

A Quantitative Analysis for Projections of Japan's Public Assistance:  
"Longevity" and "Decrease the premium payment ratio for the National Pension"\*<sup>1</sup>

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Abstract

The purpose of this paper is to estimate the future public assistance expenditures in Japan based on the assumption of multiple different scenarios.

We use the analysis model proposed by Ueda [2012], EC [2015] and Yoneta et al. [2015]. We also estimate considering longevity pointed out by Nakazawa et al. [2015]. We show projections of Japan's public assistance with breadth by estimating based on three different scenario, "Baseline", "Decrease the premium payment ratio for the national Pension program scenario (DP scenario)" and "Longevity scenario".

The total public assistance expenditures of GDP at baseline will rise from 0.7% in FY2015 to 0.9% in FY2050. This can be said to indicate the effect of aging.

On the other hand, in the "DP scenario", it was estimated to be 1.6% in FY2050 and 0.6% in the "Longevity scenario". In the "DP scenario", it is 0.7% higher than the baseline. This suggests that the reduction in the premium payment ratio for the national pension has a large influence on the public assistance expenditures in the trial calculation by the mechanical method of this paper, and the possibility of future fiscal sustainability is clearly concerned.

Also, in the "Longevity scenario", it is 0.3% lower than baseline. This is lower than the total public assistance expenditures of GDP in FY2015, which is the starting point. In other words, even if the aging progressed, considering the growth of healthy life expectancy due to longevity, the fiscal impact on the public assistance is alleviated to a certain extent. It can be said that the fiscal sustainability is secured.

Keyword: public assistance, fiscal sustainability, projection

JEL classification codes: H53, H55, C53

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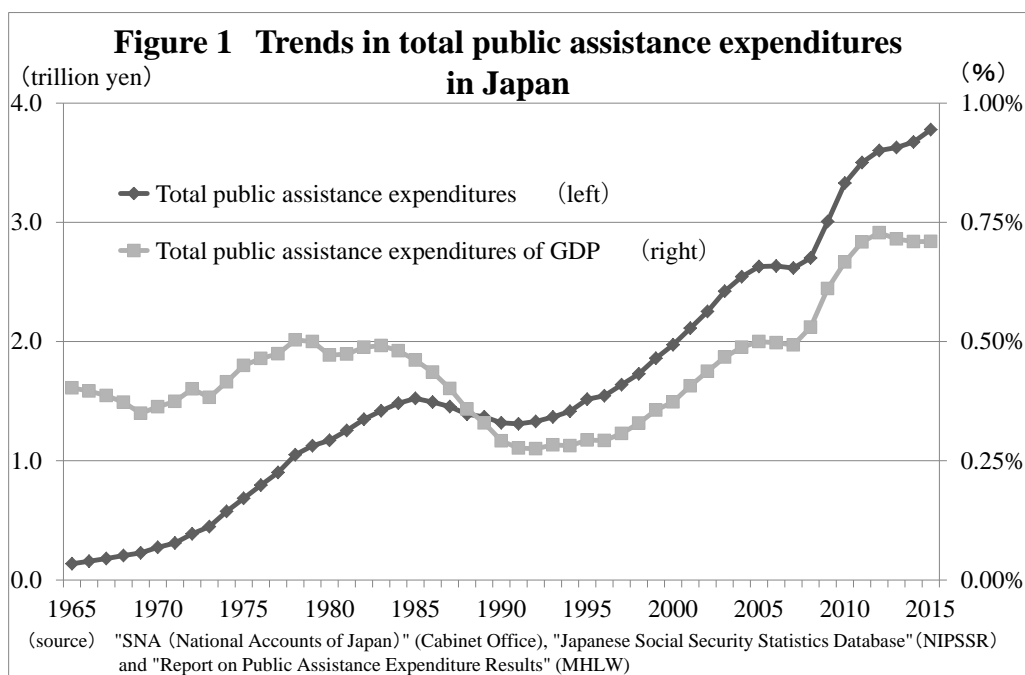
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## 1. Introduction

The purpose of this paper is to estimate the future public assistance expenditures in Japan based on the assumption of multiple different scenarios.

Figure 1 shows the trends in total public assistance expenditures in Japan. The total public assistance expenditures increased from 0.1 trillion yen in FY1965 (0.4% of GDP) to 3.8 trillion yen (0.7% of GDP) in FY2015, and it increased to about 27.8 times (1.8 times of GDP) in the past 50 years.



Generally, "deteriorating economic conditions" are considered as the main factor for the increase in public assistance expenditures<sup>1</sup>. However, as shown in Figure 1, the total public assistance expenditures are not necessarily linked to the Japan's business cycle<sup>2</sup>.

On the other hand, the proportion of elderly households in public assistance recipients increased by about 2.2 times from 22.9% in FY1965 to 49.5% in FY2015. This is close to the growth ratio of the total public assistance expenditures of GDP. Considering that the ratio of medical assistance expenditures to total public assistance expenditures in FY2015 is 46.9% and the amount of medical assistance expenditures per capita tends to become higher as elderly people become older. Therefore, it is expected that further public assistance expenditures will increase due to progress of aging<sup>3</sup>.

In this paper, we focus on the aging of the Japan's population, and estimate the future cost of total

<sup>1</sup> See the official announcement of Ministry of Health, Labor and Welfare.

<sup>2</sup> For example, during the "IT boom" period (1999 to 2000), the total public assistance expenditures have been increasing with the same ratio of growth as the "IT recession" that followed from 2000 to 2002. Of course, during the "bubble economy" (1986 to 1991), the total public assistance expenditures amount decreased slightly, it is consistent with the Japan's business cycle.

<sup>3</sup> As a factor other than the population, changes in the form of employment and consequent changes in the distribution of the poor are also considered. In this paper, we estimate the population problem to simplify the model.

public assistance expenditures of GDP. Quantitatively analysis for projections of Japan's total public assistance expenditures is considered to be very important in considering Japan's fiscal sustainability. As Abe et al. [2006] point out, the public assistance expenditures will increase by decrease the premium payment ratio for the National Pension.

Yoneta et al. [2015] are based on a similar awareness of the issue. They refine the method of Ueda [2012] and estimate the future of the ratio of total public assistance expenditures of GDP, taking into consideration the impact of lowering the premium payment ratio for the national pension since the late 1990's.

We also estimate considering longevity pointed out by Nakazawa et al. [2015]. We show projections of Japan's public assistance with breadth by estimating based on three different scenario, "Baseline", "Decrease the premium payment ratio for the national Pension program scenario (DP scenario)" and "Longevity scenario".

In anticipation of the results, the public assistance expenditures of GDP at the "baseline" will rise from 0.7% in FY2015 to 0.9% in FY2050. On the other hand, in the "DP scenario" was estimated to be 1.6% in FY2050 and 0.6% in the "Longevity scenario".

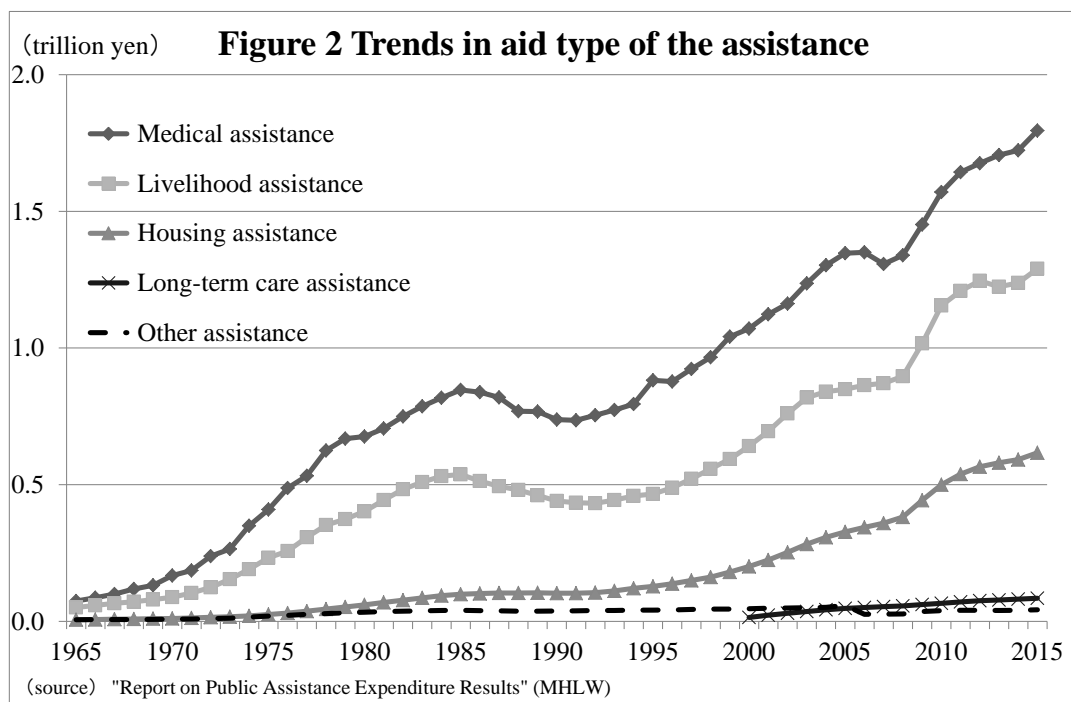
This paper is organized as follows. In Section 2, we point out important features of Japan's public assistance system and explain previous research. Section 3 shows the data and analytical model used in this paper and the estimation results are shown section 4. Finally, Section 5 is a summary of this paper.

## 2. Japan's public assistance and Literature Review

### 2.1. The features of Japan's public assistance system

The system of Japan's public assistance functions as a public aid system that guarantees "living rights" of Article 25 of the Constitution of Japan. For a more detailed explanation of the system and the history, see Abe et al. (2006). In this section, we point out the important features of Japan's public assistance, which is the prerequisite for the analysis of this paper.

First, Figure 2 shows the trends in the public assistance expenditures for aid type from FY1965 to FY2015.

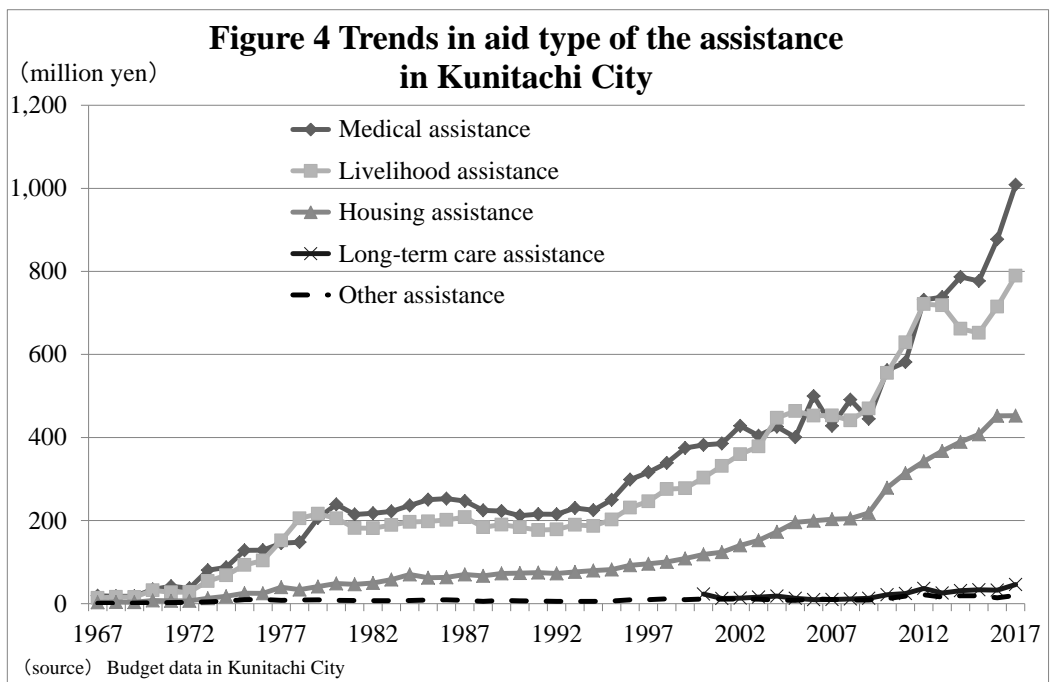
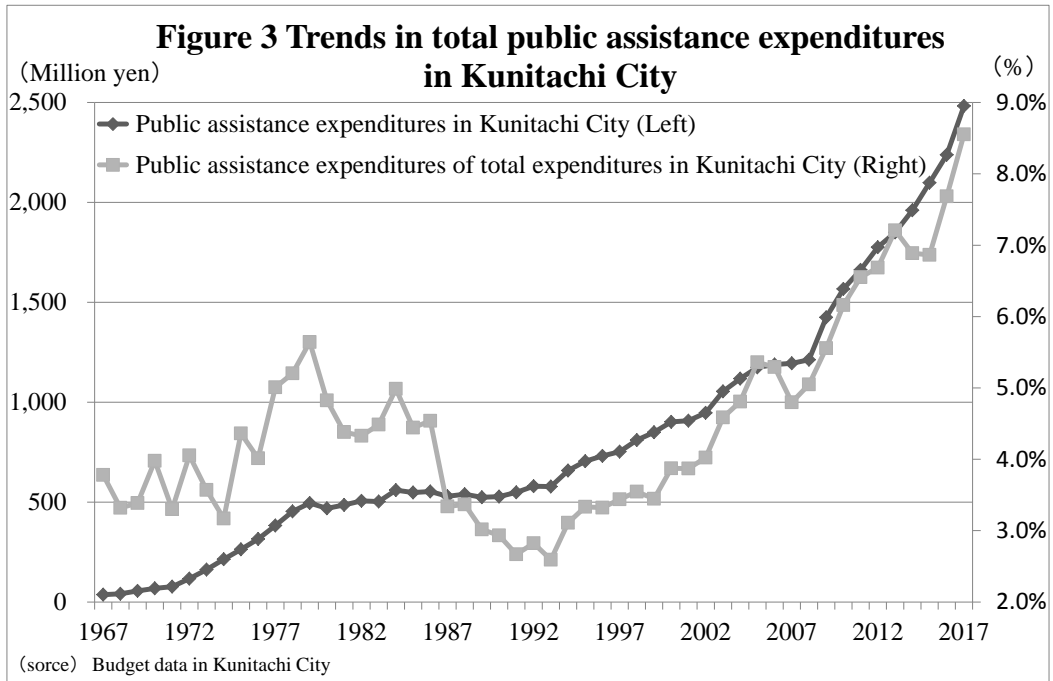


Every years, medical assistance expenditures are the highest amount of each assistance expenditures, and the proportion of the total public assistance expenditures accounts for 54.9% on average (46.9% in FY2015).

This trend is the same even for the local government such as Kunitachi City where many young people live in because it is an "academic city"<sup>4</sup>. Figure 3 and Figure 4 show the trends in total public assistance expenditures for the past 50 years in Kunitachi City and the trends in the public assistance expenditures for aid type in the same period<sup>5</sup>.

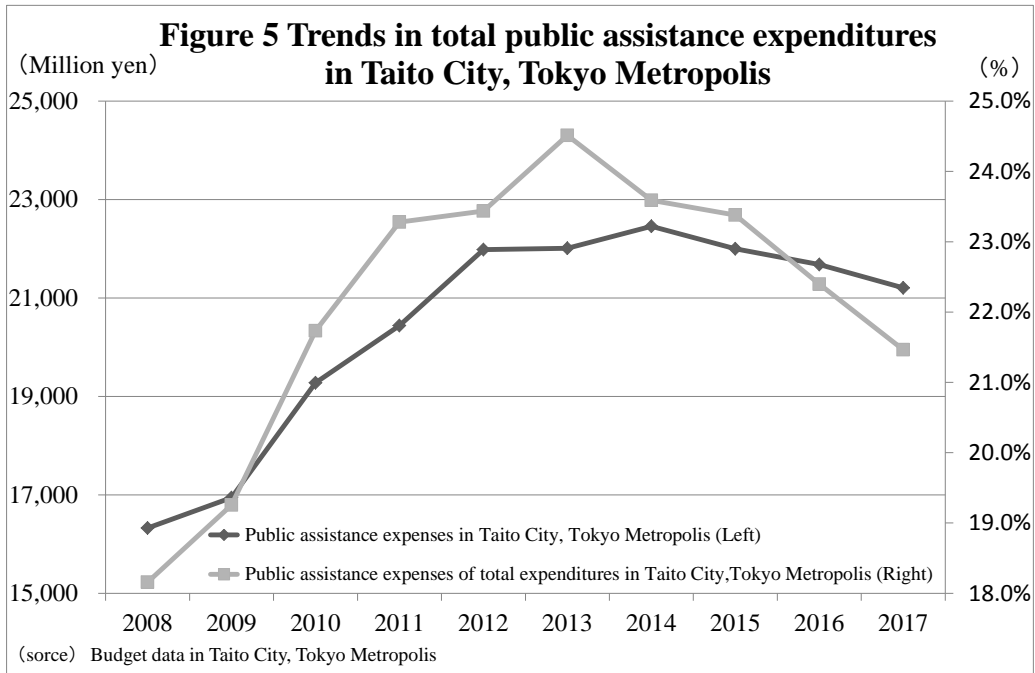
<sup>4</sup> Kunitachi City is the Japan's first academic city that reference to the city planning in Göttingen city of Germany. Hitotsubashi University was attracted to Kunitachi in 1927, and now Kunitachi City is designated as an academic city called "Bunkyo district" according to the building regulations of Tokyo Metropolitan Government.

<sup>5</sup> January 1, 1967, Kunitachi City was established in accordance to municipal organization. Before 1967, Kunitachi was a town, so the public assistance expenditures were recorded as budget for Tokyo Metropolitan Government.

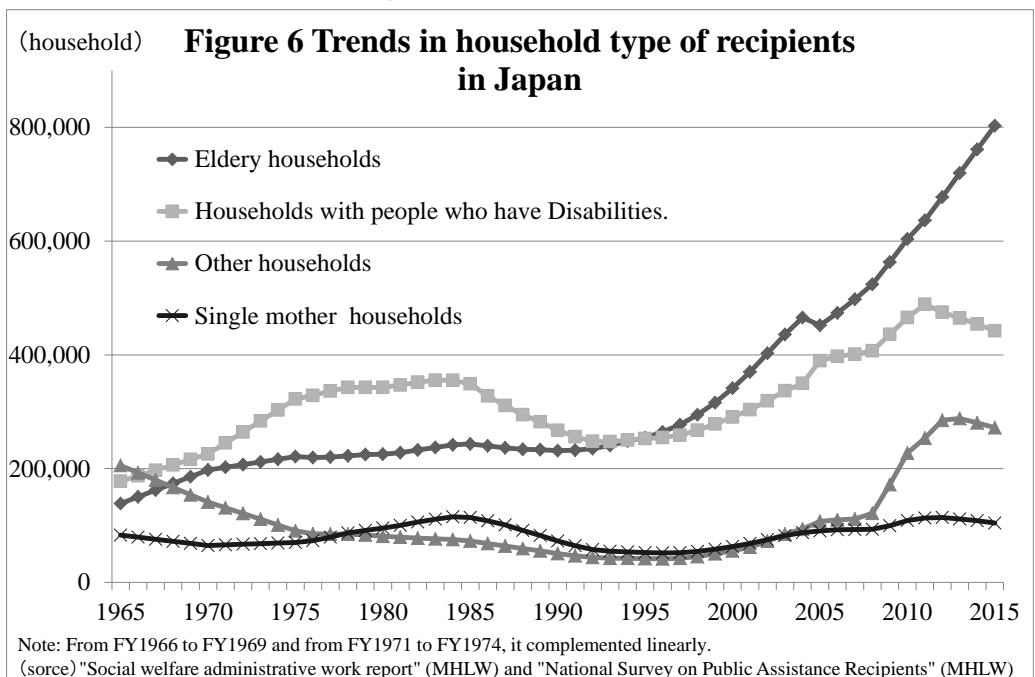


In Kunitachi City, the total public assistance expenditures increased from 29.4 million yen in FY1967 (3.0% of total budget) to 2,238.3 million yen (7.7% of total budget) in FY2017, and it increased to about 78.3 times (2.6 times of total budget) in the past 50 years. In most years, medical assistance expenditures are the highest amount of each assistance expenditures, and the proportion of the total public assistance expenditures accounts for 45.4% on average (42.0% in FY2017).

Figure 5 shows the trends in total public assistance expenditures for the past 10 years in Taito City, Tokyo Metropolis. Public assistance expenditures of total expenditures account for 22.1% on average (24.5% in FY2013). This alternative local government budget clearly shows that there is a huge financial impact for the local governments.

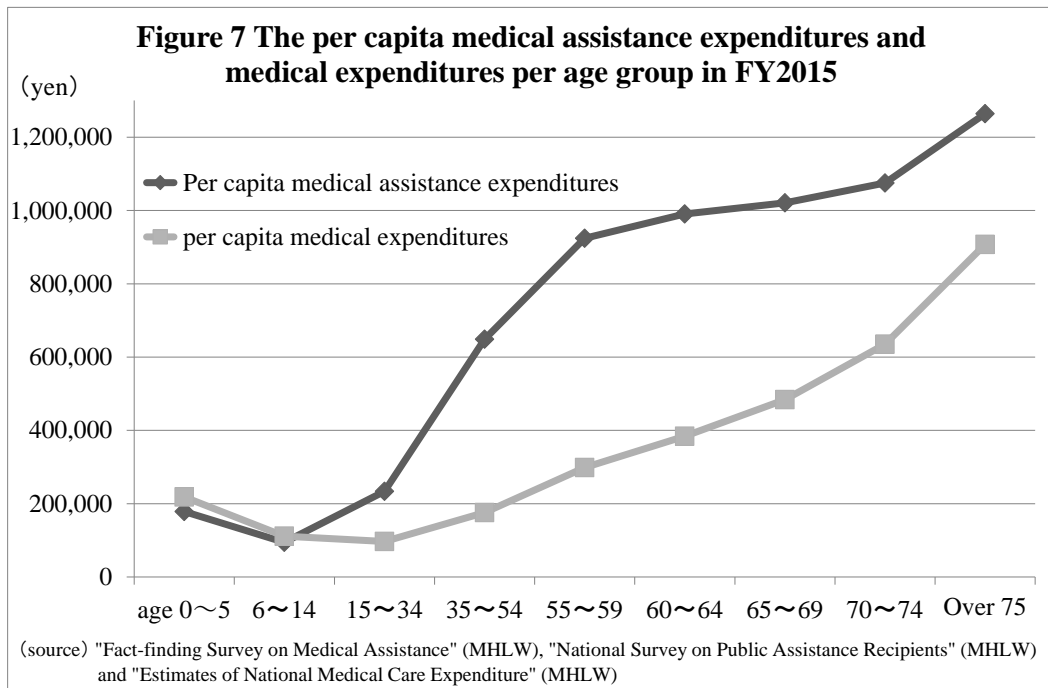


We get back to the macro data in Japan. Looking at the trends in household types of recipients in Japan (See Figure 5). Elderly households are the majority since 1995. The ratio of the total recipients is 34.5% (42.8% in FY 2015) on average.



The total of elderly households and households with people who have disabilities makes up 71.6% on average (66.4% in FY2015). Therefore, in the Japan's public assistance system, it seems that there is a strong element of public aid for households that have difficulties making a living, mainly the elderly rather than the influence of the deteriorating economic conditions.

Figure 7 shows the per capita medical assistance expenditures and medical expenditures per age group in FY2015



It shows the shape of the so-called "J-shaped curve" which is slightly higher in the stage of infancy, decreases as the age of production increases, and then increases with age. As medical assistance accounts for about half, it is expected that the aggregate public assistance expenditures will increase significantly as the aging progresses.

## 2.2. Literature Review

Yoneta et al. [2015] is a previous study of quantitatively estimating future projections of public assistance expenditures. Based on the method presented in Ueda [2012], Yoneta et al. [2015] refined the amount of per capita medical assistance expenditures divided by age group, and they estimate total public assistance expenditures of GDP by FY2050.

Nakazawa et al. [2015] estimates social security expenditures up to FY2060, taking into account "Longevity". Specifically, health life expectancy will extend by 3 years according to the prospect that average life expectancy will grow by 4 years from FY2014 to FY2060. Therefore, Nakazawa et al. [2015] analyzes assuming that the medical, long-term care and pension system can be knocked down for 3 years backward. This paper conforms to the method of Yoneda et al. [2015]. In addition, we also analyze assuming health life expectancy to increase by 3/4 of average life expectancy based on the Nakazawa et al. [2015].

### 3. Data and Methodology

#### 3.1. Data set

In this paper, we use only open data. First, we use the "Economic and Fiscal Projections for Medium to Long Term Analysis (January 25, 2017)" (Cabinet Office), "Financial Projection of the National Pension-FY2014 Financial Verification-" (Ministry of Health, Labor and Welfare; MHLW) and "Population Projection for Japan: 2011-2060 (January 2012)" (Population and Social Security Research; NIPSSR) to Estimate GDP based on Ueda [2012]. Second, we estimate future public assistance expenditures of GDP based on the results of "National Survey on Public Assistance Recipients" (MHLW), "Fact-finding Survey on Medical Assistance" (MHLW) and "Report on Public Assistance Expenditure Results" (MHLW).

Regarding the "DP scenario", as in Yoneta et al. [2015], using the "Survey on Public Pension Enrollment" (MHLW), and calculate the pension payment ratio at the age of 60 by the FY 2050 with the concept of the cohort change ratio method.

In the "Longevity scenario", we use "Population Projection for Japan: 2011-2060 (January 2012)" (NIPSSR) according to Nakazawa et al. [2015].

#### 3.2. Model

##### 1) Baseline

The analysis model of baseline is as follows<sup>6</sup>.

$$Assistance_t = Assistance_{med}_t + Assistance_{others}_t$$

$$Assistance_{med}_t = Assistance_{med}_{t_0} \times \prod_{j=t_1}^t \left( \frac{Assistance_{med\_Theoretical}_j}{Assistance_{med\_Theoretical}_{j-1}} \right)$$

$$Assistance_{med\_Theoretical}_t = \sum_{i=1}^9 (Med\_percapita_{i,t} \times Pop\_assistance_{i,t})$$

$$Med\_percapita_{i,t} = Med\_percapita_{i,t_0} \times \prod_{j=t_1}^t \left( \frac{GDP_j/pop_j}{GDP_{j-1}/pop_{j-1}} \right)$$

$$Pop\_assistance_{i,t} = \sum_{i=1}^9 (Ratio\_of\_assistance_{i,t_0} \times pop_{i,t})$$

$$Assistance_{others}_t = Assistance_{others}_{t_0} \times \prod_{j=t_0}^t \left( \frac{AO\_Theoretical_j}{AO\_Theoretical_{j-1}} \right)$$

$$AO\_Theoretical_t = Pop\_assistance_t \times (AO\_percapita_{t_0} \times \prod_{j=t_0}^t (1 + Wage\_rate_j))$$

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<sup>6</sup> The backward-looking macroeconomic model has academic criticism by "Lucas Critique" (See Lucas [1976]). When conducting policy evaluation, CBO (U.S.) and MOF (Japan) use forward-looking macroeconomic model such as "DSGE model" or "OLG model" and backward-looking macroeconomic model is use in prediction. Therefore, we also adopt a backward-looking macroeconomic model for future prediction in this paper.



The 9 categories of "Assistance\_med\_Theoretical" and "Pop\_assistance" are classified as shown in Figure 7. For the initial data of the model, we use the following statistics.

- Assistance\_med: "National Survey on Public Assistance Recipients" (MHLW)
- Assistance\_others: "National Survey on Public Assistance Recipients" (MHLW)
- Med\_percapita: "Fact-finding Survey on Medical Assistance" (MHLW)
- Pop\_assistance: "National Survey on Public Assistance Recipients" (MHLW)
- Ratio\_of assistance: "National Survey on Public Assistance Recipients" (MHLW) and  
"Population Projection for Japan: 2011-2060 (January 2012) " (NIPSSR)

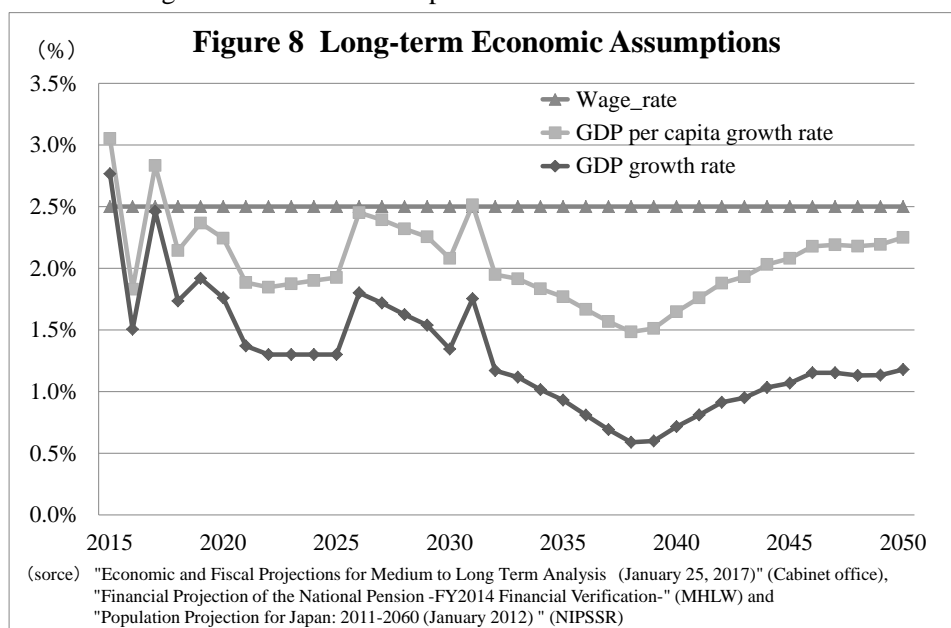
GDP is estimated as follows. "Pop1564" means population change rate from 15 to 64 years old.

$$GDP_t = GDP_{t_0} \times \prod_{j=t_1}^t (1 + (Wage\_rate_j + Pop1564\ growth\ rate_j))$$

The long-term economic assumption to use an exogenous variable is in following statistics<sup>7</sup>.

- Wage\_rate: "Financial Projection of the National Pension-FY2014 Financial Verification-" (MHLW)
- CPI\_rate: "Financial Projection of the National Pension-FY2014 Financial Verification-" (MHLW)
- Population data: "Population Projection for Japan: 2011-2060 (January 2012) " (NIPSSR)

Figure 8 shows long-term economic assumptions we use.

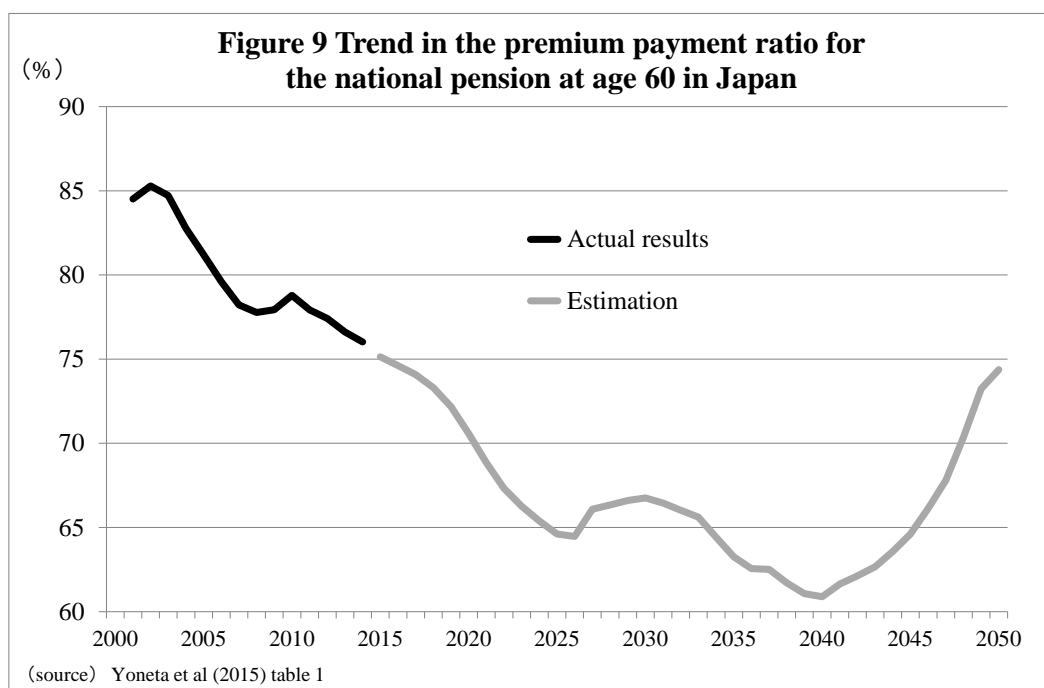


<sup>7</sup> We use the assumptions of "scenario E" in "Financial Projection of the National Pension-FY2014 Financial Verification-". "Wage rate" means nominal wage increase rate, so "Wage rate" calculated by adding real wage increase rate and inflation rate. Therefore, "GDP" means nominal GDP in this paper.

## 2) Decrease the premium payment ratio for the national Pension program scenario (DP scenario)

This scenario was proposed by Yoneta et al. (2015). In this scenario, we assume that the number of public assistance recipient will increase as the premium payment ratio for the national pension program decrease. This is due to the following three reasons. First, the national pension is an important income for retired people. Next, those who cannot pay national pensions are presumed to be "Hand-to-Mouth". Finally, every government has an obligation to assist people without income and savings.

Figure 9 shows trends in the premium payment ratio for the national pension at age 60 in Japan. For a more detailed explanation of the model, see Yoneta et al. (2015).



## 3) Longevity scenario

In the "Longevity scenario", the amount of per capita medical assistance expenditures to be applied to each public assistance recipients is adjusted according to the average life expectancy. Figure 10 shows the projection of life expectancy and health life expectancy. That is, for instance, since the average lifespan extension is 3.1 years from FY2016 to FY2050, we believe that the health age has increased only by 2.3 years of that 3/4. For example, the medical assistance expenditures of the public assistance recipient who is 70 years old as of 2050 is calculated as medical assistance expenditures equivalent to 67.7 years old.

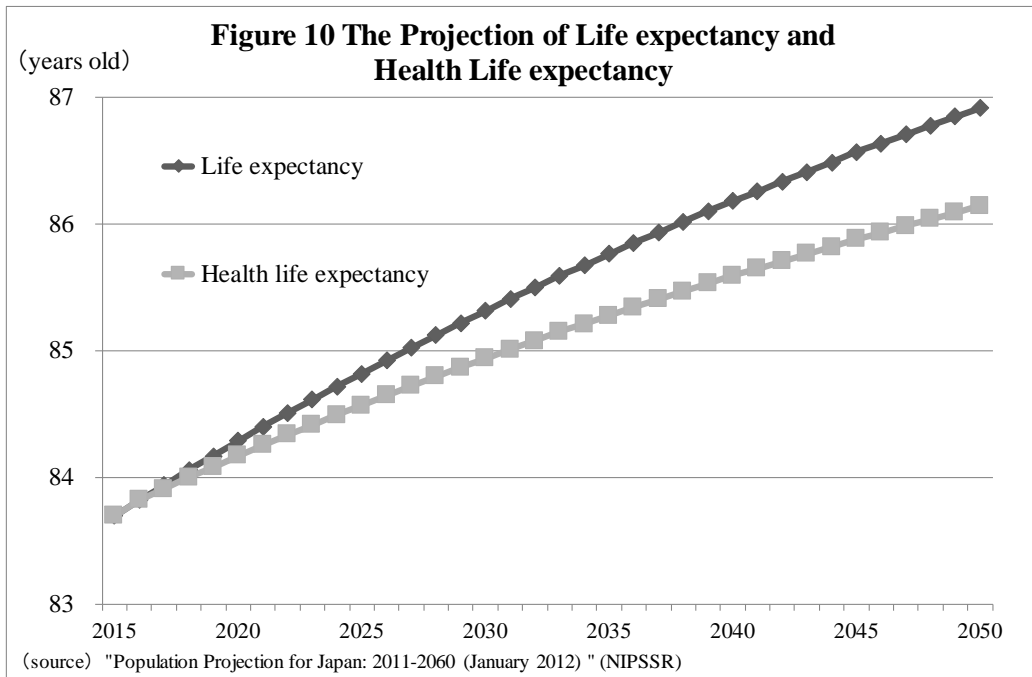
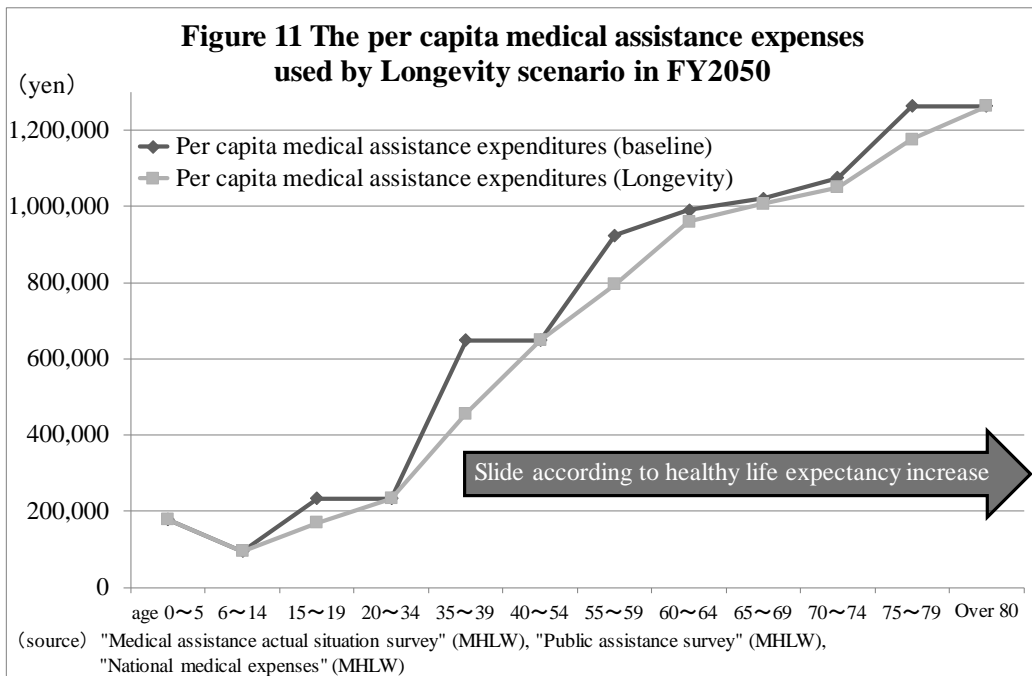
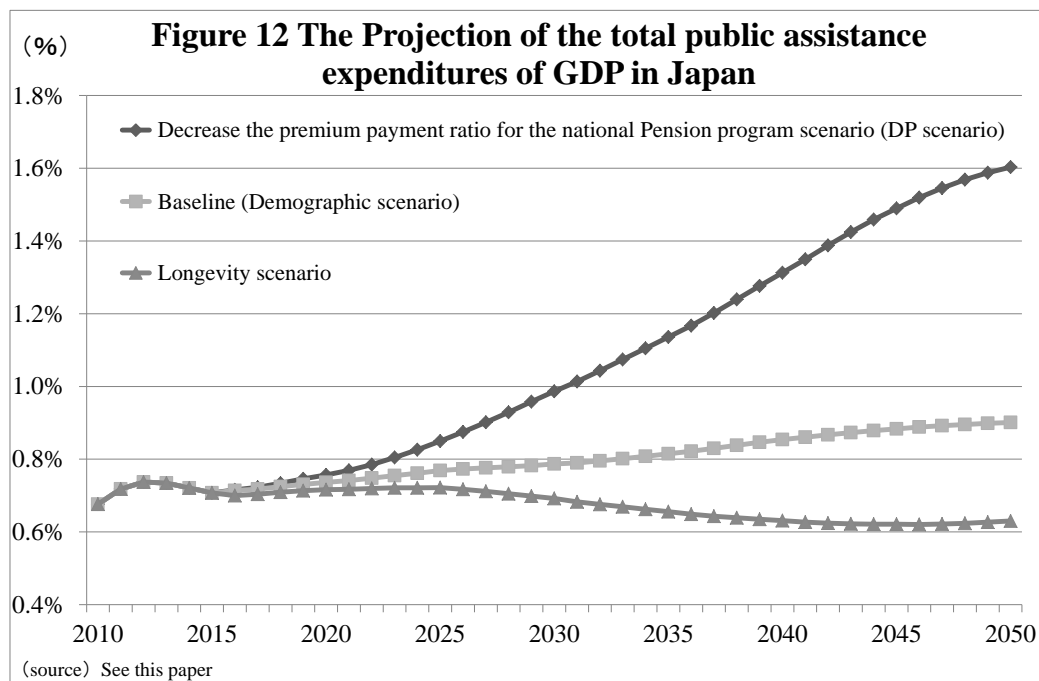


Figure 11 shows the per capita medical assistance expenses used by "Longevity scenario" in FY2050. The per capita medical assistance expenses slide according to healthy life expectancy increase.



#### 4. Results

Figure 12 shows the estimation results of baseline, "DP scenario" and "Longevity scenario" up to the FY2050<sup>8</sup>.



The total public assistance expenditures of GDP at baseline will rise from 0.7% in FY2015 to 0.9% in FY2050. This can be said to indicate the effect of aging.

On the other hand, in the "DP scenario", it was estimated to be 1.6% in FY2050 and 0.6% in the "Longevity scenario". In the "DP scenario", it is 0.7% higher than the baseline. This suggests that the reduction in the premium payment ratio for the national pension has a large influence on the public assistance expenditures in the trial calculation by the mechanical method of this paper, and the possibility of future fiscal sustainability is clearly concerned.

Also, in the "Longevity scenario", it is 0.3% lower than baseline. This is lower than the total public assistance expenditures of GDP in FY2015, which is the starting point. In other words, even if the aging progressed, considering the growth of healthy life expectancy due to longevity, the fiscal impact on the public assistance is alleviated to a certain extent. It can be said that the fiscal sustainability is secured.

<sup>8</sup> By setting the probability that each scenario will occur, integrated expected expectation can also be made, but it is a future subject.

## 5. Concluding remarks

In this paper, we pointed out the features of Japan's public assistance and estimated future public assistance expenditures with reference to the method shown in Yoneta et al. [2015]. Based on the estimation result as a baseline, we also analyzed the "DP scenario" and the "Longevity scenario".

The public assistance expenditures of GDP at baseline will rise from 0.7% in FY2015 to 0.9% in FY2050. On the other hand, in the "DP scenario" was estimated to be 1.6% in FY2050 and 0.6% in the "Longevity scenario".

In this paper, three types of estimates were made. However, in EC [2015], for example, ten different scenarios are set in the future estimation of medical expenditures of GDP. It is a future task to estimate with further different scenarios such as scenarios for increasing the usage ratio of generic drugs.

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