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The Analysis on the Poverty Characteristics of Baby Boomers -Using Models of Panel Data-

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The Analysis on the Poverty Characteristics of Baby Boomers: Using Models of Panel Data¹

Deokho Cho and Gil Hwan Park (Corresponding Author, Daegu University)

Abstract

The welfare of the elderly becomes one of the emerging problems in Asia, whose baby boomers are about to become the elderly. Few studies, however, have addressed their “potential need” for social welfare that is expected to rapidly rise soon after retirement. The potential need of these so-called elderly boomers itself also differs according to whether it is from urban and rural areas because urbanised and rural baby boomers have resorted to different income or asset (especially housing) sources. In South Korea, which is a representatively fast-urbanised country in Asia, such different income and asset circumstances are likely to differently affect “post-retirement” poverty as the potential welfare need of urban and rural baby boomers. This article, thus, aims at figuring out the probabilistic characteristics of baby-boomer poverty factors in order to formulate policy implications for urban and rural baby-boomer welfare, utilising a panel logit approach.

Keywords: post-retirement poverty; baby boomers; welfare need; population ageing; panel logit analysis

Introduction

Population ageing is directly related to a rise in life expectancy or decreasing birth rates, and is deeply related to a problem of increasing (potential) welfare need as well. In Asia, where overall increasing longevity and decreasing fertility are noticeable, it is emerging as a critical social problem (Lee, 2008; Jones and Hull, 1997). In particular, it is more

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problematic in recently developed countries like South Korea (hereafter to be referred to as “Korea”), where the economically contributive baby boomers will retire massively in few years (Giles et al., 2011).

The mass retirement of the baby boomers can be as rapid and influential as they have contributed to Korea’s fast industrialisation (e.g., 7.67 percent (1970 to 1979), 7.29 percent (1979 to 2000) in terms of the average GNP growth rate). The national income, which was improved by the young baby boomers in that period, are in turn becoming an increasing source of government spending to meet the same ageing cohort’s welfare need now. This increased need is naturally and socioeconomically due to their physical (age, health status, work ability), financial (ordinary or disposal income), and other socioeconomic (gender, housing ownership) factors, which are likely to degrade. Along with their mass retirement, these factors are more likely to lead to a relative or absolute poverty state than younger cohorts. This likelihood is mostly related to their life cycle of physical or socioeconomic ability and assets, which is “longitudinal.”

The other important aspect that should be considered regarding the baby boomer’s welfare need is the spatial dimension, which is “horizontal.” Since Korea’s wealth improvement was possible from the baby boomers’ rural-to-urban migration and its consequential external economies of scale in an industrialised city, the post-ante investigation of the grown baby boomers’ welfare circumstances should also be made regarding the city-rural perspective. It is natural that different asset accumulations have been made according to different income sources in urban and rural areas, considering that a half century has passed since the baby boomers’ first rural-to-urban migration.

The increasing welfare need of the baby boomers is just potential now, but as these retirees enter into the group of the elderly in few years it will turn out to be

problematic in line with the likelihood of realised poverty as their potential welfare need. The present article addresses this likelihood of their “post-retirement” poverty as potential welfare need, which is dependent upon the physical and socioeconomic status of the “ageing” baby boomers. In understanding such probabilistic poverty characteristics, it will be helpful to consider how different asset (especially housing) and income sources have developed in urban and rural areas.

This article is organised as follows. First, it examines the discussions on the post-retirement poverty as potential welfare need of urban and rural baby boomers to be the elderly and formulates its hypotheses for the research question. Second, it explains the characteristics and construction of the panel data released by the Korea Institute for Health and Social Affairs (KIHS) and the Social Welfare Research Center (SWRC) at Seoul National University, in order to test the given hypotheses. Third, applying a panel logit analysis to the data it examines and discusses the probabilistic characteristics of baby-boomer poverty factors in order to formulate policy implications regarding the potential welfare need of urban and rural ageing baby boomers. Last, it summarises its analysis and discussion and concludes with policy recommendations for addressing present and potential baby-boomer poverty in urban and rural areas.

Urban and Rural Baby Boomers and Their Potential Poverty

1. Ageing Urban and Rural Baby Boomers and Koreans as a Case

Many urbanisations during the second half of the last century were driven by the baby boomer’s rural-to-urban migration. In 2013, however, both urbanised-emigrant and left-rural baby boomers are retiring or about to retire. This trend is noticeable in Asia and particularly “problematic” in Korea as the fastest industrialised and urbanised country. It is because its fast development benefited much from the baby boomers’ migration to

industrialising cities where external economies of scale intensively occurred, but now their economic roles are physically and socioeconomically decreasing rapidly after retirement both in cities and rural regions. To make matters worse, their decreasing economic contribution will naturally lead to increasing welfare need.

The mass urban migration of baby boomers after the second World War itself was commonly observed in many Asian countries such as Japan, Korea, China, India, Vietnam, Indonesia, the Philippines, Thailand, and Malaysia (Jones and Hull, 1997), in the United States (Cromartie and Nelson, 2010), and even in the Europe (Weintraub, 1973), which has a long history of urbanisation since the 17th century. However, contemporary Asian countries, which aggregately share over 60 percent of the total world population and their average population density is fourth times than the European one, particularly worth noting regarding their “massive and rapid” demographic changes. Above all, the world’s fastest developing countries, China and India, are experiencing faster urbanisation (UN, 2011) and population ageing (Bloom, 2011) together, and ageing is overall accelerated while urbanisation is decelerated. This strongly suggests urbanisation and ageing are further studied in reference to Korea, as the fastest urbanised and ageing country in Asia.

At present, Korea’s rate of population ageing is unprecedented over the world. Although other countries such as Indonesia and China are also experiencing rapid population ageing, the rate is much lower than Korea’s. The old age dependency ratio (the number of people aged 65 or more to the number of people aged 15 to 64) in Korea and Indonesia is expected to increase from 22 to 53 percent in 2020 and from 13 to 25 percent in 2040, respectively. In China, where urbanisation and ageing simultaneously occur, it is expected to increase from 19 to 40 percent for the same interval (Kinsella and He, 2009).

2. Korean Baby Boomers and Their “Ageing” Circumstances

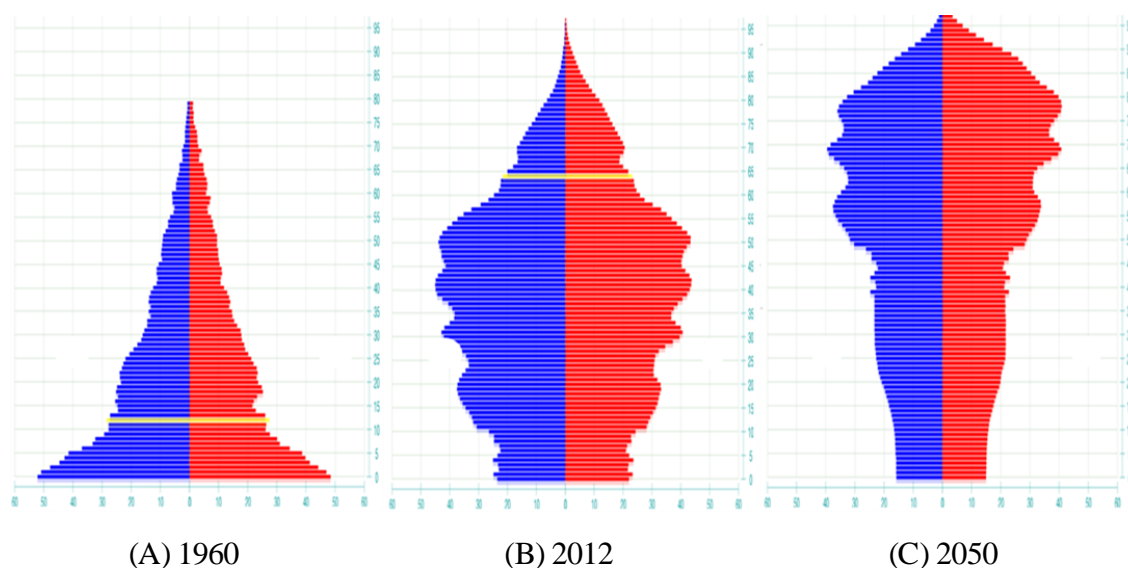
In many Asian countries, baby boomers are distinguishable according to whether they were born in either of the post-war or post-independence period in the mid twentieth century. In Korea, Taiwan, India, Vietnam, the Philippines, Indonesia, Thailand, and Malaysia, the fertility has abruptly risen in the 1950s and declined in the 1960s although their years of remarkable fertility decline span from 1958 to 1970 (Jones and Hull, 1997: 62). In Korea, babies were booming during the post-independence years (1948 from US trusteeship and 1945 from Japanese occupation) and this rising trend continued during and after the Korean War and until the year of 1960. This article defines Korean baby boomers as the Korean people born in this period, e.g., during the ten-year period from 1948 to 1957. Many of them are the heroines and heroes of Korean economic growth.

However, the recent poverty rate of Korean elderly (ages 65 or above) is the highest among 30 members of the Organisation for Economic Cooperation and Development (OECD) and the baby boomers are about to enter the group of these ages. Korea's ratio of welfare spending to the GDP is the second lowest among them. As of 2006, 45 percent of the Korean elderly households live in a state of “relative poverty,” whose income falls into below 60 percent of the median household income of the nation for the years 1984 to 2010 (KIHSA, 2012). This relative poverty rate is three times higher than the average of OECD countries, which stands at 13 percent. No other OECD countries' elderly relative poverty rates exceed 40 percent.

Over recent decades, the households in absolute poverty have decreased by the growth of Korean economy but “relative” poverty has not declined (Kim et. al., 2010). Moreover, the gap between income levels has continuously increased and the low-income group has also increased (Kim et. al., 2010; Choi and Ryu, 2003). Consequently, these phenomena are evolving into the social problem of social

insecurity or worsening welfare especially for the elderly. In addition, the changing structure of population cohorts has deteriorated the problem. The ever-worsening trend of extended longevity over declining fertility is very likely in the future as shown in Figure 1. In Figure 1, population pyramid (A) has cohort born in 1960 as age 0 in the longitudinal axis and 1948 cohort (denoted with the brighter horizontal line) as age 12 in the same axis. One interval (not the bar itself) in the longitudinal axis refers to age 5 and one interval in the horizontal axis refers to 100 thousand people. Declining total and relative female population with decreasing fertility despite increasing longevity are manifestly observed in the past, recent, and future (projected) structure of Korean population.

Figure 1. Changing population structure in the years of 1960, 2012, and 2050



Source: Korea Statistical Office (2013). "Changing Population Pyramid."

3. *The Baby Boomers' Poverty as Potential Welfare Need and the Housing Poor in Korea*

In Korea, pension and housing has recently emerged as two most preferred source of providing for elderly life. However, pension beneficiaries still relatively small to the total “eligible-aged” population (7 percent) and house prices drop. In addition, institutionally Korean tradition of children’s supporting their old parents is steadily weakening. At present, the social consensus of this family duty is overall weakening and children’s spontaneous care of their loving parents is not always sufficient and ensured for most of the elderly. However, it was not until the recent years that the modernised national pension since 1988 began to be paid for the eligible-aged subscribers. Only 7 percent of the elderly are eligible to receive the benefit from the National Pension Service (NPS) as of January 2013.

In this study, housing ownership and price as demarcating factors between urban and rural regions are to be representatively analysed to examine city-rural differences. Housing ownership and price as demarcating factors are also related to the baby boomers’ income whose disposability depends on the proportion of taxes or debts in household income. It is particularly because Korea’s lump-sum deposit (two-year-rental) housing system used to be utilised as a leverage for ensuring a more expensive house (especially in cities) in real estate booms, but the leverage has recently turned into a debt as house prices dropped. The baby boomers experiencing dropping housing-price-induced debt increase in their portfolios are often expressed as “the housing poor” in Korea.

Up until now, many previous studies, which addressed poverty as a public issue, usually focused on the (elderly) household sampled without considering ages (Hong, 2004; Gu, 2005; Kim, 2006; Shon and Kim, 2006). However, few studies centred on the poverty of the baby boomers, which can be ever-worsening. As of the end of 2012, all the baby boomers born in 1948 to 1957 have already entered the group of ages 55 to 64

and many of them are about to be the elderly. Most of the baby boomers, however, cannot get the monthly payment from the NPS until age 65. These “too young to be pension beneficiaries” (55 to 64) are not likely to have the “ensured” monthly regular income for maximum 10 years although the mean rate of regular employment for the baby boomers born before 1955 is 16.1 percent as of 2012 (Park, 2012). Many of them had already begun to be laid off during the IMF crisis in 1998 and entered into self-employed small businesses, and average house prices have also continued to decrease after 2007. As of July 2012, 42.4 percent of the baby boomers born before 1955 is non-incorporated (temporary 20.9%; casual 10.7%; unpaid house-working 10.8%) and 36.2% is in self-employed small businesses (Park, 2012). It was natural that this 78.5 % usually could not afford private pensions.

It is true that significant numbers of them do not have “regular” income sources while many of their children still need some financial help from them. Moreover, the number of single baby boomers and their financial instability have been recently increased due to the high divorce rate and this trend is expected to continue (Kim, 2011; Kim, J., 2011). However, there are few studies on baby-boomer poverty. Kim and Kim (2011) analysed the poverty of baby-boomer households in terms of gender and job types. Kim and Kim (2011) found the significance of the effect of gender on the baby-boomer poverty level, e.g., a negative effect of male on poverty. The study, however, has some weakness in the analysis of job characteristics because most baby boomers have already retired from their regular jobs. Choi (2009) also noted the causal variables of baby-boomer poverty regarding implications for senior welfare policies. However, the study did not appropriately control variables such as individual, family, and working factors to estimate the main effect on the elderly poverty.

Based on previous pioneering studies on baby-boomer poverty, the poverty characteristics of baby boomers need to be considered from several critical points of view for statistical and policy analysis as follows. First, in terms of households' socio-economic and physical properties, e.g., job types, homeownership, work ability, health status, are key variables in determining baby-boomer poverty. (As of work ability, both socio-economic and physical properties can be expressed.) Many scholars argue that the poverty level of elderly people highly depends on their previous jobs and homeownership (Hong, 2007; Choi, 2009; Cho, 2012; Suk and Lim, 2007). As a poverty determinant, the previous-job-type variable is reasonable for analysing "the elderly poverty" because 45 percent of the "fully-retired" elderly is in relative poverty while they are under a weaker social security system and with lower financial savings or cheaper real estate. The previous-job-type variable, however, is not appropriate for the poverty level of the "1948 – 1957 baby boomers" because many of them are still working in part-time or in gradual retirement (Choi, 2007; Cho, 2012). Instead of previous job types, therefore, current jobs, their work ability or health status should be simultaneously considered in addition to homeownership.

Second, previous studies also did not distinguish "rural from urban" households and "low-income from" general ones, even if their poverty characteristics are different to each other. Therefore, the characteristics of baby-boomer poverty by regions and income levels were hard to be figured out if a distinguishing variable is adopted. According to regions and income levels baby boomers' housing prices can also be different, so they should be appropriately operationalised in an analytical model. The housing price variable is important because there is an observable difference between urban and rural housing prices and such a difference also represents the real-estate-to-income ratio when the variable of relative income or poverty is analysed as a dependent.

The real-estate-to-income ratio is critical for the financial plan or the reverse mortgage of many baby boomers that still own their house but lacks a stable income source. When “disposable income” is adopted as the dependent variable, housing prices or the real-estate-to-income ratio can also reflect whether the homeownership or housing price of the individual household is ensured or real, compared to the “ordinary income,” which does not deduct the interest accruing to personal loans.

Third, in terms of gender effect on poverty in the household level, it needs to be tested whether the poverty level of baby boomers depends significantly on “the gender of household heads” controlling for other variables. The poverty rate of female household head is 1.5 times higher than one of the male households (Choi, 2009; Cho, 2012). In Choi (2009) and Choi (2012), however, there were no significant differences when the level of education and spouse death are controlled. It may come from the lower education of women and their longer life expectancy (NWLC, 2010, 2012). In terms of statistical significance, Suk and Lim (2007) showed that the female gender had a negative effect on the total income level when personal and household characteristics were controlled. On the other hand, Hong (2005) and Choi (2007) noted that there were no significant difference among the gender groups when personal and household characteristics are controlled. There are still pros and cons of the significance of the gender effect, and it needs to be examined further.

Last, the overall limitation of the previous studies above is that most of them focused on examining the cross-sectional data in their regression analyses. Except Choi (2009, 2012), other studies centred on the “static” characteristics of poverty using cross-sectional data. The “probabilistic” coefficients also need to be identified since the potential welfare need of the baby boomers – which is expressed in the dependent variable – can vary according to the poverty properties whose variables are respectively

defined in socio-economic, physical, regional, and gender aspects. In light of findings from previous studies, thus, this study is to analyse the probabilistic characteristics of baby-boomer poverty properties regarding the above poverty properties, using the 5-year welfare data of traced individuals.

Data and Analytical Approach

1. The Panel Data

This article uses the Korean Welfare Panel Data (KWPD), which is constructed and released by the KIHSA and the SWRC under the government's support. Its household datasets from 2006 to 2010 have been integrated year by year in order to figure out the characteristics of baby-boomer household poverty. The KWPD datasets are composed of figures on household characteristics, economic activity, living cost, income and asset, housing and health, social insurance and basic life, work ability, social welfare, and other family-related factors.

This article merges the 5-year datasets longitudinally using the KWPD-designated household merge-key. The datasets of the baby boomers (ages 55 – 65) are extracted from these merged datasets. The merged dataset has 2,590 observations. These datasets are surveyed by tracing individual households nationwide. Utilising the data, this article examines the probabilistic characteristics of baby-boomer poverty properties in order to formulate implications for addressing the “(relative) poverty” of the low-income baby-boomer household – whose income is fall under 60% of the median income of households in the nation as a widely-used criterion of “relative poverty” – after the IMF crisis (KOWEPS, 2013).

Methodologically, the KWPD panel data is very suitable for examining longitudinal and cross-sectional characteristics in a simultaneous framework. This analytical strength comes from that this type of data contains the “traceable” characteristics of each variable on the same (individual) household surveyed yearly by interviewers over a given period. This article adopts panel logit analysis so that probabilistic and actuarial characteristics of poverty properties can be appropriately captured for the interested dependent variable (e.g., relative poverty), which is binary.

2. Data Construction and Variable Specification

In this article, the 5-year welfare data of traced individuals are examined by panel data analysis for figuring out the likelihood of realisation of the baby boomers’ potential welfare need, given the following variables of poverty properties. The poverty properties are respectively defined as independent variables of socio-economic, physical, regional, and gender aspects and their “probabilistic” coefficients will express the influences on the potentiality of the welfare need of the baby boomers. The structure of the 5-year panel data can be described in Figure 2.

Figure 2. The structure of the Korean Welfare Panel Data

$j(hij)$	t (time)	y_{jt}	x_{jt1}	x_{jt2}
1	1	y_{11}	x_{111}	x_{112}
1	2	y_{12}	x_{121}	x_{122}
1	3	y_{13}	x_{131}	x_{132}
2	1	y_{21}	x_{211}	x_{212}
2	2	y_{22}	x_{221}	x_{222}
2	3	y_{23}	x_{231}	x_{232}
3	1	y_{31}	x_{311}	x_{312}
3	2	y_{32}	x_{321}	x_{322}
3	3	y_{33}	x_{331}	x_{332}
4	1	y_{41}	x_{411}	x_{412}
4	2	y_{42}	x_{421}	x_{422}

Note: $j = 1, \dots, m$ (unit of sample: e.g., household), $i = 1, \dots, n$ (survey area: e.g., school, class), $h = 1, \dots, l$ (survey area; ex: region, city), $t = 1 \dots T$ (year), y_{jt} = the value of response variable in time t , x_{jt} = the value of explanatory variables in time t .

Since the response variable is binary, the logistic regression method is applied into the analysis of the KWPD panel data. Based on the review of previous studies in the last section, this paper chooses one response and 8 explanatory variables for defining socio-economic, physical, regional, gender properties according to the availability and year-by-year consistency of 5-year panel data which can be merged by the household key variable. The dependent variable is given 1 (general) if it is the household which does not receive basic living security services and 0 (low-income or relatively poor) if it is the household which receives from the government or other public agencies. Independent variables represent the general characteristics of households, including income, ownership, health status, work ability, region, gender, and age, as follows:

Dependent variable

- *general: dummy variable (0 = low-income household; 1 = general household);*
and

Independent variables

- *din: disposal income*
- *oin: ordinary income*
- *nhousehold: number of householders;*

- *ownership: housing ownership (1 = owner, 2 = lump sum, 3 = deposit rental, 4 = monthly rental, 5 = others);*
- *healthstat: health status (1 = excellent, 2 = good, 3 = moderate, 4 = bad, 5 = very bad);*
- *workable: work ability (1 = workable, 2 = ill, 3 = too old, 4 = others);*
- *reg5: region (1 = Seoul, 2 = metropolitan, 3 = urban, 4 = rural, 5 = urban fringe)*
- *gender: gender (0 = man, 1 = female); and*
- *age: age*

Analysis and Discussion

1. Descriptive Analysis

In this study, the number of observations of baby boomers is 2,590 households. In order to figure out the characteristics of baby boomers for building their welfare policy, this study implements the descriptive analysis of the overall characteristics of the baby boomers on the KWPA data. According to the frequency analysis, total 2,590 observations are composed of general (1,679: 64.83%) and low-income households (911: 35.17%). More than a third of baby boomers are relatively poor (low-income) households under the relative poverty line. On the other hands, in the case of ages 65 or above, total 10,290 observations of elderly households are composed of general (2,649: 23.99%) and low-income households (7,641: 74.26%). Moreover, 1,310 (50.58%) of ordinary households live in the city. It means that three quarters of elderly people already belongs to the low-income households. It is also noted that baby-boomer households have significantly the possibility of falling into to the low-income households after retirement. It also suggests that the considerable amount of baby

boomers is relatively poor even if their income levels stand in a higher peak in their lives. Moreover, they have some difficulties to get the monthly income because of their unstable income sources such as small or no amount of savings and pension benefits.

The home ownership of the general households is found in 1,679 households (64.63%) and the ownership rate of the low-income households is very low, that is 911 households (35.17%). It means that the low-income baby boomers have the difficulty to solve the housing welfare. The general households who lived in the city are 1,310 (50.88%) and 369 (14.25%) in the rural area. The low-income households is each 617 (23.82 %) in the city and 294 (11.35%) in the rural area.

In the gender aspect of household heads, the number of male general households is 1,426 (55.06%) and that of female ones is 253 (9.99%). In summary 1,927 (74.40%) of baby boomers live in urban areas (Seoul, metropolitan, or urban) and others live in rural areas (rural and urban fringe). Among the baby boomers, 2,043 (78.88%) household heads are male and 547 (21.12%) are female.

2. Panel Logit Analysis

In panel data, there are multiple entities and each component has repeated measurement at the different time periods. Panel data models examine group (individual-specific) effects, time effects, or both. These effects can be regarded as either fixed or random, according to whether the “time-invariant” or permanent individual-specific effect (μ_i) is considered as a part of the fixed effect together with the constant (α) or as a part of the random effect together with “time-variant” idiosyncratic error (ϵ_{it}). A fixed effects model, thus, examines if $\alpha + \mu_i$ does not vary across individuals. A one-way model includes only one set of dummy variables (e.g., firm), while a two-way model considers two sets of dummy variables (e.g., firm and year).

The results in this type of regression analysis using the panel data also depend on the characteristics of dependent variables. The dependent variable defined in this article's panel data is binary rather than continuous for estimating the probabilistic characteristics of "relative" poverty properties, so panel logit analysis has been adopted. When the panel logit model assumes that the error term ($\mu_i + \epsilon_{it}$) follows the logistic distribution, which can be suitable for analysing the binary response variable's relationships to other discrete or continuous variables, it is a pooled logit model. When only the idiosyncratic error term (ϵ_{it}) is assumed to follow the logistic distribution and μ_i follows normal distribution, it is a random effects logit model. When μ_i is approached a fixed or time-invariant individual effect, it is a fixed effects logit model.

The general type of panel logit models, which can be applied to either pooled or random effects logit analysis, is expressed as follows:

$$y_{it} = 1 \quad y_{it}^* > 0,$$

$$y_{it} = 0 \text{ otherwise,}$$

$$y_{it}^* = \alpha + \beta x_{it} + \mu_i + \gamma_t + \epsilon_{it},$$

where

y_{it} = observed dependent variable, y_{it}^* = latent dependent variable
 α = constant, β = coefficients
 x_{it} = independent variable, μ_i = parameter which represents individual effects,
 γ_t = parameter which represents time effects, ϵ_{it} = idiosyncratic error term.

In the fixed effects model,

u_i = specific i^{th} object effects; γ_t fixed t = specific t^{th} time effects,

In the random effects model,

u_i = general object effects; γ_t random t = general time effects.

In the respective case of adopting disposal income (*din*) or ordinary income (*oin*) as the particularly interested independent, their respective result of the likelihood-ratio

test both did not reject the null hypothesis of $\rho = 1$ at the .01 level, which means that the individual characteristics of the panel is not necessarily to be considered. Based on this result, the fixed effects model needs not to be necessarily estimated and actually its coefficients could not be computed because of its log-likelihood not converged in iterations of maximum likelihood estimation. This non-convergence is due to the weak within-effects, which are too small to be calculated in the second order derivative of the log-likelihood function. In the case of excluding *ownership* from the model and adopting *din* as the dependent, the fixed effects analysis was possible to estimate and its estimates are not greatly different from pooled logit estimates. The Hausman test of the model with the same variables, however, indicated the systematic difference between fixed effects and random effects estimates.

The analysis, therefore, proceeded to the statistical comparison of pooled and random effects logit models. The Breusch Pagan Lagrange Multiplier (LM) test was not possible to apply to the model because of the same iteration problem above. In light of these procedural results, the next analysis directly compares the constant and coefficients of both pooled logit and random effect logit models each by each, considering the assumption of their error distribution.

Table 1 shows the results from pooled logit models when either *din* or *oin* was adopted as the independent. As indicated with asterisks, *din*, *nhousehold*, *ownership*, *workable*, and *age* were significant at the .01 level and *reg5* was significant at the .05 level in the pooled logit analysis with *din* as the dependent. In the pooled logit with *oin*, as the dependent, *oin*, *nhousehold*, *workable*, and *age* were significant at the .01 level and *reg5* was significant at the .1 level. However, *housing price* turned out statistically significant at the .05 level whereas *ownership* turned out not significant. This suggests housing prices and homeownership are more closely and positively related to the

ordinary income rather than the disposal income, which deducts personal interests from loans and taxes from ordinary income. Since a significant amount of personal loans is usually to buy or rent a house in Korea, this result is consistent with citizens' common observation and hypothesis in this article.

The most noticeable statistic in the table is described in the note in Table 1. In the case of *din* as the dependent, the logged value of *housingprice* turned out highly significant while *ownership*, which was significant, turned out not significant. In contrast, neither the logged value of *housingprice* nor *ownership* is statistically significant in pooled logit regression of *oin* as the dependent. This changed value and statistical significance are due to the probabilistic adjustment (e.g., an increase in the mean) by the logged value of housing price that relatively equates the differences in housing price. Figure 3 shows the change in probabilities of each ownership type's falling into either city or rural regions. It is clearly observed that less secured ownership is more likely to be found in urban areas. Figure 4 also illustrates probabilities of not falling into relative poverty in the urban-to-rural gradient, which is also consistent with the hypotheses.

Table 2 shows the estimated results of the random effects logit model. The statistical significance of each coefficient is overall consistent with the pooled logit model. It is noticeable that the pooled logit model, which assumes $\mu_i + \epsilon_{it}$ follows the logistic distribution, shows a more valid result. Comparing Tables 1 and 2 reveals both the overall coefficients and its standard errors in the pooled logit model are less than the ones in the random effects model. The smaller values are also found in the constant, which contains the model's uncertainty or fixed effects, whereas as all the t values of the statistically significant variables in the pooled logit are much larger than ones in the random effects model. These values suggest the logistic distribution (not

random plus logistic distribution) is more efficient and appropriate in the estimation of probabilities of (not) falling into relative poverty, and the signs and values of respective coefficients were consistent with the hypotheses.

Table 1. Results of the pooled logit model

<i>Disposal Income Case</i>	<i>Coefficient</i>	<i>Odds Ratio</i>	<i>Standard Error</i>	<i>t</i>	<i>Significance</i>
<i>din***</i>	0.009	1.009	0.001	15.540	0.000
<i>nhousehold***</i>	-2.813	0.060	0.220	-12.810	0.000
<i>ownership***</i>	-0.340	0.712	0.129	-2.630	0.009
<i>housingprice</i>	0.000	1.000	0.000	1.290	0.196
<i>workable***</i>	-0.831	0.436	0.178	-4.670	0.000
<i>healthstat</i>	0.024	1.024	0.122	0.200	0.844
<i>reg5**</i>	-0.306	0.736	0.106	-2.890	0.004
<i>gender</i>	-0.315	0.730	0.275	-1.150	0.252
<i>age***</i>	-0.340	0.712	0.056	-6.070	0.000
<i>(constant)</i>	15.412	4935158.000	3.214	4.800	0.000
<i>Ordinary Income Case</i>	<i>Coefficient</i>	<i>Odds Ratio</i>	<i>Standard Error</i>	<i>t</i>	<i>Significance</i>
<i>oin***</i>	0.010	1.011	0.001	14.030	0.000
<i>nhousehold***</i>	-3.683	0.025	0.301	-12.250	0.000
<i>ownership</i>	-0.117	0.890	0.141	-0.830	0.406
<i>housingprice**</i>	0.000	1.000	0.000	-2.070	0.039
<i>workable***</i>	-0.693	0.500	0.188	-3.680	0.000
<i>healthstat</i>	0.066	1.069	0.136	0.490	0.626
<i>reg5*</i>	-0.218	0.804	0.118	-1.840	0.066
<i>gender</i>	-0.113	0.893	0.308	-0.370	0.714
<i>age***</i>	-0.413	0.662	0.064	-6.430	0.000
<i>(constant)</i>	17.044	25200000.000	3.595	4.740	0.000

Note: In the case of “disposal income,” the *t* statistic for the logged value of *housingprice* is 3.85 ($p = 0.000$) while *t* statistic for *ownership* is 0.60 ($p = 0.547$) in regressing the same except the logged value. In the case of “ordinary income,” the *t* statistic for the logged value of *housingprice* is 1.07 ($p = 0.286$) while *t* statistic for *ownership* is 0.14 ($p = 0.888$) in regressing the same except the logged value. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 2. Results of the random effects logit model

<i>Disposal Income Case</i>	<i>Coefficient</i>	<i>Standard Error</i>	<i>t</i>	<i>Significance</i>
<i>din***</i>	0.010	0.001	10.680	0.000
<i>nhousehold***</i>	-3.178	0.326	-9.750	0.000
<i>ownership**</i>	-0.375	0.157	-2.390	0.017
<i>housingprice</i>	0.000	0.000	1.200	0.231
<i>workable***</i>	-0.938	0.224	-4.200	0.000
<i>healthstat</i>	0.037	0.144	0.260	0.796
<i>reg5*</i>	-0.297	0.133	-2.240	0.025
<i>gender</i>	-0.427	0.348	-1.230	0.221
<i>age***</i>	-0.435	0.085	-5.120	0.000
<i>(constant)</i>	20.120	4.655	4.320	0.000

<i>Ordinary Income Case</i>	<i>Coefficient</i>	<i>Standard Error</i>	<i>t</i>	<i>Significance</i>
<i>oin***</i>	0.012	0.001	9.480	0.000
<i>nhousehold***</i>	-4.131	0.459	-9.000	0.000
<i>ownership</i>	-0.135	0.166	-0.810	0.416
<i>housingprice*</i>	0.000	0.000	-1.760	0.078
<i>workable**</i>	-0.769	0.229	-3.350	0.001
<i>healthstat</i>	0.075	0.156	0.480	0.631
<i>reg5</i>	-0.202	0.143	-1.410	0.158
<i>gender</i>	-0.168	0.374	-0.450	0.653
<i>age***</i>	-0.512	0.101	-5.070	0.000
<i>(constant)</i>	21.733	5.299	4.100	0.000

Figure 3. Probabilities of each ownership type's falling into either city or rural regions

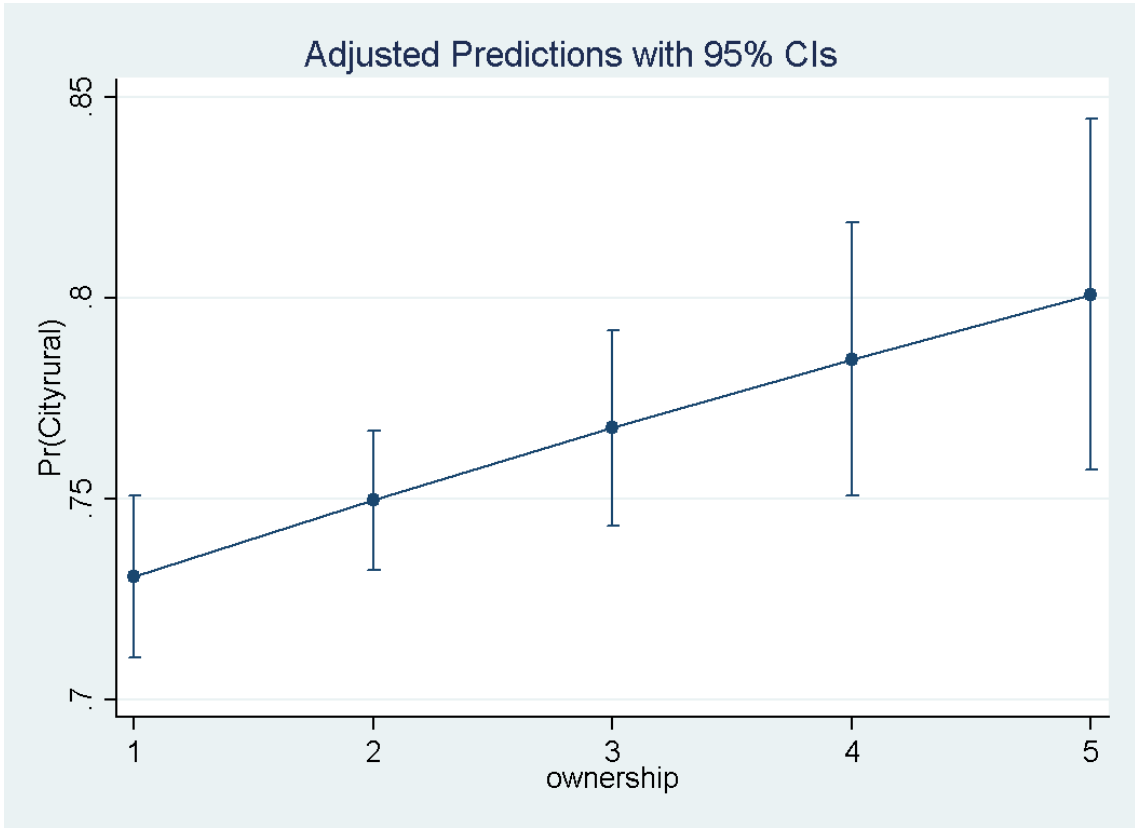
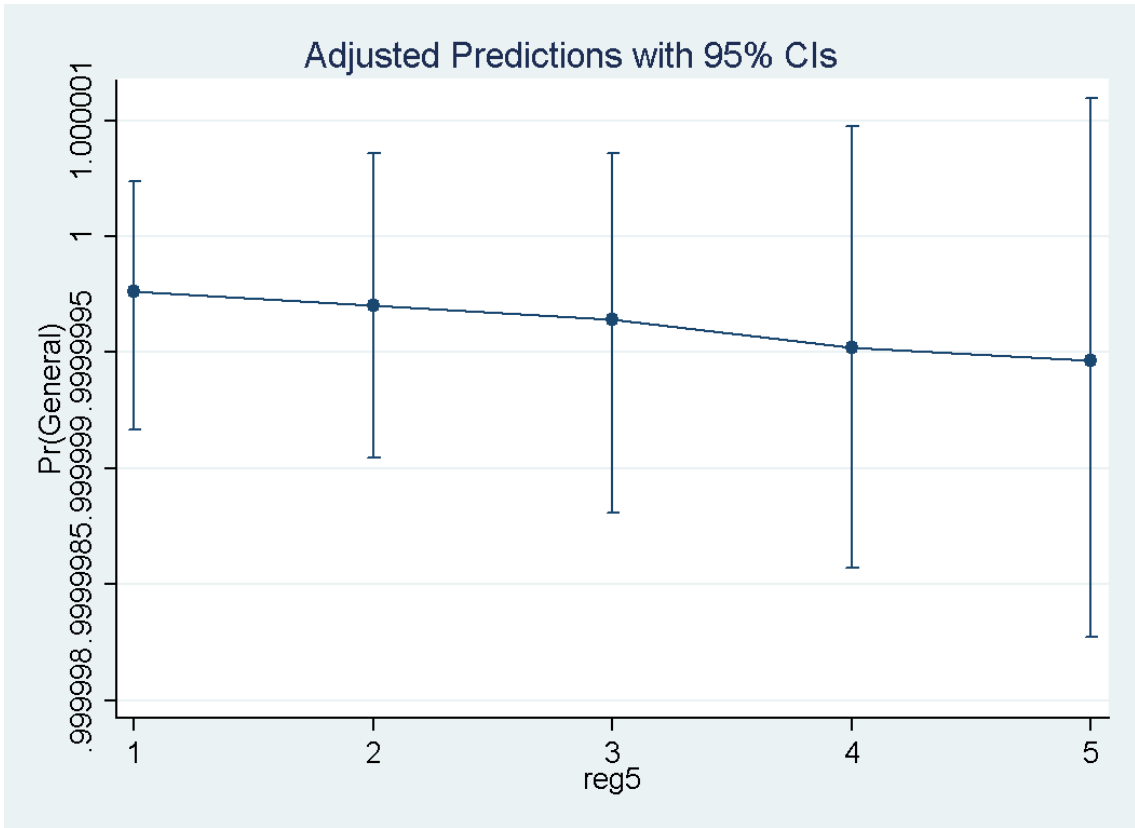


Figure 4. Probabilities of not falling into relative poverty in the urban-to-rural gradient



Conclusion and Policy Implications

The elderly welfare policy is a critical social issue and directly related with the poverty problems. However, most of the previous studies focused on the elderly households instead of the baby boomers who are likely to need potential welfare most within 10 years. This study implements the procedural panel logit analysis in order to figure out the characteristics of baby-boomer poverty in urban and rural areas and some appropriate methods for using the well-constructed 5-year KWPD.

In theoretical aspects, the poverty of elderly households comes from several different factors such as individual, household, working circumstance, health condition, and sociological factors. However, the baby-boomer poverty differs from those of general households. Eventually the poverty level of urban and rural baby boomers turned out to be influenced from several different factors such as the ordinary income, number of households, ownership, health status, workable, urban-rural, gender, and age variables.

This study concludes as follows. First, in order to prevent that the baby boomers fall into low-income households, the government should create the job opportunity to increase the ordinary income and to provide the workplace because job itself is one of the best alternatives to guarantee the baby boomers welfare. Homeownership and sex are also important factor in the urban and rural baby-boomer poverty. The governmental policy should provide the baby boomers with dwelling stabilisation policy and dwelling support system like vouchers for female households along with the supplement of the public pension system.

In methodological aspect, this paper suggests a new research method to handle the mega panel data cross-sectionally and longitudinally. Until now, most of research

methods focus on the cross-sectional analysis such as regression analyses and logistic ones depending upon the characteristics of available data. However, these methodologies cannot consider the time-effects of data. The cross-sectional analysis such as regression only measures the static relation among the variables at the specific time because it surveys several objectives at the designated time. Time series models cannot handle the several explanatory variables and only trace the effects by the time change on the one or two variables longitudinally.

Consequently, welfare policy is directly related with the job opportunity, especially for baby boomers. Moreover, poverty characteristics also differ from the age cohorts. Therefore, the government should create the diverse welfare system in order to prevent the poverty of the baby boomers because their social welfare need are about to increase. In terms of methodology, the panel analysis model can handle the cross-sectional and longitudinal statistic mega data. It also implements the individual and group effect analysis following the time change. However, this analysis also has some weakness. It cannot handle the cross-sectional and longitudinal aspects simultaneously. It also has some weakness to handle the category dependent variable. In order to do that, the detailed and systematic logistic panel analysis methods should be elaborated for the welfare policy and research in Korea and many “ageing” countries from now on.

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