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The residential location choice of the elderly in Korea: A multilevel logit model

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ABSTRACT

The present study explores a residential movement of elderly households, which is postulated based on the probabilistic choice theory. This study intends to develop a residential location choice model integrating micro- and macro-approaches by adding regional factors to the probabilistic choice model in terms of the individual level. With the movement to rural areas being given more focus, the estimated results will have implications on local governments' policies with regard to the shrinking population. The findings suggest that the propensities associated with the decision to move to rural areas vary in different regions. The unemployed elderly or the elderly who live with their children are most likely to move to urban areas, while elderly couples show more inclination to migrate to rural areas than the spouseless elderly. This study presents that the probability that the urban elderly will move to rural areas is lower than that of the rural elderly.

1. Introduction

Aging has far-reaching implications in diverse fields, including social, cultural, and economic ones, because reaching critical points in the life cycle leads to many changes in needs and preferences. Residential location choice is affected by these changes without exception. It leads the geographical mobility of populations. The patterns and determinants of residential mobility vary considerably by age groups. Although these differences between age groups are generally accepted, limited research has been conducted on the residential location choices of the elderly—the group that is retired or nearing retirement.

At present, South Korea (hereafter Korea) is aging faster than any other industrialized nations. According to the Korea National Statistical Office in (2011), Korea already reached the level of an "aging society" in 2000, where the elderly aged 65 and above make up at least 7 percent of the country's total population. Korea is now rapidly approaching the next level of becoming an "aged society". By 2026, the number of elderly in the population is expected to reach the 20 percent mark. The 7.1 million baby boomers, conventionally defined as those born between 1955 and 1963, represent 15.2 percent of the total population of Korea according to the 2005 Population Census by Korea National Statistical Office (Park and Kim, 2015). The oldest of them turn 55 years old, which is retirement age in many Korean workplaces. In the next decades, Korea will experience a huge increase in the number of the elderly and their proportion to total population.

Earlier research, especially those regarding baby boomers' migration within the United States (US), showed that many of the elderly stay at their current residences; however, a substantial number may move back to their childhood places. As they retire, they may seek more bucolic lifestyles and move to areas with high levels of rural amenities (Domazlicky, 2002). The majority of the 77.5 million baby boomers in the US intend to buy a new home for retirement (Klebba, 2005). Recent census evidence from several Western countries indicates that retirees now prefer to move to rural areas and towns in, or adjacent to, areas of high landscape quality rather than to "classic" retirement resorts (Rogers, 1992). Although almost imperceptible, this trend is also being noticed in Korea. Kim et al. (2008) suggested that some urban residents return

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to their hometown or migrate to rural areas after their retirement.

Elderly migration can result in urban shrinkage or regeneration because it is expected that the total population in Korea will reach its peak in 2018 and then decrease. In contrast with the elderly in previous generations, the well-educated and wealthy elderly of this generation contribute to the vitalization of regional economies (Joseph and Cloutier, 1991). According to Jauhiainen (2009), some peripheral municipalities in the countryside consider the return migration of the elderly as an opportunity to vitalize their local economies. In particular, the population of rural areas in Korea has decreased during industrialization and urbanization because of the great influx of the rural population into the cities. Thus, the present study focuses on the elderly migration into rural areas.

This research assumes that individual attributes and regional characteristics affect individual evaluation and decision concerning residential location. The focus is on elderly migrants who moved residential locations during the period 2000–2005. Instead of focusing solely on inter-province migration, this study captures a more disaggregated view of residential location choices by exploring *si/gun/gu–si/gun/gu* migration and characteristics of the regions. Special attention is paid to the residential location before moving and the current residence. Korea has adopted two-tier administrative district system: the provincial level division and municipal level division. At the municipal level, those provincial level entities are subdivided into smaller ones such as cities (*si*), counties (*gun*) and districts (*gu*). There are a total of 234 municipal level entities.

The purpose of the present study is to explore and determine the factors related to the residential location choice of the elderly. More specifically, this study attempts to answer the following research question: How does the migration to rural areas of the elderly relate to individual socioeconomic attributes and location-specific attributes? To solve this research question, this study will also specify a multilevel logit model for the probability of location choice as an analytic methodology. This study intends to draw implications for contemplating strategies to attract elder migrants. With the migration to rural areas being given more focus, the estimated results will have implications on local governments' policies with regard to the shrinking population.

2. Literature review

2.1. The characteristics of elderly migration

Previously, several studies on the characteristics of elderly migration have been conducted. According to Florida (2009), Americans over 65 years old migrate less compared with younger ones, but when they do, they tend to migrate the longest distance. A total of 37.3 percent of Americans over 65 years old migrate to places more than 500 miles away, in contrast to only 25.6 percent of those aged 45–54 years. The main reasons for this tendency are improved health, more generous pension arrangements, and the growing absolute and relative size of the older population (Rogers, 1992).

Conway and Houtenville (2003) suggested that differences exist between younger and older elderly migrants. The differences concern the patterns of migration and the factors that affect their migration decisions. The younger elderly look for destinations with a temperate climate and favorable government policies with regard to income tax and welfare spending. On the other hand, more significant pushing factors for the older elderly include high costs of living as well as income and property taxes.

According to Longino (1994), a survey among subscribers to *Where to Retire* magazine found the following to be the most important considerations for its readers: (1) low crime rate, (2) good hospitals nearby, (3) low overall cost of living, (4) mild climate, (5) low overall taxes, (6) low housing cost, (7) friendly neighbors, (8) major city nearby, (9) no state income tax, and (10) active social/cultural environment. Barsby and Cox (1975) showed that elderly migrants' destination have characteristics such as less urbanization, low crime rate, low population density, mild climate, good landscape, and sufficient hospitals.

Son (1990), focusing on inter-county migration in the northeast region of the US, highlighted the person–environment interaction in the migratory behavior of the elderly. He suggested that the younger and better-off migrants are more likely to display amenity considerations, whereas the older migrants of lower socioeconomic status are more likely to make social network moves.

According to observations of some studies, many rural regions in the US have gained popularity because they offer desirable climates, unique physical features, less congestion, less crime, lower costs of living, and a community atmosphere (Conway and Houtenville, 2003; Fuguitt and Tordella, 1980; Serow, 2001). Plane and Jurjevich (2009) suggested that the elderly leaving large metropolitan areas are moving to small metropolitan and rural counties with good climates and other natural amenities.

However, only a handful of studies on elderly migration are found in Korea or other Asian countries. Han et al. (2005) intend to investigate quantitatively the possible cause of migration pattern for different age groups. In the 60s, 70s, and 80s age groups, the factors which have significant impact on migration pattern are not found except for the total of housing unit. Yoon et al. (2009) examined the trend and nature of elderly migration, yet the determinants of elderly migration were not explored. It has been presented that the destinations of elderly migrants were mostly neighboring provinces, except *Chungnam*, *Jeonbuk*, and *Jeju*.

2.2. Methodological concerns

Many early economic studies used aggregated data to treat migration as an equilibrating mechanism that minimizes geographic employment and wage differentials, whereas later studies shifted to a microeconomic approach to study why individuals and families move (DaVanzo, 1981). Many migration studies have attempted to identify the attributes of places that influence residential location decisions. Most of the said studies relate an area's migration rates to its own attributes, or the flow of migrants between two areas to the attributes of both places.

A considerable number of studies on migration have been performed in Korea; however, they have focused on population concentration in the metropolitan area (e.g., Kim, 2006; Kwon, 1994). Those studies used aggregated migration flow data on the large region level. The causes of population concentration have been explained using economic factors. Recently, various studies have substantiated the migration determinants by using a probabilistic choice model for individual attributes and the macroeconomic model (e.g., Kim and Lee, 2009; Han et al., 2005; Lee, 2001, 2002).

Little attention has been given to demographic factors and neighborhood amenities as simultaneous determinants of residential location. This study intends to explore the effects of interaction between individual attributes and regional characteristics on elderly migration. A multilevel model is used because this analysis has a structural feature of data with a two-level hierarchy, namely, individual and regional. Within a multilevel model, each level is formally signified by its own sub-model. Each sub-model represents the structural relations that occur at that level and the residual variability at that level. Chi and Voss (2005) compared hierarchical regression and multivariate regression in analysis methodology. They included demographic, socioeconomic, and geographic factors as the determinants of migration decision, and

suggested that the hierarchical regression approach provides significant advantages in the study.

3. Modeling framework

3.1. Conceptual framework

This study uses the concept of *elderly* to indicate those over 60 years old, as defined in the National Pensions Act. The Act provides that a person over 60 years old is an old-age pensioner. In the current study, the elderly are assumed to be retired or nearing retirement. According to Moore (1959), the residential location choice of a worker is less possible because one must reside near one's job regardless of the characteristics of the location during his working life. This study hypothesizes that the elderly have considerable flexibility in their residential location choice because they no longer fall under the influence of employment ties in a fixed locality. Planning for retirement may have an effect on their preference for a residence. Nevertheless, unlike those in Europe or US, about 62.0% of elderly in Korean are willing to work. According to a statistics in 2014, a pensioner receives USD 370 a month on average when he or she needs at least USD 1420 a month to sustain the costs of living.

This study implies that the elderly move to locales that offer an attractive quality for them. The decision of where to move must be made from a variety of choice sets. It depends on a preference of the elderly among many places. This analysis includes only elderly householders over 60 years old because members of a household usually move together and the residential location is decided by their aggregate demand. In this paper, the residences of the elderly in 2000 and 2005 are called the *origin* and the *destination*, respectively.

This study intends to explore the case wherein the elderly migrate into rural communities. It considers both individual attributes and regional characteristics as factors that affect the choices of the elderly. Despite the same environment, the residential satisfaction of each household can be different because satisfaction is assessed in combination with the households' preferences and socioeconomic characteristics. Specifically, neighborhood environment can be a push factor, which makes a household leave the region, and a pull factor, which makes other households move in. This study assumes that the elderly move to a location where they can maximize their utility compared with their current residence. It supposes that the factors in which the differences of regional characteristics between origins and destinations are greater than zero have positive effects on the choice of the locale. This model uses the location attributes, which are the differences in characteristics of their residences, in 2000 and 2005. It hypothesizes that the elderly migrate to maximize the benefit factors and to minimize the cost factors concerning their residence.

3.2. Hypotheses

The hypotheses of the choice about where to move are broadly organized into the elderly's socioeconomic attributes and location-specific characteristics. The first set of hypotheses implies that the elderly, all else being equal, make a residential location decision differently based on individual characteristics. The individual characteristics such as age, educational background, economic activity condition, existence of a spouse, physical condition, source for living expenses and cohabited children all have effects on the residential location choice of the elderly (H1~H7). In particular, cohabited children play an important role in their choice because the elderly may move to regions where their children reside, or they may decide a residential location reflecting the suggestions of cohabited children.

A second set of explanatory variables tests the hypothesis that an elderly chooses a residential location by considering their concerns on the favorable environment and cost factors. First, most people tend to live in areas where basic infrastructures like water and sewage are sufficient. In addition, many people generally prefer to live in a region with reasonable accessibility to certain services. This study supposes that the elderly are no exception to this tendency. It is hypothesized that the elderly consider the level of infrastructures in their decision making regarding a residential location (H8). This study expects that the accessibility of the regions might attract the elderly to a location (H9).

The hypothesis is that the elderly's desire to increase their consumption of natural landscape has effects on their location decision. In other words, the elderly will choose the location where there are more natural amenities than their current residence (H10). Demand for elderly welfare facility will also increase as the number of elderly increases. This research formulates that the elderly choose a location with sufficient elderly welfare facility for maximum utility (H11). Considering the high demand among elderly for health services, this study hypothesizes that the elderly make location decision based on the convenience of medical services (H12). The elderly prefer regions where there are sufficient health care services available (H13).

Supposing that the housing demand varies as the household size changes, it is hypothesized that the elderly will choose a residential location where he/she can have a lot of new housing stock (H14). Since new housings can provide diverse location choice options for the elderly, the likelihood that the elderly households have no cohabited children and are single is generally higher in the later life stage. These households may prefer a smaller housing unit.

Following Tiebout (1957), and with everything else being equal, people choose the residential location that has low tax and good service. Tiebout suggested that a tax burden is a cost factor on location decision and public expenditure is a benefit factor in making the decision. Based on Tiebout's hypothesis, this research speculates that the migration decision would be affected by the welfare budget of the residence because the elderly need more welfare benefits compared with younger residents. This study expects that the welfare service heavily used or valued by the elderly might attract them to a location (H15).

This study supposes that destination choice of the elderly depends on whether the residential location before migration is urban or not because many urban areas tend to have distinct characteristics such as pollution, crime, and convenient commercial facilities. As Burby and Rohe (1990) suggested, there might be potential offsetting effects between negative factors and more convenient diverse services in residential location choice to urban areas. It is hypothesized that the experience in an urban residence affects the residential location choice (H16).

As a cost factor, housing price is related to location decision. In the studies of elderly residential mobility, the elderly are generally observed to look for less expensive housing. Considering the circumstances that the elderly are retired or preparing for retirement, it is assumed that elderly householders prefer relatively cheap housing (H17).

Moving distance has been considered in most migration studies to reflect moving costs. Moving distance can reflect the psychic costs with respect to leaving friends and familiar neighborhoods. Following Castel (2001), in case an elderly relocates further away from a familiar area, the move may be more stressful if the movement is within a more familiar region. This study hypothesizes that the distance between origin and destination is associated with the residential location choice (H18).

3.3. Dataset and variables

This model uses the data of two types. The one is 2 percent microdata sample of the Korea's Population Census, a disaggregate data type which describes householder attributes and residence distinctions. The other is place–characteristics data in a given location, which assembles an extensive set of place characteristics from sources such as the Census of Housing and the Statistical Yearbook of local governments. It includes the characteristics of all 234 *Si/Gun/Gu* in Korea.

As of 2005, this analysis explores only 4009 householders who reside in a *Si/Gun/Gu* region different from where they were in 2000 because the migrants are defined as persons who move across *Si/Gun/Gu* local boundaries. This figure, however, does not include all the residential movements between 2000 and 2005 because the census does not survey intermediate and return moves within the five-year period. This analysis classifies residence type into two categories of urban and rural regions. The urban and rural areas are divided into administrative districts because of the lack of data sources. This classification method is generally used in studying the rural areas in Korea. All *Gu* regions are classified as urban areas, and all *Gun* regions are classified as rural areas. On the other hand, *Si* regions are divided into those that include only *Dong* and those that include *Eup* and *Myeon*. The former consists of 23 *Si* regions classified as urban areas, and the latter consists of 54 *Si* regions classified as rural areas. According to the 2005 Population Census, 3157 of 4009 migrants are urban residents in 2000. This means that urban residents have a strong tendency to move. A total of 1900 urban residents out of 3157 moved to other urban regions, whereas 1257 migrated to rural regions during the period 2000–2005 in Table 1.

Various kinds of causal factors entering into a household's decision about residential location alternatives are abstracted from previous empirical studies. The names, sources, definitions, and years of all variables used in this study are presented in Table 2. The individual attribute data are based on their status at the time of the census, 2005. The average values of location-specific data for 2000 and 2005 are used in the analysis because the date of migration is unclear by the nature of the data on the census, which is conducted every five years. Some data are not available for 2000 and are replaced by the data for 2003.

The dependent variable of this model, *DESTINATION*, has a binary outcome. In case an elderly migrant chooses rural area as the destination, then the destination variable gets a value of 1; otherwise, 0. The explanatory variables are sorted into two distinct categories. The first category includes the socioeconomic attributes of householders. These are represented in the model as follows: householder's age (*AGE*), educational background (*EDUCATION LEVEL*), economic activity condition (*UNEMPLOYED*), existence of spouse (*MARITAL STATUS*), existence of cohabited children (*COHABITING CHILDREN*), physical health condition (*HEALTH CONDITION*), and source of income (*WAGE*, *ASSET*, *FILIAL SUPPORT*). The second category covers location-specific attributes as follows: basic infrastructure such as water and sewage (*WATER AND SEWAGE*), accessibility by roads (*ACCESSIBLE ROAD*), forest area and river area as natural amenity (*GREEN AREA*), hospital beds per 1000 people (*HOSPITAL BED AVAILABILITY*), elderly welfare facilities per 1000 elderly (*WELFARE FACILITY*), construction of new housing (*NEW HOUSING*), welfare budget ratio (*WELFARE BUDGET*), land price (*LAND PRICE*), the case wherein residences belong to urban areas in 2000 (*RESIDENTIAL TYPE*), and distances between origins and destinations (*MOVING DISTANCE*). The location attributes, except for *RESIDENTIAL TYPE* and *MOVING DISTANCE*, are used in this model by the differences in characteristics of their residences in 2000 and 2005. Regional variables of their residences in 2000 and 2005 have the prefix *O* and *D* for *origin* and *destination*, respectively. For example, *O-D_WATER AND SEWAGE* means the gap between infrastructure level of the region resided in 2000 and that in 2005. In other words, the model uses variables such as *O-D_WATER AND SEWAGE*, *O-D_ ACCESSIBLE ROAD*, *O-D_GREEN AREA*, *O-D_HOSPITAL BED AVAILABILITY*, *O-D_WELFARE FACILITY*, *O-D_NEW HOUSING*, *O-D_WELFARE BUDGET*, *O-D_LAND PRICE*, *RESIDENTIAL TYPE*, and *MOVING DISTANCE*.

WATER AND SEWAGE presents the activity ratios of water supply and sewage system. It is considered to represent the basic infrastructure level. *ACCESSIBLE ROAD* captures the accessibility of certain services. It indicates the proportion of road area to the total land mass. In this study, natural amenity means forest and river area on land use. *GREEN AREA* takes the ratio of forest area and water area to the total land mass in terms of natural environment for the elderly.

The quantity and quality of the services decide the level of service provided in a given locale. However, the quality of services is still difficult to measure. This study uses a spending per population as a rough proxy for the level of services. The convenience of medical services in a particular location, *HOSPITAL BED AVAILABILITY*, is suggested as the number of hospital beds per 1000 people. *WELFARE FACILITY* reflects the availability of elderly welfare facilities and is expressed as the number of elderly welfare facilities per 1000 people over the age of 60.

NEW HOUSING depends on the ratio of new housing units to the total housing units. New housing means that the housing units were built within a 10-year period. The Tiebout hypothesis is tested to reflect the welfare expenditure of local governments. *WELFARE BUDGET* is represented as the ratio of welfare budget to the total general account. *LAND PRICE* is inputted in the model by land price per square meter in an urban zone. Although housing price is more appropriate for analysis, land price is used as a proxy variable because of the constraint on data availability. *RESIDENTIAL TYPE* represents whether the residential location was urban five years ago. If the residential location belonged to an urban area five years ago, then the variable gets a value of 0; otherwise, it gets a value of 1.

To capture the costs of moving, the distance between origins and destinations is considered. *MOVING DISTANCE* represents the natural log of distance between origins and destinations. It is

Table 1
The Number of migrations of elderly.

			2% microdata samples of the 2005 population census (Unit: Persons)
Householders aged 60 + who resided in other *Si/Gun/Gu* in 2000			4009
2000		2005	
Urban	→	Another urban	1900
Urban	→	Rural	1257
Rural	→	Another rural	402
Rural	→	Urban	450

Source: Korea National Statistical Office, 2005c.

Table 2
Definitions of variables.

	Variable	Definition
Dependent variable	*DESTINATION*	A householder migrated to rural, 1; otherwise, 0
Level-1 householder attributes[1]	*AGE*	Age
	EDUCATION LEVEL	The period of receiving education
	UNEMPLOYED	Economic activity condition
		The state of unemployment, 1; otherwise, 0
	MARITAL STATUS	Presence of spouse, 1; otherwise, 0
	COHABITING CHILDREN	Presence of cohabited children, 1; otherwise, 0
	HEALTH CONDITION	Physical health condition
		Restriction of movement, 1; otherwise, 0
	INCOME	Source of income
	WAGE	Householder or spouse's wage, 1; otherwise, 0
	ASSET	Pension or real estates, 1; otherwise, 0
	FILIAL SUPPORT	Assistance of children, 1; otherwise, 0
Level-2 location-specific attributes	*WATER & SEWAGE*	The activity ratios of water supply and sewage system (the average of 2003 and 2005)
	ACCESSIBLE ROAD	The proportion of road area to total land mass (the average in 2000 and 2005)
	GREEN AREA	The ratio of forest area and river area to the total land mass (the average in 2000 and 2005)
	HOSPITAL BED AVAILABILITY	Hospital beds per 1000 people (the average in 2003 and 2005)
	WELFARE FACILITY	Elderly welfare facilities per 1000 elderly (2005)
	NEW HOUSING	The proportion of housing units built within 10 years (the average of 2000 and 2005)
	WELFARE BUDGET	The ratio of welfare budget to total general account (the average of 2004 and 2005)
	LAND PRICE	Land price in urban zone[2] (the average in 2000 and 2005)
	RESIDENTIAL TYPE	Residence in 2000 belongs to urban, 1; otherwise, 0
	MOVING DISTANCE	The distance between origins and destinations, that is, moving distance

Notes: 1. Householder attributes are measured at the time of the census, 2005.
2. Urban zone is one among zoning systems.
Sources: Korea National Statistical Office (2000a, 2000b, 2005a, 2005b); Korea Local Government (2000, 2005).

transformed by natural log to allow for a nonlinear relationship between distance and cost (Newbold, 1996; Duncombe et al., 2003). The distance is computed in meters between the centroids of all pairs of *Si/Gun/Gu*.

Table 3 shows the descriptive statistics of variables used in the model. The householders who have migrated during the five-year period (2000–2005) are presented. The elderly migrants are comparatively young; their average age is lower than that of the total elderly householder by 8.4 months. They are relatively well educated and, on the average, their educational background exceeds that of a middle-school graduate. About 80 percent of the elderly migrants are unemployed. The ratio of the elderly that live on their salary to the total migrants is 18 percent. As explained earlier, considering the fact that 6 out of 10 elderlies are willing to work (Korea National Statistical Office, 2014), this value is smaller compared with the total elderly householders.

The migrants commonly move to increase the benefit factors and to decrease the cost factors. If the difference of location-specific characteristics between origin and destination presents positive values on the average, it is accepted that the elderly migrate to locales that have a higher level of characteristics than the origin. The averages of the variables, excluding *O-D_GREEN AREA* and *O-D_WELFARE FACILITY*, have positive values. These results provide support for the assumption that the elderly will move to the locale

Table 3
Descriptive statistics for the residential choice model.

Variables	*n*	Mean	Standard deviation	Min.	Max.
Householder attributes					
AGE#	4009	71.38	5.24	65	85*
EDUCATION LEVEL#		9.25	4.23	0	19
UNEMPLOYED		0.82	0.38	0	1
MARITAL STATUS		0.59	0.49	0	1
COHABITING CHILDREN		0.05	0.22	0	1
HEALTH CONDITION		0.30	0.46	0	1
WAGE		0.18	0.39	0	1
ASSET		0.27	0.45	0	1
FILIAL SUPPORT		0.04	0.20	0	1
Location-specific characteristics					
O-D_WATER & SEWAGE#	234	25.44	26.72	−59.75	80.96
O-D_ACCESSIBLE ROAD#		5.69	6.06	−17.58	23.91
O-D_GREEN AREA#		−19.04	23.29	−71.20	40.12
O-D_HOSPITAL BED AVAILABILITY#		0.08	6.66	−20.28	29.82
O-D_WELFARE FACILITY#		−7.18	6.81	−30.33	6.64
O-D_NEW HOUSING#		9.36	17.60	−42.68	59.08
O-D_WELFARE BUDGET#		7.03	12.12	−20.57	32.88
O-D_LAND PRICE#		100.13	111.15	−255.17	515.50
RESIDENTIAL TYPE		0.41	0.49	0	1
MOVING DISTANCE#		11.03	1.26	7.84	12.87

Notes 1. Variables denoted with # are continuous variables. The others are binary outcomes.
2. * The age of the eldest householder is 85 because elderly over the age of 85 are recorded with an age of 85 in the census data.
3. The variables prefixed with "*O-D*" have differences of characteristics between origin and destination.

with more attractive factors to maximize their utility. Surprisingly, natural amenity and elderly welfare facility are not valued for location choice by the elderly population. The average of *O-D_LAND PRICE* shows positive value, contrary to expectation that it will have a negative value because land price is a cost factor for residential location.

The individual attributes used in this model to analyze the elderly's residential choice whose residence in 2005 differed from the one in 2000 are as follows: age, educational background, economic activity condition, existence of spouse and cohabited children, physical health condition, and source of income. Other attributes such as the elderly's hometown, economic level and the proximity to friends' or relative's residence that could affect elderly's residential choice are not included since they are not provided by the Korea's Population Census.

The regional characteristic data that affected elder's residential choice are as follows: the activity ratios of water supply and sewage system, the proportion of road area to the total land mass, forest area and river area, hospital beds per 1000 people, elderly welfare facilities per 1000 elderly, construction of new housing, welfare budget ratio, land price, the case wherein residences belong to urban areas in 2000, and distances between origins and destinations. Other characteristics such as cultural facilities, level of medical and social welfare, price of housing and etc. are not included due to unavailability.

3.4. A residential choice model of the elderly: a multilevel logit model

This study builds a discrete choice model with respect to a residential location choice of the elderly. The effects of household's socioeconomic characteristics and location-specific attributes are explored in terms of the probability that the elderly migrants choose the residential location between urban and rural within the period 2000–2005. If this study subdivides the destination into 234 *Si-Gun-Gu*, each sample size will be small. That would prevent this analysis from working out the proper probabilities. Furthermore, the probabilities that a householder will move from one *Si-Gun-Gu* to any other individual region over a five-year period are extremely small. Rather than determining the probability that each of the 234 *Si-Gun-Gu* is chosen as a destination, this study intends to figure out the probability by classifying destination type into two categories of urban and rural regions. The destination type can be divided into certain areas such as metropolitan areas according to concerns. This study attempts to explore the case in which the elderly choose rural communities as destinations to reflect "retirement migration" to rural regions of developed countries and find policy implication for rural areas with shrinking populations.

Previous empirical studies have investigated the determinants of residential choice in a single structure, such as individual or household, county, or state. Those analyses have separately used microdata and aggregated data. This study intends to integrate micro- and macro-approaches by adding regional characteristic factors to probabilistic choice model in terms of the individual level. It suggests a multilevel model because explanatory variables affecting residential choice have a hierarchical structure, such as individual attributes and region. The individual attributes, which affect the evaluation on residence of elderly households, are the following: *AGE*, *EDUCATION LEVEL*, *UNEMPLOYED*, *MARITAL STATUS*, *COHABITING CHILDREN*, *HEALTH CONDITION*, *WAGE*, *ASSET*, and *FILIAL SUPPORT*. With respect to the regional attribute, this analysis explores the effects of the following explanatory variables: *WATER AND SEWAGE*, *ACCESSIBLE ROAD*, *GREEN AREA*, *HOSPITAL BED AVAILABILITY*, *WELFARE FACILITY*, *NEW HOUSING*, *WELFARE BUDGET*, *RESIDENTIAL TYPE*, *MOVING DISTANCE*, and *LAND PRICE*. This model can include a variety of individual differences and spatial heterogeneities. Furthermore, the dependent variable is binary; hence, a multilevel logit model is constructed.

This model explores the probability that an elderly householder migrates to rural areas. It is composed of two sub-models: the level-1 model deals with individual attributes and the level-2 model deals with regional characteristics. Let p_{ij} be the probability that an elderly householder *i*, living in a region *j*, will migrate to rural areas during a five-year period. Level-1 logit link function is represented as follows:

$$\eta_{ij} = \log\left(\frac{p_{ij}}{1 - p_{ij}}\right) \tag{1}$$

where η_{ij} is the log of the odds of migration to rural areas. Level-1 model is expressed as follows:

$$\eta_{ij} = \beta_{0j} + \sum_{q=1}^{Q} \beta_{qj} X_{qij} \tag{2}$$

where β_{qj} is the level-1 coefficient and X_{qij} is the level-1 qth predictor for householder *i* in region *j*.

In this model, X_{qij} contains the individual attributes for householder *i* in region *j*, such as *AGE*, *EDUCATION LEVEL*, *UNEMPLOYED*, *MARITAL STATUS*, *COHABITING CHILDREN*, *HEALTH CONDITION*, *WAGE*, *ASSET*, and *FILIAL SUPPORT*. The choice whether or not householder *i* in region *j* would migrate to rural areas depends on β_{0j}—a fixed effect of *j* region—and regression coefficients of individual variables. In the binomial family, the variance of the error is a function of the mean and it cannot be estimated separately. Therefore, this error term does not show up.

The level-2 model is embodied as follows:

$$\beta_{0j} = \gamma_{00} + \sum_{s=1}^{S} \gamma_{0s} W_{0j} + u_{0j} \tag{3}$$

where γ_{0s} is a level-2 coefficient and W_{0j} is a level-2 predictor. These include the location-specific characteristics that affect the migration to rural communities of the elderly. This study assumes that the elderly move to a location where they can maximize their utility compared with their current residence; thus, the level-2 model uses the variables of location-specific characteristics by the difference between origins and destinations. They include *O-D_WATER AND SEWAGE*, *O-D_ACCESSIBLE ROAD*, *O-D_GREEN AREA*, *O-D_HOSPITAL BED AVAILABILITY*, *O-D_WELFARE FACILITY*, *O-D_NEW HOUSING*, *O-D_ WELFARE BUDGET*, *O-D_LAND PRICE*, *RESIDENTIAL TYPE*, and *MOVING DISTANCE*. u_{0j} is a level-2 random effect, $u_{0j} \sim N(0, \tau)$.

At the level-2 model, each level-1 coefficient can be modeled as a fixed level-1 coefficient; for example,

$$\beta_{1j} = \gamma_{10},\ \beta_{2j} = \gamma_{20},\ \ldots,\ \beta_{qj} = \gamma_{q0} \tag{4}$$

Two sub-models, level-1 and level-2 models, combine to form one model as follows:

$$\eta_{ij} = \gamma_{00} + \sum_{q=1}^{Q} \gamma_{qj} X_{qij} + \sum_{s=1}^{S} \gamma_{0s} W_{0j} + u_{0j} \tag{5}$$

4. Empirical results

4.1. A base model concerning location choice

Tables 4 and 5 present the results of estimation by the base model.[1] Unit-specific results are chosen instead of population-average model. This study is interested in how a change in the level-2 variables can be expected to affect a particular regional mean. A random effect, u_0, shows the differences between regions. Following the estimation results, u_0 has a statistically significant value. This means that the "migration propensity to rural area" of the elderly has discrepancies between residential locations. The probability that an elderly chooses to migrate to a rural community, φ, is calculated as 42.0 percent because the odds ratio is 0.723 in Table 4. A variance in householder level, or the level-1 variance, is 1.351 because the sigma squared is 0.997. The level-2 variance (i.e., a variance in region level) is 0.206. Intra-class correlation is expressed as follows:

$$\text{Level}-2\ \text{varience}/(\text{Level}-2\ \text{variance}+\text{Level}-1\ \text{variance}) = 0.206/(0.206+1.351) = 0.132 \quad (6)$$

These statistic values show that the variance of the log odds ratio that an elderly migrates to rural areas is more affected by the discrepancies between the elderly in regions than by the difference between regions. Specifically, the variance of around 13 percent is influenced by regional differences and the other 87 percent is due to distinctions between elderly householders. In other words, individual attributes affect 87 percent of decision to migrate to rural area.

4.2. A study model concerning location choice

A study model is formulated to test the hypotheses supposedly concerned with the residential location choice. The probability that an elderly householder would migrate to rural communities is the subject of this analysis. The level-1 model is the householder-level model. It is hypothesized that the age, educational background, economic activity condition, existence of a spouse, existence of cohabited children, physical condition, and source of income of the householder would be associated with the residential location choice. Every level-1 record corresponds to a householder, with a single binary outcome per householder. Hence, the model type is Bernoulli.

Householder-level model is represented as follows[2]:

$$\begin{aligned}&\text{Prob}(Y=1|\beta)=\varphi,\\&\text{Log}[\varphi/(1-\varphi)]=\beta_0+\beta_1(AGE)+\beta_2(EDUCATION\ LEVEL)+\beta_3(UNEMPLOYED)+\\&\beta_4(MARITAL\ STATUS)+\beta_5(COHABITING\ CHILDREN)+\beta_6(HEALTH\ CONDITION)+\\&\beta_7(WAGE)+\beta_8(ASSET)+\beta_9(FILIAL\ SUPPORT)\end{aligned} \quad (7)$$

β_0 is the average log odds of the probability that elderly householders would decide to migrate to rural communities. It is hypothesized that β_0 is affected by regional attributes such as basic infrastructure, accessibility by roads, natural amenity, medical service, elderly welfare facility, new housing, welfare budget ratio, housing price, regional type of current residence, and distances between origins and destinations. Reliability estimate of β_0 is calculated as 0.318. This means that location-specific attributes, level-2 variables, can account for 31.8 percent of the observed variation of probability that a household in each region migrates.[3]

In particular, because it is supposed that an elderly householder chooses the location in which a maximum utility can be expected, the regional characteristics of potential residence as well as current residence are considered. Corresponding to an elderly householder, the differences of regional characteristics with their origins and destinations are used in the model. Level-2 variables, except for the *RESIDENTIAL TYPE* variable, are centered around their grand mean. It is supposed that level-1 coefficients from β_1 to β_9 are non-random. Region-level model, the level-2 structural model, is specified as follows:

$$\begin{aligned}&\beta_0=\gamma_{00}+\gamma_{01}(WATER\ AND\ SEWAGE)+\gamma_{02}(ACCESIBLE\ ROAD)+\\&\gamma_{03}(GREEN\ AREA)+\gamma_{04}(HOSPITAL\ BED\ AVAILABILITY)+\gamma_{05}(WELFARE\ FACILITY)+\\&\gamma_{06}(NEW\ HOUSING)+\gamma_{07}(WELFARE\ BUDGET)+\gamma_{08}(LAND\ PRICE)+\\&\gamma_{09}(RESIDENTIAL\ TYPE)+\gamma_{10}(MOVING\ DISTANCE)+\ u_0,\end{aligned} \quad (8)$$

$$\begin{aligned}&\beta_1=\gamma_{10},\ \beta_2=\gamma_{20},\ \beta_3=\gamma_{30},\ \beta_4=\gamma_{40},\ \beta_5=\gamma_{50},\ \beta_6=\gamma_{60}\\&\beta_7=\gamma_{70},\ \beta_8=\gamma_{80},\ \beta_9=\gamma_{90}.\end{aligned} \quad (9)$$

[1] The base model is estimated to explore how much of the variance of the dependent variables has been affected by the difference of householders' attributes and location-specific attributes in the analysis of multilevel data. The variance of the dependent variable is estimated by dividing it into "variance in regions" and "variance between regions" using random-effects one-way ANOVA model as follows:Level-1 model: Prob(Y = 1|β) = φ, Log[φ/(1−φ)] = β_0Level-2 model: $\beta_0 = \gamma_{00} + u_0$Level-1 variance = $\sigma^2/[\varphi(1-\varphi)]$where outcome variable is *DESTINATION*, whether or not an elderly would migrate to a rural community. The variance of the dependent variables is divided into "variance in regions" and "variance between regions." Specifically, level-1 variance is the variance of outcome by the discrepancies between the elderly in regions. Level-2 variance is the variance of outcome by the difference between regions.

[2] Where the variables *AGE* and *EDUCATION LEVEL* are centered around their grand mean because they are continuous variables. According to Talyor (2002), grand-mean centering makes the intercept somewhat more meaningful; it may decrease multicollinearity between level-1 and level-2 predictors. Furthermore, grand-mean centering is appropriate among centering methods because this study is interested in the contrasts between individuals and the average value in the sample. The variables used in the models meet the requirements that the values of variance inflation factor (VIF) are below five. Generally, although the criteria of VIF value for forestallment of multicollinearity problem depends on analysts, the case when the VIF values are below five is considered as having no multicollinearity of the estimations.

[3] Bryk and Raudenbush (1992) interpreted that if a reliability estimate is measured to be more than 0.3–0.4, it shows a high level of reliability.

Table 4
Estimation of fixed effects: unit-specific model.

Fixed effect	Coefficient	Standard error	*T*-ratio	*P*-value	Odds ratio	Confidence interval*
For INTRCPT 1, β_0						
INTRCPT 2, γ_{00}	−0.323955	0.050709	−6.389	0.000	0.723283	(0.655, 0.799)

Note: * 95% Wald confidence interval is calculated as follows: $(L_j, U_j) = \widehat{\beta}_j \pm z_{0.95}\widehat{\sigma}$, where L_j = lower limit, U_j = upper limit, $\widehat{\sigma}$ = standard error of $\widehat{\beta}_j$.

Table 5
Estimation of variance components.

Random effect	Standard deviation	Variance component	d.f.	Chi-square	*P*-value
INTRCPT 1, u_0	0.45357	0.20572	227	423.77788	0.000
Level 1, *R*	0.98858	0.97730			

Table 6 presents the estimation results for the location choice model.[4] Only the householders' attribute variables are used in model 1. According to the estimation results of model 1, the random effect u_0 is statistically significant. This means that the location choice of the elderly is different between residential locations and the householders' socioeconomic status. Model 2 is performed by adding regional characteristic variables to model 1.

The goodness of fit in the study model is illustrated in proportion reduction in variance statistics, θ. θ is worked out in the following manner:

θ = (level-1 variance in the base model − level-1 variance in a study model)/level-1 variance in the base model (10)

The level-1 variance in study model 1 decreases to 0.84 from the level-1 variance, which is 1.35 in a base model. θ is presented as 51.1. These data imply that the socioeconomic variables used in model 1 account for 51.1 percent of the dependent variable.

Study model 2 used location-specific variables and elderly householders' attributes, which decreased the variance of the dependent variable. This supports the usefulness of the study model. In a base model, the variance of the dependent variable is 1.56 adding to the level-1 variance, 1.35, and the level-2 variance, 0.21. According to the estimation results of study model 2, the total of variance is 0.82, and the variances of levels 1 and 2 are 0.65 and 0.18, respectively. That is, the variance statistic of the dependent variable in study model 2 decreases by 47.1 percent compared with that in a base model. The level-1 and level-2 variances decline 52.1 percent and 13.9 percent, respectively.

4.3. Interpretation of estimation results

Estimation results in study model 2 are substantiated in Table 6. Table 7 shows the estimates of the odds ratio, and it represents the marginal effects of the explanatory variables under control of all other predictors at a fixed level. According to the estimated coefficients in the location choice model, some coefficients of the explanatory variables have the expected sign. Some of the coefficient estimates are statistically significant at conventionally acceptable test levels.

According to Beale and Johnson (1998), amenity-seeking retirees are inclined to migrate to rural communities. New migrants to rural regions have higher income, more educational background, occupations that are nontraditional by rural standards, and are not seeking socioeconomic gains (Saint Onge et al., 2005). Educational background and an opulent lifestyle such as living on real estate or savings, however, are statistically insignificant in this study.

Variables such as employment condition (H3), marital status (H4), and existence of cohabited children (H5) are statistically significant among the predictors at the householder level. As a result of the 3rd hypothesis (H3) test, in case an elderly householder is unemployed, the probability that he/she migrates to rural communities is 0.50 times that of the probability that he/she moves to rural areas in case of employment. This means that if an elderly is unemployed, and with everything else being equal, he/she is most likely to migrate to urban areas. This is due to the general perception that there are plenty of jobs in urban regions compared with rural communities.

The 4th hypothesis (H4) in which the presence of a spouse is a variable seems to affect the migration decision to rural regions. Following the estimated coefficient, the presence of a spouse is positively associated with migration decision to rural regions. Under the same conditions, the probability that the elderly with spouse would be in-migrants to rural areas is 1.35 times the opposite case. The spouseless elderly are highly likely to migrate to urban areas.

The result of the 5th hypothesis is interesting. Compared with the elderly without cohabited children, the probability that the elderly who live with children would migrate to rural regions is lower. This can be understood in the same context. According to Scott (2010), local employment opportunities have a dominant impact on the destination chosen by people of working age. Children of the elderly are likely to prefer locations where there are sufficient jobs. In addition, the elderly who live with children include the elderly who migrated to live with children, because the existence of cohabited children is the status of the elderly in 2005. Between the elderly with and without cohabited children, the ratio of the probability that they migrate to rural communities is 0.56.

This study assumes that the regions with more location characteristics such as infrastructure (H8), accessibility (H9), natural amenity (H10), medical service (H11), elderly welfare facility (H12), new housing (H13), and welfare expenditure (H14), generally provide bigger utility to their residents. It presumes that the location attributes show the positive relationship with location choice. Meanwhile, it is hypothesized that the higher land price (H15) and the further the distance between current residence and potential destination (H16), the less utility for the elderly. That is to say, it is assumed that the difference of the characteristics between origin and destination is negatively associated with location decision.

Among the variables of location level, there are statistically significant variables such as infrastructure (H8), medical service (H11), region type of residence in 2000 (H16), and distance between origin and destination (H17). It means that the probability that the elderly would move to rural areas varies with the attributes in the regions.

Concerning the result of the 8th hypothesis (H8), given the estimated coefficient of *OD_WATER AND SEWAGE*, it can be

[4] To handle the problem of over- and under-dispersion, this model is first performed by constraining σ^2 in the level 1 as 1 and is then estimated without control. The latter results are illustrated because the estimated coefficients of two cases are similar.

Table 6
Estimation results of the residential choice model.

		Model 1		Model 2	
		Coefficient	*P*-value	Coefficient	*P*-value
	Fixed effect				
	Intercept	0.149508	0.335	0.415981	0.025
Householder attributes	*AGE#*	0.010255	0.176	0.009865	0.198
	EDUCATION#	0.003190	0.732	0.006003	0.515
	UNEMPLOY	−0.690361	0.000	−0.691276	0.000
	MARITAL	0.291245	0.000	0.298855	0.000
	CHILD	−0.577983	0.002	−0.575993	0.002
	PHYSICAL	0.007332	0.918	0.002049	0.977
	LIFEWAGE	−0.112733	0.441	−0.094270	0.522
	LIFEASSET	−0.046611	0.609	−0.029426	0.751
	LIFEASSIST	−0.254152	0.170	−0.259775	0.167
Location-specific attributes	*OD_INFRA#*			−0.010451	0.017
	OD_ACESS#			−0.004905	0.726
	OD_NATURAL#			−0.003872	0.298
	OD_MEDICAL#			0.015099	0.042
	OD_FACILITY#			0.008904	0.538
	OD_HOUSING#			−0.004379	0.227
	OD_TAX#			0.008772	0.314
	OD_PRICE#			−0.000768	0.222
	TYPE			−0.467343	0.031
	LNDISTANCE			0.201186	0.000
Variance component	Random effect				
	Level-1 σ^2	0.97529		0.98105	
	Level-2 u_0	0.22284	0.000	0.17719	0.000

Notes 1. Fixed effects is the final estimation of unit-specific model with robust standard errors.
2. The variables with # are centered around their grand mean.

interpreted that in-migrants to rural areas decide on their location choice regardless of the infrastructure level. Due to the coefficient having a negative sign, the probability that the elderly would move to rural regions decreases in cases where the difference of the infrastructure level between origin and destination has a positive value. It is illustrated in the descriptive data that, on the average, the migrants choose a location with a higher level of basic infrastructure than their previous residence. This is in accordance with the basic needs of the people. It is a reasonable interpretation that the elderly migrants to rural communities do not desire a lower infrastructure level, but move there in spite of that.

The result of the 11th hypothesis is as anticipated. The convenience of medical care is shown to be positively associated with residential location choice to rural areas. If the difference of medical service between the origin and destination increases by one unit from the average value, and under control of other variables, the probability that the elderly would move to rural communities increases by 2 percent.

The result of the 16th hypothesis indicates that the elderly are most likely to migrate to rural communities in cases where the previous residence is located in rural areas. With everything else being equal, the probability that the urban residents would move to rural areas is 0.51 times the probability that the rural residents would migrate to the urban area. In other words, compared with urban residents, rural residents are twice as likely to choose rural communities as their residential location.

Table 7
Odds ratio estimates of the location choice model.

Fixed effect		Odds ratio	Confidence interval
	Intercept	1.515856	(1.056, 2.176)
Householder attributes	*AGE#*	1.010371	(0.995, 1.026)
	EDUCATION#	1.006587	(0.989, 1.025)
	UNEMPLOY	0.505337	(0.379, 0.673)
	MARITAL	1.343898	(1.158, 1.560)
	CHILD	0.561035	(0.390, 0.807)
	PHYSICAL	0.999025	(0.869, 1.148)
	LIFEWAGE	0.912939	(0.685, 1.217)
	LIFEASSET	0.971190	(0.811, 1.164)
	LIFEASSIST	0.772401	(0.535, 1.114)
Location-specific attributes	*OD_INFRA#*	0.989604	(0.981, 0.998)
	OD_ACESS#	0.995107	(0.968, 1.023)
	OD_NATURAL#	0.996135	(0.989, 1.003)
	OD_MEDICAL#	1.015214	(1.001, 1.030)
	OD_FACILITY#	1.008944	(0.981, 1.038)
	OD_HOUSING#	0.995631	(0.989, 1.003)
	OD_TAX#	1.008810	(0.992, 1.026)
	OD_PRICE#	0.999232	(0.998, 1.000)
	TYPE	0.626665	(0.410, 0.958)
	LNDISTANCE	1.222852	(1.125, 1.329)

Note: * 95% Wald confidence interval is calculated as follows: $(L_j, U_j) = \widehat{\beta}_j \pm z_{0.95}\widehat{\sigma}$, where L_j = lower limit, U_j = upper limit, $\widehat{\sigma}$ = standard error of $\widehat{\beta}_j$.

The distance between origin and destination is considered as the cost of moving (H17). Under control of all other predictors at a fixed level, if the natural log of distance increases by one unit, then the probability that the elderly would move to rural areas is 1.22 times the probability that the elderly would move to urban areas. That is, the migration to rural areas shows a propensity for long distance. According to Bigger (1978), long distance migrants are responding more to the pull of amenities rather than push factors such as neighborhood dissatisfaction. Thus, the elderly who choose rural areas move far to live under favorable conditions. This result supports the migration trend of the elderly suggested by Florida (2009).

As illustrated above, some location characteristics related to choosing a rural area as the destination show different aspects from the general location choice. It is interpreted that the factors not used in these analyses and the regional attractions are not captured by the statistics data affecting migration to rural communities.

5. Conclusions

This study explores the residential mobility of elderly households, which is postulated based on the life course theory and the probabilistic choice theory. When a person reaches critical points in life, his or her needs and preferences for housing undergo changes. It is hypothesized that the elderly choose the residential locale to maximize their utility with respect to their personal characteristics. That is, this study develops a residential location choice model of the elderly under the hypothesis that both individual characteristics and regional attributes affect an individual's evaluation and decision of residential location. This analysis is interested in elderly migrants over the age of 60, and focuses on the residences before and after they move. It uses a multilevel model that can integrate heterogeneous variables at the aggregate level into one model.

The study on residential location choice of the elderly has two broad objectives. One is to determine the mechanism that leads elderly people to choose their residential location. The other objective is to predict how they react to changed circumstances so that policies can be more objectively formulated. In particular, this study attempts to contribute toward finding the policy for the influx of people to rural communities, as well as exploring the factors that affect elderly migration decision to rural communities.

In this model, employment condition, marital status, and presence of cohabited children are shown to be statistically significant with the migration to rural areas of the elderly. It indicates that if the elderly are unemployed, and everything else being equal, they are most likely to move to urban areas. This is due to the general perception that there are plenty of employment opportunities in urban regions compared with rural areas. Furthermore, the prolonged life expectancy may generate the need for new jobs after retirement. Therefore, in order for the rural areas to attract recently retired elderly into their communities, they need to create jobs for the elderly.

Following the results of this study, elderly couples show more inclination to migrate to rural areas than the spouseless elderly, while elderly who live with their children intend to move to urban areas. The children of the elderly are likely to prefer urban regions, which provide sufficient jobs and convenience of various services compared with rural areas. Instead of focusing only on the factors for the elderly, it is also important to meet the basic needs for people of all ages.

The residential choice model suggests that the propensities associated with the decision of the elderly to move to rural areas vary in different regions. Basic infrastructure, medical service, moving distance, and region type are presented to explain the differences. On the average, elderly migrants desire to increase the benefit factors and to decrease the cost factors. The elderly who move to rural areas show distinct characteristics compared with those who migrate to urban regions. They move to the locale that provides a lower infrastructure level than their previous residence and show long-distance movement. The elderly who choose to move to rural areas live under favorable conditions in spite of the inconvenience and cost. Regional attractions not captured by the statistics data affect migration to rural communities. On the other hand, natural amenity is considered as a strong point in rural areas not significantly related to location choice to rural regions.

This study presents that the probability that the urban elderly will move to rural areas is lower than that of the rural elderly. The findings mentioned above implicate that rural communities have a shrinking population and that various strategies such as promotion of rural attractiveness are needed to attract urban elder migrants. Their strategies must be beyond simply marketing natural amenities that the regions already possess. They should also provide services to match the preference of potential migrants.

There are some limitations to this study in spite of some contributions. The limitations are primarily due to the absence of longitudinal data for residential movement. The Population Census data for this study made it difficult to understand the movement and related factors therein. Individual attributes that correlate with residential choice, such as the residences of relatives and friends, hometowns, and economic level, are excluded. The Census might have missed intermediate and return moves within the five-year period because it is surveyed at five-year intervals. Moreover, it does not cover the exact time of movement and identities of those who moved within the period. The values of possible correlatives with moves are recorded at the end of the time interval, rather than at the beginning. Therefore, the individual attributes should be interpreted carefully as correlatives on residential choice. Panel data covering residential movement and a variety of individual attributes are needed to clearly explore residential choice in further studies.

Rural areas classified in this study are also not a homogeneous unit. It is difficult to find general factors associated with location choice to rural regions because the regions have various characteristics. Each elderly with various status and preferences give different values on the regions. The factors used in this study are likely to be available in other destination choice because they are based on empirical studies. Hence, this study can be easily extended to other places. Future studies should set a more homogeneous spatial range as a destination.

As the elderly choose a residential location, the housing type, tenure, and neighborhood are considered. It is reasonable to suppose a simultaneous association of these choices. This study, however, focused on the effects of the place characteristics in residential location choice because it intended to investigate the interregional migration for residence. If disaggregate data, including the housing characteristics, are available in terms of individual choice, these relationships are necessary to consider in the residential location choice of the elderly.

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