

Estimation of the Difference in Medical Costs and Nursing Care Costs by Prefecture

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1. Introduction

Although it has been a long time since reform of the social security system has been the most important challenge, the largest reason why reform of the social security system is necessary is the declining birthrate and aging population that is, needless to say, showing no sign of coming to a halt. According to the basic estimates (estimates on median birth and median death) for the latest version (December 2006 estimates) of the official future population statistics of Japan that the National Institute of Population and Social Security Research (IPSS) announces regularly, the future total fertility rate is predicted to shift at a level slightly higher than 1.2. In addition, based on annual estimates for vital statistics in 2009, the number of births in Japan was approximately 1.06 million, and the number of deaths was 1.14 million, indicating that the number of births was lower than the number of deaths for the third consecutive year. There is a sense that the decrease in total population has become completely rooted.⁽¹⁾

Aging of the population structure is triggered not only by low birthrates, but by an increase in longevity. The average life expectancy, which was 50.06 years for males and 53.96 years for females as of 1947, has increased to 79.19 years for males and 85.99 years for females based on the latest Abridged Life Table from 2007. If this growth continues in the future, increased longevity is predicted to progress to 83.57 years for males and 90.34 years for females as of 2055, based on the future life table.

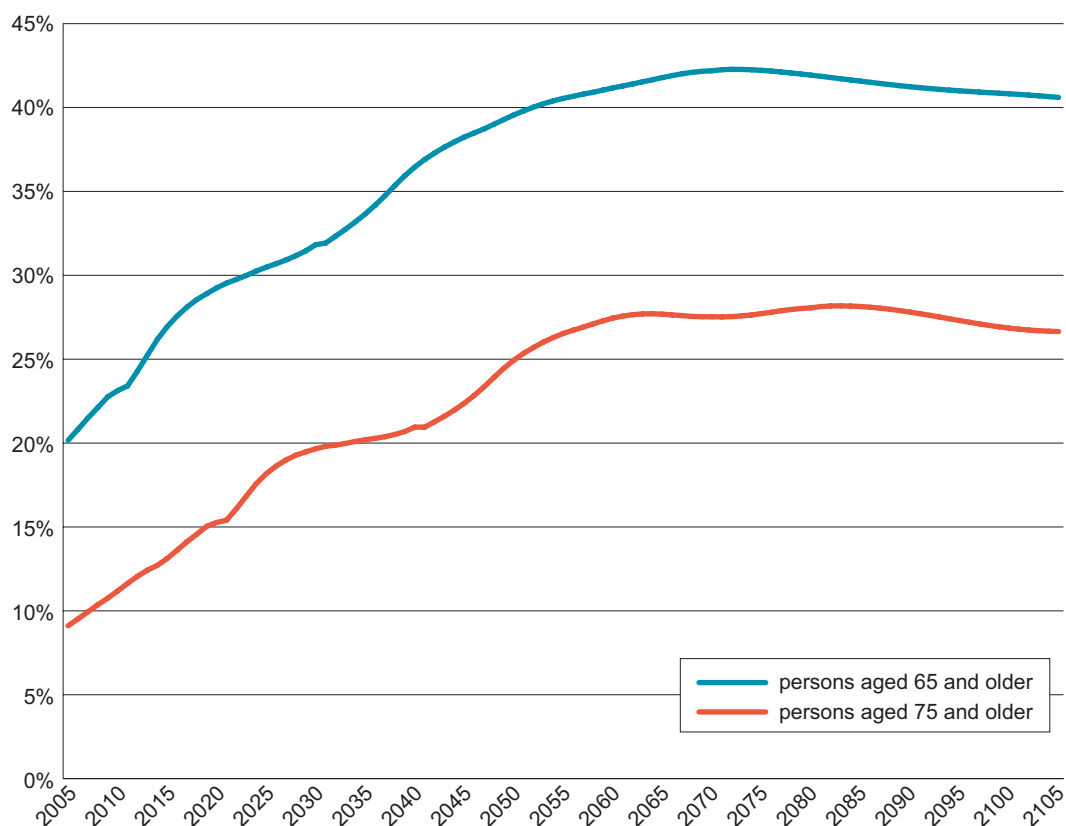
Due to the progression of low birthrates and an increase in longevity, further aging of Japan's population structure will continue. Figure 1 shows the percentage of the total population accounted for by the population of persons aged 65 years or 75 years and older as based on population estimates by the IPSS, and as it can be discerned from this figure, aging in Japan will progress in the future upon passing through 2 phases. The first phase is aging associated with retirement of the baby boomer generation, which is currently underway,

and the second phase is aging that is associated with the retirement of Generation Y, which will start around 2040. Future population estimates differ from future estimates for other social sciences, such as economic forecasts, and since forecasts for the population structure and birth activities have been specified tens of years in advance as of the current point in time, it can be said that aging of the future population structure is unavoidable on one level or another, taking into consideration the fact that the estimates are extremely stable.

In order to be ready for the coming super-graying society, Japan's social security system has been taking various kinds of approaches. For example, in the public pension system, in addition to clarifying the schedule and limit for raising insurance premiums, reserves that complement the pay-as-you-go system are further built up, its returns and dissavings are utilized, and accordingly, benefit levels are also reduced based on certain rules (macro slide), thus resulting in revisions in 2004 where the robustness of a century-old system could be maintained. Based on this, the sustainability of pension financing, at the very least, was able to be strengthened.

In contrast to this, in the medical care and nursing care systems, which generally adopt a purely pay-as-you-go system, progressive reforms were repeated and although various improvements can be seen, there are still thought to be a mountainous pile of problems. Of course, the medical care and nursing care system differs from the pension system, which is concluded based on discussions regarding only the ideals of finance, and since such a system possesses various aspects such as finance and a medical delivery system, discussions are more complex. There are many points of controversy, such as the lack of and uneven distribution of physicians, the scope of coverage of public insurance and private insurance, financing of medical fees for the elderly, etc. In addition, as with the coverage of new pharmaceuticals, there are some issues that should be improved that are not related to long-term perspectives.

Figure 1: Shifts in the population ratio of persons aged 65/75 and older as based on estimates by the National Institute of Population and Social Security Research (median birth/median death)



Source: the author's tabulation based on "Population Projection for Japan: 2006–2055 (December 2006)" National Institute of Population and Social Security Research

However, as the aging that continues to advance in the future is unavoidable, it is necessary to carry out long-term discussions as to how to make use of the medical care/nursing care system in the coming aging of the society to make such a system as sustainable as possible. However, when conducting long-term discussions regarding medical care/nursing care systems, the fact that there are no official estimates covering a long period of time regarding medical care costs and nursing care costs serves as a bottleneck. Even in the "Estimates on Social Security Benefits and Burdens" that the Ministry of Health, Labour and Welfare had been publishing regularly and the simulation announced by the National Council on Social Security in the Fukuda Cabinet in 2008, although the period up until 2025 has been established as the estimation period, for estimates after 2025, there are statistics that are official, at the very least.

The reason why the government does not carry out estimations on medical fees and nursing care fees extending over a long period of time is that most likely, as it was made clear in a series of researches after Newhouse's research (1977) in

the field of healthcare economy, it is thought that since technological innovations are what have the greatest impact on the past growth of medical care fees, as long as the position of technological innovations in the future is opaque, there is thought as being limitations even if more long-term estimates are conducted than necessary.⁽²⁾ However, since the situation in Japan in one is where graying of the population structure is unavoidable over the medium- and long-term, it is necessary to obtain *merkmal* of discussions by focusing on the long-term stance of the medical care and nursing care system, based on a certain set of hypotheses. Thus, in this paper, future forecasts related to long-term medical fees and nursing care fees in Japan are estimated in a form where they are harmonized with official government statistics.

What must be kept in mind when conducting estimates on medical care and nursing care fees is that contrary to a pension insurance that is the same for all insured persons throughout the country, medical care and nursing care insurance are operated concomitantly with corporate insurance/insurance by occupational field and

local insurance.⁽³⁾ Employees working at large companies and their dependents are insured under cooperative insurance, and employees working at small- and medium-sized companies and their dependents are insured under the Japan Health Insurance Association; however elderly persons who are 75 years and older are enrolled in the Latter-Stage Elderly Healthcare System run by extended associations according to each prefecture, and other persons such as those who are self-employed or engaged in agriculture and forestry are enrolled in the National Health Insurance operated by each municipality.

Furthermore, the national government and the Ministry of Health, Labour and Welfare have indicated policies to promote reorganization of each of these kinds of insured individuals in units of prefectures. Although a classic example of this is the extended associations being the insurers for the Latter-Stage Elderly Healthcare System that was established starting in 2008 in units of prefectures, even with regard to municipal insurance and National Health Insurance, in order to improve the current state in which there are vulnerable, insured persons in the financial foundation due to the scale being too small, a policy is currently being created to reorganize and integrate the approximately 1,800 insured persons that exist currently in units of prefectures, to set a precedent for expanding operations to jointly stabilize public finances for medical insurance. In addition, insurance for employees of small- and medium-sized companies, which had previously been operated as government-managed health insurance and in a single unit of the entire country has also been reorganized into health insurance managed by the Japan Health Insurance Association (Kyokai Kenpo) in 2008. For government-managed health insurance up until then, a uniform insurance rate for the entire country had been maintained, but in the future, insurance will be managed in a way where each of the prefectural branches for the Japan Health Insurance Association will establish insurance rates by prefecture that reflect the actual record of benefits in each region. Even with regard to the National Federation of Health Insurance Societies, which had been supported up until now by a stable financial base, in recent years, there has been a steady stream of societies that have been beleaguered due to the smallness of their scale and the economic slump. Thus, starting in 2006, integration of these small-scale and vulnerable health insurance societies within prefectures in a manner that surpasses companies and industries, and the establishment of local health insurance societies have come to be recognized.

In such a way, it is thought that colors of local medical care insurance will become bolder in the future for the medical care insurance system in Japan. In particular, reorganization into units of prefectures that ensure a given scale will progress further. At this time, estimation of medical care costs and nursing care costs for the nation as a whole is effective in cases where consideration is given to the financial burdens of the government and macroeconomics, but when thinking about the stability of the medical care/nursing care system itself, it is understood that the meaning of such estimations becomes limited. Thus, in this paper, the primary focus is to estimate future long-term medical and nursing care costs not only for the nation as a whole, but by prefecture as well. This is because by conducting estimations by prefecture, contributions can be made to discussions related to ideals for financing and design of the medical care system in Japan in the future.⁽⁴⁾

The configuration of this paper is as follows. In Section 2 below, explanations are made regarding the data used in estimations and the estimation method.⁽⁵⁾ In Section 3, results are indicated and speculations are made regarding the implications. A conclusion is given in Section 4.

2. Estimation method

2.1 Fundamental framework for estimations

The basic framework for estimations follows “Simulation of Medical Care and Nursing Care Fees” by the National Council on Social Security that was published in 2008. This simulation estimates future medical care and nursing care fees using the same method as “Estimates on Social Security Benefits and Burdens,” which are official estimates that have been published by the Ministry of Health, Labour and Welfare. Fundamentally, medical care/nursing care fees for each year are estimated using the following formula.

Estimation formula = Number of persons utilizing medical care/nursing care by facility/gender/age group (total number of days)
× unit price per day by facility/service
× growth rate of unit price

For the number of users, the percentage of the population of the same age group accounted for by the number of users of medical care/nursing care services by facility/age group under the current conditions is deemed as the probability of number of users, and by multiplying this probability by the population of each age group for each year, the number of users for medical care/nursing care services per day is determined. By multiplying the

usage conditions by facility/service such as the average length of hospital stays, etc. to the number of users as determined above, the total number of patients/users for each year is estimated.

For unit price by facility/service, medical care/nursing care fees by facility/service under the current conditions are divided by the total number of days of users, resulting in the unit price per day. Then, by multiplying this with the growth rate of the unit price to which the economic growth rate, wage growth rate, etc. have been added, the estimate value for the unit price of future medical care/service costs is determined.

However, two years have passed already since the simulation conducted by the National Council on Social Security, and as new statistical information has been announced during this time, the statistical information that is used for immediate assumptions was altered to the latest information. In addition, in the abovementioned simulation, macro estimations of the country as a whole are conducted, but since the estimations made in this paper are for each prefecture, estimations are conducted by using statistics that have been announced arbitrarily by the Ministry of Health, Labour and Welfare as the necessary information.

In addition, although "Estimates on Social Security Benefits and Burdens" includes future estimations at multiple points in time up until 2025, and the simulation by the National Council on Social Security includes future estimations for only 2025, in the estimations in this paper, diachronic, long-term estimations up until 2105 are carried out.

For the software program used for estimations, since the simulation published by the National Council on Social Security carries out estimations by emphasizing versatility so that any member of the public can understand, Microsoft's spreadsheet software, Excel, is used. However, when conducting estimations by prefecture, operations become cumbersome due to specifications of spreadsheet software and thus, in this paper, estimations were made using Matlab, which is statistical operations software.

2.2 Estimation of the population/users

2.2.1 Extended statistics for the population by prefecture

For the future population, although there is the 2006 estimate by the National Institute of Population and Social Security Research, these estimates also include a population estimate for the entire nation by gender and age. There are several versions of future population estimates by the National Institute of Population and Social Society

Research that are based on the abovementioned estimates. Concretely, these consist of estimates of the number of households and future population estimates by prefecture or by municipality. These estimates and the national version of estimates, which serve as the original estimates, are designed so that consistency is maintained in their tabulated values. This paper targets medical care/nursing care estimates by prefecture, and population estimates by prefecture are also used.

However, compared to estimates for Japan as a whole, there are several inconvenient points in using these prefectural estimates. Firstly, for estimates for Japan as a whole, estimates for each age and every year up until 2105, when including reference estimates, have been published, but for population estimates by prefecture, only population by five-year age groups for every five years up until 2035 have been published. Thus in estimations in this paper, estimations for every five years (up until 2105) are made, rather than for every year, and with regard to the estimated population by prefecture starting in 2035, unique extended estimations are conducted based on a published list of hypothesized values.

Concretely, using the survival rates by five-year age group and by prefecture that have been published, the population for five-year groups by prefecture for the following year are measured, and in relation to infants who are 0 to 4 years old, the number of births for a single year is determined based on multiplying the published birthrate by age group and by prefecture with the population of women who are of a childbearing age, and then by multiplying the prefectural percentage of this number of births with the same age group as the national version of estimations, which are basic statistics. However, in the above method, since a slight difference arises between the national version of estimates and aggregation of estimates for each prefecture by age, compensation was carried out by multiplying the error rate with the national rate. Accordingly, consistency is maintained in the total numbers for the national version of estimates and the extended estimates unique to prefectures.

In population estimates by percentage, although the population of persons aged 85 years and older are combined as a single group, in estimates for medical care/nursing care costs, it is necessary to divide those who are aged 85 and older into five-year groups for persons aged up to 100 years and older. For those who are 85 years and older, the population ratio in the national estimate was multiplied and pro-rated for every five years.

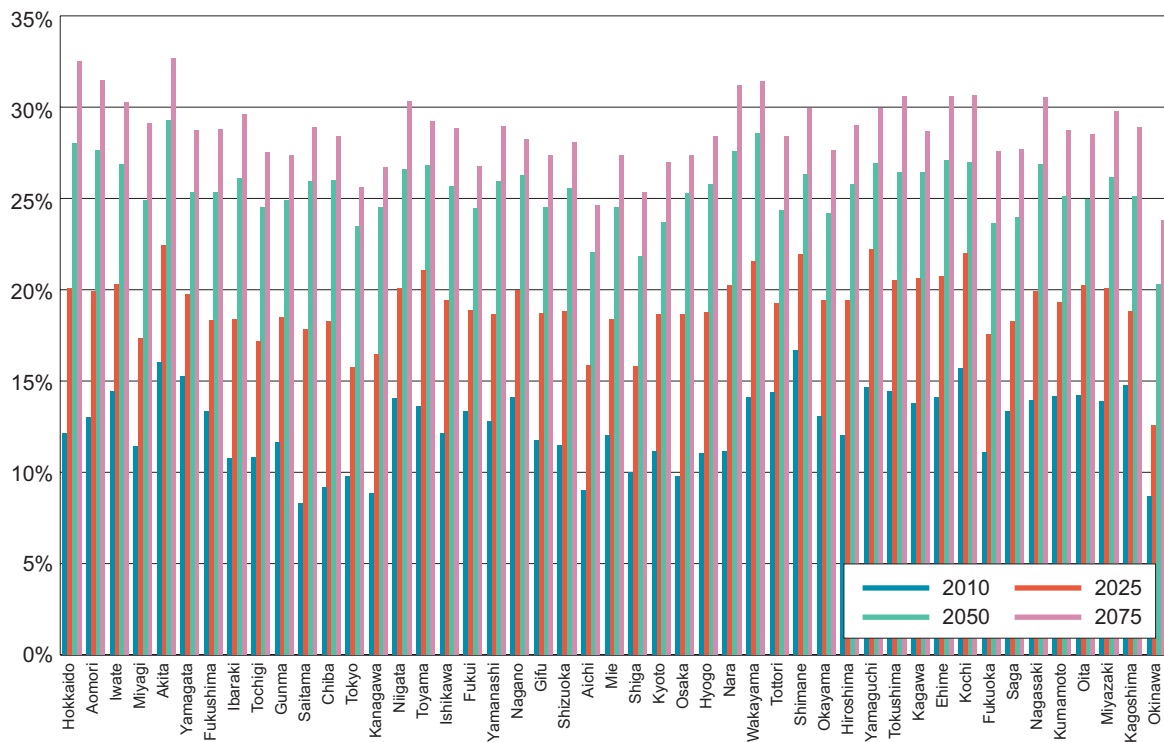
Using future population estimations by prefecture that were estimated in such a way,

calculations that were made for the population percentage of those aged 75 and above by prefecture are shown in Figure 2. As shown in Figure 2 and similarly to the national estimates indicated in Figure 1, it is evident that the population structure will further age starting in 2025 due to retirement of the second baby boomers generation. However, the degree of difference of aging of the population by prefecture is not necessarily obvious from Figure 2. By comparing the population rate of persons aged 75 and older by prefecture to the population ratio of those aged 75 and older for the country as a whole, the extent of divergence of the level of aging in each prefecture from the national average

is shown in Figure 3. As can be seen in Figure 3, according to the estimates by the National Institute of Population and Social Society Research, it is evident that the standards for aging of the population structure in each prefecture are expected to converge gradually by around 2035.

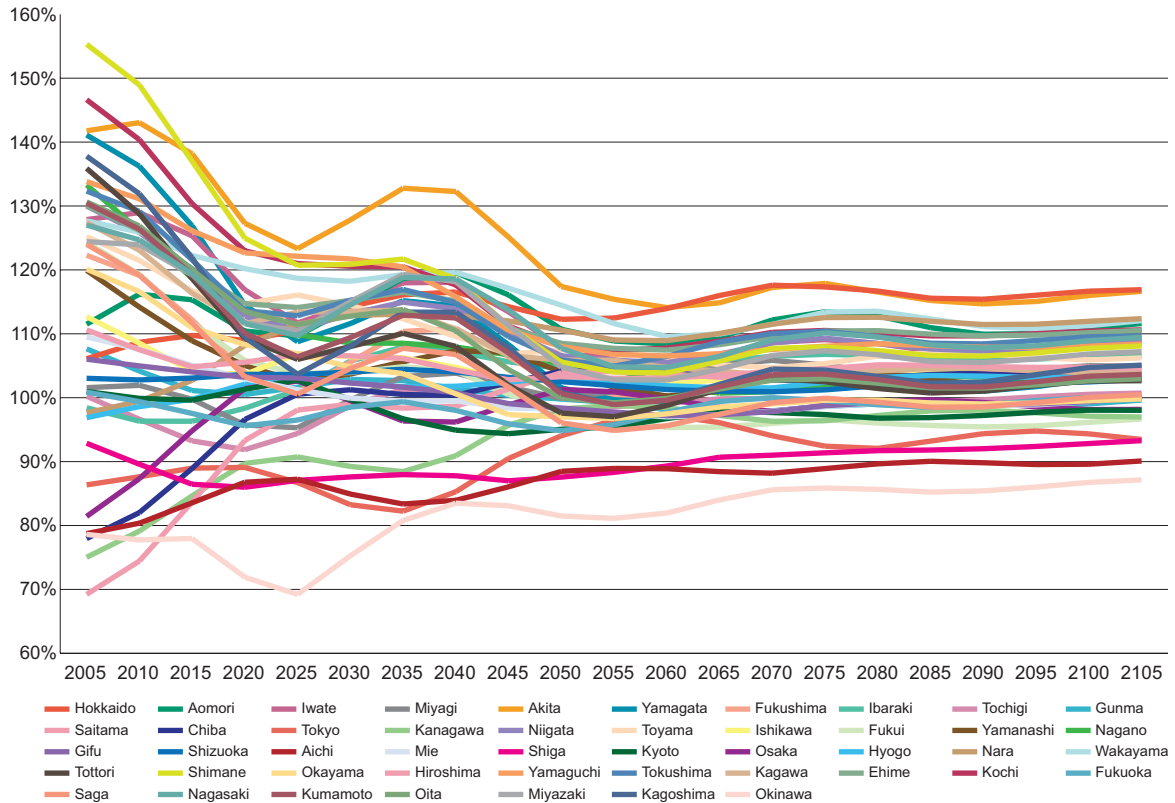
The causes as to why such a convergence phenomenon of aging standards will occur are thought to be the impact of a low birthrate in urban areas such as Tokyo where the aging standard is currently not high (Figure 4), as well as the fact that among these regions, there are regions with high and positive migration rates of adults and the elderly age group between prefectures.

Figure 2: Shifts in the population of persons aged 75 and older by prefecture/ total population ratio by prefecture



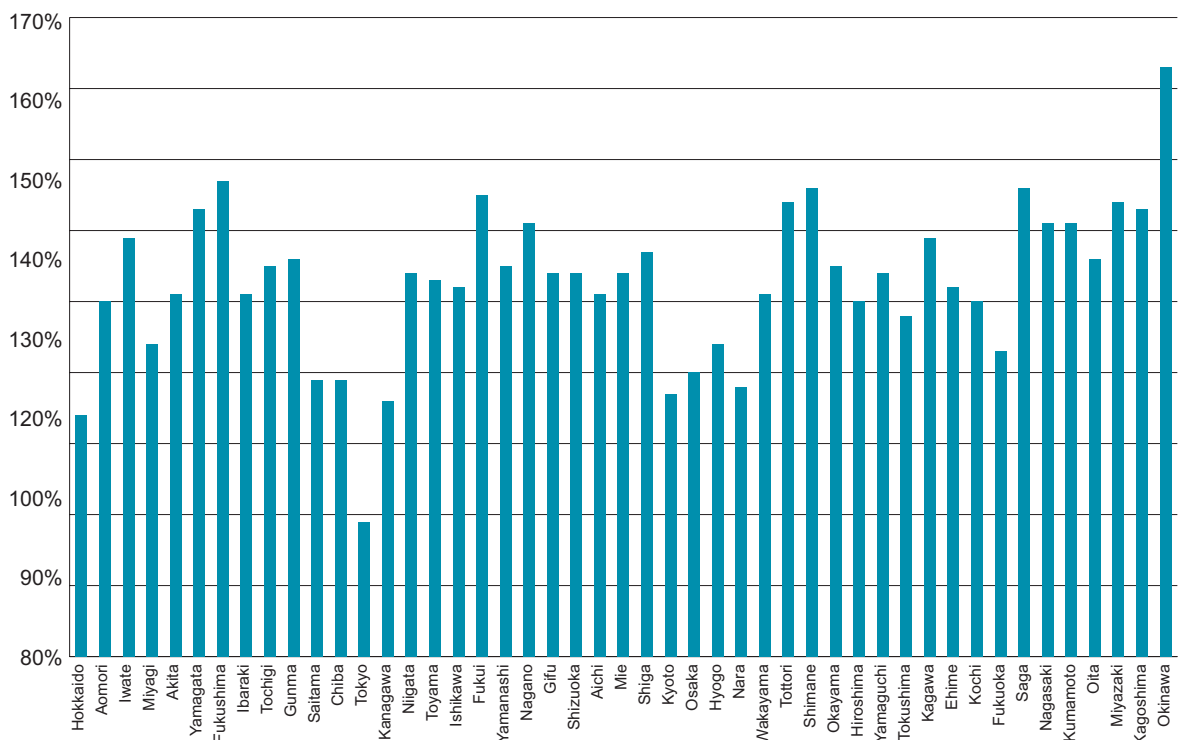
Source: the author's estimation based on the values of the premise used in "Population Projection by Prefecture (May 2007)" National Institute of Population and Social Security Research

**Figure 3: Shifts in the population rate of persons aged 75 and older by prefecture/
national population rate of persons aged 75 and older**



Source: the author's estimation based on the values of the premise used in "Population Projection by Prefecture (May 2007)" National Institute of Population and Social Security Research

Figure 4: Hypothesized values for the total special birthrate by prefecture between 2030 and 2035 as based on estimates by the National Institute of Population and Social Society Research



Source: the author's tabulation based on estimates by the National Institute of Population and Social Society Research

2.2.2 Estimation of the number of patients/ nursing care users

For estimations of the number of patients/number of nursing care service users, a method of first estimating the number of such persons in the whole country and then prorating this number for each prefecture was carried out. The reason why such a method was adopted was not only to bring estimations by prefecture and macro estimations to the same level in cases where the same methods as estimations by the National Council on Social Security and the Ministry of Health, Labour and Welfare are used, but because in contrast to there being a large amount of detailed information such as by age group in statistical tables for national tabulations in public statistical materials such as patient surveys (Ministry of Health, Labour and Welfare), in cases of tabulations by prefecture, there are many examples where items such as age, etc. are tabulated and published. As a result, when the number of patients is estimated in a manner where estimations by prefecture are accumulated, there is the possibility of inadvertent errors. To avoid this, the method of prorating national aggregations by prefecture was adopted in this paper.

With regard to the number of patients in terms of the national total, a method that is nearly the same as that of the simulation by the National Council on Social Security was adopted. First, for the number of hospitalized patients, the number of estimated patients by type of illness, hospital and clinic, and gender and age group as in the “2008 Patient Survey (Ministry of Health, Labour and Welfare)” was used, and its population ratio (estimated population ratio for FY2006) is deemed as the patient probability; the future number of hospitalized patients was estimated by hypothesizing that this probability will be maintained diachronically. Even with regard to outpatients, estimations were made similarly by using the number of estimated patients by hospital and clinic and by gender and age group as in the “FY2008 Patient Survey” (Ministry of Health, Labour and Welfare).

However, since these patient numbers represent the number of patients per day, in order to extend this number to the total number of days in a year, the total number of days of consultation as in “FY2008 Trends in Medical Care Fees/MEDIAS” (Ministry of Health, Labour and Welfare) was multiplied and used as the annual number of patients. When doing so, in the simulation by the National Council on Social Security, although consideration is not given to the type of illness, and the total number of days is calculated evenly, in estimations by prefecture that are targeted in this paper, since it is impossible to ignore

the effect of the differences in illness structure by prefecture on medical care costs, when prorating the total number of days calculated based on the abovementioned MEDIAS by illness, the average number of days of hospitalization by prefecture and by illness type that is obtained from the “FY2008 Patient Survey” (Ministry of Health, Labour and Welfare) is used and allocated.

The above represents a macro estimation of patients, but in order to prorate the estimation to prefectures, data by prefecture is used. The number of patients per day that was estimated above is prorated using information on the estimated number of patients by whether the patient is hospitalized or an outpatient, by gender and age group, and by prefecture (based on the patient’s address) that are also published in the “FY2008 Patient Survey” (Ministry of Health, Labour and Welfare). However, this estimated number of patients by prefecture represents a spreadsheet on whether the patient is hospitalized or an outpatient and on gender and age group, and there is no information by illness or by hospital and clinic, which are included in the national table. With regard to this, the number of estimated patients by prefecture and by hospital and clinic that is included in the Patient Survey is used for prorating.

In order to determine the number of hospitalized patients based on the total number of days by prefecture, the estimated average length of hospital stays by prefecture, by hospital and clinic, and by age group included in the “FY2008 Patient Survey” (Ministry of Health, Labour and Welfare) are used to proportionally prorate the total number of days of consultation in a macro perspective.

With regard to estimation of the number of nursing care service users, after conducting the same kind of macro estimation of the number of users that was conducted for estimating the number of patients, macro estimations and estimations by prefecture were conducted simultaneously without depending on the method of prorating by prefecture, and consistency was maintained by multiplying the estimations uniformly for the entire nation using the error rate of macro estimations and the national tabulated value for the number of users by prefecture as the correction factor. This is because in the data for “FY2008 Survey of Long Term Care Benefit Expenditures” (Ministry of Health, Labour and Welfare) that is used in estimating the number of nursing care service users, there are many cases where the same cross tabulation as the national tabulation is published by prefecture, and there is little necessity to prorate the national estimates once again according to prefecture. However, since the number of people

is published in units of 1,000 people, this yields slight errors with the national tabulations when tabulating according to prefecture. As a result, in order to match the national tabulations, the correction coefficient was multiplied uniformly to each prefecture in the end.

As the concrete estimation procedure, the probability of persons requiring nursing care (requiring support) in each prefecture was first calculated using the number of recognized persons by category of need of nursing care (need of support), by gender and age group, and by prefecture that is included in “FY2008 Survey of Long Term Care Benefit Expenditures” (Ministry of Health, Labour and Welfare), and by crossing this probability with the number of users of various services by category of need of nursing care (need of support), by gender and age group, and by prefecture included in the same survey, nursing care services of a type where one lives in a facility is regarded as the probability of beneficiaries, and estimated by prefecture. Furthermore, from among the recognized persons, those who are not receiving services of a type where one lives in a facility are regarded as persons subject to receiving at-home nursing service care, and for the number of such persons, the proportion of people actually receiving at-home nursing care services is multiplied to determine the actual estimate of the number of users of at-home service care.

By multiplying the number of patients and the number of nursing care services users estimated as described above with the unit price, the annual medical care fees/nursing care fees are determined.

2.3 Setting of the unit price, growth rate, and economic suppositions

2.3.1 Setting of the unit price for healthcare

With regard to the unit price for medical care costs and nursing care costs, a uniform unit price for the entire nation was used, rather than estimating the unit price by prefecture. In establishing the unit price for medical care costs, the simulation by the National Council on Social Security was followed, and the unit price per day by hospitalization or outpatient, by illness type, and by hospital and clinic was estimated using the point table per day included in MEDIAS and “FY2008 Survey of Medical Care Activities in Public Health Insurance” (Ministry of Health, Labour and Welfare).

The unit price for nursing care costs was established using “FY2008 Survey of Long Term Care Benefit Expenditures” (Ministry of Health, Labour and Welfare) and “Report on Long Term Care Insurance Operations (Monthly)” (April

2008) (Ministry of Health, Labour and Welfare). Concretely, the number of beneficiaries that can be obtained from “FY2008 Survey of Long Term Care Benefit Expenditures” (Ministry of Health, Labour and Welfare) is subtracted from the total amount of costs by degree of need of nursing care (need of support) and by service type that can be obtained from “Report on Long Term Care Insurance Operations (Monthly)” to determine the monthly unit price per person.

2.3.2 Setting of the growth rate for the unit price and economic suppositions

Although the growth rate of the unit price is the largest factor that affects the results of future estimations, even with regard to the growth rate, in principle, the method for setting growth rates by the National Council on Social Security was followed. Since the purpose of the simulation by the National Council on Social Security is to look at changes in medical care/nursing care costs that arise based on future reforms of the medical care provision system, multiple scenarios are prepared. In particular, there are 2 scenarios for the medical care provision system, 4 scenarios for economic premises, and 2 scenarios for setting the growth rate of the unit price of medical care costs, representing that estimations for a total of 32 patterns ($4 \times 4 \times 2$) are possible. However, in this paper, since focus is placed on how future differences in medical care/nursing care fees among regions will change in cases where the current medical care provision system is maintained, the method for setting the growth rate was followed for only those deemed as being fundamental cases.

As the method for setting the unit price for medical care fees, “Case (1) for growth rate of the unit price” in the simulation by the National Council on Social Security was used. This is a case that is anticipated when the growth rate of medical care fees per person is specified based on the economic growth rate, based on the results of research by Getzen et al., and concretely, it supposes that the growth rate is determined in accordance with a relational expression of $2.2\% + 0.3335 \times$ economic growth rate (from 5 years prior). The first item of 2.2% in the abovementioned expression incorporates sophistication of medical care technology, etc. and is established by the National Council on Social Security based on the growth rate of past medical care fees and reform rate of remuneration for medical services.

In the simulation by the National Council on Social Security, the growth rate of the unit price for nursing care costs is hypothesized as being determined by the weighted average of the wage

increase rate and inflation rate. Concretely, it is assumed that growth rate is determined based on the following formula:

$$65\% \times \text{wage increase rate} + 35\% \times \text{inflation rate}$$

This reflects that in the structure for nursing care fees, approximately 65% is comprised of labor costs.

Although the growth rate for the unit prices of medical care fees and nursing care fees is determined based on setting the unit prices as above, what becomes necessary here is the wage increase rate and inflation rate. In relation to this, the short-

term and long-term economic suppositions that are used in “FY2009 Financial Verification of Public Pension” related to public pension financing published by the Ministry of Health, Labour and Welfare last year are used (Table 1). “FY2009 Financial Verification” represents official statistics for future estimations of public pension that replaces the past fiscal recalculation system, and as there is a high probability that it will be used in “Estimates on Social Security Benefits and Burdens” in the future as well, the reason why it was used is because there is thought to be a necessity for harmonization.

**Table 1: Economic suppositions (%) in FY2009 Financial Verification
Inflation rate and nominal wage increase rate**

Year	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Percentage Change in Prices	0.3	0.0	1.4	-0.4	0.2	1.4	1.5	1.8	2.2	2.5	1.0
Percentage Change in Nominal Wages	-0.3	-0.3	-0.1	0.1	3.4	2.7	2.8	2.6	2.7	2.8	2.5

Source: the author’s tabulation based on FY2009 Financial Verification of Public Pension”

The macroeconomic growth rate (GDP growth rate) was determined by regarding the real wage increase rate as the real growth rate per person in the labor force. The labor force participation rate used in doing so was the same as the one used in “FY2009 Financial Verification,” and was set in accordance with “case in which participation in the labor market progresses” in “Estimation of Supply and Demand of Labor Force (March 2008)” by the Japan Institute for Labour Policy and Training. In the simulation by the National Council on Social Security, a rate that is obtained by subtracting 0.5% points from the abovementioned nominal wage increase rate is used for the macro economic growth rate.

3. Estimation results of medical care fees and nursing care fees

3.1 Results of macro estimations

The results of estimations based on the abovementioned estimation methods are shown below. However, macro medical care fees/nursing care fees for Japan as a whole, rather than by prefecture, are shown in Table 2. When looking at this table, high growth is indicated for both medical care costs and nursing care costs, but as this growth includes the inflation rate, it is difficult to comprehend their relative scale. Thus, Figure 5 indicates these medical care costs and nursing care costs in terms of the ratio of gross domestic product. As can be seen in Figure 5, the ratio of medical care and nursing care costs in relation to GDP, for which there is only 6.6% points for medical care costs and 1.5%

points for nursing care costs at the latest point in time, will continuously expand up until about 2060, when aging and death of the second baby boomers generation will progress. As hypothesized in the simulation by the National Council on Social Security, estimations in this paper do not presume development and expansion of the medical care provision system; rather, if consideration is given to the fact that such estimations are relatively reserved estimations in cases where the current medical care provision structure is maintained, it can be understood that the forecast is indeed grim.

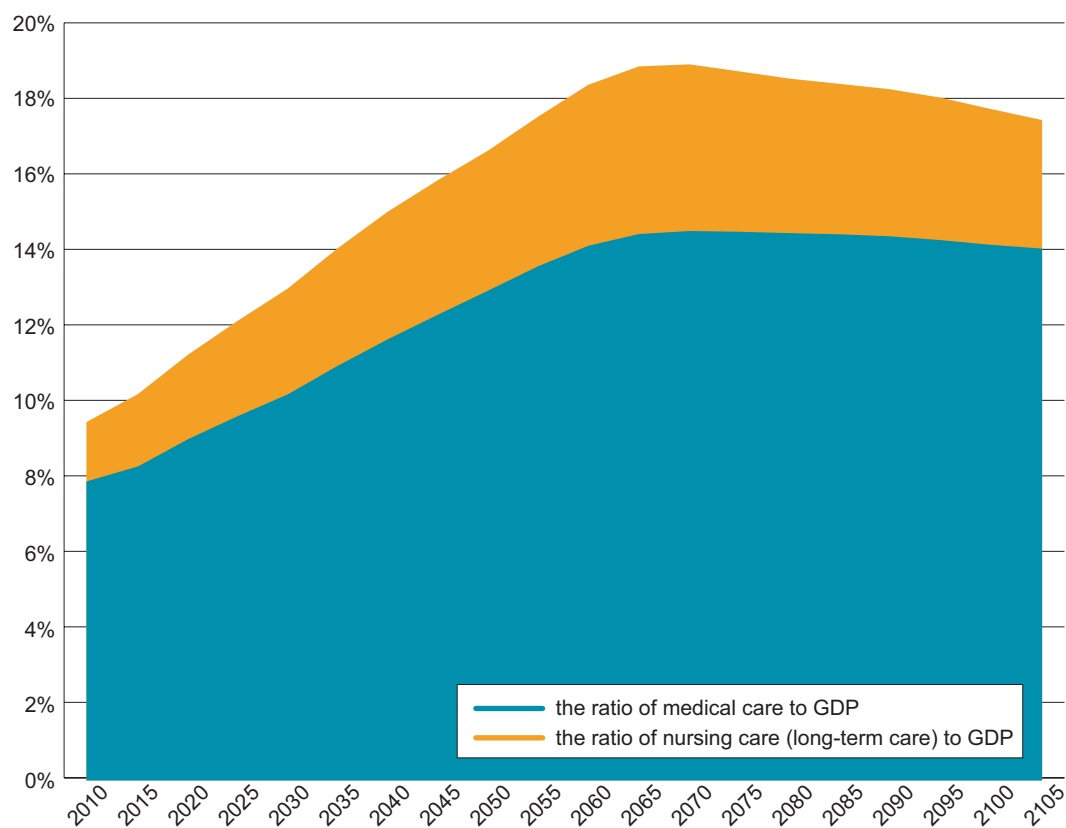
The reason why such a rapid increase in medical care fees is produced is, needless to say, because of the expansion in medical care fees for elderly persons aged 65 years and older. Figure 6 shows the shifts in the ratio of the GDP accounted for by medical care fees for persons aged 65 or 75 and older, and 64 and younger, but as seen in a single glance, medical care fees for elderly persons is a major factor in the future increase of the ratio of medical care fees in relation to GDP. It can be understood that medical care fees for persons 65 and older or 75 and older illustrate nearly the same path as medical care fees for the country as a whole, and account for a large portion of national medical care fees. At the same time, the ratio of medical care fees for the generation of persons aged 64 and younger who are still working illustrates a moderate slope as compared to that of elderly persons, and it is understood that although the impact on macro medical care fees cannot be

Table 2: Estimated values for nominal medical care fees/nursing care fees (trillions of yen)
Medical care fees and nursing care fees

Year	Medical expenditures	Nursing care (Long-term care) expenditures
2010	39.9	8.1
2015	47.5	11.1
2020	57.7	14.5
2025	68.5	18.2
2030	80.0	22.2
2035	92.1	26.4
2040	103.8	30.4
2045	115.5	33.7
2050	128.1	37.0
2055	141.8	41.7
2060	155.4	47.2
2065	166.9	51.7
2070	176.1	53.9
2075	184.7	54.5
2080	194.2	55.4
2085	204.9	57.0
2090	216.3	59.0
2095	227.6	60.6
2100	239.2	61.3
2105	252.1	61.7

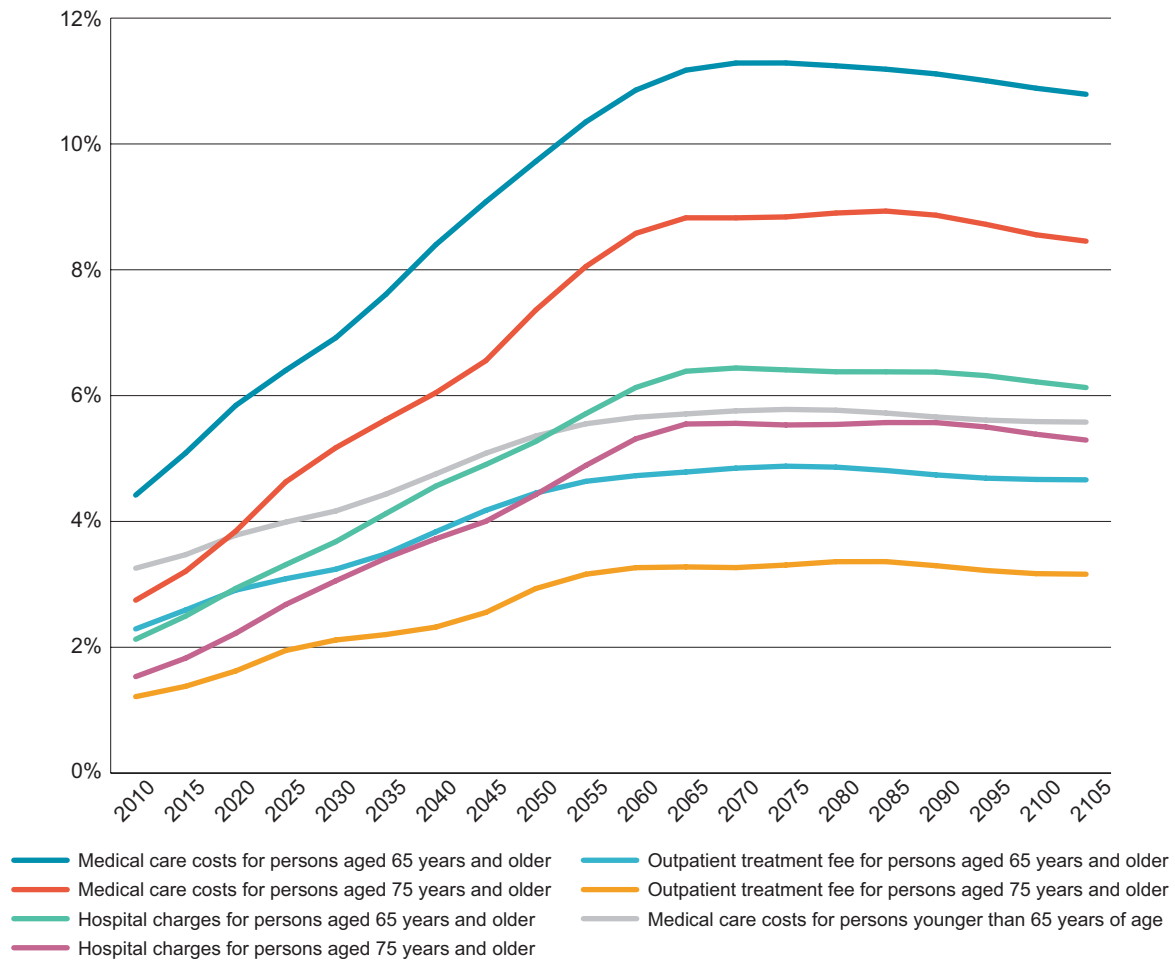
Source: the author's estimation

Figure 5: Long-term estimation of medical care fees and nursing care fees (GDP ratio)



Source: the author's estimation

Figure 6: Shifts in GDP ratio of medical care costs for persons aged 65/75 and older, and 64 and younger



Source: the author's estimation

ignored, the impact is small as compared to the elderly.

3.2 Estimation results by prefecture

Next, estimation results by prefecture are shown. Figure 7 displays estimations of medical care costs by prefecture as of 2005 as well as "FY2005 Estimates of National Medical Care Expenditure" (Ministry of Health, Labour and Welfare) from the same point in time. As it is obvious upon looking at this figure, although there are slight differences, the medical care fees for each prefecture were able to be reproduced in a general manner.

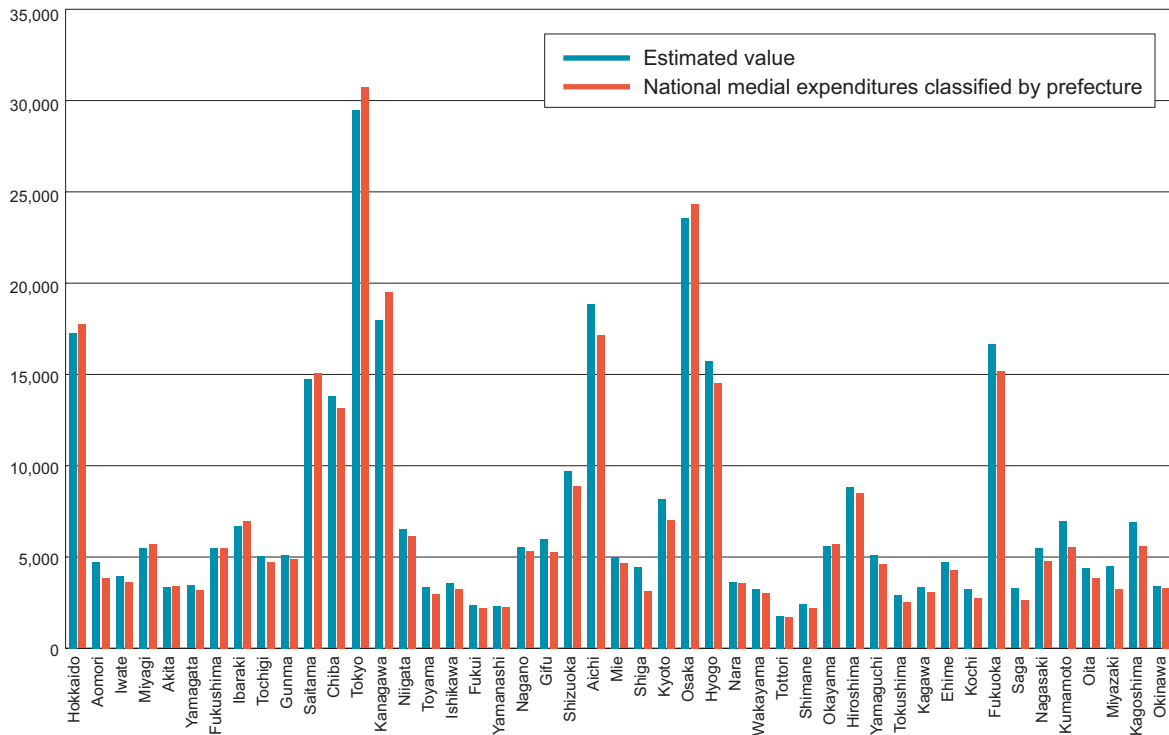
Now, let's take a look at what kind of shifts are illustrated by differences in medical care and nursing care costs by prefecture. Figure 8 demonstrates the approximate percentage of medical care and nursing care costs per prefectural resident in each prefecture in comparison to the average national medical care and nursing care costs per person, or in other words, the future image of

differences in medical care costs and nursing care costs among prefecture.

Since data for 47 prefectures is plotted onto a single sheet, although it is not possible to draw forth the behavior of individual prefectures, when looking at the overall scatter, it can be comprehended that prefectural differences in medical care fees/nursing care fees expand gradually as the years pass. What should be taken note of is that, as shown in Figure 3, in population estimates by prefecture that are used in these estimations, it was forecasted that the aging difference among prefectures converges to a large extent. However, when looking at medical care costs per person that each prefecture should bear, it is interesting that on the contrary, the difference demonstrates a tendency towards moderate expansion.

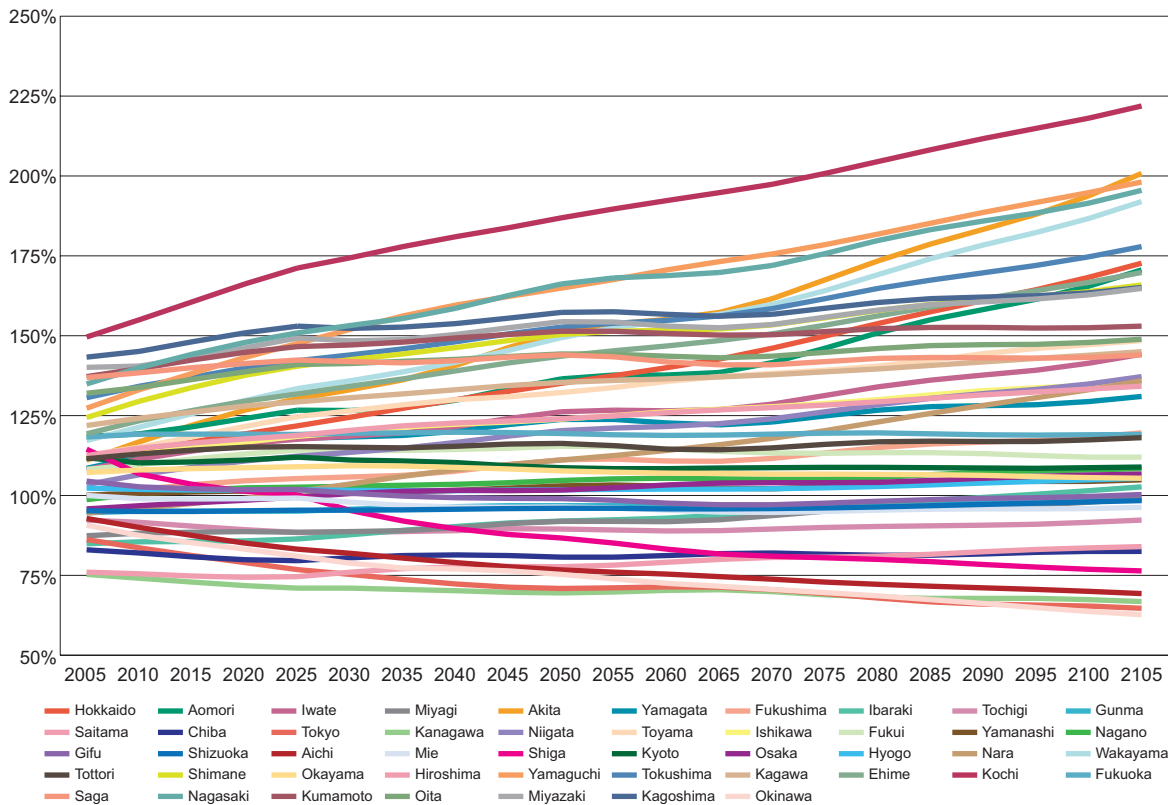
As a factor behind how this came about, the fact that the level of medical care fees/nursing care fees per person for the elderly in particular differ greatly can be considered. Although it cannot be

Figure 7: Estimation of medical care fees by prefecture (2005) and national medical care expenditure by prefecture (2005)



Source: the author's estimation

Figure 8: Ratio of medical care/nursing care costs per prefectural resident by prefecture in relation to the national average medical care/nursing care costs



Source: the author's estimation

ascertained from these estimations as to whether this factor is due to inefficiency on the supply side or overconsumption on the demand side, when a full-fledged aging society is reached in the future with the differences in medical care/nursing care costs that are inherent among each prefecture, even if, for example, the aging difference among prefectures is contracted, it is better to acknowledge that this will not be directly connected to resolving the differences in medical care/nursing care as is.

As mentioned in the beginning, insured persons will be integrated and reorganized by prefecture in the future. Strengthening the financial base of each insured person by expanding the area of insured persons and increasing the number of subscribers is considered as being an orthodox method. However, the estimations here signify that it is possible that we will not be able to overcome the future graying of society simply by strengthening the financial base through expanding the number of subscribers. In such a case, concrete examinations should be initiated on adjustments of financial resources that surpass the frame of prefectures, and on the method for structural adjustment of risks that take into consideration the aging of society and income gaps in particular.

3.3 Shifts in the differences in medical care costs for persons aged 65 and older according to prefecture

According to a newspaper report dated January 12, 2010, the Democratic Party's coalition government fundamentally reexamined the current Early-Stage/Latter-Stage Elderly Healthcare System, and is conducting concrete reviews toward making it mandatory for all elderly persons aged 65 and older to be enrolled in the National Health Insurance. However, even if such persons were to be enrolled in the National Health Insurance, since financial administration views the working generation of persons aged 64 and younger as being differentiated, it can be understood that the "independent method" is to be adopted substantively, from among the ideals for the elderly persons' medical care insurance system that was discussed.

Of course, medical care insurance for only elderly persons literally cannot continue existing independently without enormous burdens of insurance premiums, and although some form of adjustment of financial resources is necessary, the newspaper report states that concrete discussions regarding the method for such adjustments will be initiated in the future.

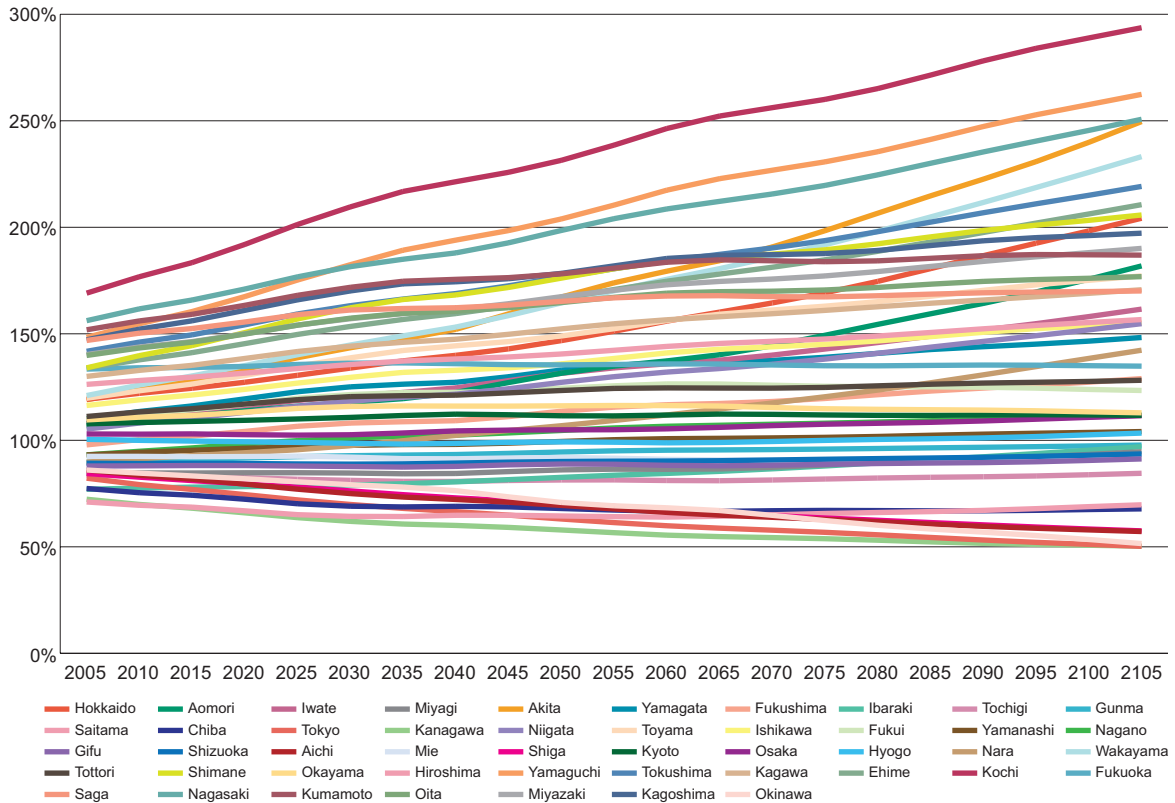
Thus, here, an examination is conducted on

the properties of differences in medical care fees for persons aged 65 and older for each prefecture. Figure 9 shows the shifts in the ratio of medical care fees per prefectural resident for those aged 65 and older in relation to medical care fees per national citizen aged 65 and older. It is evident that the shifts in Figure 9 demonstrate a pattern that is similar to that for differences in medical care fees per person among prefectures shown in Figure 8. Of course, such differences in medical care fees do not exist only for medical care for the elderly. Similarly, Figure 10 shows the medical care fees per prefectural resident and per national citizen for those who are 64 years and younger. It is also evident from this figure that regional differences in medical care costs have an expanding tendency even for persons aged 64 years and younger. However, the extent of this expansion is clearly smaller as compared to medical care fees for those aged 65 and older. In addition, in both cases, it can be read that the same prefectures follow the path of expansion or contraction of differences in medical care fees.

Figure 11 shows the results upon dividing the ratios by prefecture of medical care fees for persons aged 65 and medical care fees for persons aged 64 years and younger by the national average ratio. In other words, this figure forecasts approximately how much each prefecture will spend on medical care for the elderly in comparison to medical care fees for the working generation, and the extent to which this divergence with the national average will shift. It can be understood from this figure that for all prefectures, the proportion of medical care fees for the elderly in relation to medical care fees for the working generation will relatively shift in a stable manner. What can be implied here is that in prefectures with high medical care fees for the elderly, the differences in risks that arise based on age in the age structure is not a factor behind the high fees, but that these prefectures are ones that are saddled with institutional factors that have a possibility of high medical care fees for the elderly. For example, in prefectures such as Kochi prefecture and Fukuoka prefecture, which traditionally have high medical care fees, it is understood that medical care fees for the elderly hover at high levels over long periods of time.

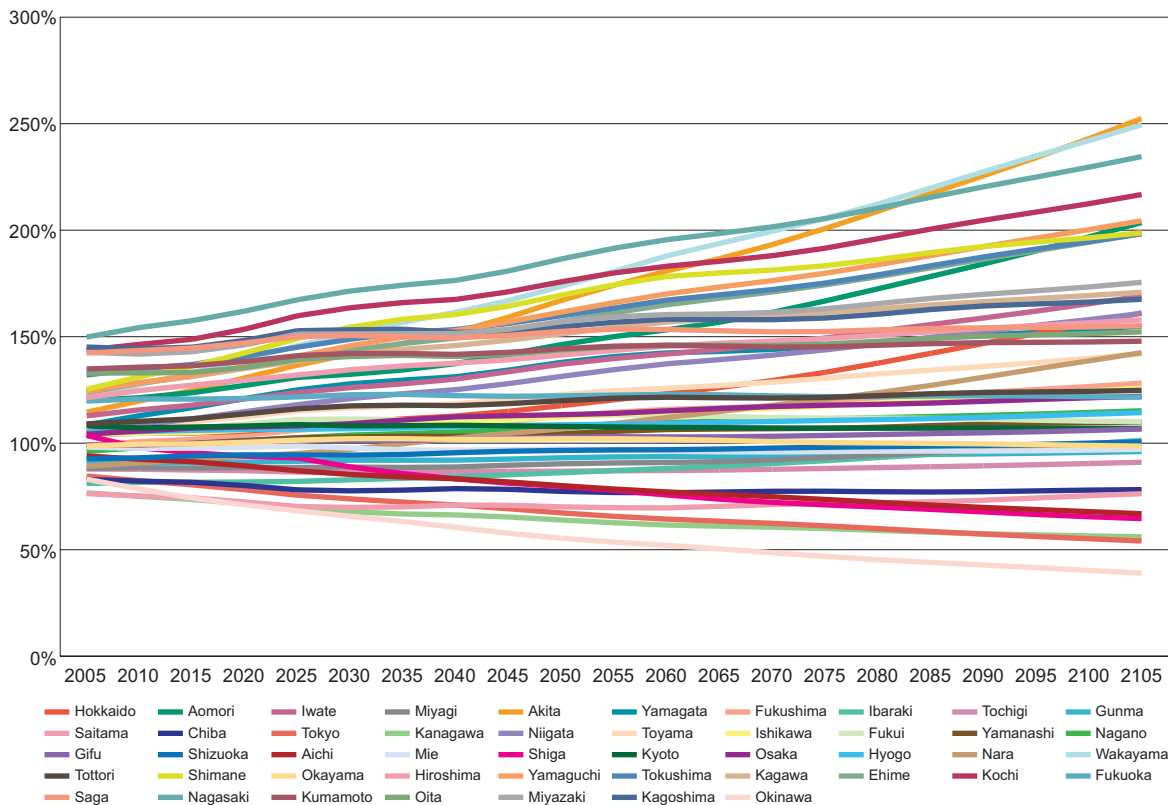
Based on this, what can be said is that even if a system where medical care insurance for the elderly is integrated and managed uniformly in units of prefectures, when a financial resource adjustment system that does not have any incentives in relation to making medical care fees more appropriate for insured persons is constructed, it is possible that such a system would not resolve any

Figure 9: Shifts in the ratio of medical care fees per prefectural resident aged 65 years and older in relation to medical care fees per national resident aged 65 and older



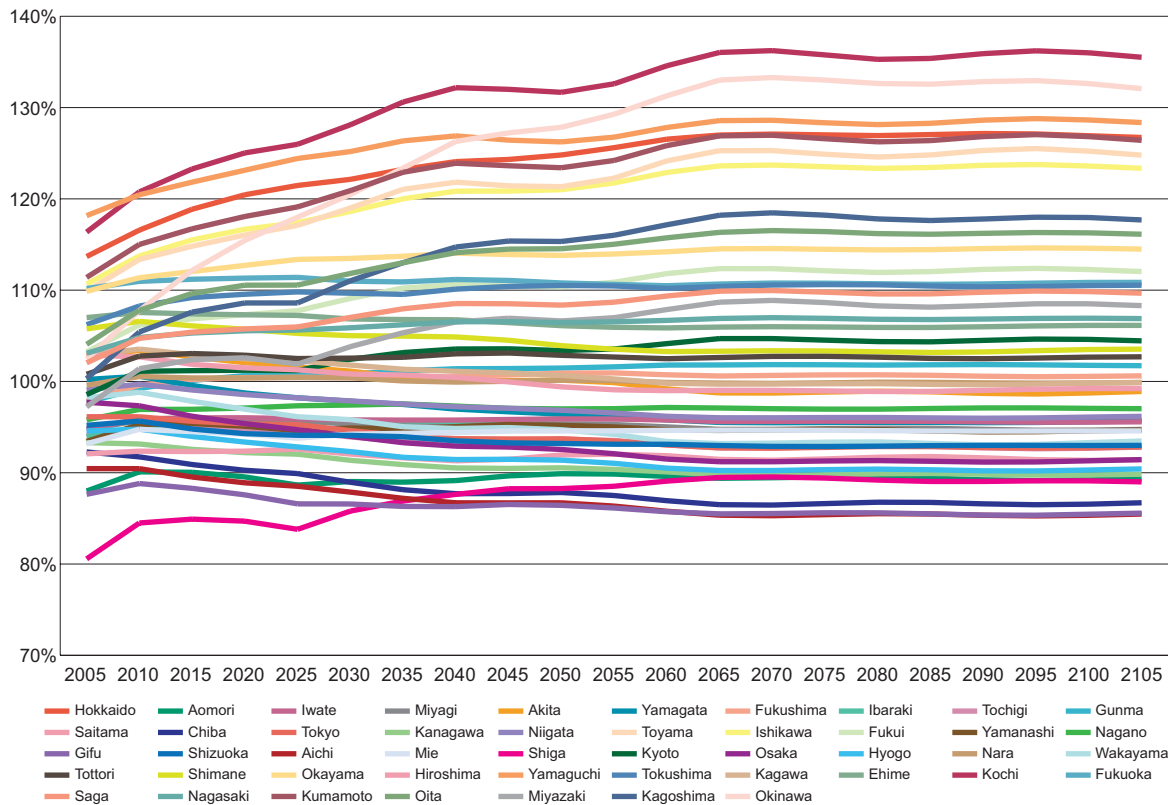
Source: the author's estimation

Figure 10: Shifts in the ratio of medical care fees per prefectural resident aged 64 years and younger in relation to medical care fees per national resident aged 64 and younger



Source: the author's estimation

Figure 11: Comparison of ratios of medical care fees for persons aged 65 years and older and medical care fees for persons aged 64 years and younger, and the national average ratio



Source: the author's estimation

problems. If adjustment and integration of medical care insurance for the elderly are to be promoted, it is necessary for insured persons to make adjustments to differences in financial resources based on risk structure factors that insured persons themselves can do nothing about, such as the age structure and income structure in the jurisdictional area, and, in relation to efforts being made by insured persons themselves to make medical care fees more appropriate, to design a system that takes into full consideration incentives so that such adjustments are reverted back to the insured persons and allowances in terms of financial resources.

4. Conclusion

In this paper, long-term estimations of medical care fees/nursing care fees in Japan were carried out. The purpose of such estimations is to obtain a forecast for medical care fees and nursing care fees even after retirement of the second baby boomers generation, during which the aging of the population structure will become full-fledged, as well as to shed light on issues in reorganizing insured persons in units of prefectures, which will most likely further progress in the future, by carrying

out estimations not only on the national level but in units of prefectures as well.

Thus, in addition to indicating that medical care fees for elderly persons aged 65 years and older are a factor behind the future rise in medical care and nursing care fees in relation to the GDP ratio, it was also demonstrated that the differences in medical care/nursing care fees among prefectures will further expand regardless of the fact that the standards for aging among prefectures will equalize comparatively.

Also, keeping in mind the reorganization of elderly persons aged 65 years and older into national health insurance for each prefecture that was announced by the current coalition government, this paper also includes some speculations regarding what kind of a path future medical care fees for persons 65 years and older by prefecture would take, and what the factors behind such a path would be. As a result, although there is no mistake that the risk factor of the age structure yields differences in medical care fees for persons aged 65 years and older among prefectures, it was indicated that the tendency of high costs that is latent in the medical care system for each prefecture is a factor that produces a continuous

expansion in differences.

Although discussions regarding ideals for adjustment of financial resources including new national health insurance for the elderly will be initiated in the future, the results of analysis in this paper suggest that when conducting such functions, it is recommended to carry out financial resource adjustments based on risk structure factors that insured persons in each prefecture can only be considered as being a given, and then to construct an adjustment method that incorporates incentives for each insured person to launch voluntary movements toward making medical care costs more appropriate.

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Notes

- 1) According to annual estimates on population dynamics, the total special birth rate for the past few years has been hovering at slightly higher than 1.3, exceeding the estimates by the National Institute of Population and Social Security Research (December 2006); this is regarded as being the result of so-called “last-minute births” of the second baby boomers generation.
- 2) As a survey related to international comparisons of medical care expenditures and their determining factors, refer to Gerdtham and Jonsson (2000), which is published in Chapter 1 of Handbook of Health Economics.
- 3) According to Shimazaki (2007), the universal healthcare system in Japan, which is one of the characteristics of the public medical care insurance system, was achieved and maintained based on the foundation of the 2 communities of *kaisha* (companies) and *mura* (regions), that have been in existence in Japanese society for a long time.
- 4) Although long-term estimates on medical care fees/nursing care fees in Japan by economists include Nishimura (1997), Suzuki (2000), Oguro (2006), Iwamoto and Fukui (2009), etc., it is interesting that the advocacy of a funding method in some form or another for the purpose of contracting

the differences in burdens among generations even while aging advances is given as a characteristic that is common to these estimates. On the contrary, this paper differs in that it conducts analysis with a main target on how differences in medical care/nursing care costs among regions should be handled.

- 5) The New Population Projection for Japan (January 2012) was released by National Institute of Population and Social Security Research in January 2012. However, the population projection by prefecture based on this new population projection has not been released yet. Therefore, in this paper, we analyze and estimate the future health care and nursing care (long-term care) expenditures by prefecture based on Population Projection for Japan: 2006–2055 (December 2006) and Population Projection by Prefecture (May 2007). After the new population projection by prefecture is released, we shall perform a new estimation of these expenditures according to that new projection.

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