Comparing public opinions regarding the old-age livelihood among the four East Asian countries[ξ]

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Abstract

This study compares four East Asian countries, Japan, Korea, Taiwan, and China, in the formation of public opinions regarding the old-age livelihood, using micro-data from their national surveys in 2006 under the East Asia Social Survey (EASS) initiative. To do so, we estimate ordered logit models, taking the objective variable to be the answer to the question: whether it is the responsibility of the government or families/individuals to provide a decent old-age livelihood. Estimation results show that, among various socio-economic explanatory variables, only age shows a significant effect for all countries, but that the direction of influence is the opposite for Japan and the other three countries. Marital status, being employed full time, having a good health, desirability for three generations living together, the number of children, education (graduate-level), and residing in rural areas also exert a significant effect but for at most two countries. Interpretations for these results are offered in view of the history and institutional details of the four countries' public pension systems.

JEL Code: H55, O53

[ξ] We are greatly appreciative of the grant from *Zengin Foundation for Studies on Economics and Finance* to conduct this research.
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I . Introduction

Given the rapid aging of the society, how to ensure the old-age livelihood poses a pressing problem in Japan. There have been various efforts in formulating policies in order to prevent further deterioration of the public pension system, which is an inevitable outcome of the aging society. In such efforts, simulation analyses have been conducted based on concrete reform plans, in quest for rebuilding the system as a sustainable one. Japan's social security system is built on the insurance principle of the Franco-German type, which is conceived as hybrid between the tax principle of the Anglo-Nordic type and the market principle of the US type. Various reform plans thus far are categorized in the following two types; one to increase the degree of government involvement by injecting more tax into the insurance systems, or one to decrease it by bringing the market mechanism more into the system. This implies that these two opposing directions of the reform concern whether the Japanese system will be tilted toward the Anglo-Nordic or the US types.

Regardless of which direction a reform takes, its success critically depends on how the people, the beneficiaries of the system, perceive the responsibility of ensuring their old-age livelihood. Therefore, research is necessary on how the people's opinions are formed as to whether the responsibility resides with the government or the family/individual. In this sense, analyses on the *objective* effects of reform plans are not sufficient; those focusing on the *subjective*, people's opinions are in need. However, such research remains very scarce to date, not only for Japan but also for other countries. In order to fill this gap, therefore, we have conducted two researches. Hayo and Ono (2010), using multiple-year micro-data of the Japanese General Social Survey (JGSS), identified household finance, political orientation, educational attainment, and family composition as factors affecting opinions in both the public pension as well as medical /long-term care. The paper also showed an increase in the opinion supporting more government involvement over the years under study. Hayo and Ono (2009) compare the opinion formation between Japan and Germany, as the country has been experiencing the same problem, and find age and part-time worker status to be distinct differences between the two countries.

The current study is an extension of these researches, and compares Japan with three East Asian countries, namely Korea, Taiwan, and China, using micro-data of national surveys in 2006 under the East Asia Social Survey (EASS) initiative. This is a social survey similar to the JGSS, but covers the three countries as well as Japan. Although these countries differ not only in the social security institutions

but also in a greater, political systems, they have much more in common than Germany does with Japan in terms of culture and social norms. In addition, because their societies have been rapidly aging recently, it is apparent that how to ensure the old-age livelihood will become an important issue, if not yet. From this viewpoint, the comparison with the three East Asian countries will clarify the key features in Japan's public opinions regarding the old-age livelihood.

This study distinguishes itself from other related studies in two respects. First, it examines the fundamental opinions of the public at large, conceivably the basis for any reform plans. Second, the study analyses four countries which are culturally similar albeit the differences in the institutions. The research is expected to shed more light on the detailed characteristics of public opinions in Japan as to how various personal characteristics and backgrounds influence the opinion, by comparing the results of the other three countries. Depending on the outcome, it may point to a new direction in which the Japanese pension reform should precede beyond the simple dichotomous argument "the Anglo-Nordic type versus the US type," by suggesting more fine-tuned designing of the institutions.

The paper is organized as follows. The next section briefly discusses the salient features of the public pension system for each of the four countries. The third and fourth sections explain in some details, respectively, the data and methodology used in the analyses to follow. The fifth section conducts the analysis and discusses the results. The final section concludes the paper with summary, caveats and venues for future extensions.

Ⅱ. Some Institutional Details

This section explains some salient features of the public pension system for each of the four countries, paying a particular attention to the institutions as of 2006, the year under analysis in the following sections.

2-1 Japan

The Japanese public pension system has, at least, three important characteristics worth mentioning. The most salient one is its so-called two-storied system. Everyone belongs to the common "first floor" or the *Basic Pension*, which provides them with the same level of entitlements, regardless of the premium they have paid up to the starting age. The "second floor" differs from person to person, based on

their job categories. For instance, salaried workers of private sectors and government employees (collectively, *category-II insured*) belong to, respectively, their employees' pension insurance and mutual aid associations, which entitle them with the benefits based on their income before the retirement. These two are compulsory. However, self-employed and the non-working spouses of the *category-II* insured (*category-I insured* and *category-III insured*, respectively) do not have such "second-floor" coverage as compulsory, and *can choose* to join the National Pension Fund if so desired.

The second characteristic of the Japanese public pension is that, although it is run as a funded system in principle, it is *de facto* a pay-as-you-go system. In 2003, the system ran a deficit, with revenues of 3,614 billion yen and expenditures of 3,664 billion yen (Ministry of Health, Labour, and Welfare (2008), p. 37). The third characteristic is that even though it was originally designed as an insurance institution, it is partially financed by tax at present. More specifically, one third of the revenue for the Basic Pension is tax; so, there is much ambivalence in the system as to whether it is a social insurance or tax-based government program.

2-2 Korea[1]

The Korean public pension system started in 1960 as a system for civil servants, and expanded to include more employment-categories through the 1970s: military services in 1963 and private school employees in 1975. In 1986, a law was passed to establish the National Public Pension (NPP), and its coverage widened gradually. By 2006, five main "pillars" have been established as mutually exclusive entities in the system: the public servant, military services, private school employees, postal service employees and NPP, which covered both the employees of all the private companies with more than four employees and the self-employed. Although the coverage of NPP further expanded to include employees of companies with less than five people and students (age 26 or younger), homemakers, and unemployed[2], they were not a part of the system as of 2006.

The system is principally run as a funded system and is in a substantial surplus, as the system is still relatively new and underdeveloped. The premium payment is 9% of the annuitants' income. It is halved by the employer and the employee for those who are employed, and completely born by other annuitants such as students,

[1] Fujimori (2012)
[2] The entry into the system is optional for those without incomes.

homemakers, and unemployed. The injection of tax money is limited only in small parts of NPP.

2-2 Taiwan[3]

Until the beginning of the early 1990s, only people in a few employment categories, namely civil servants, teachers, and military services, were covered in the public pension system; regular company employees and farmers were more or less excluded. In addition, since these employment categories are largely coincided with ethnic groups, a strong sentiment of unfairness existed among the Taiwanese people. Therefore, a strong political tide rose to the surface, advocating a fairer and more comprehensive system around 1993. With these in background, the Democratic Progressive Party, which assumed power in 2000, pushed its way to establishing such a system based on tax, but it was soon halted at the downturn of the economy, because a huge fiscal burden was prospected.

It took several more years until a law was finally passed to establish a unified system; in 2008 the long waited National Pension System was introduced to include, for the first time, those who had not been in any public pension systems before, preserving several old entities based on employment categories. During the process of establishing it, after many twists and turns, it was finally determined to be run as a social insurance with premium payments. The entry was also determined to be non-mandatory; so the coverage turned to be rather small, and was estimated to be some 4 million people.

2-4 China[4]

According to Miura (2007), a distinct urban-rural difference was one of the most prominent features of the Chinese public pension system in 2006. The system had developed independently between two types of regions. In the urban regions, the public pension was run basically by a local government on a pay-as-you-go basis, and the institutional details and the ratios between the contribution and entitlement were vastly different. In 1997, when the confidence in those local public pensions became shaky, the central government stepped in toward establishing a unified system by narrowing those differences. The central government, however,

[3] See Lin (2011), for instance.
[4] For the changes before the 1997 reforms, for instance, see Salditt et al. (2007).

took a very cautious approach; it ran a pilot program in Liaoning province in 2001 and added a few more, before launching a nationwide system in 2006. In that system, workers would pay in 8% of their salaries, enterprises would pay in 20% of the salaries paid to their workers, and any gap between the revenues and expenditures would be filled by government subsidies. Although the public pension for the urban regions had improved toward a more fair and efficient system, its coverage was quite limited, with only 130 million members and 44 million recipients, as of the end of 2005.

The development path of the public pension in rural regions was completely different, and it was still quite underdeveloped as of 2006. Prior to the Economic Reform Policy adopted in 1978, people's communes were solely responsible for all aspects of old-age welfare. Great socio-economic changes during the late seventies and early eighties, such as the abolition of people's communes, adoption of one-child policy, and large-scale migration to cities, created a serious problem for the old people in rural regions. Some rural communities voluntarily established a pension system, and the central government tried to expand a nationwide system modeled after such a system. However, various problems and contradictions surfaced, and the central government was forced to suspend it in 2000. Therefore, as of 2006, it is safe to say that no concrete public pension covering the entire population was not in existence.

Ⅲ. Data and Variables

3-1. Question in focus

Because questionnaires are not conducted in such a way that common questions in common format are asked for the four countries in the EASS dataset, we need to look for the replies to the question in focus in the national datasets for each country[5]. In Hayo and Ono (2010), based on the JGSS in 2000 through 2005, we focused on the following question:

Q. Who do you think should be responsible for the following? Choose a number from 1 to 5 for each.

A. Individuals and families Government

1 2 3 4 5

[5] They are: the Japanese General Social Survey (JGSS) for Japan, the Korean General Social Survey (KGSS) for Korea, the Taiwan Social Change Survey (TSCS) for Taiwan, and the Chinese General Social Survey (CGSS) for China.

In the 2006 survey, the same question is asked[6]. We examine this question, because similar questions are also asked in the Korean, Taiwanese and Chinese surveys in 2006 as follows:

[Korea][7]

> Q. On the whole, do you think it should be or should not be the government's responsibility to provide decent standard of living for the old?
>
> A. 1. definitely should be, 2. probably should be, 3. probably should not be, 4. definitely should not be

[Taiwan][8]

> Q. Generally speaking, would you consider the following matter to be the responsibility of the government, or the responsibility of individuals/families?
>
> A. 1. all the responsibility of the government, 2. mostly the responsibility of the government, 3. half-and-half, 4. mostly the responsibility of individuals/families, 5. all the responsibility of the individuals/families

[China][9]

> Q. Generally speaking, to what extent do you think that the following things ought to be the responsibilities of the government, or those of individuals or their families? (Choose only one answer in each row) Elderly's daily needs
>
> A. 1. The government ought to take full responsibility, 2. The government ought to take most of the responsibility, 3. The government and individuals/families ought to share the responsibility, 4. Individuals/families ought to take most of the responsibility, 5. Individuals/families ought to take full responsibility

Table 1 shows a descriptive statistics of the replies to these questions for each country, and Graph 1 is their graphical presentation. Note that, for Japan, the ordering of preference is reversed to be consistent with other three countries, such that the more the government option is preferred, the lower the number is. Note also that, because there are four alternatives in the Korean survey while there are five in the other three, the middle category is blank for Korea. A few interesting observations can be made. First, there is a clear difference between Japan and

[6] Question 22 in the self-administered questionnaire
[7] Question 93
[8] Question E1
[9] Question E1 in the household questionnaire

Korea, on the one hand, and two Chinese states on the other. For Japan and Korea, the opinion is more tilted towards the government responsibility, but is more tilted towards the individual option[10] for the two Chinese states. The Korea stands out in that people opt for the individual option the least among the four countries[11]. Those who chose that category consist only 0.6% for Korea, while they are 4.7%, 11.4% and 11.4% for Japan, Taiwan, and China. Reflecting that, the mean value for Korea is the lowest, 1.85[12].

Table 1: Descriptive statistics

country	Japan	Korea	Taiwan	China
1 Government	28.6%	35.7%	3.4%	8.8%
2	29.8%	54.3%	8.1%	19.1%
3	27.4%		45.5%	40.4%
4	9.5%	9.4%	31.6%	20.4%
5 individual	4.7%	0.6%	11.4%	11.4%
Mean	2.319715	1.849141	3.394098	3.064255
Median	2	2	3	3
Maximum	5	5	5	5
Minimum	1	1	1	1
Std. Dev.	1.123088	0.875442	0.913311	1.094984
Skewness	0.548631	1.362684	−0.231084	−0.010362
Kurtosis	2.58737	4.800223	3.224762	2.507156
No. of observations	2105	1571	2101	3206

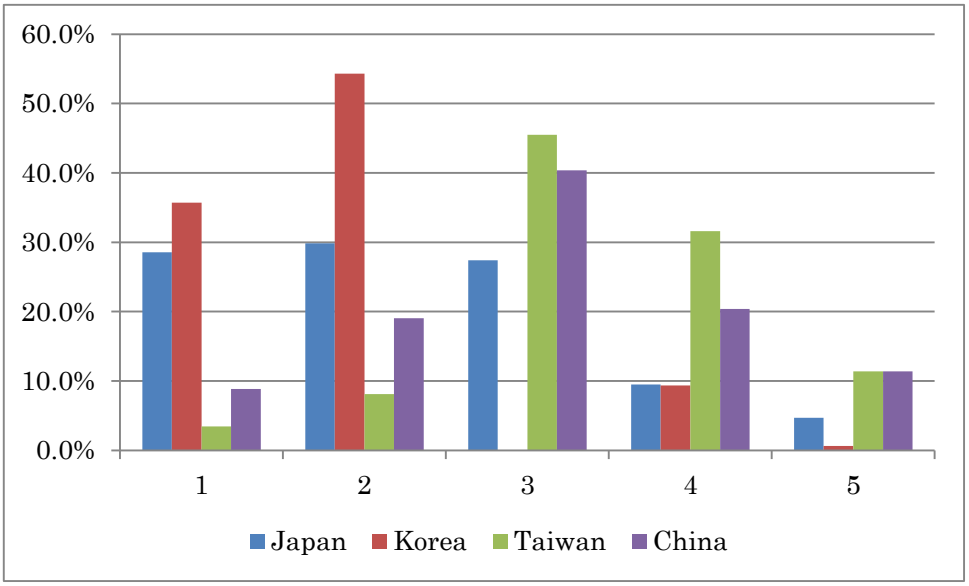
（Notes） Because there are only four alternatives in the Korean survey, the middle category is blank; therefore, the standard deviation, skewness, and kurosis are not directly comparable with the other three countries.

Graph 1:

[10] In what follows, the choice representing the strongest tendency towards private responsibility will be referred to the "individual" option, to avoid cumbersome repetition of "individuals / families."

[11] Given that there are four alternatives and no middle category in the Korean survey, the three categories other than the individual (Answer 5) might have been greater, had there been five alternatives like in other three countries. However, the number of respondents in the individual would have only been lower; so, this characteristic of the Korean survey results would have been more salient.

[12] Because there are four alternatives and no middle category in the Korean survey, the descriptive statistics other than means cannot be directly compared.



(Note) There is no middle category, "3", for Korea, because the survey is designed to have four alternatives. Category 1 implies that the government option is the most preferred, while category 5 implies that the individual option is the most preferred.

3-2. Explanatory Variables

There is no theory or consensus on what factors would influence the choice between the government and individual in ascertaining the old-age livelihood. Therefore, we follow the logic explained in Hayo and Ono (2009, 2010), and aimed to select explanatory variables accordingly. However, because the questionnaires are not designed in exactly the same way for all four countries, there are not many common questions[13]. The main focus of this paper is to shed light on similarities and differences among the four countries, as in Hayo and Ono (2009) which compare Germany and Japan. Therefore, we are to estimate the same model for the four countries, restricting the explanatory variables to those commonly available in their surveys. It turns out that those variables are basically in line with Hayo and Ono (2009)[14]. To them are added a few others used in Hayo and Ono (2010), which study

[13] The survey for China is conducted in three different questionnaires: the household, urban and rural questionnaires. The urban and rural questionnaires are mutually exclusive; *i.e.* no single respondent answers to both questionnaires. Respondents covered in either of these two questionnaires are selected to answer the household questionnaire. Because the question concerned with the objective variable is asked in the household questionnaire only, and some of the questions used as the explanatory variables are asked in either the urban or rural questionnaires, we compiled the data of the objective and explanatory variables using the respondents' identification numbers.

[14] Among those used in Hayo and Ono (200), questions concerning political orientations are excluded because they are not available for China and Taiwan. The reason for this lack of data is obvious for China under the communist regime, but is unknown for Taiwan.

only Japan and thus have a larger set of explanatory variables[15].

(1) Age

Age, the variable expressed as AGE, will be one of the most important factors affecting the opinions. Whether, and how if any, this has a noteworthy impact on the opinion towards our question of interest is not clear, however. One hypothesis based on assuming rational actors is that the older the people get, the more inclined they become towards the government option, because they have already paid a large amount of contributions into the public system and would want to "collect them back" in the form of the benefits[16]. We could call this a "life-cycle effect." An alternative is "the cohort effect" explanation. The respondents' opinions are influenced by the social norm when they grew up into adulthood. In all four countries, because the notion that the family must care its elderly members has become weaker over time, age could make the respondent inclined toward the individual option.

(2) Gender

Men and women may develop different opinions towards the livelihood of their old age. Before becoming of old age, men work, earn, and possibly save more for their old age than females. On the other hand, women spend more time with their children, if any, and develop greater bonds with them. They also tend to be more integrated into social networks. Thus, a male-female difference, expressed as GENDER, would have some explanatory power on the choice of the dependent variable.

(3)Marital status

In the EASS initiative, marital statuses are asked in a uniform manner. There are six alternatives for each of the four surveys: currently married, divorced, separated, widowed, never married and cohabiting. We thought that these classifications are too detailed, because no country makes a difference between, say, the widowed and the divorced in the public pension scheme. The only relevant

[15] The factors (1) through (8) in the following are all the same as in Hayo and Ono (2009), and (9) through (12) are taken from Hayo and Ono (2010).

[16] Assuming *non-fully* rational agents or hyperbolic discounting, in an early age, very few would ever think of their livelihood when old. Over time, after moving through childhood and adolescence into adulthood, more certain attitude about who should support them after retirement will be formed. In particular, entering the labour market, and thereby paying taxes and social insurance premium, will make people more aware of this issue.

difference, we thought, would be the difference between the married and not married. If a respondent is married, he/she can rely on his/her spouse for the old-age livelihood to a greater degree than those who are not. Therefore, the respondent is more likely to tilt towards the individual option. For this reason, we employ a dummy, expressed as CURRENTLY MARRIED, which differentiates only the married and not-married in the following analysis, using the "not-married" as a reference.

(4) Number of children

If people have offspring, they can rely on them for old-age support, at least in principle. The more children they have, the greater the insurance effect is resulting from more choices in the means of sustaining their old age life. Thus, our hypothesis is that they rather oppose the public support option of paying higher contributions and receiving higher benefits. The variable is expressed as NUM CHILD in the following analysis.

(5) Education

More educated people know better where and how their taxes and contributions are used than those who are not. Because of that, they tend to view the public system more critically. In addition, educated persons may be more likely to think about their life from an inter-temporal perspective and more aware of the economic life-cycle, while less educated people may naively expect more support from a public system. Therefore, our hypothesis is that educated people will prefer a more individualistic system.

In the EASS initiative, data on education are not collected in a uniform manner, because educational systems among the four countries are too diverse. For instance, "no formal education" is not an alternative for Japan, while it is for the other three countries. The alternatives are more or less the same for Japan and Korea with no detailed breakdowns within the secondary education, but for Taiwan and China there are vocational schools in the alternatives. Given this, we decided that, following Hayo and Ono (2010), the educational attainment is broken down into four categories: elementary, secondary, college-level, and postgraduate-level education uniformly for the four countries. In the following analysis, the elementary education is used as reference, and the other three are expressed as SECONDARY, COLLEGE, and GRADUATE.

(6)Employment status

As for the marital status, the uniform classifications are employed for employment status. There are nine categories: the employed-full time, employed-part time, self-employed, helping family members, unemployed, studying, retired, housework and permanently disabled. We thought that these categorizations are too detailed, and reduced them into four: the employed-full time (FULL TIME), employed-part time (PART TIME), self-employed (SELF), and "not-working" which cover all the last six. Among these four categorizations, the "not-working" is used as a reference. The rationale behind this re-categorization is that, in Japan as well as in the other countries, the coverage by the public system is the most thorough for those who are employed full time, the least for those who are not working, and falls somewhere between the two for part-time workers and the self-employed[17]. Our conjecture is therefore that, fully incorporated into the system, the full-time employed is the most in favor of the public support.

(7) Income

The more income people earn, the more financially secure they become. Arguably, greater financial security would make people lean towards the individual option, because they have little control over the public support system than the private ones they may choose in the financial markets. In other words, the compulsory public system would lower their personal welfare.

In all the four surveys, there are questions asking incomes of the respondent and of his/her household. However, these questions are not uniform across the countries, either. For Japan and Taiwan, they are asked only by choosing an income class, but the number of classifications is not the same ; 19 for Japan and 24 for Taiwan. For Korea, they are asked by *both* income class and real monetary value. For China, they are asked only by real monetary value. Therefore, to make the variable uniform and the analysis simple, we convert the income classes to a real monetary value for Japan and Taiwan, by assigning the middle value in each of the income classes[18]. The values are all in the unit of the respective national currencies. Respondents' own incomes and household incomes are highly correlated and are

[17] In Japan, those who are not employed such as students and unemployed are also *de jure* covered in the system, but it is often pointed out that their participation rate is very low because the registration is not automatic. It is true, to a lesser degree, for part-time workers and the self-employed.

[18] Of course, we could convert the real monetary values for Korea and China into some income classes, but that would be a lot more demanding task. For, we would have to figure out what are the appropriate threshold values, in light of the income distribution of the entire population for each of the two countries.

thus suspected to cause multi-collinearity if used simultaneously. We use household incomes, expressed as HHD_INCOME, as a factor influencing the opinion.

(8) Community

In general, it is considered that people who live in a rural area tend to have a traditional family value compared with urban dwellers. This is the reason why we employ the community size in Hayo and Ono (2010). Given the institutional details of the public pension scheme for Korea, the same logic applies to employ the community size as a relevant explanatory variable. In addition, for Taiwan and China, as explained in the second section, the system was largely underdeveloped for people in the agricultural sector/rural areas. In all four countries, there are three breakdowns: big city, mid-sized or small city and village/rural region. However, for the above reason, we thought only the last category should exhibit a distinct influence and created a dummy accordingly, expressed as VILLAGE.

(9) Health condition

Whether people are healthy or ill should affect their anxiety about living when old. Arguably, the more concerned people are about their health, the more anxious they feel about their old-age lives. However, it is not clear how this presumed anxiety affects people's opinions. It could lead to more inclination toward the individual option if people have less confident in the public support, but the effect could be reverse if they are confident in it. Therefore, the direction of the influence is unclear, but we presume the health condition is highly likely to affect the people's opinion[19]. In the four surveys, the health condition is rated by 5 categories in descending order, "1" being "very good" and "5" being "very bad." In the analysis, we express it as HEALTH.

(10) Frequency of dinner

The more attached people feel to their families, the more they would feel like relying on their families for old-age livelihood. To gauge the respondents' *objective* intimacy with their families, we employed the frequency of family dinner as in Hayo and Ono (2009). In the surveys of all four countries, the frequency is measured by 7 categories, but we only took "everyday" as containing the relevant information; so, we created a dummy variable, expressed as THREE GEN, distinguishing those who

[19] The ordering is made consistent with the Taiwanese and Chinese, such that the higher number means healthier.

chose “everyday” and those who did not[20].

(11) Desirability of three generations living together

Similarly, we conjectured that the respondent’s *subjective* intimacy to their family would affect their opinion. To gauge it, we employed the desirability of three generations sharing home. In the four surveys, the alternatives are uniformly prepared, such that 1 is “desirable” and 2 is “not desirable.” This variable is expressed as THREE_GEN.

Ⅳ. Methodology

4-1. Ordered logit model

As explained before, the objective variables used in the analysis are all of the categorical type. In addition, the values of those variables have a meaning of order; *i.e.* the respondents who chose the alternative “1” are more supportive than those who chose “2” of the idea that the government should take responsibility for ensuring peoples’ old-age livelihood. To analyzing such an ordered, categorical objective variable, a usual OLS is known to be inappropriate[21]. The standard tool of analysis is an ordered logit model as follows:

$$y^* = x'\beta + \varepsilon$$

Here, y^* is an unobserved, latent variable (scaler) and x is a vector of explanatory variables considered to affect y^*. β is a vector of coefficients associated with x and ε is a vector of disturbances. That the observed, objective variable y is a categorical, ordered variable implies[22]:

$$\begin{aligned} y = 1 \quad & \text{if } y^* \le \mu_1 \\ = 2 \quad & \text{if } \mu_1 < y^* \le \mu_2 \\ = 3 \quad & \text{if } \mu_2 < y^* \le \mu_3 \end{aligned}$$

[20] The results are basically the same when the seven categories are used.
[21] See Greene (2007), for instance.
[22] This explanation applies for the three countries except for Korea, which have five alternatives to the question in focus.

$$= 4 \quad \text{if} \quad \mu_3 < y^* \leq \mu_4$$
$$= 5 \quad \text{if} \quad \mu_4 < y^*$$

The threshold parameters $\mu_1 \sim \mu_4$ are unknown and thus are to be estimated with ß. If a logistic distribution is assumed for ε, with the mean and standard deviation normalized to be 0 and 1, respectively, we obtain:

$$\text{Prob(y=1} \mid \text{x)} = \Lambda(\mu_1 - x'\beta)$$
$$\text{Prob(y=2} \mid \text{x)} = \Lambda(\mu_2 - x'\beta) - \Lambda(\mu_1 - x'\beta)$$
$$\text{Prob(y=3} \mid \text{x)} = \Lambda(\mu_3 - x'\beta) - \Lambda(\mu_2 - x'\beta)$$
$$\text{Prob(y=4} \mid \text{x)} = \Lambda(\mu_4 - x'\beta) - \Lambda(\mu_3 - x'\beta)$$
$$\text{Prob(y=5} \mid \text{x)} = 1 - \Lambda(\mu_4 - x'\beta)$$

Here, Λ(.) represents a cumulative, logistic distribution function[23].

4-2. Marginal effects

As in normal regression analyses, it is highly likely that they influence the choice of the objective variable when explanatory variables obtain a significant coefficient. When the sign of the coefficient is positive (negative), the concerned explanatory variable tends to lead a higher (lower) value for the objective variable, as is also true with a normal regression. However, the value of the coefficients is not to be given the same interpretation. In an ordered logit model, to interpret the value, a marginal effect must be calculated. When the explanatory variable concerned is of the continuous type, the marginal effect is defined to be a change in the probability of choosing each value of the objective variable with a unit increase in that explanatory variable, holding the values of the other explanatory variables constant. This implies that the marginal effect is calculated as a partially derivative of equation (1) with respect to the explanatory variable x, as follows:

$$\partial\,\text{Prob(y=1} \mid \text{x)}/\partial\,\text{x} = -\Lambda(\mu_1 - x'\beta)\,\beta$$
$$\partial\,\text{Prob(y=2} \mid \text{x)}/\partial\,\text{x} = [\Lambda(\mu_1 - x'\beta) - \Lambda(\mu_2 - x'\beta)]\,\beta$$
$$\partial\,\text{Prob(y=3} \mid \text{x)}/\partial\,\text{x} = [\Lambda(\mu_2 - x'\beta) - \Lambda(\mu_3 - x'\beta)]\,\beta$$
$$\partial\,\text{Prob(y=4} \mid \text{x)}/\partial\,\text{x} = [\Lambda(\mu_3 - x'\beta) - \Lambda(\mu_4 - x'\beta)]\,\beta$$
$$\partial\,\text{Prob(y=5} \mid \text{x)}/\partial\,\text{x} = \Lambda(\mu_4 - x'\beta)\,\beta$$

[23] If Λ here represents a normal distribution, the method is an ordered probit model. The difference between ordered logit and probit models are minor.

When the explanatory variable concerned is of the discrete type, the marginal effect is defined to be a change in the probability of choosing each value of the objective variable when the explanatory variable increases its value by one, holding those of other explanatory valuables constant.

Ⅴ. Estimation Results

5-1. General and reduced models

We first estimate a general model for each country; *i.e.* the one including all the explanatory variables. Table 2 reports the results for the general models. When the general-to-specific testing down approach is applied to the models, we obtain the reduced models shown in Table 2[24].

(1) Japan

For Japan, age, graduate-level education, full-time employment status, household income and health condition obtained an estimated coefficient that is significant at the conventional level. The sign for age is positive, meaning that the older the respondent, the more they inclined toward the family/individual option, implying the cohort effect overweighs the life-cycle effect. The sign of graduate-level education is positive, suggesting highly educated respondents tend to tilt toward the individual option. Those people may be critical of the public pension system because they are well informed of its various problems. People who are employed full time tend to choose the government option, compared with those who are not working. This is consistent with our conjecture that, among various segments of population, they are the most fully incorporated into the system and in a situation where they would like to "collect back" what they paid into the system. The higher the household income is, the more the respondent tilts toward the individual option, because they are materially more capable. Finally, the less healthy the people are (having a higher number in HEALTH), the more they incline toward the government option. The less healthy people are more concerned about their old-age life; so, they feel safer if they are taken care of by the government.

(2) Korea

For Korea, four explanatory variables obtained a significant coefficient: age, the

[24] See Hendry (1993), for instance.

currently-married status, the secondary education, and desirability for three generations living together. First, age has a negative sign, suggesting older respondents tend to choose the government option more. This is consistent with the "life-cycle effect" interpretation. The people who are currently married tend to choose the individual option compared with those who are not. This is intuitive because those who are married have a spouse to rely on when old. What is puzzling is that the desirability of three generations living together obtained a positive, rather than negative, coefficient. Recall that this variable takes 0 when the respondent thinks it desirable and takes 1 when he/she thinks it undesirable. So, those who think it undesirable tend to choose the individual option, compared with those who think it desirable. This is counter-intuitive. It is possible that this variable picks up the effect of another variable. Unfortunately, however, we do not know what it is at this point.

(3) Taiwan

For Taiwan, the number of variables obtaining a significant coefficient is only two, the least among the four countries. Age has a positive coefficient; so, the same interpretation can be given as for Korea. The sign of the coefficient for health condition is the opposite of the one for Japan: for Taiwan, the less healthy people tend to prefer the individual option more. We interpret this difference as stemming from the confidence in the public system; while the system already had existed more than 40 years in Japan, it had not been fully established in Taiwan in 2006.

(4) China

China has the largest number of significant coefficients among the four. Age has a significantly negative coefficient, consistent with Korea and Taiwan. The result for the currently-married status is the same as for Korea. For those, the same interpretations given before are applicable. The result for the full-time employment is the same as for Japan, and is similar to the one for the part-time employment[25].

The number of children has a significantly positive coefficient; the more children the respondent has, the more he/she tilts toward the individual option, because they have more "resources" to rely on. The coefficient for the desirability for three generations living together has an expected sign, in contrast to the one for Korea; the more people are subjectively attached to their families, the more they opt for the

[25] Although a further investigation is necessary, our tentative interpretation is that those who are employed part time are similar to those who are employed full time, at least relative to those who are not working, in terms of the coverage by the public pension system.

individual option naturally. The result of the village residence has a significantly positive coefficient. Since the coverage of the public pension in rural areas was very much limited in 2006, those who resided in those areas do not have much confidence in the system; so, they would have rather relied on their families and/or on their own.

(5) Cross-country comparison

When the results are compared across countries, a few interesting observations are made. First, one can tell that factors influencing the opinion are diverse. There are no factors other than age which have a statistically significant effect on the choice of the objective variable across all the four countries; other factors affect the choice at most two countries. Even the effect of age is not uniform. The direction of influence is opposite between Japan and the rest of the countries. Only for Japan, the cohort effect overweighs the life-cycle effect, but for the other three the opposite is true. The reason behind is difficult to tell, but it could be related to the history of the public pension system. Among the four, Japan established the public system the earliest. So, the Japanese elderly take it for granted, and do not care much about "collecting back" what they have paid. In the other countries, however, the system is relatively new, so that the elderly people are more aware of their benefits and are a lot more conscious about the contributions they made.

Table 2: Results for general models

	Japan		Korea		Taiwan		China	
AGE	0.01102	0.004	−0.0124	0.025	−0.0114	0.033	−0.0121	0.000
SEX	0.05242	0.631	−0.1150	0.315	−0.1573	0.159	0.0725	0.269
CURRENTLY_MARRIED	−0.06713	0.606	0.2836	0.031	−0.1493	0.344	0.2011	0.029
NUM_CHILD	0.00045	0.524	0.0679	0.243	−0.0180	0.706	0.1298	0.001
SECONDARY	0.20498	0.151	0.3675	0.060	0.0959	0.486	−0.1647	0.048
COLLEGE	0.17570	0.282	0.5512	0.759	0.0166	0.923	−0.1844	0.164
GRADUATE	1.01051	0.003	0.1086	0.728	0.4146	0.201	−1.1609	0.091
FULL_TIME	−0.29890	0.032	−0.0049	0.969	−0.0023	0.987	−0.2953	0.001
PART_TIME	−0.10472	0.492	−0.0919	0.699	−0.3024	0.303	−0.3006	0.011
SELF_EMP	0.04022	0.833	−0.0074	0.965	0.0170	0.926	−0.0080	0.952
HHD_INCOME	0.00047	0.000	0.0000	0.690	0.0000	0.977	0.0000	0.648
DINNER_EVERYDAY	0.00591	0.960	−0.0835	0.460	0.1001	0.417	−0.0202	0.793
THREE_GEN	−0.14727	0.148	0.3697	0.001	0.1088	0.363	−0.4855	0.000
HEALTH_CON	−0.20179	0.000	0.0187	0.703	0.2373	0.000	0.0226	0.521
VILLAGE	0.16115	0.273	−0.0677	0.530	−0.0452	0.702	0.3910	0.000
μ_1	−0.7647		−0.4529		−3.2309		−3.0980	
μ_2	0.5576		2.3669		−1.9261		−1.6092	
μ_3	2.0437		5.1473		0.4171		0.2036	
μ_4	3.250		−		2.0724		1.5418	
Nomber of observations	1429		1462		1374		3202	
Log likelihood	−2049.5		−1382.6		−1780.4		−4579.6	
LR Test	56.82		28.85		37.89		241.34	
Pseudo-R^2	0.014		0.010		0.011		0.026	

Notes) 1. For all the explanatory variables, the left-hand value in each cell is an estimated coefficient and the right-hand value is its associated P-value. 2. Because there are four alternatives for Korea, μ_4 is not reported.

Table 3: Results for reduced model

	Japan		Korea		Taiwan		China	
AGE	0.00999	0.003	−0.0082	0.019	−0.0131	0.000	−0.0068	0.000
SEX								
CURRENTLY_MARRIED			0.3108	0.006			0.0980	0.055
NUM_CHILD							0.0851	0.000
SECONDARY								
COLLEGE								
GRADUATE	0.80583	0.008						
FULL_TIME	−0.25894	0.017					−0.1945	0.000
PART_TIME							−0.1929	0.005
SELF_EMP								
HHD_INCOME	0.00049	0.000						
DINNER_EVERYDAY								
THREE_GEN			0.3427	0.001			−0.2914	0.000
HEALTH_CON	−0.19793	0.000			0.1838	0.000		
VILLAGE							0.2245	0.000
μ_1	−0.7767		−0.2696		−3.2703		−1.9052	
μ_2	0.5411		2.5350		−1.9568		−1.1115	
μ_3	2.0141		5.3484		0.4062		−0.0058	
μ_4	3.2103		−		2.194		0.7587	
Nomber of observations	1448		1502		2100		3208	
Log likelihood	−2081.8		−1422.85		−2683.4		−4706.0	
LR Test	51.02		23.43		46.56		236.7	
Pseudo-R^2	0.012		0.008		0.009		0.025	
Testing-down restriction	6.8485		3.7458		5.5905		4.9694, 4.4632	

Notes) 1. For all the explanatory variables, the left-hand value in each cell is an estimated coefficient and the right-hand value is its associated P-value. 2. Because there are four alternatives for Korea, μ_4 is not reported. 3. The value for testing-down restriction is a Chi-squared statistic, with appropriate

degrees of freedom, for the null hypothesis that the coefficients for the explanatory variables, whose estimated coefficients are not significant at the 10% level in the general model, are jointly zero. For China, such testing-down is required twice to obtain the result reported in the table. The left-hand value is the Chi-squared in the first round, and the right-hand value is that in the second round.

5-2. Marginal effects

Recall that the estimated coefficients in ordered logit models cannot be given the usual interpretation as in standard regressions. To obtain intuitive interpretations, one would need to calculate the marginal effects based on the reduced models reported in the previous subsection. They are presented for each of the four countries in Table 4.

First, let us look at age, the only variable which turns to be significant in all four countries, despite that the sign of the coefficient is not uniform. For Japan, getting 10 years older implies that the probability for choosing "1", the government option, increases almost 2%. This is quite large; for the other three countries, the qualitative impacts (of decreasing the government option) are substantially smaller[26]. On the other hand, getting 10 years older implies that the probability for choosing "5", the individual option, increase 1.24% for China, while that impact is a lot smaller for the other countries, including Japan.

What is noteworthy for Japan is that the qualitative impact of graduate education is quite substantial. Attaining graduate-level education decreases the probability of choosing "1" by more than 12% and increasing that of choosing "5" by more than 5%, while the corresponding impacts of having a household income by 1 million yen more are only 1% and 0.2%, respectively. Those of being currently married and of deteriorating health by one degree are also less than half.

For Korea, the quantitative impact of being currently married on choosing "1" is quite large, even taking into consideration that there are only four alternatives; the variable is also significant for China, but the corresponding value is a lot smaller. However, the opposite is true for choosing "5"; the marginal effect is only 0.2% for Korea, but is 1.75% for China. In fact, the same applies for not desiring for three generations living together, which is significant in the estimations for both Korea and China. For Taiwan, the health condition is the only significant explanatory variable other than age. Its impact is fairly moderate, compared to its counterpart in the estimation for Japan.

For China, there are three factors that exert a significant influence only for the

[26] The value for Korea, 1.899, seems to be equivalent to the one for Japan, but note that there are only four choices for Korea; if there were five choices, the value would be conceivably smaller.

country. The quantitative impact of the number of children is quite similar to that of being currently married. They are both indicators of family-related "resources" for ascertaining old-age livelihood[27]. The marginal effect of being part-time employed is similar to that of being full-time employed. This should tell that, in China, being part-time employed is not an indicator of job *insecurity*, but rather of job *security*, as far as the old-age livelihood is concerned. Residing in a village shows quite a significant impact. Given that the public pension system was underdeveloped in 2006 in rural regions, it would be an indicator that a villager did not have much confidence in the government-provided old-age livelihood.

Table 4: Marginal effects

(1) Japan

	1 (Government)	2	3	4	5 (Family/individual)
AGE × 10	−1.932	−0.517	1.193	0.784	0.471
GRADUATE	−12.641	−7.186	6.794	7.604	5.428
FULL_TIME	5.094	1.209	−3.132	−1.987	−1.184
HHD_INCOME	−0.955	−0.255	0.590	0.388	0.233
Health_con	3.827	1.024	−2.364	−1.553	−0.934

(2) Korea

	1 (Government)	2	3	4 (Family/individual)
AGE × 10	1.899	−1.174	−0.672	−0.053
Currenlt_married	−7.240	4.606	2.444	0.191
Three_gen	−8.403	6.074	2.167	0.162

(3) Taiwan

	1 (Government)	2	3	4	5 (Family/individual)
AGE × 10	0.779	1.328	0.484	−1.867	−0.724
Health_con	−1.094	−1.864	−0.679	2.620	1.016

(4) China

	1 (Government)	2	3	4	5 (Family/individual)
AGE × 10	1.020	0.491	0.127	−0.404	−1.235
Currently married	−1.493	−0.699	−0.146	0.593	1.746
Num_child	−1.273	−0.613	−0.158	0.503	1.541
Full_time	2.930	1.394	0.334	−1.158	−3.500
Part_time	3.028	1.351	0.171	−1.204	−3.346
Three_gen	3.890	2.155	1.134	−1.437	−5.741
Village	−3.330	−1.618	−0.451	1.309	4.089

[27] One may say that being currently-married is a dichotomous variable, while the number of children takes various values. True it is in general, both have some similarity in China; because of its "one-child policy," 51% of those who have any children have one child in China, compared with 16.3% for Japan, 16.6% for Korea and 12.7% for Taiwan.

VI. Conclusion

How to ensure the old-age livelihood poses a pressing problem in any ageing societies. Japan and other East Asian countries, such as Korea, Taiwan, and China, are among such societies. In any reforms of the public pension system, its success critically depends on how the people, the beneficiaries of the system, perceive the responsibility of ensuring their old-age livelihood. Research on how the people's opinions are formed, however, is scarce to date, the notable exceptions being Hayo and Ono (2009, 2010). In view of this, the current study extends of these researches, and compares Japan with the three East Asian countries, using micro-data of national surveys in 2006 under the East Asia Social Survey (EASS) initiative.

The objective variable is the answer to the question: whether it is the responsibility of the government or families/individuals to provide a decent old-age livelihood. Given that the objective variable, *i.e.* the answers to the above question, is of the ordered, categorical type from 1 to 5, we estimate ordered logit models. Because the national surveys are not conducted in a uniform manner across the countries, common questions are limited, from which explanatory variables are selected. Based on Hayo and Ono (2009, 2010) selected in this research are: age, gender, marital status, number of children, education, employment status, income, frequency of family dinner, desirability for three generations living together, and health condition.

Estimation results show that age has a significant effect on the choice of the objective variable for all countries, but that it pushes towards the individual option for Japan, while the direction is the opposite for the other three countries. Marital status (being currently married) pushes toward the individual option for Korea and China, because a spouse is a "resource" for old-age livelihood. Being employed full time pushes towards the government option for Japan and China, because those are employed full time are covered by the public system the fullest. Having a good health pushes toward the government option for Japan but toward the individual option for Taiwan. This difference is interpreted to be manifestation of the confidence in the public system. Desirability for three generations living together reasonably pushes toward the individual option in China, but peculiarly pushes towards the government option for Korea. The number of children, education (graduate-level), and residing in rural areas exert a significant effect for only China, Japan, and China, respectively. The direction of the influence all accord with the prior expectation.

Before concluding, it is worth mentioning the caveats and venues for future extensions. Because the main purpose of this study is to *compare* how various factors affect the people opinion, we are to estimate exactly the same models for all four countries. Meaningful it may be, this approach falls short of investigating deeply how the opinions are formed, given different institutional and historical backgrounds of the public pension system in each of the four countries. This short-comings point to a direction, in which the current study can develop; to concentrate on an individual country and select all the variables thought to be relevant in explaining people's attitudes. In fact, that is our plan for future research.

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