An Empirical Analysis of the Welfare Magnet[†]

Aged Care Provision and Migration in Japan

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1. Introduction

A large amount of retirement of a so-called baby boom generation starts, and an increase in the population of retirement generation has been accelerated since 2007. The importance of the nursing care increases as the number of retirees increases. Moreover, the importance of the nursing care facilities increases where the number of the elderly increases and the family supporting function get weak. However, the supply of nursing care facilities is insufficient, and a lot of people who are waiting exist in many municipalities and facilities[1]. In such a situation, "welfare magnet" that the elderly move to another area where nursing care facility was more fulfilled has gathered our attention.

In the previous research on population migration between regions in Japan, the analysis concerning the labor mobility between cities was the main. Little study has been done to "welfare magnet", the level of welfare program and interregional migration. It is difficult to say that attention is paid for the migration of the elderly whom this paper focuses[2]. The cause will include the limit of data that can capture the interregional migration of elderly.

Then, Nakazawa (2007) calculated the number of net social increase of elderly in city, town and village in Tokyo metropolitan area from 2000 to 2005 by combining existing statistical materials[3]. He calculated the number of net social increases separately for early-stage elderly people (age 65-74) and late-stage elderly people (age 75 and over). Nakazawa (2007) reveals that migration factor of late-stage elderly is influenced by the height of the nursing care facilities level of each area. Moreover, his study also shows that the early-stage elderly flows out from Tokyo metropolitan area and the late-stage elderly flows into Tokyo metropolitan area.

However, many problems are left in Nakazawa (2007). It is the one that whether elderly migration tendency is a peculiar phenomenon only of Tokyo metropolitan area or on nationwide or specific is not clarified. Moreover, it is necessary to examine in what kind of municipality the migration of elderly increases. In this paper, we examine the issues for migration of the elderly and nursing care factor at the nationwide city, town and village level based on such awareness.

This paper is organized as follows. We extend Nakazawa's (2007) research in section 2. We calculate the number of net migration of each city, town and village by age group, and we figure

[1] According to the investigation that the Ministry of Health, Labour and Welfare executed in 2006, the number of those who are waiting for admission to a nursing home for the aged (number of applicants) reaches 385,500 people. The ratio of the numbers of those who are waiting for admission to the number of facilities capacity is 101% on the national average. In a word, to accommodate the entire of those who are waiting for admission, we need to double the facilities capacity. There are especially a lot of those who are waiting for admission in the city area, for instance, it is 126% in Tokyo and Kanagawa Prefecture.

[2] Japan Aging Research Center (1994, 1995, 2000) investigated for a specific municipality such as Sendai-city and Kitakyushu-city, Edogawa-ku.

[3] Tokyo metropolitan area indicates following four prefectures, Chiba, Kanagawa, Saitama and Tokyo.

out the migration tendency by age group at prefecture level. In section3, we conduct an empirical analysis using city, town, and village data and examine the relationship between migrations of elderly and provision of nursing care facilities. Section 4 concludes the paper.

2. Descriptive analysis on migration of elderly

2.1. Calculation procedure of net migration of elderly

After the introduction of long-term care insurance in 2000, it made the consumer be able to select facilities and services so far. The purpose of this paper is grasping of elderly migration tendency after the long term care insurance is introduced at the basic municipality (city, town and village) level in Japan. However, judging from that viewpoint, because of the limit of data that can capture the interregional migration in Japan, the number of migration between cities by age groups cannot be captured by the statistical data open to the public now[4]. Therefore, it is necessary to attempt the approach in data by combining the existing statistics.

In this paper, we produced the net migration data (number of inflow minus outflow) obtained from *the Basic Resident Register* (Ministry of Internal Affairs and Communications) and *the Vital Statistics of Japan* (Ministry of Health, Labour and Welfare) similar to Nakazawa (2007). As concretely described as follows, by combining the number of population in *the Basic Resident Register* and the number of fatalities in *the Vital Statistics of Japan*, we calculate the number of net migration by age groups by city, town and village. Hereafter, we explain the procedure of the calculation.

The population by age group in *the Basic Resident Register* is five-year old interval. In a word, population with a certain age group will change places into the above group in five years. When we compare the number of population with one age group in one city in 2000 to the number of population with above age group in the same city in 2005 after five years, the gap of the number of population is decomposed into those who die, those who flow out and those who flow in. For instance, a change of 55-59 years old population in 2000 of a certain city between 2000 and 2005 is defined by the following expressions.

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[4] We can get the statistics that can capture the aggregate migration at municipalities level such as *the Population Census* (Ministry of Internal Affairs and Communications, MIC), *the Basic Resident Register* (MIC), *the Migration Survey* (National Institute of Population and Social Security Research), *the Business Report of Long-term care insurance* (Ministry of Health, Labour and Welfare). However, we cannot capture the number of net migration of late-stage elderly after the introduction of long-term care insurance in these data.

$$N_{60-64}^{2005} - N_{55-59}^{2000} = -(D_{55-59}^{2000} + D_{56-60}^{2001} + D_{57-61}^{2002} + D_{58-62}^{2003} + D_{59-63}^{2004}) + (IM - OM)_{55-59}^{2000-2005} \quad (1)$$

where N is number of population, D is number of fatalities, IM is number of inflows, OM is number of outflows. Moreover, superscript is the investigation year and subscript is an age group. Here, we assume NM is number of net migration and rewrite the equation (1) as follows.

$$NM_{55-59}^{2000-2005} = (IM - OM)_{55-59}^{2000-2005} = (D_{55-59}^{2000} + D_{56-60}^{2001} + D_{57-61}^{2002} + D_{58-62}^{2003} + D_{59-63}^{2004}) + N_{60-64}^{2005} - N_{55-59}^{2000} \quad (2)$$

We obtained the number of net migration (the number of inflow minus the number of outflow) from 2000 to 2005 by age group by combining the population by age group in *the Basic Resident Resister* with the number of fatalities in *the Vital Statistics of Japan* as equation (2)[5]. Then, next, we obtained the number of those who died from 2000 to 2004 from *the Vital Statistics of Japan*[6]. Thus, we can calculate the number of net migration of each age group of each city, town and village though it is impossible to separate those who flow in and those who flow out[7].

Though the data year extends from 2000 to 2005, the number of municipalities has decreased greatly for this period by the large merger of municipality at the Heisei era. To deal with this problem, we incorporated the data from 2000 to 2004 into the municipality at the time of, April 1, 2005.

2.2. Migration pattern of elderly at prefecture level

[5] In *the Basic Resident Register*, investigation year's population on March 31 is collected. On the other hand, investigation year's population until January 1 to December 31 is collected in *the Vital Statistics of Japan*. Therefore, there are gaps of the back and forth three months between the number of population and the number of fatalities for the convenience of the data acquisition period.

[6] Due to the number of fatalities in *the Vital Statistics of Japan* collected at intervals of five years old, we cannot obtain the number of fatalities of every year old. Then, we assumed the number of fatalities in the middle age of each age group (It is 62 years old if it is 60-64 years old) to be a simple mean value of the number of fatalities of this age group and obtained the number of fatalities of each year old by conducting a linear interpolation between age groups.

[7] The person who flows in certain city that is after March 31, and who died by December 31, is counted only in the mortality data. It should be noted that there is a possibility of overestimation of the number of fatalities (It underestimates net migration).

Figure 1 illustrates net migration pattern of late-stage elderly at prefecture level calculated by the method described in the previous section. Note that dark color indicates net inflow and light color indicates net outflow. Figure 1 shows prefectures that the number of net migration is positive are follows: from the north, Ibaraki, Tochigi, Gunma, Saitama, Chiba, Kanagawa, Shizuoka, Aichi, Shiga, Nara, and Hyogo. In a word, it is suggested that late-stage elderly migrate to municipality around the big city such as Tokyo, Nagoya, and Osaka.

Furthermore, when you see the number of net migration of late-stage elderly in Tokyo, it is a decrease of 16,606 people in the Tokyo special district (the 23 wards) though they are 6,569 people in the entire Tokyo. Similarly to Tokyo, it is a decrease of 4,846 people in Osaka City though those are 2,496 people in the entire Osaka. The number of outflow in the central city (such as 23 wards in Tokyo and Osaka City) exceeds the number of those totaled in entire prefecture. In a word, we can find the number of net migration of late-stage elderly in municipalities around big city such as Tokyo and Osaka increases.

According to these migration patterns of late-stage elderly, there are two trends, (1) migration pattern from central city to suburbs and (2) migration pattern from rural to suburbs of big city. Our hypothesis is that there are two migration factors of late elderly that requires a nursing care relatively high. First, the one from central cities requests the nursing care facilities. Second, the one from rural areas brought over by his/her children.

＜Figure 1＞

Figure 2 illustrates net migration pattern of early-stage elderly at prefecture level. It is understood that the outflow tendency from the metropolitan area is remarkable for early-stage elderly compared with late-stage elderly. On the other hand, it exists in the increasing tendency in prefectures in Kanto area (Fukushima, Ibaraki, Tochigi, and Chiba), Nagano, Yamanashi, Shiga, Fukui and prefectures in Southern Kyushu area (Miyazaki, Kumamoto, and Kagoshima), etc. It is thought that this is a U-turn according to the retirement. When you compare migration patterns of elderly, you can see a different tendency between early-stage elderly and late-stage elderly, i.e., the late elderly is an inflow to suburbs around the big city and early elderly is a return to rural areas.

＜Figure 2＞

2.3. Migration pattern of elderly in metropolitan and urban areas

Judging from migration pattern of elderly as noted previously, it is possible that the tendency similar to Tokyo metropolitan area shown in Nakazawa (2007) is confirmed in other metropolitan areas. Moreover, the number of net migration might be greatly different according to municipality even in case of being in the same prefecture. Then, migration of elderly is confirmed more in detail next for three metropolitan areas[8], the government-designated cities, the core cities。

＜Table 1＞

The number of net migration of below retirement age (age 55-64)[9], early-stage elderly (age 65-74), and late-stage elderly (age 75 and over) in three metropolitan areas is shown in Table 1. Table1 reports that the number of net migration of age 55-64 and early-stage elderly is excess outflow while that of late-stage elderly is excess inflow in three metropolitan areas excluding Osaka area[10]. In addition, it is excess outflow of elderly in the central city such as the 23 wards, Nagoya City, and Osaka City. On the other hand, it is excess inflow of late-stage elderly in municipalities except the government-designated city in these areas. In the case of late-stage elderly, it is thought that the surrounding area absorbs the outflow from the central city, and it flows in from the out of the area.

Next, we will pay attention to the government-designated cities and the core cities. Table 2 shows the number of net migration of each age group in the government-designated cities. It has inflow trend around entering school and starting work, and outflow trend around retiring age in the government-designated cities. It is thought that these big cities are places that spend the period of the first half of the life as a base of entering school and starting work, and leave at the latter half period. However, we cannot find the same trend among these government-designated cities. It has excess inflow of late-stage elderly in Sapporo-city, Chiba-city, Yokohama-city, and Kobe-city while it has excess outflow in the 23 wards of Tokyo, Nagoya-city, and Osaka-city as we mentioned previously. These cities are big cities that are adjacent with the 23 wards or Osaka-city and it is thought that the inflow from the central city has occurred. Furthermore, the trend is different in each city, for example, it is excess inflow excluding age 25-34 in

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[8] The definition of the Ministry of Land, Infrastructure and Transport and Tourism is used for the setting of three metropolitan areas. Concretely, Tokyo metropolitan area is composed of Chiba, Kanagawa, Saitama, and Tokyo, Nagoya metropolitan area is composed of Aichi and Mie, Osaka metropolitan area is composed of Hyogo, Kyoto and Osaka.

[9] According *to the Migration Survey* (National Institute of Population and Social Security Research) in 2001, the first reason of age 55-64 years old man’s migration is due to the mandatory retirement. This survey also shows those people are more likely to migrate from the metropolitan area to non-metropolitan area.

[10] It is excess outflow of late-stage elderly in Osaka area. However, if Shiga, Nara, and Wakayama are included, it changes to excess inflow.

Sapporo-city and it is excess outflow in Kitakyushu-city. Sapporo-city has excess inflow that is greater than other government-designated cities. Particularly, the number of early-stage elderly inflow into Sapporo-city is 3,165, and that of late-stage elderly is 4,594. The outflows of late-stage elderly of Hokkaido except Sapporo-city are 5,132 people, and most of those who migrate in Hokkaido will have been absorbed only in Sapporo-city[11].

＜Table 2＞

Table 3 shows the number of net migration of each age group in the core cities. It is excess inflow only for late-stage elderly while it is excess outflow consistently from the age of entering school to early-stage elderly in the core cities as shown in Table 3. Among these, in Akita, Ishikawa, Nagano, and Okayama, the number of net migration of late-stage elderly in the core cities exceeds that of the entire prefecture. In a word, net migration of these prefectures except the core city is a decrease. Though there is a different tendency among these core cities, it is possible to see the core cities as late-stage elderly saucer as well as the surrounding cities of three metropolitan areas.

＜Table 3＞

3. Estimation of welfare magnet

3.1. Relation between migration of elderly and nursing care facilities

Table 4 through Table 7 shows the ranking of the number of net migration of late-stage elderly and the percentage of migration of late-stage elderly.

＜Table 4 – Table 7＞

As pointed in Nakazawa (2007), we can think that the enhancement level of nursing care facility is one of main factor of migration of elderly. Table 8 shows the top 10 ranking of

[11] Takechi (1996) explains the situation of such Sapporo-city. Takechi (1996) discussed about social hospitalization in Sapporo-city before the introduction of long-term care insurance. In Hokkaido that life in winter is severe, and a lot of regions where medical facilities are insufficient exist, Takechi (1996) shows the elderly might be hospitalized in nursing care facility or hospital in Sapporo-city by moving his/her resident card to Sapporo-city in winter. He named this as the “bringing nursing care” because the child who lives in Sapporo-city brings his/her parents.

capacity of welfare facilities divided by the number of elderly in 2000.

＜Table 8＞

3.2. Previous literatures

Many previous literatures on interregional migration focus on Tiebout's (1956) "voting with feet" hypothesis. As an initial empirical study, Oates (1969) examined a capitalization hypothesis, and Cebula and Korn (1975), Cebula (1978, 1979) estimated migration per se. After that, there has been a great discussion about differences in welfare service among regions and migration. Recent empirical studies have questioned the extent of welfare migration. It is an object of examination that interstate inequality in program benefits of Aid to Family with Dependent Children (AFDC) and migration[12].

Some studies discuss on Tiebout's hypothesis from the viewpoint of capitalization hypothesis in Japan (Sakashita and Hirao 1999; Kondo et al., 2007). In these studies, it can be concluded that the capitalization hypothesis is valid to some degree in Japan[13]. On the other hand, especially, little study has attempted to examine on migration of elderly. Therefore, in this paper we use data produced in previous section to estimate the magnitude of welfare-induced migration of elderly at municipality level in Japan.

3.3. Regression model

We estimate the magnitude of welfare-induced migration of elderly in this paper. We employ the number of net migration of elderly as a dependent variable and capacity of nursing care facilities as independent variables. We pay attention to nursing care facility service in this paper, because we thought incentive that late-stage elderly migrate to new municipality to receive relatively enhanced at-home nursing service is low. As Takechi (1996) pointed out, when child bring his/her parent, they do not necessarily choose cohabitation with parent. The child frequently gets their parent in facility not so far away from their home. Moreover, Takechi (1996) shows it is a main factor of "bringing nursing care" that people cannot live in rural area alone with aging. We claim that the elderly prefer nursing care facility service from this aspect.

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[12] Southwick (1981), Gramlich and Laren (1984), Blank (1988), Islam (1989), Enchautegui (1997), Borjas (1999) shows a positive relationship between the level of welfare program and migration while a clear effect is not achieved in Schroder (1995), Levine and Zimmerman (1999). A summary of the earlier research is provided in Hayashi (2006), Nishikawa and Hayashi (2006). Dowding et al. (1994) and Nagamine (1998) surveyed empirical literatures on Tiebout's hypothesis in detail.

[13] Gramlich and Rubinfeld (1982) verify homogeneity of resident's attitude toward public service as a different approach, and Yabuki (1993) applies this to our country.

We estimate the following regression model:

$$
\begin{aligned}
RNM_i = \beta_1 + \beta_2 Welfare_i + \beta_3 Healthcare_i + \beta_4 Sanatorium_i \\
+ \beta_5 Bed_i + \beta_6 Hsize_i + \beta_7 Alone_i + \beta_8 Dummy_i + \varepsilon_i
\end{aligned}
\tag{3}
$$

where RNM is the percentage of net migration and subscript i indicates municipality. Based on migration data of elderly from 2000 to 2005, we use explanatory variables in 2000 to deal with causal relation problem. We estimate the regression model (3) separately in early-stage elderly (age 65-74) and late-stage elderly (age 75 and over).

The variable $Welfare$ is capacity of welfare facilities (*Kaigo Rojin Fukushi Shisetsu*), $Healthcare$ is capacity of healthcare facilities (*Kaigo Rojin Hoken Shisetsu*), $Sanatorium$ is capacity of sanatorium type medical care facilities (*Kaigo Ryoyo-gata Iryo Shisetsu*). These variables are divided by the number of population aged 65 or older of each municipality. That is, these variables shows quantitative enhancement of each facilities. Bed is the number of bed in hospital per capita、it shows enhancement level of medical service in region. It is a proxy for hospitalization of elderly for non-medical reasons as a shortage of nursing care facilities. $Hsize$ is average size of household, and $Alone$ is percentage of elderly who live alone (Number of aged single household that occupies it to number of all households). The former shows strength of the domestic supporting function, and the latter shows opposite direction. Our hypothesis is that the elderly flow out from one municipality along with bringing to his/her children or with entering to facilities. Based on our review so far, $Dummy$ are city dummy variables (12 major cities and core city) and three major metropolitan areas dummy variables (Tokyo, Nagoya, and Osaka area).

We show source of these variables in Table 9, and summary statistics in Table 10.

＜Table 9 – Table 10＞

3.4. Estimation results

First of all, we estimated the model in equation (3) for 2,522 nationwide municipalities. The estimation method we employed is OLS. The regression coefficients are reported in Table 11 and Table 12.

＜Table 11 – Table 12＞

Taken as a whole, the results show that the interregional differences in capacity of nursing care facility induce migration of elderly. The result of the early-stage elderly sample, the parameters are not significant except for the size of household and Tokyo area dummy. On the other hand, estimation results of late-elderly shows the parameters of facilities are significant. Especially, the coefficient of capacity of welfare facilities indicates that it is the main factor of migration of late-stage elderly. From the results that the size of household is positive and the percentage of elderly who live alone is negative, these indicate that the elderly who is difficult for living alone outflow from their hometown. Moreover, city dummy variables are significantly positive and this indicates inflow into big city. Coefficient of per capita bed is significant only in 10% level and this indicate that the elderly migrate to another area that has a lot of medical facility

Next, we estimate by districts (Table 13 through Table 16). From these results, we show the welfare-induced migration of elderly not only in Tokyo area but also nationwide in Japan. Especially, it is clarified that the tendency is strong in city area.

＜Table 13 – Table 16＞

4. Conclusion

As population aging and weakening of domestic supporting function, it has been pointed out that the provision level of the nursing care facilities in Japan is still low. In such a situation, the “welfare magnet” that the elderly move to another area where nursing care facility is fulfilled has gathered our attention. In this paper, we conduct an empirical analysis on migration of elderly that little study paid attention in Japan.

First, we produce the number of net migration data by age group by combining statistics and we capture migration pattern of elderly who need nursing care. The results show there are three migration patterns: (1) migration from central city to suburbs, (2) migration from rural to suburbs, and (3) migration into core city in local area.

Second, we estimate the magnitude of migration using municipality data. The empirical evidence presented in this paper is consistent with the hypothesis that interregional differences in capacity of nursing care facility generate strong magnetic effects on migration of elderly. The results show that we can see the welfare magnet not only in selected area but also in nationwide in Japan. Especially, the migration tendency can be seen strongly in three metropolitan areas.

By aging in the baby-boom generation, it is thought that this trend becomes strong more and more. In thinking about the long-term care insurance policy, we cannot ignore the factor of migration of elderly.

References

Blank, R.M. (1988) The Effect of Welfare and Wage Levels on the Location Decisions of Female-Headed Households, *Journal of Urban Economics*, 24, pp.186-221.

Borjas, G.J. (1999) Immigration and Welfare Magnets, *Journal of Labor Economics*, 17, pp.607-637.

Cebula, R.J. (1978) An Empirical Note on the Tiebout-Tullock Hypothesis, *Quarterly Journal of Economics*, 92, pp.705-711.

Cebula, R.J. (1979) A Survey of the Literature on the Migration-Impact of State and Local Government Policies, *Public Finance*, 34, pp.69-84.

Cebula, R.J. and Korn, R.M. (1975) Public Policies and Migration Patterns in the United States, *Public Finance*, 30, pp.186-196.

Dowding, K., John, P. and Biggs, S. (1994) Tiebout: A Survey of the Empirical Literature, *Urban Studies*, 31, pp.767-797.

Enchautegui, M.E. (1997) Welfare Payments and Other Economic Determinants of Female Migration, *Journal of Labor Economics*, 15, pp.529-554.

Gramlich, E.M. and Laren, D.S. (1984) Migration and Income Redistribution Responsibilities, *Journal of Human Resources*, 19, pp.489-511.

Gramlich, E. and Rubinfeld, D. (1982) Micro-Estimates of Public Spending Demand Functions and Tests of the Tiebout and Median-voter Hypothesis, *Journal of Political Economy*, 90, pp.536-560.

Hayashi, M. (2006) Redistribution and Local Governments, *Financial Review*, 82, pp.138-160 (in Japanese).

Islam, M.N. (1989) Tiebout Hypothesis and Migration-impact of Local Fiscal Policies, *Public Finance*, 44, pp.406-418.

Japan Aging Research Center (1994) *Survey on migration of elderly living in big city: Comparative Analysis of Sendai-city, Kitakyusyu-city, Yokohama-city, Nagoya-city, Fukuoka-city*.

Japan Aging Research Center (1995) *Survey on migration and migration factor of elderly in Tokyo: Setagaya-ku, Itabashi-ku, Edogawa-ku, Hachioji-city, and Tama-city*.

Japan Aging Research Center (2000) *Report of elderly and child-nurturing generation's migration in Edogawa-ku*.

Kondo, H., Terai, J. and Takama, S. (2007) Empirical Analysis on Capitalization of City Government Finance, PRI Discussion Paper Series No.07A-13 (in Japanese).

Levine, P.B. and Zimmerman, D.J. (1999) An Empirical Analysis of the Welfare Magnet Debate Using the NLSY, *Journal of Population Economics*, 12, pp.391-409.

Nagamine, J. (1998) *Public Choice and Decentralization*, Keiso Shobo (in Japanese).

Nakazawa, K. (2007) Empirical Analyses of Senior Citizen's Migration Factor between Regions, *Financial Research*, 3, pp.142-159 (in Japanese).

Nishikawa, M and Hayashi, M. (2006) Empirical Studies of Intergovernmental Fiscal Relations: A Survey, *Financial Review*, 82, pp.197-222 (in Japanese).

Oates, W.E. (1969) The Effects of Property Taxes and Local Public Spending on Property Values: An Empirical Study of Tax Capitalization and the Tiebout Hypothesis, *Journal of Political Economy*, 77, pp.957-971.

Sakashita, N. and Hirao, M. (1999) On the Applicability of the Tiebout Model to Japanese Cities, *Review of Urban & Regional Development Studies*, 11, pp.206-215.

Schroder, M. (1995) Games the States Don’t Play: Welfare Benefits and the Theory of Fiscal Federalism, *Review of Economics and Statistics*, 77, pp.183-191.

Southwick Jr., L. (1981) Public Welfare Programs and Recipient Migration, *Growth and Change*, 12, pp.22-32.

Takechi, H. (1996) *Broad-based Administrative District Plan of Health and Welfare*, The Japan Research Institute for Local Government Booklet, No.48 (in Japanese).

Tiebout, C.M. (1956) A Pure Theory of Local Expenditures, *Journal of Political Economy*, 64, pp.416-424.

Yabuki, H. (1993) Uniformity of the Structure of Local Public Expenditures in Japan, *Public Choice Studies*, 21, pp.54-60 (in Japanese).

Figure 1　Net migration of late-stage elderly people (age 75 and over)

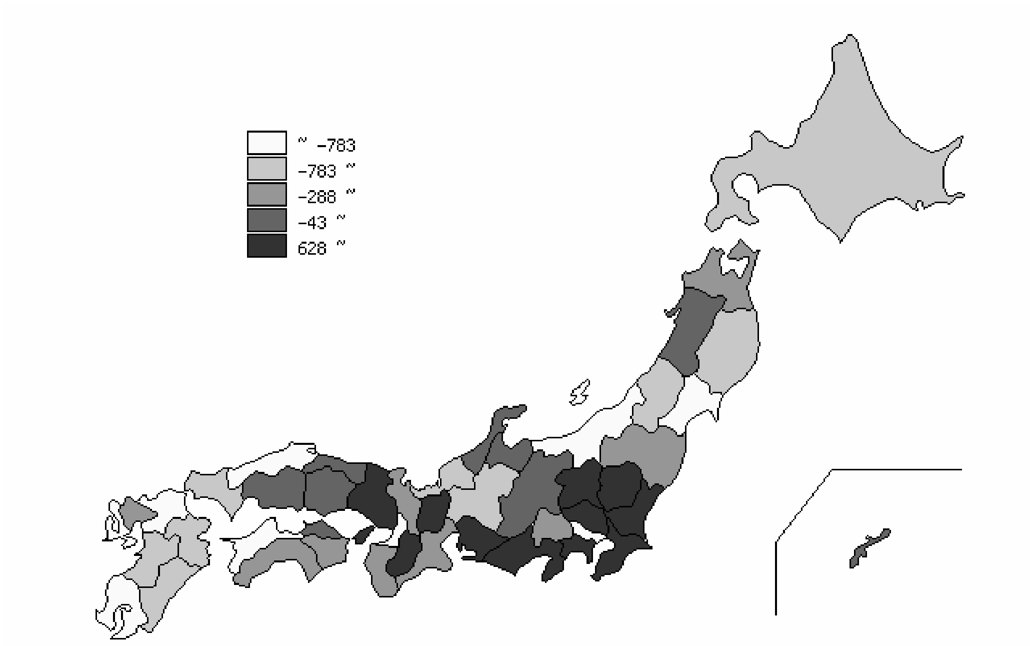

Figure 2 Net migration of early-stage elderly people (age 60-74)

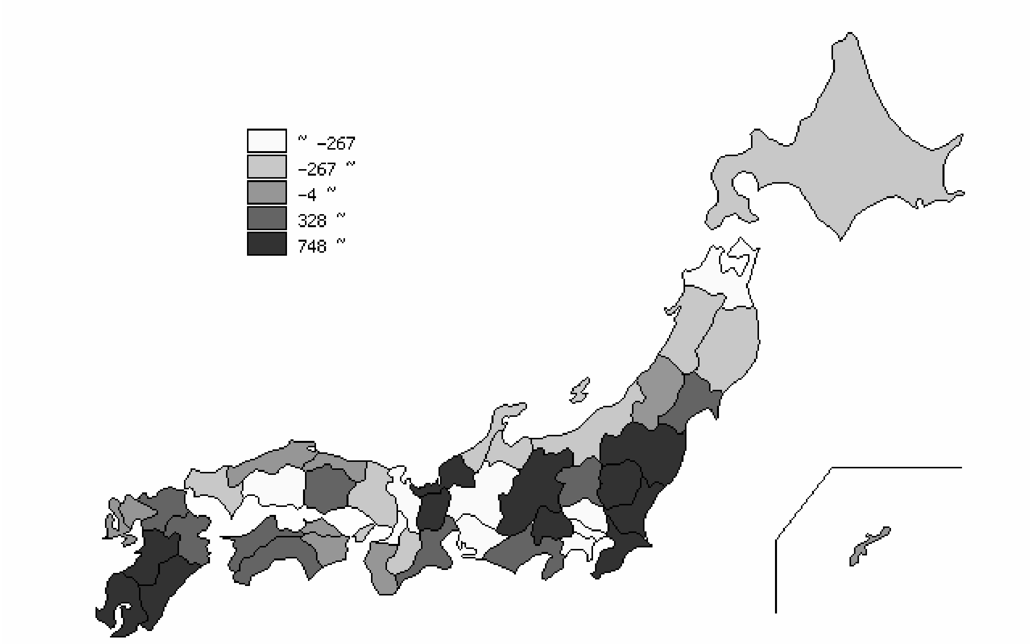

Table 1 Number of net migration in three metropolitan areas

		age 55-64	age 65-74	age 75-
Three metropolitan areas	Total	-56,530	-27,045	16,530
	23 wards+gov.designated city	-32,033	-21,611	-18,752
	Others	-30,889	-7,944	31,027
	Town and village	6,391	2,511	4,255
Tokyo area	Total	-32,839	-13,375	15,851
	23 wards	-19,088	-18,377	-16,606
	23 wards+gov.designated city	-27,744	-20,022	-13,121
	Others	-9,739	3,770	25,554
	Town and village	4,644	2,877	3,418
Nagoya area	Total	-3,442	-1,702	1,335
	Nagoya-city	-3,226	-427	-1,342
	Others	-893	-746	2,278
	Town and village	677	-530	399
Osaka area	Total	-20,249	-11,967	-656
	Osaka-city	-1,660	-2,385	-4,846
	Osaka-city+gov.designated city	-1,064	-1,162	-4,288
	Others	-20,256	-10,969	3,195
	Town and village	1,071	164	438

Table 2 Number of net migration in the government-designated cities

	age group						
	age 15-24	age 25-34	age 35-44	age 45-54	age 55-64	age 65-74	age 75-
Sapporo	22,288	-3,098	997	2,650	4,051	3,165	4,594
Sendai	14,807	-9,111	-1,928	-958	-1,008	43	-818
Saitama	9,563	10,405	1,930	1,157	-2,026	-1,265	-1,827
Chiba	6,246	1,289	2,793	590	-481	868	1,796
Yokohama	32,523	32,347	11,398	3,401	-4,044	-262	3,246
Kawasaki	25,070	24,507	-7,411	-130	-2,104	-987	269
Nagoya	15,660	5,719	-1,234	-1,116	-3,226	-427	-1,342
Kyoto	19,908	-14,990	-5,436	309	-390	-212	-1,040
Osaka	36,087	13,170	-7,484	1,883	-1,660	-2,385	-4,846
Kobe	6,523	237	5,898	2,111	987	1,434	1,598
Hiroshima	2,485	3,081	-561	-1,471	-2,033	-497	706
Kitakyusyu	-696	-7,447	-1,031	-1,003	-1,159	-1,053	-2,440
Fukuoka	27,332	2,379	190	1,527	-278	280	198
Total	40,765	-62,699	-12,610	5,762	5,715	17,081	16,701
Tokyo 23 wards	177,030	121,189	10,731	3,189	-19,088	-18,377	-16,606

Table 3　　Number of net migration in the core cities

	age group						
	age 15-24	age 25-34	age 35-44	age 45-54	age 55-64	age 65-74	age 75-
Asahikawa	-2,088	-1,276	-372	-475	509	38	98
Akita	-2,126	-172	324	-90	13	42	133
Koriyama	-874	1,223	-71	-379	40	91	200
Iwaki	-4,093	-19	-230	-153	320	70	-120
Utsunomiya	-340	5,052	-161	-695	-706	-22	206
Funabashi	6,027	3,913	-1,092	115	-1,101	-707	690
Yokosuka	1,707	-3,319	-264	-565	-41	200	407
Sagamihara	8,166	1,225	-2,347	-133	-620	159	876
Niigata	-1,835	739	988	-89	-2	131	320
Toyama	-631	-547	-129	-33	-23	71	46
Kanazawa	1,082	-1,629	-755	-720	-477	-130	191
Nagano	-2,422	649	32	-392	71	9	257
Gifu	-108	-1,790	160	-47	-388	-356	2
Shizuoka	-3,581	-1,836	-944	-911	-1,024	-588	-58
Hamamatsu	-375	5,308	-339	-77	-107	123	369
Toyohashi	140	-269	47	-169	-79	33	115
Toyota	3,905	-1,068	-1,971	-561	-831	-93	251
Okazaki	387	3,820	749	123	-13	38	-12
Sakai	553	-2,508	-1,176	-1,029	-2,273	-1,131	238
Takatsuki	635	-3,798	-2,663	-563	-1,359	-535	291
Higashiosaka	3,164	-4,157	-2,095	-136	-1,168	-1,202	-334
Himeji	-686	-219	-1,078	-470	-463	-102	-124
Nara	-353	-4,203	-986	-331	-421	167	429
Wakayama	-1,566	-2,389	-844	-571	-813	-248	44
Okayama	2,298	944	-76	-61	-77	94	411
Kurashiki	282	99	218	-41	-90	-83	393
Fukuyama	-2,497	674	-209	-329	-42	-52	272
Takamatsu	-1,495	2,656	-570	-729	-498	-10	55
Matsuyama	249	-1,247	893	-44	673	144	291
Kochi	-231	1,012	80	-110	-128	89	90
Nagasaki	-5,080	-3,496	-801	-996	-619	-486	-459
Kumamoto	1,693	-1,103	-23	-750	-563	279	662
Oita	-1,863	84	714	62	-5	176	443
Miyazaki	-1,936	815	499	-462	525	165	175
Kagoshima	-11,715	-2,598	1,204	-283	568	147	315
Total	-15,606	-9,433	-13,287	-12,098	-11,208	-3,480	7,162

Table 4 Number of net migration of late-stage elderly: Top 10 ranking

		Number of net migration of late-stage elderly
Hokkaido	Sapporo-city	4,594
Kanagawa	Yokohama-city	3,246
Tokyo	Hachioji-city	1,985
Chiba	Chiba-city	1,796
Tokyo	Ome-city	1,617
Hyogo	Kobe-city	1,598
Tokyo	Machida-city	1,259
Tokyo	Hino-city	1,075
Kanagawa	Sagamihara-city	876
Chiba	Kashiwa-city	825

Table 5　Number of net migration of late-stage elderly: Bottom 10 ranking

		Number of net migration of late-stage elderly
Tokyo	Nakano-ku	-1,184
Tokyo	Suginami-ku	-1,290
Tokyo	Shinjuku-ku	-1,314
Aichi	Nagoya-city	-1,342
Hyogo	Amagasaki-city	-1,396
Tokyo	Setagaya-ku	-1,634
Tokyo	Ota-ku	-1,740
Saitama	Saitama-city	-1,827
Fukuoka	Kitakyusyu-city	-2,440
Osaka	Osaka-city	-4,846

Table 6 Percentage of net migration of late-stage elderly: Top 10 ranking

Percentage of net migration of late-stage elderly		
Aichi	Kasuga-cho	24.5%
Tokyo	Hinode-cho	22.8%
Akita	Ogata-mura	20.7%
Nara	Kanmaki-cho	18.6%
Hokkaido	Tomari-mura	15.7%
Saitama	Kamiizumi-mura	14.7%
Wakayama	Koza-cho	12.6%
Tokyo	Okutama-cho	12.4%
Tokyo	Ome-city	11.9%
Saitama	Tamakawa-mura	11.0%

Table 7　Percentage of net migration of late-stage elderly: Bottom 10 ranking

Percentage of net migration of late-stage elderly		
Nara	Shimokitayama-mura	-10.0%
Nara	Kamikitayama-mura	-10.4%
Miyagi	Naruko-cho	-10.5%
Nagano	Ooshika-mura	-10.6%
Iwate	Ashiro-cho	-13.3%
Aomori	Nishimeya-mura	-14.1%
Nagano	Kami-mura	-14.4%
Tokushima	Mino-cho	-15.0%
Yamanashi	Kosuge-mura	-15.4%
Gifu	Sekigahara-cho	-24.0%

Table 8 Capacity of welfare facilities per elderly : Top 10 ranking

Capacity of welfare facilities per elderly		
Tokyo	Hinode-cho	0.243
Hokkaido	Otaki-mura	0.225
Nagano	Hase-mura	0.186
Tokyo	Okutama-cho	0.185
Tokyo	Hinohara-mura	0.167
Hokkaido	Toyoura-cho	0.166
Hokkaido	Shinshinotsu-mura	0.148
Nara	Kanmaki-cho	0.140
Saitama	Kamiizumi-mura	0.136
Tokyo	Ome-city	0.121

Table 9 Data source

Variables	Source
Number of net migration of early-stage elderly	*Basic Resident Resister* *Vital Statistics of Japan*
Number of net migration of late-stage elderly	*Basic Resident Resister* *Vital Statistics of Japan*
Percentage of net migration of early-stage elderly	*Basic Resident Resister* *Vital Statistics of Japan*
Percentage of net migration of late-stage elderly	*Basic Resident Resister* *Vital Statistics of Japan*
Welfare	*Survey of Institutions and Establishments for Long-term Care* *Vital Statistics of Japan*
Healthcare	*Survey of Institutions and Establishments for Long-term Care* *Vital Statistics of Japan*
Sanatorium	*Survey of Institutions and Establishments for Long-term Care* *Vital Statistics of Japan*
Bed	*Survey of Medical Institutions* *Vital Statistics of Japan*
Size of Household	*Population Census*
Alone	*Population Census*

Table 10 Descriptive statistics

Variables	Mean	Std. Dev	Min	Max
Number of net migration of early-stage elderly	-4.788	174.697	-2799	3165
Number of net migration of late-stage elderly	3.538	224.909	-4846	4594
Percentage of net migration of early-stage elderly	0.003	0.044	-0.495	0.851
Percentage of net migration of late-stage elderly	-0.002	0.028	-0.241	0.245
Welfare	0.019	0.019	0	0.243
Healthcare	0.011	0.017	0	0.191
Sanatorium	0.005	0.012	0	0.274
Bed	0.012	0.014	0	0.213
Size of Household	3.056	0.456	1.701	4.567
Alone	0.077	0.041	0.007	0.291

Table 11 Estimation results (early-stage elderly)

	Percentage of net migration of early-stage elderly	
Welfare	0.004	(0.059)
Healthcare	0.099	(1.661)
Sanatorium	-0.172	(-1.202)
Bed	0.161	(1.829)
Size of household	0.019	(6.864) ***
Alone	0.127	(3.402) ***
Metropolitan city dummy	0.006	(1.221)
Core city dummy	0.003	(1.351)
Tokyo area dummy	0.015	(5.001) ***
Nagoya area dummy	-0.001	(-0.528)
Osaka area dummy	-0.003	(-1.327)
Constant	-0.068	(-6.409) ***
Adj R-squared	0.028	
Number of obs.	2522	

Note: t-values are in parentheses. Robust standard errors are used.

***Significance at 1% level, **Significance at 5% level, *Significance at 10% level.

Table 12 Estimation results (late-stage elderly)

	Percentage of net migration of late-stage elderly		
Welfare	0.531	(10.525)	***
Healthcare	0.149	(4.372)	***
Sanatorium	0.018	(0.174)	
Bed	0.086	(1.803)	*
Size of household	0.003	(2.187)	**
Alone	-0.247	(-14.334)	***
Metropolitan city dummy	0.002	(0.498)	
Core city dummy	0.007	(4.889)	***
Tokyo area dummy	0.013	(8.161)	***
Nagoya area dummy	0.005	(2.061)	**
Osaka area dummy	0.005	(3.366)	***
Constant	-0.008	(-1.359)	
Adj R-squared	0.314		
Number of obs.	2522		

Note: t-values are in parentheses. Robust standard errors are used.

***Significance at 1% level, **Significance at 5% level, *Significance at 10% level.

Table 13 Estimation results of early-stage elderly (Tokyo area)

	Tokyo area	
Welfare	0.882	(15.546) ***
Healthcare	0.178	(1.635)
Sanatorium	0.132	(1.152)
Bed	-0.238	(-1.706) *
Size of household	-0.006	(-1.871) *
Alone	-0.564	(-7.763) ***
Metropolitan city dummy	-0.006	(-0.573)
Core city dummy	0.004	(1.122)
Constant	0.044	(4.229) ***
Adj R-squared	0.664	
Number of obs.	256	

Note: t-values are in parentheses. Robust standard errors are used.

***Significance at 1% level, **Significance at 5% level, *Significance at 10% level.

Table 14 Estimation results of early-stage elderly (Nagoya area)

	Nagoya area	
Welfare	0.634	(3.433) ***
Healthcare	-0.108	(-0.909)
Sanatorium	-0.287	(-1.164)
Bed	0.179	(0.756)
Size of household	-0.007	(-0.801)
Alone	-0.365	(-3.916) ***
Metropolitan city dummy	-0.009	(-1.627)
Core city dummy	-0.004	(-0.789)
Constant	0.039	(1.122)
Adj R-squared	0.183	
Number of obs.	132	

Note: t-values are in parentheses. Robust standard errors are used.

***Significance at 1% level, **Significance at 5% level, *Significance at 10% level.

Table 15　Estimation results of early-stage elderly (Osaka area)

	Osaka area	
Welfare	0.608	(3.659) ***
Healthcare	-0.006	(-0.038)
Sanatorium	0.389	(2.998) ***
Bed	0.052	(0.216)
Size of household	-0.011	(-2.883) ***
Alone	-0.414	(-6.217) ***
Metropolitan city dummy	-0.005	(-0.531)
Core city dummy	-0.004	(-1.168)
Constant	0.052	(3.803)
Adj R-squared	0.315	
Number of obs.	159	

Note: t-values are in parentheses. Robust standard errors are used.

***Significance at 1% level, **Significance at 5% level, *Significance at 10% level.

Table 16　Estimation results of early-stage elderly (Other area)

	Percentage of net migration of late-stage elderly		
Welfare	0.453	(8.483)	***
Healthcare	0.174	(4.634)	***
Sanatorium	-0.024	(-0.217)	
Bed	0.136	(2.957)	***
Size of household	0.006	(3.512)	***
Alone	-0.204	(-10.806)	***
Metropolitan city dummy	0.009	(1.254)	
Core city dummy	0.011	(6.429)	***
Constant	-0.021	(-2.881)	***
Adj R-squared	0.255		
Number of obs.	1975		

Note: t-values are in parentheses. Robust standard errors are used.

***Significance at 1% level, **Significance at 5% level, *Significance at 10% level.

Table 17 Estimation results (number of migration: early-stage elderly)

	Number of net migration of early-stage elderly	
Welfare	341.540	(3.391) ***
Healthcare	260.064	(3.343) ***
Sanatorium	300.149	(1.109)
Bed	267.540	(1.821) *
Size of household	52.483	(4.102) ***
Alone	85.356	(1.073)
Metropolitan city dummy	-36.427	(-0.096)
Core city dummy	-78.267	(-1.319)
Tokyo area dummy	-47.071	(-2.125) **
Nagoya area dummy	-14.137	(-1.922) *
Osaka area dummy	-77.702	(-3.175) ***
Constant	-174.081	(-3.711) ***
Adj R-squared	0.041	
Number of obs.	2522	

Note: t-values are in parentheses. Robust standard errors are used.

***Significance at 1% level, **Significance at 5% level, *Significance at 10% level.

Table 18 Estimation results (number of migration: late-stage elderly)

	Number of net migration of late-stage elderly		
Welfare	1141.710	(5.421)	***
Healthcare	388.489	(4.536)	***
Sanatorium	749.972	(2.184)	**
Bed	-649.703	(-2.923)	***
Size of household	-2.876	(-0.292)	
Alone	-816.321	(-7.991)	***
Metropolitan city dummy	-1.799	(-0.003)	
Core city dummy	126.568	(4.389)	***
Tokyo area dummy	41.279	(1.553)	
Nagoya area dummy	-2.355	(-0.175)	
Osaka area dummy	-12.991	(-0.396)	
Constant	48.019	(1.052)	
Adj R-squared	0.043		
Number of obs.	2522		

Note: t-values are in parentheses. Robust standard errors are used.

***Significance at 1% level, **Significance at 5% level, *Significance at 10% level.