

Master Thesis

“How Ageing (Demographic change) affects Health care expenditure in Japan?”

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1. Introduction

1.1. Research Question

As society is aging and dependency ratio is increasing, social expenditure including health care and pension will go up. Generally speaking, we can take one of the following options, 1 Accepting the growth in health spending and increase the public spending on health, or 2 Containing the health spending to match the income level. In order to think about the growing health care expenditures, the aim of this thesis is to examine the health spending (How much of health spending will demographic factor expand?) and we will discuss about which direction we should go to.

1.2. Type of health care service

Health care includes the following types; inpatient care, outpatient care, nursing home care and family informal care. These four generally go into two groupings; Acute care (AC) which mainly reflects medical care, and Long-term care (LTC) which mainly reflects nursing care. Broadly speaking inpatient care and outpatient care reflects the AC expenditure, while nursing home care and some of the family informal care reflects the long-term care expenditures. Long-term health care system support some of the family informal care through providing families who need help with at-home care service and care services at facilities. OECD (2006)¹ stated “Individuals need LTC due to disability, chronic condition, trauma, or illness, which limit their ability to carry out basic self care or personal tasks that must be performed every day. Such activities are defined as activities of daily living, ADLs (eating, dressing, bathing, getting in and out of bed, toileting and continence) or instrumental activities of daily living, IADLs (preparing own meals, cleaning, laundry, taking medication, getting to places beyond walking distance, shopping, managing money affairs and using the telephone/Internet). A person is dependent if he or she has limitations in ADLs and IADLs.”

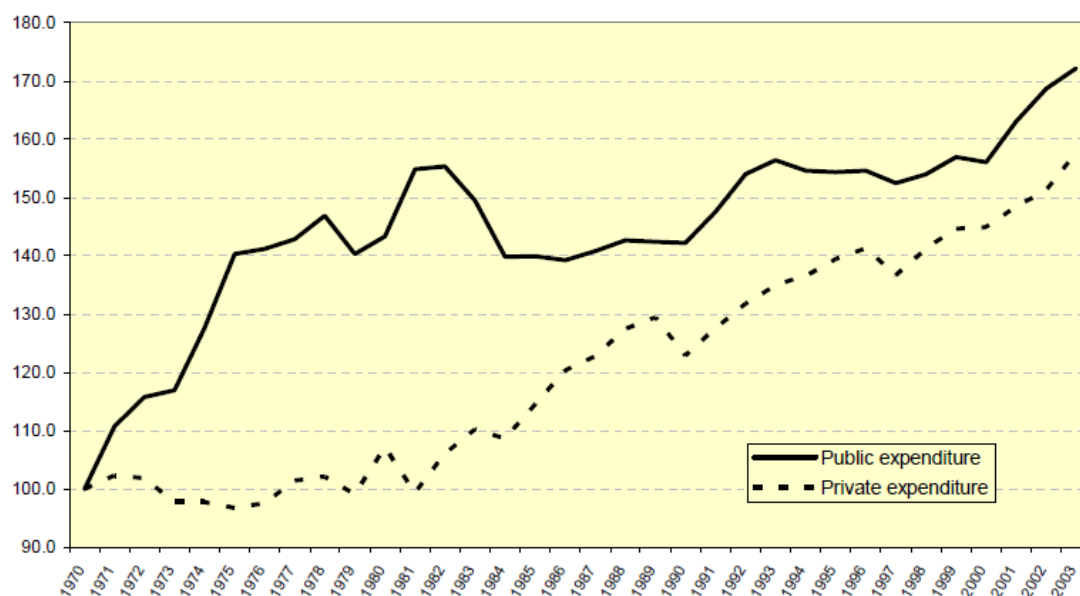
¹ P.18,69 3; 41)

1.3. General framework of this thesis

This thesis consists of nine chapters and the general framework is following. We will first look at the health spending review macro economically and will review major determinants that affect the health spending in Chapter 1. Health care system in Japan will be described in Chapter 2. Demographic change that will occur in Japan (up to 2025) is discussed in Chapter 3. Calculating (forecasting) the health spending in 2025 conditioning there is no change in the current trend and the system will be performed in Chapter 4, 5, and 6. In Chapter 4 AC (Acute care: in this thesis it means medical care provided mainly by clinics or hospitals) spending will be forecasted. In Chapter 5 LTC (Long-Term Care) spending will be forecasted. In Chapter 6 interpretation of our projection result along with comparisons with the government forecast will be made. Suggestions regarding policy implication are described in Chapter 7. Specifically prevention and introduction of funded system will be discussed. The former can be done without any major reform in system and the latter does not harm any public spending. But there is another option of increasing the public spending to health care. To see the probability of taking this option, we will check Japan's health spending compared with other OECD countries in Chapter 8. And finally we will make conclusion remarks in Chapter 9.

1.4. Brief look at the health care expenditure in OECD countries

Figure 1.1 Evolution of public and private OECD health spending ¹
Index 1970 = 100



1. Unweighted average of available OECD countries. As a % of GDP.
Source : OECD Health Database (2005).

Above figure is the Figure 1.1 of OECD (2006). This is the yearly ratio of annual health care spending to GDP and is indexed by 1970=100. Public health spending among OECD countries grew more than the growth of economy in 1970s but this growth has been contained and leveled off since the end of 1970s. Private expenditure took off in 1980s and has been growing steadily.

1.5. Aging society

In Japan ageing of society is progressing very fast. In the latter half of 1990s the proportion of people aged 65 or older became bigger than the share of people aged less than 15 years old and the discrepancy is getting bigger. As a result the number of elderly (65 yrs old or older) is 27,464 thousand and accounts for 21.5% of total population in 2007 in Japan. At the same time the decrease in the number of children is ongoing. TFR (Total Fertility Rate) in 2007 is 1.34 and the total population is expected to go down to 95,152,000 in 2050². Decreasing number of children means that number of people aged between 15 and 65 will be going down in near future. The

² Data is from National Institute of Population and Social Research (<http://www.ipss.go.jp/>)

health care spending is expected to grow with increasing number of elderly people. Life expectancy in Japan has been getting longer every year. Increasing number of people are able to survive into aged 65 or older. The increasing number of people aged 65 and older increases the demands of pension, medicine and nursing. Since social security expenditure accounts for about 25% of general accounting budget this has been a growing concern (in USA more than 50%).

Under the current situation stated above, Basic Policies 2006 incorporated the integrated reform of expenditures and revenues. According to this plan the government will cut the social security costs during 2007-2011 by 1.1 trillion yen in the national budget and by 0.5 trillion yen in the local budget. This budget cut is made by reducing medical price (revision of “payment fee book” (which will be explained in later section)) and by cutting subsidies to the health insurance for small companies or offices employees and by the increase in out-of-pocket payment. However people are worried about these ongoing policies. Is it enough to make the system sustainable? The fact that the government’s cutting cost means that out-of-pocket payment is going up. It is questionable for individual people to bear this increasing burden. Is cutting the health expenditure what we should do? Medicine and nursing are essential service for the people and that is the task what government is supposed to do. Ironically it is the government who is eager to cut the expenditure of social security. As Henke (1992) noted, objectives of health care and health insurance is 1) provision of health care according to the need of the population, independent of income, residence and social status, 2) best quality available for all citizens, 3) a high degree of freedom to choose and personal responsibility by appropriate incentives and 4) cost-minimal production of health services and a development of expenditures that is justifiable from an economic, social and health policy point of view.

Health care expenditure consumed by people aged 65 and older accounts for more than 50% of total health care expenditure and per capita expenditure for elderly is five times as much as that of young people. Therefore it is important to start with calculating how much the change in the shape of population structure affect health care expenditures.

1.6. What is the meaning of the macro analysis and the projection of health care spending?

Macro level analysis using the descriptive data or statistics for applying the health care policy helps to understand the structure and implication of health care policy.

The research of health care expenditure by macro analysis is originated back to Newhouse (1977). He used the data from 13 OECD countries and derived two implications. The first implication is that based on the fact that income elasticity of medical care exceeds one he stated “While the marginal unit of medical care may do little or nothing for mortality and morbidity rates, it may well produce improvements in so-called subjective components of health. Additional resources in ambulatory care may alleviate symptoms (for examples, pain, itching), relieve anxiety, and provide prognostic information. countries that spend more may well buy more caring, but little additional curing”³. The second implication is that based on the fact that R squared of regression analysis of health care expenditure per capita on GDP per capita was more than 90%, he stated⁴ that “the price paid by the patient and the method of reimbursing the physician are not important” and concluded “a wealthier country may desire and be able to pay for more expensive, medical-care system”.

Conditioning that GDP can explain more than 90% of health spending, as Getzen (2000) stated, in order to get the proper long-term projection of health care spending, it is necessary to forecast the level of national income, to make an assessment of the public’s willingness to pay for health care, and to speculate about the future shape and organizational structure of the health care system. Payne (2007) said “The aging of the population is only one driver of health care expenditures, and the effects of the relatively slow pace of demographic change may be overwhelmed by other factors like the introduction of new technologies and treatments”.

It is almost impossible to see what the policy will be, TFR, labor force participation, interest rate, economic growth rate, and so on, all of which are necessary to forecast. We all know that it is

³ Newhouse(1977), P.122

⁴ Newhouse(1977), P.123, P.124

impossible to forecast the future. However it is still helpful for decision makers to have some estimates or forecasted figures for policies making or for conforming public opinion. It is also helpful to assess whether the policy have been effective or not after having been implemented the policy by comparing forecast and what is there. In this thesis we will calculate how it will be the health care expenditures in 2025 taking into account the change in the shape of population structure, given that the health care system is not changed. We chose 2025 because we know the number of people who had been born before 2008 so that population structure in 2025 is not strongly affected by the assumptions of TFR or mortality until 2025. It seems that the only factor which we are able to take into account is demographic factor.

1.7. Factors influencing health spending

In this section, we will talk about important points regarding health care and determinants of health care. If we are allowed to split health spending into two types, one is health care or medical care (We call it, acute-care (AC)) which is for cure, and the other is the long term care (LC) which is for care. Health spending is the addition of AC spending and LTC spending. Some of the factors in this section affect both AC spending and LTC spending while some factors affect either AC or LTC only.

What are the determinants of health spending? OECD (2006)⁵ decomposed growth in public health spending using data between 1981 and 2002 and showed that out of growth rate of 3.6% in health spending among OECD countries, growth in GDP accounts for 2.3%, aging accounts for 0.3% and the residual (technological change or inflation) accounts for 1.0%. But one thing to remember is that aging may not affect the total amount, but it affects the distribution of health care spending among different age groups. Gerdtham and Jönsson (2000) introduced and summarized international variation in health spending and possible relationships between health spending and variety of variables both institutional and non-institutional variables. Researches they summarized

⁵ P.32, "Table 2.1 Decomposing growth in public health spending, 1981-2002"

range from using only OECD countries to the one including non-OECD countries data. Most dominant factor that affects the total health spending is income and the reported elasticity is around one or slightly higher. Population structure (aging), unemployment rate and female labor force participation does not affect as much as income does to health expenditure. According to the analysis conducted by MHWL (Ministry of Health, Welfare and Labor, in Japan)⁶, the growth in health care expenditure is broken into one of the following four categories. The contribution due to the increasing number of elderly people, due to system reforms, due to the regular change in “payment fee book” (refer to Chapter 2) and due to factors not explained by the factors mentioned above. Last one is often called technological change which is an unexplained upward trend by other factors. The demographic factor accounts for 1.8~1.9% and the technological change accounts for 2~3% in the last 15 years.

1.7.1. Income effect

This effect is important for both AC and LTC spending. What is the elasticity of health spending to income? The basic idea behind this is that the variability which is not explained by both GDP growth rate and demographic factors (residuals) is assumed to be the effect of technological change, policy effect and so on. According to OECD (2006) “Income growth is certainly the main non-demographic driver of expenditures, although the vast literature on this topic is still somewhat inconclusive on the effect size of the income elasticity.” And concludes “the most reasonable approach seems to assume unitary income elasticity and, subsequently, to test the sensitivity of the projections to this assumption.” Our projection assumes that income elasticity is one. This assumption seemed to be reasonably appropriate as we can see in the result in chapter 8.

Another important thing we need to take into consideration is inflation. Real expenses should be used instead of nominal expenses. However how can we get the real expenses? The one way to do that is to use the medical care component of the CPI (MCPI) and other medical price indexes⁷. For

⁶ <http://www.mhlw.go.jp/shingi/2006/12/dl/s1227-20b.pdf> (in Japanese)

⁷ Iwamoto (2000) made a good summary about the variety of medical price indexes.

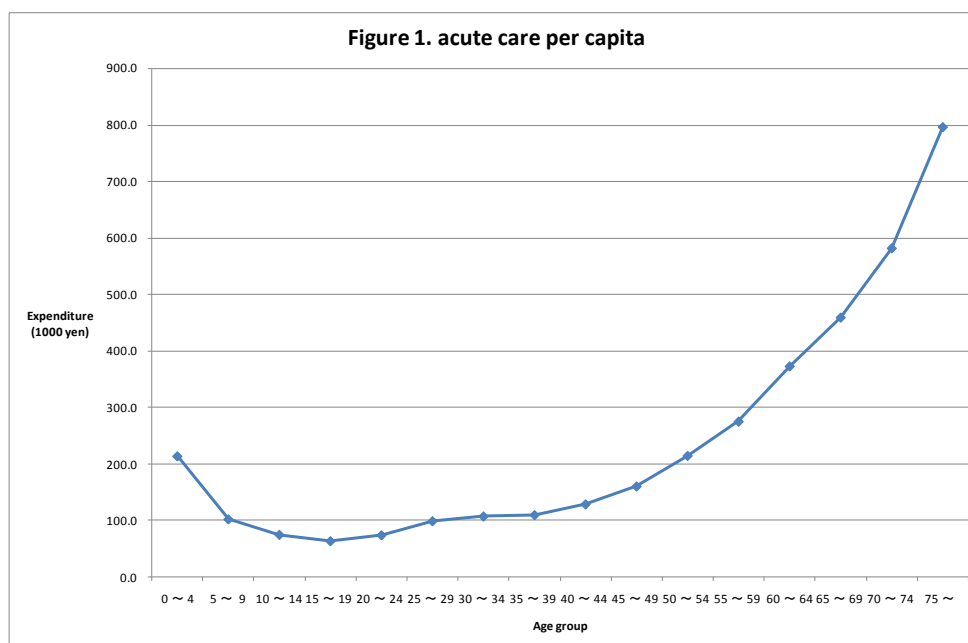
example treatment for heart attacks such as angina and myocardial infarction has been improved and if we want to see that medical cost per episode gets more expensive now than 20 years ago we have to compare these two years by taking account of inflation and holding the quality constant. Using MCPI is called disaggregated approach. This approach is vulnerable to the change in sub-components of MCPI. If the price which has a substantial weight in calculating MCPI goes up greatly, MCPI is going to be distorted. Other difficulty of disaggregated approach is “holding the quality constant” part. Quality in most cases is defined as patient’s health. For example, Lenderking (1994) used quality adjusted life years (QALY) to assess the effectiveness of Zidovudine to AIDS. Besides that we need to take into account opportunity cost. We need to compare how much would be lost by being sick now (not only health care cost but also how much we would have earned if we had not been sick), with how much would have be lost if we had got sick 20 years ago, for example. The evaluation of health is essential to create a sound measure of deflator, which is very difficult. Iwamoto (2000) showed that there were different kinds of medical prices deflators and it was hard to tell which one would be appropriate. As Getzen (2000) stated usage of these indexes fail to improve the accuracy of expenditure forecast.

The other way to do is the usage of percentage share of nominal GDP spent on health as a dependent variable instead of using nominal value. There are two reasons why health spending should be used as the share of GDP. First the health care industry is labor intensive industry. Labor cost tends to go up if the average labor cost in the society goes up. The other reason is that under the current system most of health care spending is financed publicly therefore national budget which is influenced by income level will affect the health care spending.

Health spending expressed as a share of GDP and using it as a dependent variable in the regression analysis can be useful not only to handle the problem of difficulty to forecast the GDP level in 2025 but also the problem of no existence of reliable CPI that can deflate the nominal amount of money to the real one.

1.7.2. Demographic factor

Figure 1 shows that health care expenditure per capita by age group.



Basically health care cost goes up as people get older. As the graph shows that annual money spent on AC per capita is going up as the person gets older. Therefore even if the health care expenditure per capita in each age group is constant in the future, total health care cost is going up when the population structure is aging. This effect is called demographic factor. As we will state in chapter 3, because the proportion of elderly is sure to grow the demographic factor can be one of factors for high growth in total health spending. Iwamoto (2000) observed that the growth rate of health spending for elderly is more than that for young people. If we take that fact into consideration our projected health spending will be higher than otherwise. Felder (2008) analyzed the data between 1997 and 2006 in Swiss insurance and they found no evidence of higher growth rate of health care expenditure in old age groups.

1.7.3. Technological change and other factors that related with increasing health spending

According to OECD (2006)⁸ health spending grew by 3.6% per year between 1981- 2002 and out of which only 0.3% is explained by demographic effects and income effect accounts for 2.3%.

⁸ OECD (2006) P.12

Residual expenditure growth accounts for the rest of 1%. Income effect is dominant but when income goes up, money we can get from insurance premium goes up as well. Therefore the growth of health spending due to income effects could be financed fully or partly. However other factors which may increase the total health spending as well as demographic effect is very important in terms of sustainability of health care system. OECD (2006) stated “What are the factors underlying this residual expenditure growth? The main culprits seem to be technology and relative prices. Indeed, the gains in health status discussed above do not only arise from improvements in lifestyle, but also from advances in medical treatment/technology. The latter, however, do not come free of economic cost. Technological progress could be cost-saving and reduce the relative price of health products and services, but its impact on expenditure will depend on the price elasticity of the demand for health care. If it is high, a fall in prices will induce a more than proportionate rise in demand, increasing expenditures. Even if prices do not fall, new technologies may increase demand by increasing the variety and quality of products.”

Greater insurance coverage is possibly to exacerbate the cost because lowering the out-of-pocket money to get access to new technologies makes many people to use those new technologies. We refer to Folland (2004)⁹ that “current insurance system tends to provide the consumer with incentives such that what is good for an individual is bad for society”

1.7.4. Cost of dying

Cost of dying is the health spending which will be spent in the last year or six months of person’s life. It is easy to designate “the end of life expenditures” retrospectively. These days there are a lot of researches related to the spending of life-long health and have shown the importance of end-of-life health spending. If we look at Payne’s article (2007)¹⁰ there is a figure of the relationship between per capita expenditures and death rate. Cost for decedents is known to be higher than that for survivors. Longevity society development center in Japan (1994) showed that

⁹ Folland (2004) P.247

¹⁰ P.218; Figure 1. Sources: CDC 2006; CMS 2006

spending on health care for the last year of life was 4.1 times larger than that for survivors. In Scitovsky's article (2005), it is shown that total Medicare reimbursements for decedents are 6.2 times as much as that for survivors (\$4,572 per enrollees for decedent vs. \$729).

The definition of cost of dying varies substantially especially in how we can define the end stage of one's life. It could be the period of 6 months before death, one year before death or two years before death. The cause of being into end stage could be "aging" (medical terminology senility) that mostly dealt as the problem for the elderly, "end stage cancer", "AIDS", "neuromuscular disease", etc.

When people's life span gets longer we have three scenarios that could happen which are in line with the context of demographic transition. First is the "Happy aging" scenario. This is what would happen if people's health status improved as they lived longer. In this scenario people gain longer lives by longer healthy life span with shortening unhealthy period. In this case the period of being in need of cure and care gets shorter which could lead to the decrease of health spending. Second is "Postponement" scenario. In this scenario people live longer by increasing healthy life span but nothing changed in end-stage (unhealthy) period. In that case the period of being need of health care service remains unchanged which means no change in health spending. Final scenario is "Unhappy aging" scenario. In this scenario people live longer but only periods of exacerbating health status gets longer and healthy life span remains the same. The health care cost of the last scenario increases. The definition of healthy state and non-healthy state (morbidity) is rather complicated. The level of ADL, self-reported health status or being chronically ill could be used as a measurement of non-healthy state.

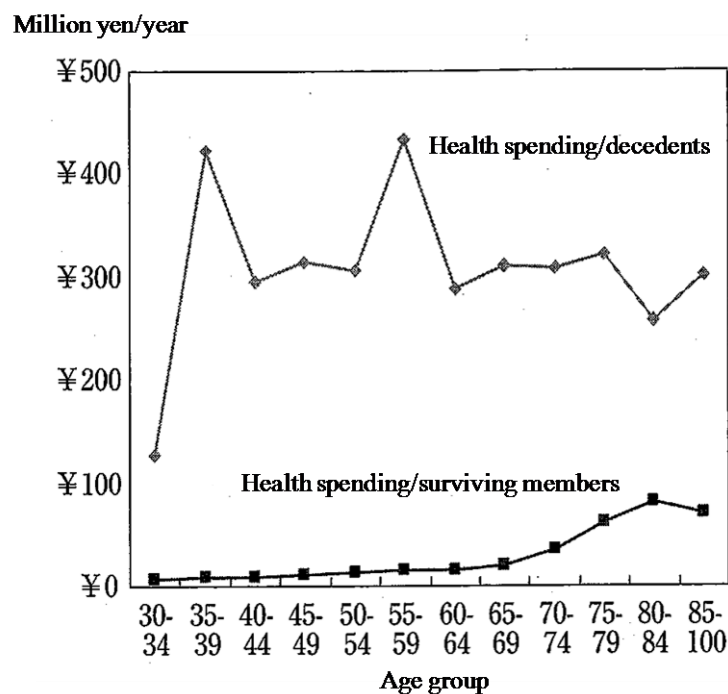
Which scenarios would be correct? According to Payne (2007)¹¹, the evidence concerning recent trends in morbidity is quite consistent with "Happy Aging". In many developed countries, most measures of morbidity among the elderly have declined in recent years". However these are the result of the mixture effect of the prevalence of chronic diseases, severity of these diseases and

¹¹ P.221

levels of disability, and it would not be easy to conclude which scenario might be plausible in our current settings.

However calculating the TOTAL health spending by taking into account cost of dying and survivors cost does not change the result much. Let's see how much difference it would make between if we did take into account cost of dying and if we did not.

Konno (2005) showed using insurer's data that expenditures consumed by last year of decedents is 27.9 times as large as that of survivors for the whole age group average, and 5.3 times as large in group aged 70 or older. He compared the cost of dying among different age groups (30-34, 35-39, 40-44, ..., 85-100; age groups under the age of 30 was not included because of sample size problem) and cost of dying was seemed to be similar in all age groups. If life expectancy gets longer it is just the cost of dying is moving into the later stage of life.



For the sake of simplicity, we have two age groups, young and old.

Suppose that survivors cost remain the same as years go by. If we denote real (not nominal) survivors cost per person as CS_{young} for young group, CS_{old} for elderly group, real cost of dying per person as CD for young and elderly, number of people in the young group as N_{young} ,

number of people in the elderly group as N_{old} , and number of people dying in the year as a for young and b for elderly.

Group	Num of Survivor	Num of Death	Population
YOUNG	$N_{young} - a$	a	N_{young}
OLD	$N_{old} - b$	b	N_{old}

Total cost needed for health care in the year t is

$$X = CS_{young} * (N_{young} - a) + CS_{old} * (N_{old} - b) + CD * (a + b)$$

If young people who would have died in the year t can survive in the year t+a, life table in the year t+a will be

Group	Num of Survivor	Num of Death	Population
YOUNG	$N_{young} - a + c$	$a - c$	N_{young}
OLD	$N_{old} - b$	$b + c$	$N_{old} + c$

if increasing longevity means that more individuals “exit” an age group by living a bit longer into an older group (rather than “exit” by dying).

The total cost X' will be

$$\begin{aligned} X' &= CS_{young} * (N_{young} - a + c) + CS_{old} * (N_{old} - b) + CD * (a - c) + CD * (b + c) \\ &= CS_{young} * (N_{young} - a + c) + CS_{old} * (N_{old} - b) + CD * (a + b) \\ &= X + CS_{young} * c \end{aligned}$$

If we do not take into account cost of dying, total cost Y in the year t

$$\begin{aligned} Y &= \frac{CS_{young} * (N_{young} - a) + CD * a}{N_{young}} * N_{young} + \frac{CS_{old} * (N_{old} - b) + CD * b}{N_{old}} * N_{old} \\ &= X \end{aligned}$$

If we calculate the expenditure in year t+a using the health care expenditure data of the year t, the total cost Y' will be

$$\begin{aligned}
Y' &= \frac{CS_{young} * (N_{young} - a) + CD * a}{N_{young}} * N_{young} + \frac{CS_{old} * (N_{old} - b) + CD * b}{N_{old}} * (N_{old} + c) \\
&= X + H_{old} * c \\
&= X' + c * (H_{old} - CS_{young})
\end{aligned}$$

where $H_{old} = \frac{CS_{old} * (N_{old} - b) + CD * b}{N_{old}}$ (average health care expenditure in the old group).

If we ignore “cost of dying” effect, the difference will be $c * (H_{old} - CS_{young})$.

This difference is due to the change in mortality rate in both young group and elderly group. But 79% of death (=467,155 / 592,784) happened for male aged 65 or older and 89% (=456,511 / 515,550) for female in 2007. The mortality in young people will not be expected to change in absolute number up to 2025 so that c would be small. Therefore taking into account cost of dying will not make a big difference from doing otherwise ($X' \approx Y'$). This is mainly because we assume that income and other influential factors are expected to shift both type of expenditure (cost of dying and cost of survivors) at the same rate.

1.7.5. Formal care / Informal care ratio to LTC expenditures

OECD (2006) says “The main non-demographic driver of LTC expenditure is related to the relative shares of informal and formal care and their evolution over time. While the bulk of LTC is provided informally throughout the OECD area, it is relatively more important in southern European or lower income countries. As labor force participation is projected to increase in the future, concerns are expressed that informal care will have to be substituted by more expensive formal care, adding to the fiscal burden alongside the projected graying of the population.” The ratio of formal care to informal care is an important factor for LTC spending. Both formal care and informal care have strengths and weaknesses. Formal care is best way to provide professional and instrumental care while informal care is suited for emotional care.

There is a study about Japanese people’s attitudes towards formal and informal care (Ishikawa (2005)). In this study 1,059 young-old people 60 through 74, who were not in need of care, were

chosen in Chino city, Nagano prefecture, in the middle of mainland Japan and 810 out of 1,059 were interviewed. The results showed that respondents prefer formal care for professional or instrumental needs but they prefer informal care for emotional and autonomous care needs. But two-third of the respondents still thinks that their children have to take care of their parents in need of physical care. There seems to have a gap between ideal balance of formal/informal care and social norm. We are still looking at the appropriate formal / informal care combination.

1.8. What kind of health care framework induces cost containment?

In OECD working paper (1994), Gerdtham, Jönsson, Mac-Farlan and Oxley (GJMO) used 1970-1991 panel data from OECD health data and ran regression analyses of health spending on health care system, outpatient expenditure, inpatient expenditure, medication cost and so on. The results of GJMO concluded the following.

- “The use of primary care "gatekeepers" seems to result in lower overall expenditure through their impact on in-patient spending.”
- “Lower levels of overall, ambulatory, and pharmaceutical spending appear to occur in systems where the patient first pays the provider and then seeks reimbursement.”
- “The way of remunerating physicians in the ambulatory care sector appears to influence health expenditure. Capitation systems tend to lead to lower overall expenditure on average than fee-for-service systems, through their impact on in-patient care and pharmaceutical expenditure. In the ambulatory care equation, the terms representing payment by capitation and by wage and salary were combined in order to avoid multi collinearity. This combined term then appeared to have a significant negative effect on ambulatory spending. Taken separately, wage and salary payments in ambulatory care seem to be associated with significantly lower in-patient spending, but this variable was not significant (although negative) in the total spending model.”
- “There are indications that in-patient care is more expensive than ambulatory care. The

share of in-patient spending to total spending is positively related to overall expenditure. A higher inpatient share is also associated with lower ambulatory care expenditure per capita, and higher in-patient spending per capita. The elasticity on the in-patient share term in the in-patient spending model is higher than zero, suggesting some substitution between in-patient and other forms of care.”

- “Public sector provision of health services (proxied by the share of public beds to total beds) is associated with lower overall health expenditure, through its (negative) impact on in-patient and ambulatory care expenditure.”
- “The total supply of doctors may be having a positive effect on ambulatory spending and, at the level of total and in-patient care spending; this also appeared to be the case for countries where doctors practice under fee-for-service arrangements.”

What is worth trying introducing to Japanese system among which stated above is “gate keeper” system. Japan seems to be the only country which increased the number of hospital beds in 1980s while rest of major OECD countries decreased the number of beds and were trying to divide health care into cure and care. The number of hospital beds was 14.0 per 1000 population in Japan in 2006 while 8.3 in Germany, 3.6 in UK, and 3.2 in USA¹². If gate keeper had a great impact on inpatient expenditure, the introduction of it might have a great impact financially. However free-access system is one of the characteristics of Japan and it would not be easy to introduce it in a political sense.

Factors which have contribution to long-term forecast national care spending are only income and health system structure (Getzen(2004)). In this respect health care system change is an important factor in the long run. However system structure could not be a dominant factor because the influence of income is large (In OECD (2006) 64% (=2.3% / 3.6%). In Newhouse 90% (=R²)).

¹² OECD Health data (2008)

2. Health care system in Japan

2.1. Acute care (AC) system¹³

Japan has Universal Health Insurance System. This system was established in 1961 by enforcing every Japanese citizen to join health insurance programs. Roughly there are two types of insurance. One is “Employees’ Health Insurance” (EHI) program. This is the insurance program for working people. The Employees’ Health Insurance Act mandates that organizations with five or more employees participate in this program. Upon joining an organization, the employees and their families of government, private sectors and public organizations automatically join the program. The employer and the employee pay about 50% each of the insurance premiums to health insurance unions they are in. The other is “National Health Insurance” (NHI) which is an insurance system that covers self-employed persons, farmers, and others who are not insured by other insurance programs. Since 1961 people who are not members of health insurance union have been required to join this program. This makes the foundation of social security system.

About 63 % of the population is covered by EHI. Amount of premiums is approximately 8.5% of their salary. The rest of 37 % of the population is covered by NHI. Premiums for people covered by NHI depend on income and assets of the previous year. Under this system Japanese citizens can seek care and get health care service at anytime and anyplace. We can choose which facility (public/private, clinic/hospital) we would like to get services from because both hospitals and clinics treat outpatients.

As described by the OECD, "combines a mainly private provision of services with mandatory health insurance. Service providers are paid directly by insurers (the third payer system). Only 19.3% of the total medical institutions including hospitals and clinics are public. About 70.3% of hospitals or clinics are private, physician-owned, while 19.3% is public.¹⁴ But since private services play main role in providing health care, medical facilities are concentrated on urban area

¹³ Some of the explanation of Japanese health care system (in English) refers to Hirose (2003)

¹⁴ The data is from annual report of medical facilities (2009) from MHWL (Ministry of Health, Welfare and Labor)

(in Japanese: 医療施設(動態)調査・病院報告)

both qualitatively and quantitatively. There exists the disparity between urban and rural area which is also a big problem in Japan.

Payments for outpatient care are on a fee for service basis, and inpatient care is paid through a mixture of fixed-fee payment system (DRG) and fee-for-service. Medical payment fee is determined by MHWL (Ministry of Health, Welfare and Labor in Japan) and is revised every two years. Payment fee for the examination or the procedure can be found in “payment fee book” which has over 2000 pages. For example suppose a patient goes to a hospital and is examined. The hospital calculates how much of medical care they gave to this patient according to this “payment fee book”. This is the total cost. This patient pays the 30% of the total cost to the hospital on site and hospital invoices the insurer the rest of 70%. We are still looking for the ideal combination of fee-for-service and fixed-fee payment systems.

Imai (2002)¹⁵ explains, "Another characteristic of the Japanese system is a conspicuous lack of differentiation and standardization. First, the fee for a given service is identical across service providers and does not recognize the difference in quality. Second, general practice medicine is not clearly established as a separate discipline, so that specialist doctors are not differentiated from general practitioners. Virtually all doctors in private clinics try to deal with all the problems of their patients."

To deal with the situation of world’s most aging population “Long term care insurance” has been introduced since 2000.

2.2. Long-term care (LTC) system

The LTC insurance program was introduced in 2000 in Japan to facilitate a system for supporting those who needed long-term cares. This insurance is funded half by government’s subsidy and half by insurance premium paid by individuals aged 40 or older. Every citizen aged 40 or older has to pay the premium to the local government (insurer). This program covers nursing

¹⁵ OECD report Health Care Reform in Japan

home care or at home care. This program is intended to people aged 65 or older but this program is also available for individual between 40 and 65 who needs care.

Individual aged 40 or older has to pay the insurance premium for the insurer. The insurers for the LTC insurance programs are local municipalities. When an insurer wants to use the LTC insurance, the insurer has to turn in LTC service application to the municipality. This application will be processed by the LTC approval board. This board will decide the user's care level based on investigation of the insurers' mental and physical status. Once the insurer gets a certificate of his/her care level, care service will begin. His/her care level will be re-assessed every six months. His/her care level decides what and how many services the insurer can get. The user pays 10% of the total cost of the services covered by the insurance. The insurer (local municipalities) pays the rest of 90%. Payment for the services can also be found in "payment fee book" for LTC insurance. The system is to be reviewed every five years and the government implemented the first review in 2006. As is said in Chapter 1, formal / informal care is very important. Availability of care givers, especially future supply of informal care (un-paid) by children, and how it affects to labor force participation under this current socio-demographic trend is the concern for most of aging countries. There seems to be no service in our LTC insurance system to focus on informal family care. Care givers of informal family care are calling for, for example, capital benefits or in-kind benefits not only for insured persons but also for care givers, all of which is on-going discussion about the system reform.

3. Demographic changes up to 2025

Total population will be 121,567,000 in 2025. Among them people aged between 0 and 14 accounts for 11.5%, people aged between 15 and 64 accounts for 58.6% and people aged 65 or older accounts for 29.9%. The old dependency ratio will be 0.51 in 2025 which is jump from 0.31 in 2005 (66.1 % of total is working age and 20.2% is elderly). Considering that work force participation was 60.4% in 2006 and assuming that this level remains the same in 2025,

dependency ratio may be higher if effective number of workers is used in the calculation instead. TFR is estimated in 2025 between 1.04 (pessimistic scenario) and 1.5 (optimistic scenario) but still far below the replacement level of 2.1.

According to “the Projection of Social Security Benefits and Burdens” (MHWL (2002))¹⁶, the social security benefit (pension + health spending (acute + long-term care)) will be 31.6% of national income in 2025, which is a great challenge. But since then cost-containment policy have been implemented and “the Projection of Social Security Benefits and Burdens” (MHWL (2006))¹⁷ shows that the social security benefit will be only 26.1% which is different from the estimated figure in 2002. This projection takes into account reform in social security systems but the policy that can make it possible is so drastic that questions whether or not the people of Japan would like to make it happen.

4. Projection of AC expenditure in 2025

4.1. Brief overview of health care expenditure

In Japan total health care expenditure¹⁸ was around 3.3% GDP at the beginning of 1970s and it grew rapidly at the beginning of 1970s but from the latter half of 1970s to the first half of 1980s the growth rate of health care was contained to be as same as the rate of economic growth. In the latter half of 1980s the share of health spending to GDP went down a bit because of high economic growth rate due to the bubble economy. However in 1990s health care expenditure increased in faster pace than economic growth due to rapid aging and so on. Since 2000 when LTC insurance program was introduced, the growth rate for the health care expenditure (AC) has been mild. According to OECD (2006)¹⁹, health care spending (AC spending) in % GDP in 2005 is

¹⁶ <http://www.mhlw.go.jp/houdou/2002/05/h0515-1.html>

¹⁷ <http://www.mhlw.go.jp/houdou/2006/05/dl/h0526-3a.pdf>

¹⁸ This is the estimated cost which needs to be paid for medical care in one fiscal year. This health care expenditure includes not only payment covered by the public insurance but also industrial injury insurances and the payment not covered by the public insurance (out-of-pocket payment). It is not possible to break this spending into public and private in easy way so in the following discussion these figures are considered to be “Public Health expenditure” in OECD (2006).

¹⁹ P.31, Table 1.1 Public health and long-term care spending

5.7% in OECD average, 6.2% in Canada, 7.0% in France, 7.8% in Germany, 6.0% in Italy, 6.1% in UK, 6.3% in USA and 6.0% in Japan.

4.2. Which factors should be taken into account in AC spending forecast?

Income effect is the most dominant factor and it would be reasonable to assume that income elasticity is one according to the previous researches. Therefore our dependent (response) variable will be AC expenditure as the share of GDP per capita. By doing this we would be able to handle the problem of MCPI and we do not need to estimate the nominal health spending and nominal GDP in 2025 separately as governments forecast (2008) did.

Health care cost goes up as people get older. We will take into account the demographic change. Other important factor is technological change. It is not easy to decide how we can reflect the technological change in our model. But as evidence has shown, technological change has increased the health care expenditure. Therefore in our model we put linear effect of calendar year in our model to reflect the technological change. We cannot test the linearity of technological change to AC spending because of limited data availability. Less than ten years have passed since the introduction of LTC insurance and the data available which enables us to get AC and LTC spending separately covers only 7 year span.

Cost for decedents is known to be higher than that for survivors. But we put one variable to describe technological change which means cost of dying and cost of survivors change at the same rate. Under this condition NOT taking account of cost of dying does not influence much on total health spending as was discussed in Chapter 1. Therefore cost of dying will not explicitly put in our model.

4.3. Data

Annual report of health care expenditure is published from MHWL. From this report the amount of money consumed per individual in each age category can be obtained. The extract of data for

2006 will be shown as an example below.

Age group	Health care cost		
	Total	(billion yen)	per capita (thousand yen)
0 ~ 4	1170.6	4%	212.7
5 ~ 9	599.7	2%	101.2
10 ~ 14	443.1	1%	73.8
15 ~ 19	401.2	1%	62.5
20 ~ 24	533.6	2%	73.0
25 ~ 29	784.8	2%	97.9
30 ~ 34	1024.6	3%	106.3
35 ~ 39	1008.3	3%	108.7
40 ~ 44	1019.4	3%	127.7
45 ~ 49	1226.1	4%	159.4
50 ~ 54	1797.3	5%	213.5
55 ~ 59	2967.3	9%	274.1
60 ~ 64	3028.3	9%	371.9
65 ~ 69	3493	11%	458.2
70 ~ 74	3956.7	12%	580.7
75 ~	9673.5	29%	795.1
Sum	33127.6	100%	259.3

In this data people aged 75 or older can form only one category which can tell nothing in detail about this age group. The health care expenditure by age group from 2000 to 2006 fiscal year will be used in this thesis because LTC insurance program was introduced in April 2000 (fiscal year 2000) so that the data for health care expenditure before 2000 included LTC. That is why the data before 2000 will not be used in this thesis.

Expected 2025 population data which is going to be used for our calculation both in AC projection and LTC projection is the data from UN.

4.4. Method (model) for AC forecast

Our projection of AC expenditure in year 2025 is as follows. First we will estimate the coefficient of formula (4.1). (4.1) means that log of AC expenditure in the age group i in the year t as a share of GDP will be explained by age effect and fiscal year effect.

Let us denote that

- Nominal Acute care expenditure per capita of the age group i in the year t : A_{it}

- Nominal GDP per capita in year t : $GDPc_t$
- Dummy variable. 1 if the dependent variable is in the age group i , 0 if not: X_i
- Year (this variable handles the technological change and the regular reform in system (“payment fee book” revision)): T

The model will be

$$\begin{aligned} \log(A_{it} / GDPc_t) &= \alpha_0 + \alpha_{1i} * X_i + \alpha_2 * T + e_{it} \\ e_{it} &\sim N(0, \sigma^2) \end{aligned} \quad (4.1)$$

After estimating coefficients by solving (4.1) with OLS we will calculate the AC spending as a share of GDP in 2025 by using the formula (4.2).

Let us denote

- Number of people in the age group i in the year 2025 : n_i
- Total acute care expenditure in the year 2025 : $A_{2025} = \sum_i \hat{A}_{i2025} * n_i$

The projection of acute care in 2025 ($= A_{2025}$) will be

$$\begin{aligned} E\left(\frac{A_{2025}}{GDPc_{2025}}\right) &= \frac{A_{2025}}{N(= \sum n_i)} / GDPc_{2025} \\ &= \sum \left(\hat{A}_{i2025} / GDPc_{2025} * \left(\frac{n_i}{N}\right) \right) \\ &= \sum \left(\exp(\hat{\alpha}_0 + \hat{\alpha}_{1i} * X_i + \hat{\alpha}_2 * 2025) * \left(\frac{n_i}{N}\right) \right) \end{aligned} \quad (4.2)$$

4.5. Projection for AC in 2025

First by using the data of 2000 – 2006 the analysis based on the model (4.1) was conducted. The result was

$$\begin{aligned}
E\left(\log\left(\frac{A_t}{GDPc_t}\right)\right) = & -3.5416 + 0.0010 * year \\
& -1.4921 * X_0 - 2.1009 * X_5 - 2.4325 * X_{10} - 2.5691 * X_{15} - 2.3818 * X_{20} \\
& -2.1463 * X_{25} - 2.0517 * X_{30} - 1.9731 * X_{35} - 1.8454 * X_{40} \\
& -1.6313 * X_{45} - 1.3557 * X_{50} - 1.1103 * X_{55} - 0.86 * X_{60} \\
& -0.581 * X_{65} - 0.3008 * X_{70}
\end{aligned}$$

where the age group 75 years old or older ($= X_{75}$) is the reference category. R^2 is 99.7%. The effect of calendar year was estimated to be 0.0010. The period between 2000 and 2006 was the period that the government implemented the cost containment policy so that this calendar year effect reflected the effect of technological change under the period of cost containment. This means that technological change under the implementation of cost containment policy could increase AC spending by 1% of GDP in 10 years ($\text{Exp}(0.0010*10) = 1.01$).

Using these estimated coefficient and population data of 2025, the AC in 2025 was projected as 8.3794%.

5. Projection of LTC expenditure in 2025

5.1. Which factors should be taken into account in LTC spending forecast?

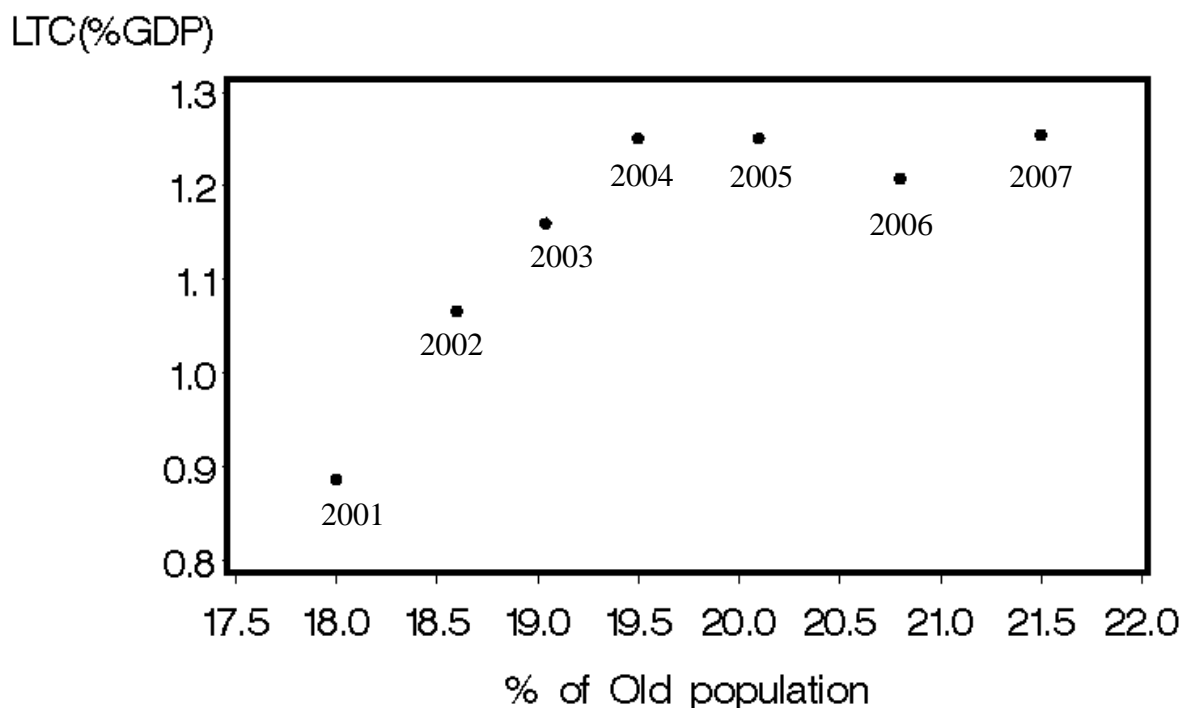
What factors determine the total LTC expenditure?

First of all is an income effect. Since we forecasted AC expenditure as the percentage of GDP, we need to forecast LTC expenditure as the percentage of GDP for comparability as well. And demographic effect is important as well. Since LTC are the mixture of nursing care and informal family care, this ratio will affect LTC expenditure substantially. However there is a lack of data in the current and ideal formal / informal care ratio, this factor cannot be included in our model.

Is technological change influential on LTC as much as it is on AC? LTC insurance was introduced in 2000 and we have annual benefits data of LTC between 2001 and 2007.

The figure drawn below is the plot of LTC spending as percentages of GDP per capita on Y axis by the proportion of people aged 65 or older. LTC spending gets bigger as the percentage of old

people increases. This trend seems to have a structural change between 2005 and 2006 when there was a major reform in LTC insurance program. There seems to be no trend by looking at the graph that the growth of LTC spending is more than the growth of aging. The number of observations is only 7 and we could say nothing conclusive about the existence of technological change which is usually explained by the residual after controlling other important factors such as income, demographic factor (aging), system reform and so on.



In our projection of forecasting the LTC as the percentage of GDP we will consider only demographic factor and will not take account of formal/ informal care ratio which we cannot get the whole picture.

5.2. Data

From MHWL, monthly report of LTC service²⁰ is published. This report gives us the number of people who get service from LTC insurance program and how much benefits spent on service. The data extracted from the report for April 2008 is shown below as an example.

²⁰ LTC Benefit survey conducted by MHWL (in Japanese: 介護給付費実態調査)

Care grade for LTC insurance program is from support service care grade 1 and 2, and care grade 0, 1, 2, 3, 4, and 5. The number of grade level is 8 in total. Support service is for primary prevention before being in need of LTC while the usual care service is for the individual who is in need of LTC.

The number of people who got LTC services (by 5 year age group)

2008, Apr
unit: thousand

	Total number	Support service		Care service					
		Grade 1	Grade 2	Grade 0	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5
Total	3 688.8	336.9	430.9	2.4	624.6	711.5	643.6	524.0	414.8
40~64	129.9	5.3	14.3	0.5	19.6	32.5	25.1	17.1	15.5
65~69	155.4	12.3	19.5	0.1	23.9	35.0	28.5	20.0	16.2
70~74	324.4	33.8	42.9	0.1	53.0	66.6	55.0	41.1	31.8
75~79	595.7	73.4	83.2	0.3	105.1	112.2	94.7	71.4	55.3
80~84	869.9	105.9	119.5	0.5	162.2	159.4	137.0	104.2	81.2
85~89	850.0	75.9	99.1	0.5	155.5	161.9	147.2	118.2	91.7
90~94	543.9	26.3	43.4	0.3	83.5	106.7	108.9	98.0	77.0
95~	219.6	4.1	8.9	0.1	21.8	37.3	47.2	54.1	46.1

Expenditure per recipient by groups of care level

2008, Apr
(unit: thousand yen)

Support service			Care service						
Subtotal	Grade1	Grade2	Subtotal	Grade0	Grade1	Grade2	Grade3	Grade4	Grade5
39.3	28.3	48.1	179.1	28.5	97.7	133.8	192.3	240.9	281.3

One thing good about using monthly data is that the person who used LTC insurance is counted only once. Annual data counts the same person twice if he/she used the insurance twice.

One drawback of using this report is that it does not include the cost to buy welfare tools such as wheelchairs, walkers or canes, and the costs for making home improvement (renovations). Ninety percent of these costs are also subsidized by the local municipalities but the data is not aggregated in national level and gaining these data needs asking each municipality (1,781 municipalities; 783 cities, 805 towns and 193 villages as of January 1st, 2009) for the data which is extremely difficult. This data is purely reflecting the fee for service which is controlled by the government through the revision of “payment fee book of LTC”.

There was a reform in system in April 2006 in which the classification of care grade has changed (some care levels have broken into two categories and other grades have been introduced). In our analysis the data after April 2006 will be included. Also annual GDP data is available until 2007

(data for 2008 is not available because fiscal year in Japan starts in April). Therefore monthly data from May 2006 to March 2008 is included in our analysis and yearly change (in acute care case this variable seizes on technological change or revision of payment fee table) will not be considered because it is hard to see the annual trend from two year data and according to 5.1 we don't have any evidence to support the existence of annual trend in LTC spending.

5.3. Method (model) for LTC forecast

As stated in the section of AC, projection of LTC will be done as the % share in GDP.

The amount of money (service) from the long-term care insurance in Japan is determined by the level of disability, in other words care grades. Once care grade has decided the amount and the kind of services the user get will be determined. Therefore the question will be “How much the change in population structure (the number of old people goes up) will affect the distribution of care level?”

Our projection precedes two steps. First using 2025 population structure data we will estimate the number of people who need care by care grade groupings. Second using the estimated number of people by care grades we will estimate the total LTC spending.

Before we proceed to projection part we need estimate the coefficients which we use in our calculation of forecast (formula from nominal LTC spending to LTC spending as the percentage of GDP, and formula which describes the relationship between age and care grade distribution).

Let us denote

- expenditure per person with the care grade j in month m in the year t : l_{jmt}
- Nominal GDP per capita in the year t : $GDPc_t$

$$pLc_{jt} = Mean(l_{jmt} / GDPc_t) \quad (5.1)$$

pLc_{jt} is the monthly expenditure per “person who gets services” as percentage of annual GDP “per one population”. It does not make a meaning but it works as an intermediate variable which is

needed in projecting 2025 LTC expenditures.

Let us denote

- Number of population in the age group i in the year t : n_{it}
- Number of people in the care grade j in age group i in month m : m_{ijm}
- Number of people in the care grade j in month m : $M_{jm} = \sum_i m_{ijm}$

The distribution of care level will be calculated by the following model using coefficient γ_i

$$m_{ijm} = \gamma_i * n_{it} + error \quad (5.2)$$

The monthly average of the number of people who need grade j care in 2025 will be

$$\hat{M}_j = M_{j,2025} = \sum_i m_{ij,2025} = \sum_i \gamma_i * n_{i,2025} \quad (5.3)$$

After estimating \hat{M}_j , we are able to estimate the annual LTC expenditure of the care grade j in 2025, \hat{L}_{j2025} by calculating

12 * (monthly number of persons who are in care grade j)

*($p\hat{L}c_{j2025}$ *GDPc (= monthly expected LTC expenditure per person with the care grade j))

Therefore the projection of LTC in 2025 will be (L_{2025} : Total LTC expenditure in the year 2025)

$$\begin{aligned} E\left(\frac{L_{2025}}{GDP_{2025}}\right) &= (L_{2025} / N) / (GDP_{2025} / N) \\ &= L_{2025} / N / GDPc_{2025} \\ &= 1 / N * \sum_j (\hat{L}_{j2025} / GDPc) \\ &= 1 / N * \sum_j (p\hat{L}c_{j2025} * \hat{M}_j * 12) \end{aligned} \quad (5.4)$$

“12*” in (5.4) is to calculate the annual LTC expenditure from monthly LTC expenditure.

5.4. Projection for LTC in 2025

First by using the data of monthly data in fiscal year 2006 and 2007, the pLc_j in model (5.1) was calculated. As we can see in (5.1), the calculation of pLc_j is monthly LTC expenditure per person with the care grade j divided by annual nominal GDP per capita. pLc_j does not have a special meaning but functions as an intermediate variable, which is going to be used (5.4). Table of expected pLc_j (mean of 23 observations) is shown below.

Care grade	Support 1	Support 2	Care 0	Care 1	Care 2	Care 3	Care 4	Care 5
n	23	23	23	23	23	23	23	23
pLc(mean)	0.0069058	0.01163	0.0091775	0.02258	0.033137	0.046947	0.058938	0.068541

Second the number of people in each care grade was estimated by (5.2) and (5.3).

【Prevalence of becoming in need of LTC insurance by age group】

Care grade	Support 1	Support 2	Care 0	Care 1	Care 2	Care 3	Care 4	Care 5
40-64	0.0001	0.0002	0.0001	0.0006	0.0007	0.0005	0.0004	0.0004
65-69	0.0013	0.0018	0.0006	0.0043	0.0043	0.0035	0.0026	0.0022
70-74	0.0040	0.0046	0.0019	0.0109	0.0093	0.0076	0.0060	0.0048
75-79	0.0106	0.0107	0.0049	0.0252	0.0191	0.0159	0.0126	0.0101
80-84	0.0216	0.0220	0.0098	0.0538	0.0389	0.0330	0.0264	0.0211
85-89	0.0284	0.0333	0.0128	0.0925	0.0735	0.0657	0.0556	0.0444
90-	0.0190	0.0293	0.0088	0.1041	0.1097	0.1165	0.1187	0.0997

Using these estimated coefficient and population data of 2025, the LTC spending in 2025 was projected as 2.3588%.

6. Interpretation of the projection of health spending

6.1. The result of our projection

If we see AC as public expenditure as we mentioned in Chapter 4, total health expenditure will be $8.38\% + 2.36\% = 10.74\%$ of GDP.

Let us remind again that we need to see this result with precaution because the data for AC includes out-of-pocket payment. Current law requires that the new drug (medicine) has to be reviewed before it becomes prescribable based on the data of Japanese patients. Review of new drug takes long and we have a social problem called “Drug Lag” which means that some drugs which are widely used in USA and major European countries are not covered in health care insurance in Japan. There are some drugs especially in anti-cancer field, which should have been covered in health care insurance but cannot be used in health care setting now. AC expenditure includes out-of-pocket payment but some part of out-of-pocket payment is the payment for drugs which are under the reviewing process. This should have been covered. They will be covered in the near future because they are widely used drugs in North America and European countries. That is part of the reason why we treated this AC expenditure data as “Public health spending” thought this includes out-of-pocket payment.

If we take account of out-of-pocket payment, LTC expenditure will be 2.62% ($=2.3588 \times 100/90$), because data for LTC is only benefits from public and generally speaking 90% of the total cost is paid by the insurers. Total health care expenditure as a % share of GDP (defined by AC+LTC) will be $8.38 + 2.62 = 11\%$.

6.2. Comparison with government forecast

In October 2008, Japanese government announced an official outlook of health care related expenditures in 2025²¹. There are four scenarios for their projections. One is the mechanical projection which is similar to which was just done in this thesis based on the scenario which assumes no big reform in system and no change in the current trend (Scenario A), and the other three scenarios are future expenditure estimates based on three different scenarios of reforming the system (scenario Bs). The latter reforming scenarios are for having an outlook on how much would be needed in 2025 if we could reform the current system to the one with more tender care

²¹<http://www.kantei.go.jp/jp/singi/syakaihosyoukokuminkaigi/kaisai/service/dai08/08gijisidai.html>

nursing and decreasing the length of hospitalization period by concentration and more appropriate allocation of resources. Approximately, 9.7~10.4% of GDP will be expected to be needed in Scenario A which is similar to our forecasting result. Budget increase for Scenario A (mostly due to demographic change) is the worth 2~3% value added taxes.

Reforming the system in accordance with scenarios Bs needs about 12% of GDP. Scenarios Bs are broken into B1 to B3 depending on how much reform would be done. This extra needed budget is worth 3~4 % value added tax. Current level of value added taxes is 5% in Japan so that these relatively idealistic situations can be achievable by raise in tax rate from 5% to 9%. Better provision of health care which can handle demographic change as well, is still within our reach. But increasing tax will impose our economy the excess burden and it might be necessary to go up to more than 9%.

One more thing about this reform is that how we can get manpower. Health care sector is a heavily labor intensive and even if we had money it would not guarantee that we could obtain enough manpower. In scenario of B3, 21.6% increase in number of medical or nursing staff is assumed. Obtaining 21.6% more workforces from other sectors of industries is not an easy task. It might be that increase in wages would be necessary. In that sense those figures we have shown (11% or 12%) would be the minimum level of estimates to make the health care system more ideal.

7. What can we do to sustain the current level of expenditure?

Our projection and government estimates are consistent that 11 to 12 % of GDP will be needed for our health care system in 2025. Health care expenditures are related with demographic factor, the structure of disease prevalence, technology, economic situations including national incomes and the framework of health care system. Eleven percent of GDP cannot be something that questions on our financial sustainability of our system. But our calculation assumes the system and the current trend are not changed. The people do not seem to be happy about the current trend

of our system reform (ex. Increase in out-of-pocket payment as we mentioned in chapter 1). We are in need of reform and improvement in our system which is not just cutting budget or increasing the out-of-pocket payment.

Financially it could be called sustainable only when the revenue is bigger than the cost. As we have seen the healthcare cost would be sure to increase, our choice is either accepting this increase, or trying to maintain the health care spending in a certain range of share in GDP by means of either decreasing the cost (ex. “prevention”. But prevention does not always have an effect to decrease the cost) or increasing the revenue from other sources of finance (ex. “Introducing reserve fund system”).

7.1. Prevention

Prevention is to decrease the number of people being ill in health care sense but prevention has a broader meaning than that. The similar concept is health promotion. To achieve healthy lifestyles play an important role and it is related to well-being so that this is sometimes set as a political goal. For example, in 1990 US (United States) Department of Health and Human Services announced “Healthy People 2000: national health promotion and disease prevention objectives” which states the goals to be achieved up to 2000 in US. Prevention is classified into three groupings. One is primary prevention which includes immunizations, healthy diet, exercise, stress free, sleep and rest, no smoking and so on. This primary prevention covers the installation of societal infrastructure such as water fluoridation, clean air and water, the use of seat belts, and the elimination of domestic violence. Secondary prevention focuses on the early detection of diseases and their prompt startup of treatment. Examples are mammography for breast cancer, regular checkup of blood pressure, cholesterol for arteriosclerotic diseases and so on. Tertiary prevention includes rehabilitation of the individual after trauma or after an episode of disease. This concept (tertiary prevention) is not concordant with the public awareness of prevention. The scope of prevention is limitless and is influenced by economic and political climate of the society. From

cost containment point of view it is not clear that prevention could cut cost of health care. For example, dying by traffic accident costs less than dying by heart attack (bypass surgery costs much). But prevention could be an efficient way to achieve well-being for less cost.

What kind of disease today do Japanese people suffer from? We do not have the incidence data of disease. Only prefecture of Osaka provides us with the incidence data. It is only prefecture out of 47 in Japan. In exchange let us look at the mortality data in Japan. Top three now are cancer, stroke and cardiovascular disease. All of them are chronic diseases and are related with aging in some parts. But still it is meaningful to prevent us from being diseased or from being advanced stage of the disease because we all know that early detection can save costs in a lot of cases in cancer, for example. The other aspect of top three, especially stroke and cardiovascular disease is that they are related to obesity. Number of people with BMI more than 25 is increasing²² from 19.5% in 1980 to 23.9% in 2000. Again healthy life style plays an role.

Preventing from being disease makes it possible to work longer which leads to dependency ratio going down and improving the social security equilibrium²³. The situation where older workers should leave the unemployment for young people to get employment has changed as decrease of young people both in proportion and in number, and as decreasing total population is expected to come soon.

One characteristic which differ health care from pension is uncertainty of the consequences of service. Pension system has a clear cut relationship between contribution and benefit. Benefit in health care is to lighten the huge cost that would have had to be paid if being diseased. Even if we perform the best level health care and precaution we will have a risk of being diseased. Whether a person gets diseased or not, is beyond his/her responsibility. So in that sense we could not and should not raise the co-payment for person who becomes a disease which is related with bad habit (ex. Overeating, overdrinking), for example diabetes or obesity. However at least “a person who has not attended the annual check-ups before being chronically ill would be penalized by paying

²² Henke, Schreyögg (2004) , P.21, Table 2.2

²³ <http://news.issa.int/newsletter/read/c87addf3763e767b0960cfabb999b573/2173>

more out of pocket” could be a policy option like UK or Germany.

7.2. Fund system for health care

In Japan health care system is universal health insurance. The basic idea of insurance program is disperse the risk of equally individuals. But the older we get, the higher the risk of being diseased. From this point of view health insurance is the redistribution of money from young to elderly. Insurance, as is provided through the pooling of risk, does not seem to be fitted well in health care because there are people with different risks in one group. Since health care system has an aspect of intergenerational re-distribution of wealth so that government social security program might fit well. However cost of dying dominates the health spending and if we control the cost of dying we will not expect the big difference in health care cost among different age groups (see figure in 1.7.4.). In this respect insurance type system is not exactly fitted in health care. Besides what is good for having the insurance system is that people can see the connection between contributions and benefits, and can share the sense of mutual dependence by consisting one insurance group.

One way to supplement the finance is by way of tax. But tax system tends to reach the problem of allocation. If we look at the waiting times for surgery²⁴ 38% of UK citizens waited more than 3 months in 2001, 27% in Canada, while in USA only 5%.

The other way to handle this situation is having the reserve fund. What kind of fund system will be usable? For example, medical saving account in Singapore could be an option. Singapore is one of the countries to believe that familial support of the elderly is ideal like a lot of current politicians in Japan do. Singapore is developing a delicate mix to enhance levels of familial support while at the same time ensuring individual preparation for old age. Medical saving account is for the latter. If we saved at least certain amount of money in the medical saving account, we would be able to lighten the financial burden of pay-as-you-go part of the system. In pension, reserve fund system was introduced in Sweden with the mixture of pay-as-you-go system

²⁴ Folland (2004) p.500: Table 21-8

called NDC (Notional Defined Contribution system). NDC accounts for 16% out of 18.5% contribution rate which is for social insurance. Funded part of pension system accounts for the rest of only 2.5%. What characterizes the pension system in Sweden is that pay-as-you-go part of the pension system has the clear relationship between contributions and benefits for one thing, and it has the auto balance mechanism which makes the system financially sustainable for the other. The major part of the system is not funded system but pay-as-you-go which may imply that there is a hint to apply for health care insurance which is also a pay-as-you-go system. Is the former characteristic of Swedish pension system applicable to health care? The tight connection between contributions and benefits would not be obtained in health care settings easily because health care is to the risk of being diseased or to the risk of being in need of care while pension is for everyday life. Besides, in health care benefits is not money but are given in kind and there is always health care providers between the money we have paid and the service we get, which blurs the benefits/contributions relationship. But it is still worth looking carefully at funded part of the system because it is more robust in demographic change than pay-as-you-go. Suzuki (2008)²⁵ used the Monte Carlo Simulation to see the sustainability of health care system in case we introduced reserve fund system. According to his calculation the health care system is financially sustainable at least until 2105. Economic growth is the bottle neck of pay-as-you-go system because it is the intergeneration transfer of money. Fund system only works if it has the decent interest from the capital market. In Swedish pension system pay-as-you-go accounts for 85% and the rest of 15% is from funded system. Both pay-as-you-go and fund system have strengths and weaknesses and mixture of two would be better to reduce the risk.

The problem of fund system is that it has the problem of double burden which cannot obtain support when they are introducing. This type of reform always has had a resistance in democracy. Any type of reform would be fine if this was supported by the public.

What we really should learn from Sweden is that the process of how they reformed their pension

²⁵ <http://www.ier.hit-u.ac.jp/pie/stage2/Japanese/discussionpaper/dp2008/dp378/text.pdf>
(in Japanese)

system in 1990s. They set up the working group on pensions in 1991, announced the draft in 1992, and they got agreement in favor of the new system in five parties out of seven parties in the parliament which accounts for 85%. There seemed to be very clear direction to the reform and everyone in the parliament was clever enough not to make this a political issue. Fund system can be one option in health care with the mixture of pay-as-you-go system. But to make this happen, we need public support toward the reform and the keyword for political sustainability is “fair”.

8. Is health spending in Japan expensive?

8.1. Health spending comparison among OECD countries: Where is Japan?

We would like to see whether health care expenditure in Japan is higher or lower among OECD countries. We want to control the effect of aging so that we put “age dependency ratio” as one of explanatory variables. Our health care system is financed on pay-as-you-go system like most developed countries, which means retired elderly people are supported by tax or insurance premiums of current working tax-paying population. The system will be under the burden when young working supportive population shrinks in comparison with the elderly dependent population. That is why in this analysis we use “age dependency ratio”.

OECD health data from 1980 to 2006 was used for our analysis.

We estimated the health spending by random effect model. Country specific effect is explained by random effect. Random effects explain country’s characteristics; health care systems, health policy, public willingness to pay on health care and so on. Let’s denote health spending of country c in the year t : H_{ct} , GDP per capita of country c in the year t : GDP_{ct} , Age dependency ratio (Number of people aged 65 or older in country c in the year t divided by number of people between 15-64): Age_{ct} , and dummy variables (=1 when year t , and 0 if not): $year_dummy$. We are not treating year as continuous variable (linear or quadratic form) because we are not sure about the existence of linear relationship between year and health care costs in this period. Our data set is a size of 27 years * 30 countries = 810 observations including missing values but is big

enough to treat year as dummy.

The model is as follows.

$$\log(H_{ct}) = \beta_0 + \beta_1 * \log(GDP_{ct}) + \beta_2 * \log(Age_{ct}) + \sum_k \beta_{3k} * year_dummy + v_c + \varepsilon_{ct}$$

$$v_c \sim N(0, \sigma_v^2)$$

$$\varepsilon_{ct} \sim N(0, \sigma_\varepsilon^2)$$

v_c : random effect (country's specific effect which distributes around 0)

ε_{ct} : error term

Estimated variance of random effects (countries) will see the cross-country disparities. That is cross-country differences in the share of GDP devoted to health-care expenditure.

We could have used the fixed-effect model. In general fixed-effect model is suited in situation where the objective of analysis is the comparison between any two levels. On the other hand, using the random-effect model means that each countries level is the random sample of general public and best suited where the interest is lay more on the size of variability among countries, not on cross country comparison. Our analysis situation is not exactly the cross-country comparison but how each country position in relation to the OECD average. In a sense we are interested in both cross country comparison and the size of country variation. Using fixed model would be more suited to our analysis situation. However running the fixed-effect regression model did not change the result of random-effect model. Using random-effect means that country-specific effect assumes to be distributed normal and the fact that the result from random-effect and the one from fixed-effect are similar, suggests that whether or not this assumption is true would not be taken seriously.

Therefore only the result of random-effect model will be shown. The estimate of random-effect as well as the variance will be estimated. Ratio to OECD average is calculated by $Exp(v_c)$. Variance of random effect comparing with the variance of errors will show the size of difference among countries, in other words, the difference in the attitude towards willingness to pay for health care.

The result was as follows

Fixed effect			Random effect		
Variable	coefficient	se	Country	coefficient	ratio to OECD average
Intercept	-3.485	0.327	Australia	0.045	1.046
log(GDP)	1.017	0.031	Austria	0.101	1.106
log(dependency ratio)	0.283	0.042	Belgium	0.037	1.037
1980	-0.255	0.047	Canada	0.227	1.254
1981	-0.234	0.045	Czech Republic	-0.173	0.841
1982	-0.222	0.044	Denmark	0.122	1.130
1983	-0.218	0.042	Finland	0.005	1.005
1984	-0.244	0.041	France	0.192	1.212
1985	-0.252	0.039	Germany	0.213	1.237
1986	-0.235	0.038	Greece	-0.027	0.973
1987	-0.223	0.036	Hungary	-0.047	0.954
1988	-0.211	0.035	Iceland	0.157	1.170
1989	-0.207	0.033	Ireland	-0.008	0.992
1990	-0.198	0.031	Italy	-0.034	0.967
1991	-0.153	0.031	Japan	-0.049	0.952
1992	-0.119	0.030	Korea	-0.305	0.737
1993	-0.105	0.029	Luxembourg	-0.222	0.801
1994	-0.110	0.028	Mexico	-0.016	0.984
1995	-0.116	0.027	Netherlands	0.118	1.125
1996	-0.111	0.026	New Zealand	-0.025	0.975
1997	-0.117	0.025	Norway	0.026	1.026
1998	-0.110	0.025	Poland	-0.229	0.795
1999	-0.091	0.024	Portugal	-0.033	0.968
2000	-0.101	0.023	Slovak Republic	-0.213	0.808
2001	-0.063	0.023	Spain	-0.110	0.896
2002	-0.030	0.022	Sweden	0.063	1.065
2003	0.005	0.022	Switzerland	0.187	1.205
2004	0.013	0.022	Turkey	-0.370	0.691
2005	0.019	0.022	United Kingdom	-0.149	0.862
2006	Ref.		United States	0.518	1.678

Effect of GDP is dominant compared with other variables. Income elasticity was estimated to be unity. Health spending is expected to go up by 2.8% when age dependency ratio goes up by 10%.

Estimates of random effect were shown in table below. $\hat{\sigma}_v^2 = 0.03365$ and $\hat{\sigma}_\varepsilon^2 = 0.006685$. Variability among countries is far bigger than year to year variation (within country variation). Looking at the random effects we could see the country's characteristics. For example, in United States their willingness to pay on health care is 68% higher ($\exp(0.5178) = 1.678$) than average, in Canada 25% more ($\exp(0.2266) = 1.254$), in Sweden 7% higher ($\exp(0.06314) = 1.065$), while in UK 14% less ($\exp(-0.1489) = 0.862$), and in Japan 5% lower ($\exp(-0.0487) = 0.952$). Countries

like USA and Canada tend to spend health care more than average health spending predicted by income and demographic factor. On the contrary countries like UK and Japan consume less than average OECD.

We have been implementing cost containment policy for a couple of years in Japan. However the meaning of cost containment policy gets questionable because we spent less on health care than OECD average. We could have had an option to implement the policy of paying more on health care considering the fact that Japan's health spending is 5% less than OECD countries.

What would 5% less mean? Is it because health care spending has been efficient? Or is it because the system has not provided us with necessary health care services? Current situations in Japan described in the next section would support the idea that we could and should have spent more on health care.

8.2. Current situations in Japan: AC and LTC

8.2.1. AC (Acute care)

The WHO report (2006) reveals an estimated shortage of almost 4.3 million doctors, midwives, nurses and support workers worldwide. Japan does not seem to be exception. Today the lack in number of doctors and overwork of health care staff become great social issues in Japan. There exist a distorted distribution among regions or among different fields (very scarce in pediatrics and obstetrics) so that it could be misleading to make comparison among countries but let us see the numbers of practicing physicians and nurses per 1000 population²⁶. Number of physicians per 1000 population is 2.1 and is ranked 27th out of 30 countries (3.5 in Sweden, 2.5 in UK and 2.4 in USA). Number of nurses per 1000 population is 9.3 and is ranked 14th out of 30 (10.7 in Sweden, 11.9 in UK and 10.5 in USA). A total hospital bed per 1000 populations in Japan is 14.0 in 2006 which is far beyond the OECD average of less than 6. It is easy to imagine how busy it is to work in health care sector in Japan considering that the number of beds in Japan is twice as many as OECD average and the number of doctors is far less than OECD average. "Iryouhoukai" which

²⁶ OECD Health Data 2008

means “breakdown of medicine” in Japanese has been conspicuous in newspapers these days. There is a presentation (2007)²⁷ about breakdown of health care. In this presentation there are some statistics that show that because of the shortage in doctors, the number of institutions that can handle delivery is declining. The number was 4286 in 1993 but 3306 in 2002 and 2933 in 2005. The number of hospitals with pediatric services goes down from 4025 in 1993 to 3154 in 2005. AC service nowadays is in dire need of manpower to sustain the level of health care.

8.2.2. LTC (Long term care)

LTC insurance has introduced for 8 years and it was supposed to make a big difference both financially and in the burden of care givers. The introduction of LTC insurance had multiple purposes. For example, by separating long term care from health care (AC) we were able to contain increasing health spending, especially health care spending for elderly. Also informal family care had been a social norm before introduction of LTC insurance and there was an expectation to change in the concept, from “family should take care of their elderly” to “society will take care of elderly people”. How much of these objectives have been achieved? Arai (2004) stated “there was an obvious change shift from the idea that the care of old folks falls to family to the virtually unheard-of notion that society must shoulder the problems of the world’s fastest-graying population.”

LTC services are municipally provided services and each municipal office has its own way to get the picture of LTC situations. One example is the survey²⁸ conducted by Kodaira-shi, one city in Metropolitan Tokyo, in Dec. 2007. They drew the sample of 2500 that were in need of LTC certified by the municipality and sent them questionnaires regarding LTC including LTC insurances. The response rate was 63.6% (1591/2500). Sixty percent of respondents (who need LTC) were aged 80 or over. 22.5% of respondents lived alone. Eighty three percent got the LTC services. Twenty six percent of care-givers were spouses aged 65 or older. Thirty four percent of

²⁷ <http://www.tshp.ne.jp/toku/kanburo/stop.pdf>

²⁸ http://www.city.kodaira.tokyo.jp/kurashi/007/attached/attach_7731_3.pdf

care-givers were children and their spouses, of persons who need LTC. Forty three percent of respondents, who were in need of LTC but not getting LTC services, were doing so because they got informal family care. Regarding out-of-pocket payment, 52.9% said “the current level of out-of-pocket payment is not easy but I can take it”, while 10.5% said “I am suffering from the current level of out-of-pocket payment”. If we look at it by the level of income, fourteen percent of persons whose income are less than 50,000 yen (about 500 US \$) per month and 13.6% of persons whose income are between 50,000 and 10,000 yen (about 500 – 100 US \$) per month, answered “I am suffering from the current level of out-of-pocket payment.” These results are from one survey of one municipality but we could get a glimpse that after introduction of LTC insurance we depend on family care-givers and the current level of out-of-pocket expenditures are not easy for low income (pensions only) people. Lightening the burden of low income people by decreasing out-of-pocket payment would be an option.

For supply side, is the supply of health care enough to meet the demand? According to the government survey²⁹ labor separation rate for care worker in 2007 is 20.3% and is higher than the average labor separation rate of all job sectors (= 17.5%). This data questions the appropriateness of working environment of care workers. Imaoka (2008) reported the serious working conditions among care workers. He and his colleagues surveyed the care workers duty on their night shift and overtime work, and concluded “Besides many night shifts, insufficient staff arrangement and long working hours, care workers usually do overtime work at the cost of their mental and physical health. A single night duty without any partners is fundamentally a defective working system.” It is obvious that the number of care workers is not enough. It seems that only way to solve this is to increase the staff in numbers.

Overall the current situation tells us that we need to increase the number of staff and that needs finance. It should be at least to increase our expenditure up to the OECD average in order to

²⁹ LTC Labor survey 2007 conducted by MHWL (in Japanese: 介護労働実態調査 平成 19 年度)

sustain the level of care and not to make the staff burned out.

9. Discussion

9.1. Concluding remarks

In this thesis we summarized first about factors which might affect the health care expenditures. Next we calculated the health spending based on population structure in 2025.

We followed the idea regarding decomposing the health spending. Our projection method focusing only on income effect, demographic factor and the other factor (including technological change, policy effect, etc.) like OECD (2006) made easier for us to analyze and interpret. Under the situation where no reliable price data in health care products exists³⁰, health spending expressed as a share of GDP would have some merit and unit income elasticity assumption seemed to be valid considering previous evidences and the analysis conducted in 8.1.

According to our projection, health spending will be around 11% of GDP in 2025 considering demographic change which will happen. Technological change accounts for 1% increase per 10 year. This increase would happen even if we had no change in demographic structure. Another thing we need to keep in mind is the exclusion of formal / informal care ratio in our calculation of LTC spending. This might increase the calculated LTC spending.

We also showed that health spending in Japan is less than OECD average. Considering the fact that there is a lot to be improved in health care setting, the implication derived from this thesis is that it would be better to spend more on health to meet the standard the people would want.

Health care is highly labor intensive and gain in productivity and efficiency would be limited. As discussed in 8.1 getting enough manpower is the crucial factor. According the documents MHWL (2007), around 50% of total cost spent in health care institutions were staff costs for the recent 20 years³¹. According to the hearing on May 20th 2008 conducted by MHWL's Research on establishment of securing care workers" (介護労働者の確保・定着等に関する研究会), "labor

³⁰ OECD(2006) p.12

³¹ <http://www.mhlw.go.jp/shingi/2007/02/dl/s0206-5b.pdf>

costs are more than 80 percent," said the chairman of National council of care provider (全国介護事業者協議会). In UK staff costs in public sector homes accounted for 85% of total unit costs and in Germany staff costs accounted for between 70% and 90% of total unit cost of nursing homes.³² Besides, if the care currently provided by informal family care would shift to be covered by LTC and provided by formal LTC, more staff will be needed. Getting more manpower in health care sector competes with other sectors. When the economy works quite well it will be hard to get manpower to the health care sector so that it will be difficult to get manpower but it is easy to get financial resources. The opposite holds true that when economy is bad it is easy to get manpower but it is difficult to get financial resources. What is the best time to get manpower and financial resources at the same time to strengthen our ability of health care system or social insurance as a whole? It is impossible to get manpower when the economy is good. But if the social security becomes a driving force of economy, it will be achievable to obtain both manpower and resources at the same time when the economy is bad. Now the economy is bad and this is the time we should invest.

9.2. Pay more on social security, not for our own social well being but for economy

Can social security including health care be a driving force in economy?

Atkinson (1995) considered the empirical evidences of the relationship between economic performance and the size of Welfare State and concluded that "While popular argument often refers in a casual way to the experience of Sweden or other countries with sizeable levels of spending, the results of econometric studies are mixed, and provide no overwhelming evidence that high spending on social transfers leads to lower growth rates. Nor is it evident that firm conclusions could be drawn from such an approach, which poses serious problems of interpretation."

Agents of production in social security are family, market and government. Which agents we

³² OECD(2006), p.20

depend on mainly for our production of social security services differs from country to country. In Taiwan³³ for example they are “family type” country because old people depend on intergenerational transfer. USA is an example of “market type”. Sweden is an example of “government type”. Where is Japan? Japan seems to be close to Taiwan. Although we have universal health care and pension system in Japan the government counts on informal family care. Besides there is still a social norm that children should take care of their parents when they get old, like other eastern Asian countries.

One of the norms of anti social reform in 1930s is that “Growth of capital growth depends on the strength of individual saving motivation so that most of our economic growth stems from the surplus of rich. Therefore redistribution of income from rich to poor could be a disincentive to economic growth”. Keynes argued that redistribution of income from high income earners who have low marginal propensity to consume to low income earners who have high marginal propensity to consume can lower the gross saving rates, which leads to give advantage to economic growth using economic theory. This theory is called “Principle of effective demand”.

“Keynesian economics warns against the practice of too much saving (under consumption) and not enough consumption (spending) in the economy, and it also supports considerable redistribution of wealth, when needed. Keynesian economics further concludes that there is a pragmatic reason for the massive redistribution of wealth: if the poorer segments of society are given sums of money, they will likely spend it, rather than save it, thus promoting economic growth.”³⁴

There may be one answer to the question why many countries have social security system. It is not because of social norm or ethical issues, because of this economic theory which states that redistribution of income from rich to poor makes economic growth and assures employment.

³³ Gauthier et al (2006)Chapter 2, 3

³⁴ <http://www.wisegeek.com/what-is-keynesian-economics.htm>

Suppose that we invested certain amount of money to social security by way of in-kind benefits (not capital benefits), what would it happen?

Benefits in kind in social security goes mostly to elderly people so that these services go to rural areas where a lot of old people live, more than urban areas. Balancing effect on the difference between rural and urban areas is expected. In Japan it is said that individual saving amounts to 1,500 trillion yen and this money is saved mostly by middle age to old people in their own saving accounts because they are worried about their lives in their old ages. If we were able to give them sense of relief, we would expect them to start spending their savings which would lead to boost our economy. Economy of social security is domestic type which means less vulnerable to the economic condition outside the country. In-kind benefits are given equally to people regardless of whether they are rich or poor. We could expect redistributing income from rich to poor because people who get benefit most compared with their income (net benefit) will be poor people.

It will increase the public burden to pay more for social security, but this will lead us to better and easier life. We are hoping that this country will employ the social security policy as a means of economic policy.

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