participate direct and indirect activities for rural conservation. Questions in relation to social capital consist of degree of participation to religious service, number of trustable person, degree of government and degree of norms of reciprocity which are selected based on a policy report focusing on social capital in rural area (MAFF, 2007).

We could also include geographic characteristics of each respondent in the analysis, since we specified respondent’s residential area by their postal code which was also obtained in the questionnaire. The first one is the degree of Satoyama Index (SI) of respondent's resident area (10km×10km). SI could be a proxy indicator to capture the richness of the secondary nature, because "a high SI value is an indicator of high habitat diversity, which is characteristic of traditional agricultural systems, including Japanese satoyama landscapes[1], while a low value indicates a monotonic habitat condition typical of extensive monoculture landscapes" (Kadoya and Washitani, 2011). As the second one, we adopt the estimation of young women (aged 20 to 39) population decrease rate in the respondent's municipalities as a reproduction rate base on the calculation by National Institute of Population and Social Security Research, Japan. Because aging and decrease on a fertility rates is serious problem in Japanese society, which could affect SWB. As Masuda (2014) pointed out as long as the population of these females is continually declining, the population reproduction power continues to fall. The Descriptive statistics of the entire sample are shown in Table 3.

[1] Satoyama is a mountainous area which is affected by human activities as a result of the formation of rural communities close to mountains.

Table 3 Difinition of variables and descriptive statistics

Variable	Difinition	Mean	Max	Min	Std. Dev	Observation
SWB	Reported current life satisfaction (happiness) by integers from 0 to 10. Based on the following survey question; “Overall, how happy are you these days?” The respondent is to choose from a scale of 0 to 10, where 0 is "very unhappy", 5 "neither happy nor unhappy" and 10 is "very happy"	5.823	10	0	2.230	1500
Male	Dammy variable=1 if respondent is male	0.501	1	0	0.500	1500
Age	Age of respondents in year	43.147	64	20	12.508	1500
Age squared/100	Age of respondents in year squared/100	20.180	40.96	4	10.843	1500
Employed	Dummy variable=1 if respondent is employed	0.647	1	0	0.478	1500
Unemployed/seeking	Dummy variable=1 if respondent is currently unemployed and seeking job	0.066	1	0	0.248	1500
Student/Housework	Dummy variable=1 if respondent performs home duties or students	0.219	1	0	0.413	1500
Married	Dummy variable=1 if respondent is legally married	0.590	1	0	0.492	1500
Separated/divorced	Dummy variable=1 if respondent is separated or divirced	0.060	1	0	0.238	1500
Children	Dummy variable=1 if respondent has children	0.506	1	0	0.500	1500
Very good health	Dummy variable=1 if respondent's health condition is very good	0.108	1	0	0.310	1500
Good health	Dummy variable=1 if respondent's health condition is good	0.624	1	0	0.485	1500
Ln(income)	Natural log of household income	6.137	7.65	3.91	0.770	1246
Ln(asset)	Natural log of household asset	6.956	9.90	4.83	1.474	861
Relative income	Dummy variable=1 if respondent thinks their income is higher than neighborhood	0.341	1	0	0.474	1500
Citizen in urban	Dummy variable=1 if respondent is considerd to reside in urban area based on respondent's subjective view	0.287	1	0	0.452	1500
Citizen in midurban	Dummy variable=1 if respondent is considered to reside in relatively urban area based on respondent's subjective view	0.402	1	0	0.490	1500
Citizen in midrural	Dummy variable=1 if respondent is considered to reside in relatively urban area based on respondent's subjective view	0.216	1	0	0.412	1500
Citizen in rural	Dummy variable=1 if respondent is considered to reside in rural area based on respondent's subjective view	0.079	1	0	0.270	1500
Rural residentaial experience	Dummy variable=1 if respondent have experience of resident in rural area (only for urban residents)	0.255	1	0	0.436	1033
Urban-to-rural migration	Dummy variable =1 if respondent experienced urban-to-rural migration	0.033	1	0	0.178	1500
Rural-to-rural migration1	Dummy variable =1 if respondent experienced returning to the countryside other than home town	0.035	1	0	0.185	1500
Rural-to-rural migration2	Dummy variable =1 if respondent experienced returning to the countryside in home town	0.097	1	0	0.297	1500
MF knowledge	Dummy variable=1 if respondent have knowledge of agriculture's multifunctionality	0.725	1	0	0.447	1500
MF attitudes	Degree of attitudes toward conservation of agriculture's multifunctionalituy (summation of answer for each 8 types of elements of multifunctionality from 3:very much to 0: not at all)	17.971	24	0	4.527	1500
Farmer	Dummy variable=1 if respondents are farmer	0.062	1	0	0.241	1500
Farmland	Dummy variable=1 if respondent resides with farmland in15min by walk	0.611	1	0	0.488	1500
Direct rural activity	Degree of frequency to participate direct activities for rural conservation(summation of answer for each 7 types of activities from 3:frequent to 0 not at all)	1.723	21	0	2.929	1500
Indirect rural activity	Degree of frequency to participate indirect activities for rural conservation (summation of answer for each 6 types of activities from 3:frequent to 0 not at all)	2.003	18	0	2.615	1500
Food/Agri perspective	Degree of expectation for food, agriculture and rural issues in coming 10 years (summarion of answer for each 7 tyepe of policy issues from3:improve to 0)	7.968	21	0	3.618	1500
Neighbor friendly	Degree of friendly with people in the neighborhood（scale 0 to 3）	1.239	3	0	0.788	1500
Attendance religious service	Degree of participation to religious service(scale 0 to 3)	0.431	3	0	0.645	1500
Trust person	Number of trustable person (scale 0 to 3)	0.876	3	0	0.739	1500
Gov trust	Degree of government trust（scale 0 to 3）	0.795	3	0	0.762	1500
Norms of reciprocity	Degree of norms of reciprocity	0.269	1	0	0.443	1500
Shock	Degree of frequency of experienced shocking events in past five years (scale 0 to 4)	1.145	4	0	1.284	1500
Time discount	Degree of time discount rate (%) based on the answer to the survey question	13.219	50	-5	17.011	1431
Risk aversion1	Degree of risk aversion based on the answer to the following survey question (scale 0 to10)	5.761	10	0	2.298	1500

Table 3 Difinition of variables and descriptive statistics (cont'd)

Variable	Difinition	Mean	Max	Min	Std. Dev	Observation
Risk aversion2	Degree of risk aversion based on Holt and Laury (HL)'s measure of risk aversion (scale 0 to 10) (Holt and Laury, 2002)	4.934	10	0	3.114	1371
Altruism	Degree of risk aversion based on the answer to the survey question (scale 1 to 3)	2.083	3	1	0.854	1500
Satoyama	Degree of Satoyama Index(SI) of respondent's resident area(10km×10km). "A high SI value is an indicator of high habitat diversity, which is characteristic of traditional agricultural systems, including Japanese satoyama landscapes, while a low value indicates a monotonic habitat condition typical of extensive monoculture landscapes" (Kadoya and Washitani, 2011).	0.238	0.592	0.003	0.123	1500
Population decrease	Dummy variable=1 if population of young women (aged 20 to 39) of the respondent's municipalities is estimated to decrease to less than half of the current level in 30-years time (National Institute of Population and Social Security Research Tokyo, Japan)	0.052	1	0	0.222	1500

4. Results and discussion

4.1 GDP and ISEW

The results of the estimation of per capita ISEW and GDP are illustrated in Figure 2, and the rural-urban gap of both indicators are illustrated in Figure 3. The urban GDP grew rapidly during the late 1980s to the early 1990s – the period of Japan's so-called "bubble economy." However, GDP growth in rural areas was relatively slow. When looking at the ISEW, on the other hand, both the rural and urban ISEWs grew very slowly during the bubble. As a result, the ISEW rural-urban disparity showed little increase. In addition, the ISEW growth for both the rural and urban areas was much slower than that of the GDP.

This is mainly because the ISEW does not take investment into account; theoretically, higher investment has nothing to do with the ISEW. As high asset prices during the period were reflected in the GDP as investment, the urban GDP grew very rapidly in the bubble period and the impact of the bubble economy on the GDP was mainly seen in urban areas, resulting in an enlarged rural-urban disparity when measured by the GDP. These results imply that the bubble economy promoted only the urban GDP and did not contribute to the rural GDP or to rural or urban welfare.

After the late 1990's, both the rural and urban ISEW stagnated. While the urban ISEW has fluctuated since 2000, the rural ISEW has remained stable. Figures 4 and 5 illustrate the disaggregation of the rural ISEW by component. When looking at the urban ISEW in Figure 5, fluctuation after 2000 is mainly due to net capital growth, implying that welfare instability in urban areas is caused by economic change, which does not hold true in rural areas.

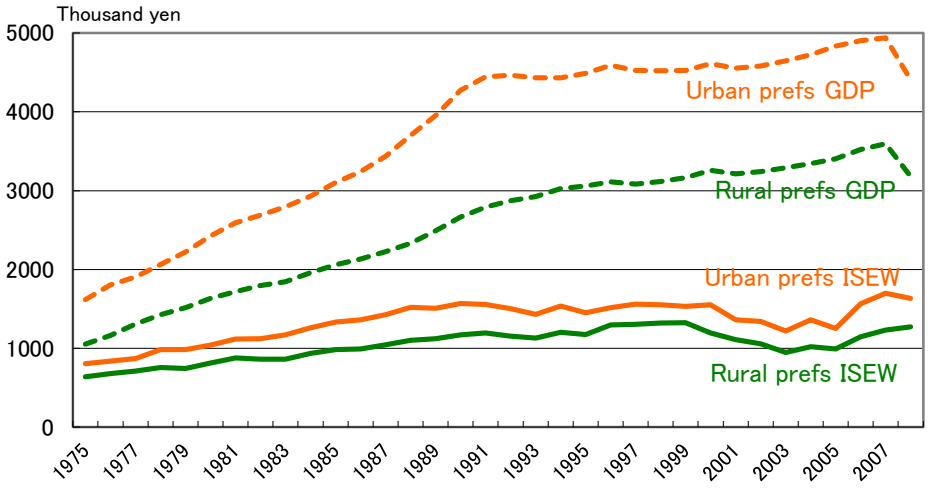

Fig. 2. Per ISEW and GDP in rural and urban

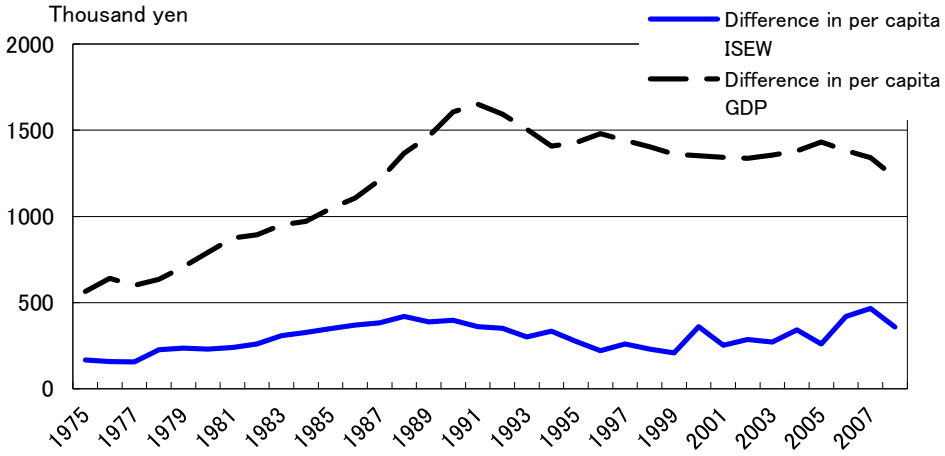

Fig. 3. Difference in per capita ISEW and GDP

Finally, the rural-urban disparity measured by the ISEW is much smaller than that measured by the GDP. For both rural and urban areas, in terms of positive items, after household consumption expenditure, the value of household labour dominates the largest share of the positive items and welfare loss caused by income inequality and car accident cost are the two dominant negative items (Figures 4 and 5). On the other hand, environmental items such as climate change are minor factors for both the rural and urban ISEWs. There is a difference between rural and urban in terms of welfare loss caused by income inequality; urban welfare loss is larger than rural. Therefore, a main factor behind the smaller rural-urban disparity in the ISEW appears to be income inequality.

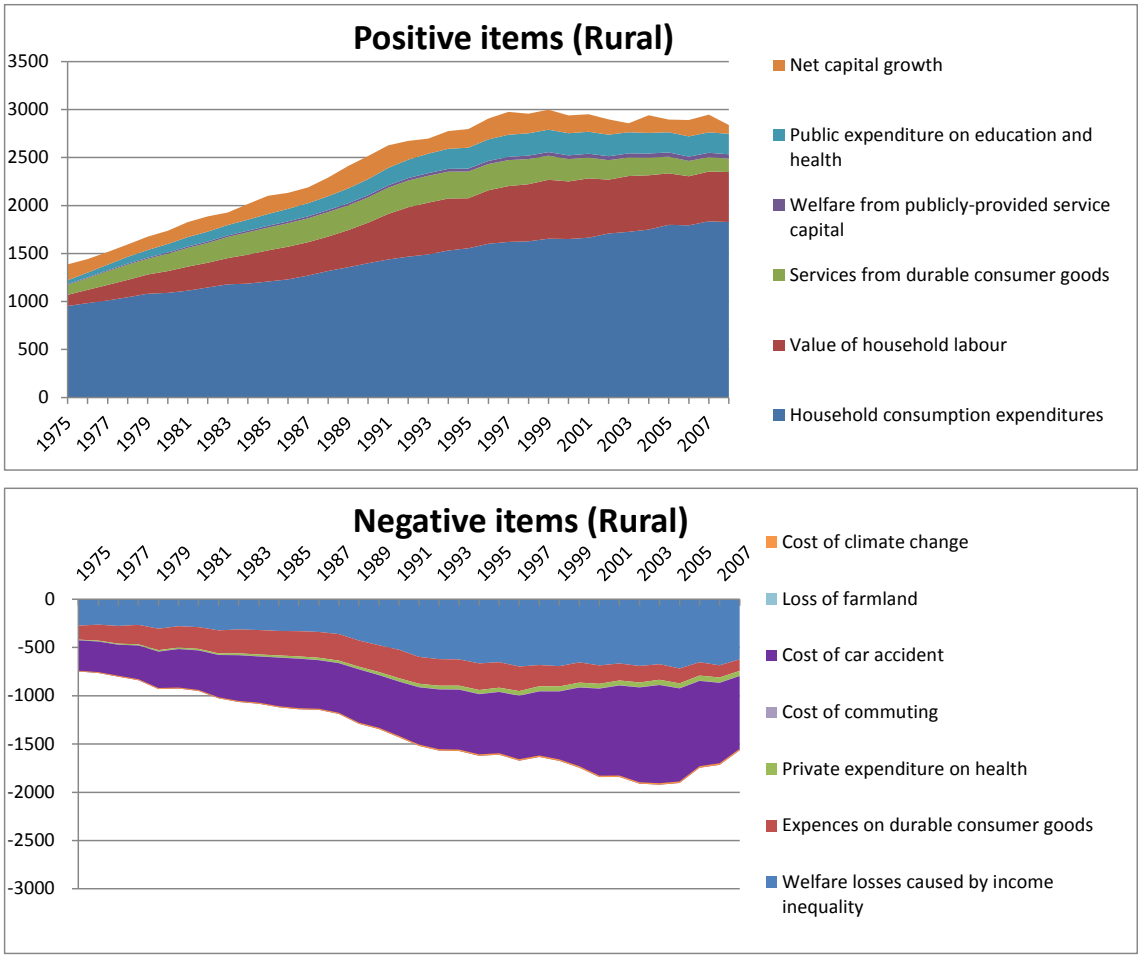

Fig. 4. Disaggregation of rural ISEW

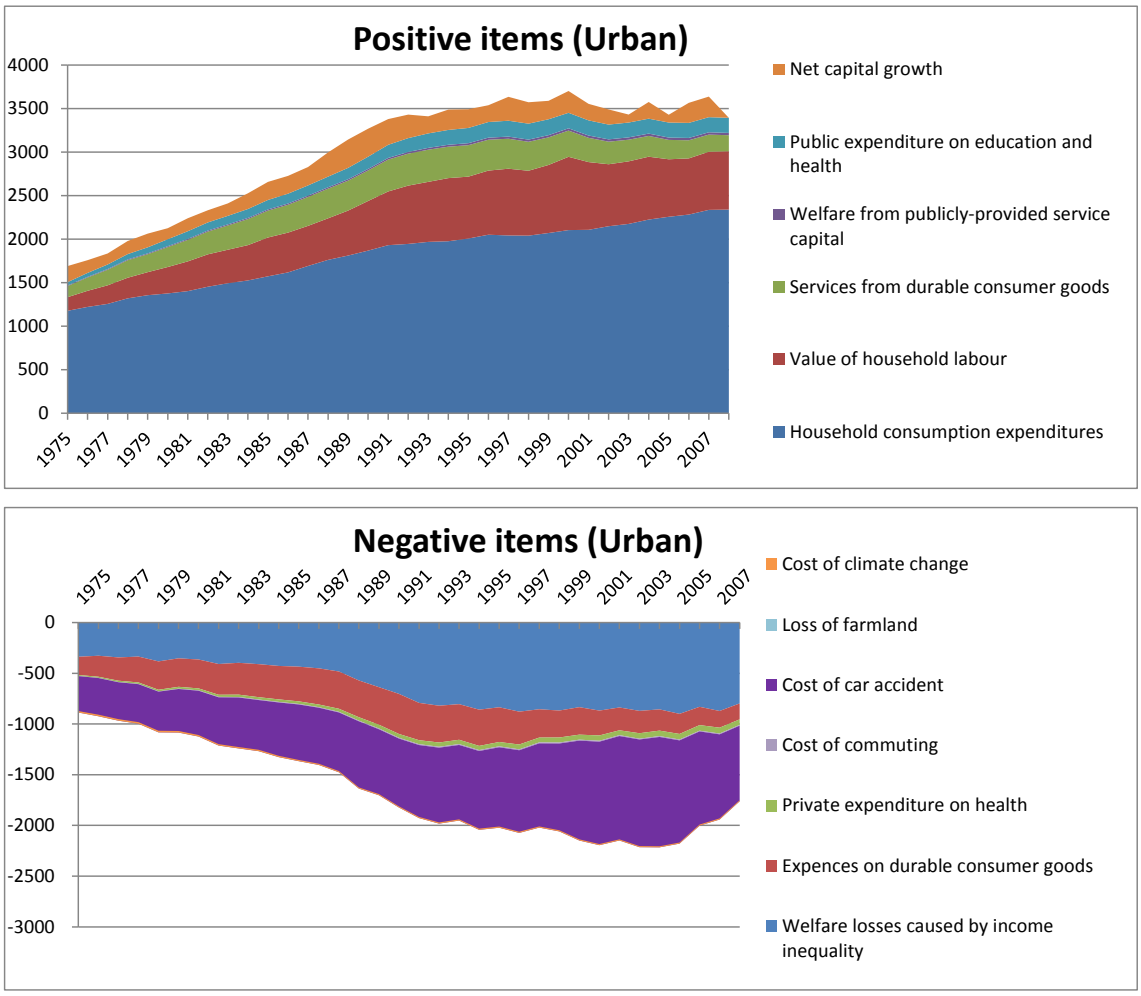

Fig. 5. Disaggregation of urban ISEW

4.2 SWB

In terms of SWB, as an overall result, there is a general trend throughout survey that the largest portion of the population has chosen 5: “I am neither happy nor unhappy” followed by 7 and 8 (Figure 6). The result is consistent with previous survey in Japan (CAO, 2011b), while data of most of western European countries show that the highest peak at 8, and it has asymmetric distribution. But the comparisons of SWB levels across nations have to be considered with caution. (Diener and Oishi, 2004)

Then, we compared the results of 10 urban prefectures and 9 rural prefectures (Figure 7). While average household income of urban residents is significantly higher than that of rural residents, SWB score in urban residents is 5.82 and rural residents are 5.92 though statistical significance is not observed (Figure 8and 9). It implies that various aspects other than household income could affect SWB especially for rural residents.

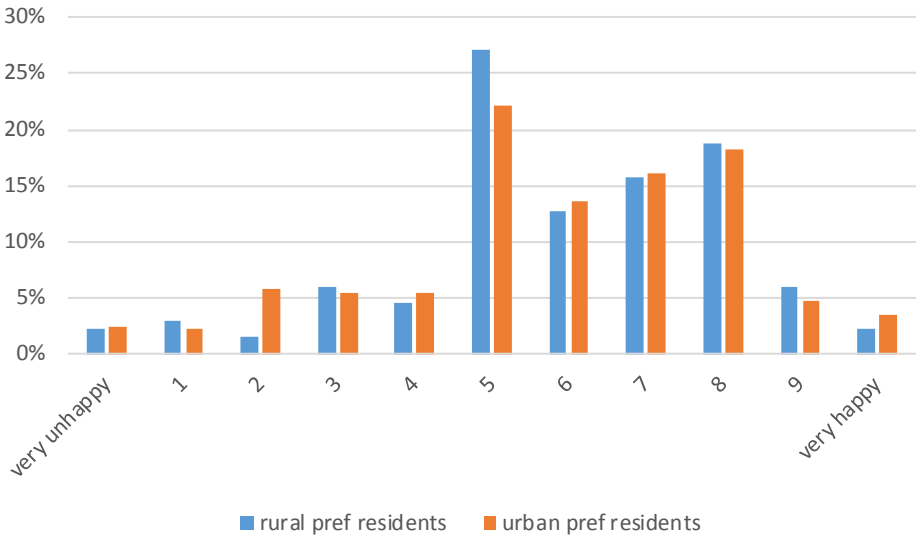

Fig.6. Distribution of LS scores in comparison with urban and rural residents

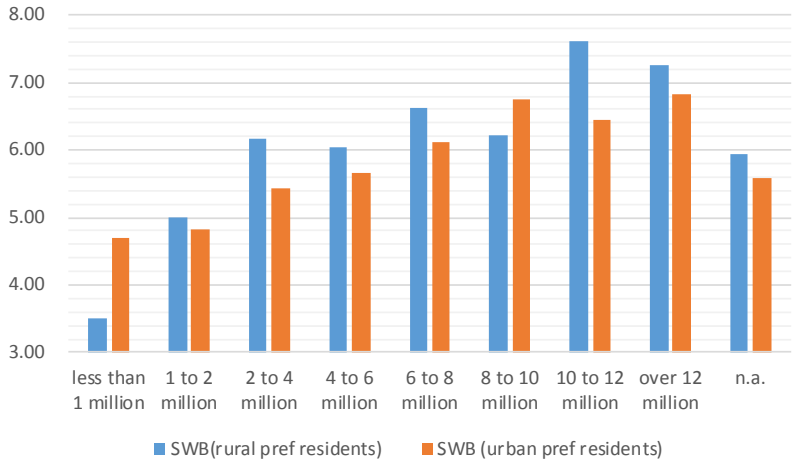

Fig. 7. Distribution of SWB score in each income group

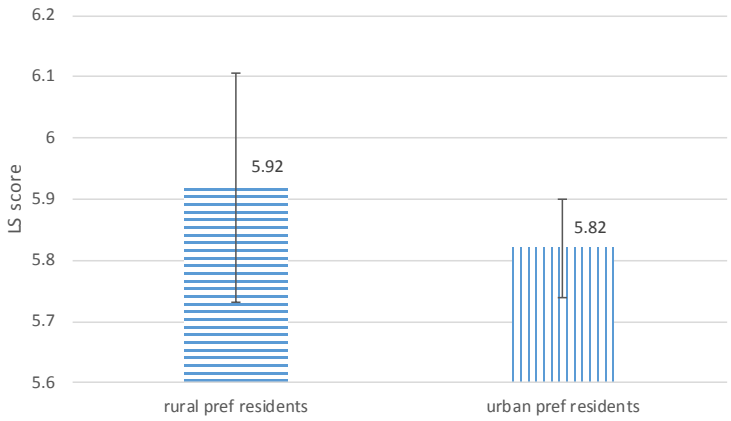

Fig. 8. Average SWB score ± SE

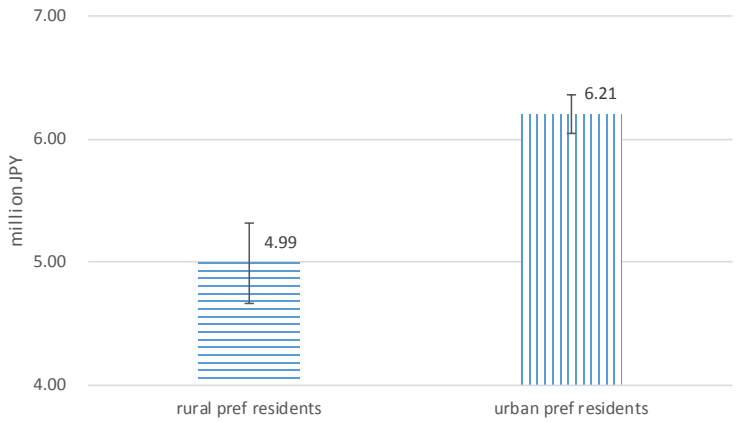

Fig. 9. Average Income ± SE

In order to examine the impact of several elements on SWB, we follow the literature and consider an ordered logit specification and the results of model specifications are presented in Table 4. The explanatory power of the model, as measured by a pseudo R^2 of 0.076, 0.211 and 0.091 are comparable to previous studies (cf. Ambery and Fleming, 2011). Consistent with earlier analysis, we find that household income and relative income have a significant and positive effect on SWB for all sample and rural prefecture residents. In addition, we find a U-shaped relationship with age, only for rural prefecture residents. However contrary to expectation, analysing the data from rural and urban prefecture does not yield remarkably different results in the effect of rural related variables such as engagement of multifunctionality conservation, social capital and rural/urban migration experience on SWB.

It might means that residential location defined by prefecture level does not capture the specific elements which affect SWB, taking into account specificity of SWB, and we thought that more location specificity surrounding each respondent's residential area might have significant effect on SWB. But capturing residential environment is quite difficult by any regal or statistical classification, because Japanese landscape consist of a diverse mosaic of agricultural and non-agricultural land. Consequently, we divided respondents to "subjective" rural residents and urban residents based on their reports in the questionnaire.

Table 4 Ordered Logit Model result with rural prefecture residents and urban prefecture residents

	All		Rural Prefecture Residents		Urban Prepefecture Residents	
Variable	Coefficient	Prob.	Coefficient	Prob.	Coefficient	Prob.
Male	-0.074	0.306	0.770	0.004 ***	-0.227	0.026 ***
Age	-0.037	0.069 *	-0.208	0.020 **	-0.035	0.225
Age squared/100	0.038	0.099	0.237	0.017 **	0.037	0.256
Employed	-0.006	0.967	-1.385	0.014 **	0.065	0.747
Unemployed/seeking	-0.303	0.113 *	-1.615	0.031 **	-0.074	0.782
Student/Housework	0.002	0.990	-0.245	0.678	0.088	0.687
Married	0.508	0.000 ***	0.575	0.281	0.496	0.000 ***
Separated/divorced	0.471	0.002 ***	1.167	0.128	0.247	0.235
Children	-0.049	0.584	0.338	0.445	-0.082	0.494
Very good health	0.752	0.000 ***	1.362	0.014 **	0.608	0.000 ***
Good health	0.425	0.000 ***	0.192	0.573	0.468	0.000 ***
Ln(income)	0.097	0.043 ***	0.896	0.000 ***	0.101	0.125
Relative income	0.472	0.000 ***	-0.037	0.902	0.548	0.000 ***
urban-to-rural migration	0.259	0.134	-0.480	0.396	0.370	0.241
rural-to-rural migration1	0.053	0.624	-0.051	0.892	0.036	0.849
rural-to-rural migration2	0.024	0.884	0.686	0.200	0.192	0.420
MF knowledge	0.079	0.301	0.155	0.641	-0.039	0.708
MF attitudes	0.018	0.019 **	0.097	0.001 ***	0.029	0.010 ***
Farmer	-0.036	0.789	0.236	0.629	-0.035	0.867
Farmland	-0.154	0.024 **	-0.034	0.911	-0.199	0.027 **
Direct rural activity	-0.015	0.345	0.052	0.403	-0.014	0.560
Indirect rural activity	-0.011	0.503	-0.058	0.452	0.006	0.794
Food/Agri perspective	0.028	0.002 ***	0.072	0.046 **	0.047	0.000 ***
Neighbor friendly	0.121	0.024 **	0.098	0.639	0.087	0.264
Attendance religious service	-0.037	0.553	0.189	0.450	-0.125	0.165
Trust person	0.071	0.178	-0.116	0.612	0.094	0.223
Gov trust	0.021	0.630	-0.079	0.637	-0.024	0.699
Norms of reciprocity	0.255	0.001 ***	-0.396	0.230	0.317	0.002 ***
Shock	-0.077	0.004 ***	-0.161	0.135 *	-0.087	0.020 **
Time discount	-0.002	0.437	-0.010	0.118	0.001	0.753
Risk aversion1	0.056	0.000 ***	0.145	0.011 ***	0.063	0.001 ***
Risk aversion2	-0.002	0.853	-0.018	0.650	-0.014	0.339
Altruism	0.001	0.989	0.108	0.500	-0.047	0.376
Satoyama	-0.210	0.417	-0.371	0.703	-0.208	0.574
Pop_decrease	-0.128	0.354	0.553	0.241	-0.226	0.293
Rural prefecture	0.134	0.246				
Urban prefecture	-0.026	0.702				
Pseudo R-squared	0.076		0.211		0.091	
Sample	1120		101		595	

Note: Significance at the ten-percent level is indicated by*, significance at the five-percent level is indicated by ** and indicated by***.significance at the level is one-percent level is indicated by***.

Table 5 Ordered Logit Model results with subjective rural and urban residents

	Subjective rural residents		Subjective urban residents	
Variable	Coefficient	Prob.	Coefficient	Prob.
Male	0.216	0.123	-0.193	0.028 **
Age	-0.111	0.006 ***	-0.013	0.592
Age squared/100	0.111	0.016 **	0.013	0.642
Employed	0.209	0.424	-0.002	0.989
Unemployed/seeking	-0.273	0.461	-0.356	0.123
Student/Housework	0.155	0.587	0.030	0.875
Married	0.336	0.109	0.497	0.000 ***
Separated/divorced	0.380	0.219	0.554	0.002 ***
Children	0.474	0.012 **	-0.169	0.107
Very good health	0.846	0.000 ***	0.788	0.000 ***
Good health	0.329	0.018 **	0.447	0.000 ***
Ln(income)	-0.009	0.919	0.148	0.014 ***
Relative income	0.531	0.000 ***	0.484	0.000 ***
urban-to-rural migration	0.880	0.001 ***	-0.386	0.137
rural-to-rural migration1	-0.028	0.865	-0.085	0.573
rural-to-rural migration2	0.318	0.373	0.023	0.907
MF knowledge	0.181	0.233	-0.001	0.989
MF attitudes	0.011	0.447	0.024	0.014 **
Farmer	-0.164	0.363	0.107	0.613
Farmland	-0.185	0.479	-0.178	0.025 **
Direct rural activity	-0.010	0.698	-0.045	0.053
Indirect rural activity	-0.005	0.869	0.016	0.455
Food/Agri perspective	0.009	0.594	0.033	0.003 ***
Neighbor friendly	0.248	0.009 ***	0.047	0.492
Attendance religious service	-0.081	0.471	-0.047	0.536
Trust person	0.269	0.006 ***	0.029	0.662
Gov trust	0.020	0.805	-0.035	0.521
Norms of reciprocity	0.295	0.039 **	0.291	0.001 ***
Shock	-0.140	0.006 ***	-0.053	0.104
Time discount	0.003	0.336	-0.002	0.431
Risk aversion1	0.051	0.048 **	0.060	0.001 ***
Risk aversion2	0.018	0.346	-0.001	0.913
Altruism	-0.095	0.189	0.041	0.379
Satoyama	-0.910	0.061 *	-0.068	0.829
Pop_decrease	0.169	0.428	-0.498	0.011 **
Rural residentaial experience			0.113	0.231
Pseudo R-squared	0.109		0.083	
Sample	337		768	

Note: Significance at the ten-percent level is indicated by*, significance at the five-percent level is indicated by ** and significance at the one-percent level is indicated by***.

We conducted an ordered logit specification for “subjective” rural residents and “subjective” urban residents as same as above and the results of model specifications are presented in Table 5. The results show that household income has a significant and positive effect on SWB only urban residents, on the contrary to the comparison base on prefecture level. In addition, we find that there is significant difference in the elements which affect SWB, which include different findings from previous model. For rural residents, social capital (neighbour friendly, number of trust person) affect significantly and positively on SWB. On the other hand, engagement with the conservation of multifunctionality (natural capital) affect positively to the SWB only for urban residents. Rural residents are not realizing the immense values of natural capital in their own backyard.

Population decrease indicator affect negatively to SWB only for urban residents. As Glaeser et al. (2014) pointed out that residents of declining cities appear less happy than other area. For example they found that the Rust Belt, developed extensive manufacturing from the mid-19th century, but it declined significantly during the second half of the 20th century, generally has lower SWB than the rest of the country. In our analysis also, declining of resident affected only for urban area.

5. Conclusions

This paper aims to measure rural-urban disparity in Japan with three different indicators: GDP, ISEW, and SWB, and analyse how the results differ. The results of the study show when we look at GDP and ISEW, the rural-urban disparity surely exists, but no disparity is observed by SWB, and that the volume of the disparity heavily depends on the indicator applied. In addition, in terms of SWB, we also found that the correlation between income and SWB for rural residents is weaker than that for urban. Various factors other than household income affect SWB particularly for rural residents.

These results are rational because each indicator is designated to measure different factors: GDP to measure economy, ISEW adjusted to measure economic welfare, and SWB itself is quite different from these two objective indicators: two economy-based indicators selected in this study do not necessarily reflect SWB. The results of the analysis implies that GDP and ISEW cannot be a proxy of SWB particularly for rural residents rather than urban residents, and that one should not apply only one single indicator but multiple ones when measuring rural-urban disparity. An application of multiple indicators can provide other points of view and supplemental information. Particularly, when policymakers try to promote SWB in rural residents, one should look at not only economic factors but also other ones; they might misunderstand when they look at economy-based indicators to evaluate their policy effect.

References

Alesina, A., Di Tella, R., MacCulloch, R., 2004. Inequality and happiness: are Europeans and Americans different? Journal of Public Economics 88(9-10), 2009–2042.

Ambery and Fleming, 2011. Valuing scenic amenity using life satisfaction data. Ecological Economics 72, 106-115.

Atkinson, A.B., 1970. On the measurement of inequality. Journal of Economic Theory 2, 244–263.

Bleys, B., 2008. Proposed changes to the index of sustainable economic welfare: An application to Belgium. Ecological Economics 64(4), 741-751.

Cabinet Office, Government of Japan (CAO), 2011a. Report on loss caused by car accidents. Tokyo, (Japanese).

Cabinet Office, Government of Japan (CAO), 2011b. Measuring national well-being -Proposed well-being indicators-. The commission on measuring well-being, Japan.

Clarke, M., Islam, S.M.N., 2005. Diminishing and negative welfare returns of economic growth: An index of sustainable economic welfare (ISEW) for Thailand. Ecological Economics 54(1), 81-93.

Clarke, M., Lawn, P., 2008. Is measuring genuine progress at the sub-national level useful? Ecological Indicators 8(5), 573-581.

Cobb, C.W., Cobb, J.B., 1994. The green national product: A proposed index of sustainable economic welfare. Lanham, Maryland, University Press of America, Human Economy Center.

Daly, H.E., Cobb, J. B., 1989. For the common good. Boston, Beacon Press.

Dasgupta, P., 2009. The Welfare economic theory of green national accounts. Environmental and Resource Economics 42, 3-38.

Diener, Ed, Suh, E.M., Smith, H., Shao, L., 1995. National differences in reported subjective well-being: Why do they occur? Social Indicators Research 34(1), 7-32.

Diener, E., and Oishi, S., 2004. Are Scandinavians happier than Asians? Issues in comparing nations on subjective well-being. In F. Columbus (Ed.), Asian economic and political issues: Vol. 10. Hauppauge, NY: Nova Science.

Di Tella, R., MacCulloch, R., 2008. Gross National Happiness as an answer to the Easterlin paradox? Journal of Development Economics 86(1), 22-42.

Economic and Social Research Institute, 2011a. Annual Report on Prefectural Accounts. Tokyo Economic and Social Research Institute.

Economic and Social Research Institute, 2011b. Annual Report on National Accounts. Tokyo Economic and Social Research Institute.

Glaeser, E L, Gottlieb, J.D., Ziv O., 2014. Unhappy Cities, Journal of Labor Economics, forthcoming. NBER Working Paper 20291.

Inglehart, R. 1990. Culture shift in advanced industrial society. Princeton, Princeton University Press.

Kadoya, T., Washitani, I., 2011. The Satoyama Index: A biodiversity indicator for agricultural landscapes, Agriculture, Ecosystems & Environment 140 (1-2), 20-26.

Kuznets, S., 1955. Economic growth and income inequality. The American Economic Review 45(1),

1-28.

Makino, M. 2008. Genuine progress in Japan and an open economy. in Lawn, P., Clarke, M., eds. Sustainable Welfare in the Asia-Pacific. Cheltenham UK, Edward Elgar, 153-190.

Masuda, H., 2014. The Death of Regional Cities: A horrendous simulation Regional Cities Will Disappear by 2040 A Polarized Society will Emerge, Discuss Japan—Japan Foreign Policy Forum No. 18. http://www.japanpolicyforum.jp/en/pdf/2014/vol18/DJweb_18_pol_01.pdf

Ministry of Agriculture, Forestry and Fisheries (MAFF), 2007. Social capital in rural, Bureau of Agricultural Community Development, Ministry of Agriculture, Fisheries and Forestry, Japan (in Japanese). http://www.maff.go.jp/j/nousin/noukei/socialcapital/pdf/data03.pdf

Ministry of Agriculture, Forestry and Fisheries (MAFF), 2011. Statistics of arable land. Ministry of Agriculture, Forestry and Fisheries, Tokyo (Japanese).

Ministry of General Affairs and Communications, 2011. Annual report on household survey. Ministry of General Affairs and Communications, Tokyo (Japanese).

Neumayer, E., 2000. On the methodology of ISEW, GPI and related measures: some constractive suggestions and some doubt on the 'threshold' hypothesis. Ecological Economics 34, 347-361.

Neumayer, E., 1999. The ISEW- Not an index of economic welfare. Social Indicator Research 48, 77-101.

OECD, 2009. The role of agriculture and farm household diversification in the rural economy of Japan, OECD Trade and Agriculture Directorate.
http://www.oecd.org/agriculture/agricultural-policies/43245392.pdf

Police Department, 2011. Annual statistical report on car accidents. Institute for Traffic Accidents Research and Data Analysis, Tokyo, Police Departoment (Japanese).

Pulselli, F.M., Ciampalini, F., Tiezzi, E., Zappia, C. 2006. The index of sustainable economic welfare (ISEW) for a local authority: A case study in Italy. Ecological Economics 60(1), 271-281.

Posner, S.M., Costanza, R., 2011. A summary of ISEW and GPI studies at multiple scales and new estimates for Baltimore city, Baltimore County, and the State of Maryland. Ecological Economics 70(11), 1972-1980.

Sahn,D. E., Stifel, D. C., 2003. Rural urban inequality in living standards in Africa. Journal of African Economics 12 (4), 564-597.

Science Council of Japan, 2001. Evaluation of multifunctionality of agriculture and forest related to global environment and human life. Science Council of Japan, Tokyo (Japanese).

Tsui, K.-Y., 1998. Trends and inequality of rural welfare in China: Evidence from rural households in Guangdong and Sichuan. Journal of Comparative Economics 26, 783-804.