Population Aging and Lifetime Tax Burden

Masahiro Hidaka*

1 Introduction

Australia’s first Intergenerational Report was released in 2002. The aim of this report is to provide a basis for considering the Commonwealth’s fiscal outlook over the long term and identifying emerging issues associated with an ageing population. Aging populations are considered one of the major factors to increase fiscal expenditure in many OECD countries, since social benefits for elderly now account for large portion of fiscal expenditure in these countries.

This kind of fiscal problem is known as the fiscal sustainability. One of the key requirements for sustainability is to balance fiscal budget over the long term. Given the natural increase of spending for elderly, government should improve efficiency in spending and/or raise taxes revenue for balanced budget. Policy tools chosen for long term sustainability would not be the same among countries since there are many differences with the structure of fiscal expenditure and revenue and the degree of aging. Therefore to study other country’s fiscal reform over the long term we should first distinguish these differences and use some measure to evaluate the effect of the fiscal reform.

In this paper, to seek for desirable policy reform for sustainability, I compare the structure of government spending and tax between Australia and Japan in view of individual net payments to government over the lifetime. In the next section, differences with the budget and demography between two countries are summarized using OECD data. In section 3, projections of future spending are developed. In section 4, net payments by generations are calculated under the sustainability constraint.

2 Features of budget and demography

2.1 Outlays and budget balances

Total outlay (percent of GDP) of Australia and Japan are close and both smaller than total OECD in Table 1. The size of the government relative to GDP is similar in two countries. In contrast, financial balances and gross financial liabilities are different. Australia’s financial balance is positive, but Japan’s is negative and worse than total OECD. It causes the similar result in gross financial liabilities.

Financial balance would reflect fiscal stance. In 1990’s Japan’s government expanded fiscal spending and reduced taxes by debt financing against the depression after the bubble boom in Japan.

* Associate Professor, Faculty of Economics, Osaka Gakuin University, and Research Fellow, Taxation Law and Policy Research Institute, Monash University
**Table 1  General Government Total Outlays, Balances and Liabilities**

(2005, percent of nominal GDP)

<table>
<thead>
<tr>
<th></th>
<th>Total Outlays</th>
<th>Financial Balances</th>
<th>Gross Financial Liabilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia</td>
<td>34.9</td>
<td>1.5</td>
<td>14.4</td>
</tr>
<tr>
<td>Japan</td>
<td>36.9</td>
<td>-5.2</td>
<td>172.1</td>
</tr>
<tr>
<td>Total OECD</td>
<td>40.7</td>
<td>-2.7</td>
<td>77.7</td>
</tr>
</tbody>
</table>

*Source: OECD Economic Outlook 80 database*

2.2 Spending

Table 2 shows percentage shares of selected 5 spending categories of General Government from National Accounts of both countries. Total outlays in table 1 are close, but compositions are non-similar. Japan’s property income is larger because of huge amount of financial liabilities.

In view of the public service, social security benefits are larger in Japan. A large part of social security consists of social insurance such as public pension, health insurance and long term care insurance. Social insurance benefits are around 16 percent of GDP. Public pension is included in Social assistance benefit in cash, and health insurance and long term care insurance are included in Final consumption expenditure in table 2. In addition, these benefits are concentrated on elderly.

**Table 2 Selected spending**

(2005, percent of total expenditure)

<table>
<thead>
<tr>
<th></th>
<th>Property income payable</th>
<th>Subsidies</th>
<th>Social assistance benefits in cash</th>
<th>Final consumption expenditure</th>
<th>Consumption of Fixed capital</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia</td>
<td>4.6</td>
<td>4.6</td>
<td>26.5</td>
<td>58.7</td>
<td>5.6</td>
</tr>
<tr>
<td>Japan</td>
<td>8.3</td>
<td>2.3</td>
<td>34.1</td>
<td>42.8</td>
<td>12.4</td>
</tr>
</tbody>
</table>


2.3 Tax Structure

Total tax receipts are shown in table 3. Japan’s total tax receipt is 11.1 points lower than total outlay. This gap is the main factor of budget deficit. In contrast, this gap in Australia is only 3.4 points and is smaller than total OECD.

Total tax includes social security contribution which does not exist in Australia. Social security contribution could be considered as payroll tax since it is added to Compensation of Employees in National Accounts. Although Australia’s personal income tax is higher than Japan’s, it would be reversed if adding social security contribution to income tax.
Tax on goods and services of Australia is close to total OECD. Japan’s is 10.2 point lower than Australia’s. Corporate income tax of Australia is also higher. Comparing tax structures, it is clear that the proportion of social security contribution of Japan is surprisingly high.

<table>
<thead>
<tr>
<th></th>
<th>Personal income tax</th>
<th>Corporate income tax</th>
<th>Social security contributions</th>
<th>Taxes on goods and services</th>
<th>Other taxes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Employees</td>
<td>Employers</td>
<td></td>
</tr>
<tr>
<td>Australia</td>
<td>31.5</td>
<td>38.5</td>
<td>16.8</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Japan</td>
<td>25.8</td>
<td>18.4</td>
<td>12.2</td>
<td>16.3</td>
<td>17.6</td>
</tr>
<tr>
<td>OECD average</td>
<td>36.3</td>
<td>26.0</td>
<td>9.3</td>
<td>8.3</td>
<td>14.6</td>
</tr>
</tbody>
</table>

Source: OECD in Figures - 2005 edition

3 Projection of Future Spending

3.1 Framework

In this section, future fiscal spending of Australia and Japan are projected. Five categories of spending listed on table 2 are separated into two parts. One is the benefits to household such as pension and health, which are age specific. The other is not age specific but has a character of public goods consumed collectively.

As an example of age specific benefit, age-health benefits profiles are drown in Fig. 1. There are quite distinction between Australia and Japan. Japan’s benefits per person for 65+ are around 6 times as much as for 15-25, on the contrary, Australia’s are around 3.5 times.
Summing up other age specific benefits, Australia’s age profiles of direct benefits and indirect benefits are shown in Fig. 2, where direct benefits consist of age pension, disability pension veterans affaires pension, unemployment allowances, family payments, and other direct benefits and indirect benefits consist of education benefits, health benefits, housing benefits, and social security and welfare benefits. The shapes of both direct and indirect benefits are flatter than health benefits solely. For indirect benefits, tertiary education benefits relatively larger for younger offset health benefits distribution.
On the contrary, Japan’s age specific benefits lean to elderly, since aggregated amount of unemployment allowances and family payments which are larger for younger are around 0.1 times as much as aggregate amount of age pension, health insurance and long term care insurance. Therefore summing up all benefits does not make significant change for Japan’s age profile from Fig.1.

3.2 Further Assumptions

To project future government spending, further assumptions on demography and economic growth should be given. Aging speed for each country is shown in table 4. Japan is now one of the most aged and will be much more in next two decades. To analyze the effect of demographic change on government spending, more precise population projection are used. For Japan, we can obtain projected population by age 0 to 100+ for every year to 2001. For Australia, the same population data are made using the work of population projection which provides 18 age classes in selected years, and extending them linearly.

<table>
<thead>
<tr>
<th>Table 4 Population aged 65 and over (Percent of total population)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td>Australia</td>
</tr>
<tr>
<td>Japan</td>
</tr>
<tr>
<td>OECD total</td>
</tr>
</tbody>
</table>
To project future spending on benefits, per person benefit are assumed to grow with economic growth rate exogenously given. The same growth rate is used for collective government spending and wage income, household consumption and wealth. Growth rates set in this paper are 2%.

3.3 Projection

Figure 3 shows that government spending of both countries will grow faster than GDP growth. Comparing Australia and Japan, we find that Japan’s spending will grow faster than Australia’s in next two decades. After middle 2020’s Japan’s spending per GDP will fall because of the decrease of population, on the contrary, Australia will grow at constant rate.

There may be two factors explaining these projected spending. One is demographic change and the other is composition of age specific benefits. To examine this supposition, simple simulation which is exchanging population data each other is executed. The result is in figure 4. Australia’s spending growth would fall with Japan’s population change and Japan’s spending growth would rise with Australia’s population change. This result indicates that Japan’s high growth is explained by the composition of age specific benefits and not by aging population. Although, increasing proportion of elderly is observed in table 3, decreasing total population is considered to reduce government spending. Applying Japan’s population for Australia would decrease government spending because
of decline of total population. Therefore, the composition of age specific benefits is considered to be the main factor explaining the growth of spending.

![Fig 4 Effects of Population on Spending](image)

4 Benefits and Tax Burdens

4.1 framework

In this section, benefits from government and tax burdens over the lifetime are estimated for all living generations and future generations supposing a sustainability condition. Future government spending is given as in figure 3. Tax revenue is assumed to meet the spending in every year. This assumption means that present value of future liability of the government will be constant at the initial level.

Benefits are assumed to be distributed among 81 generations (age 20 to 100+) by age-benefits profile which is in figure 2. Tax is also distributed among generations in the following manner. First, tax revenue is divided into ‘Tax on Income,’ ‘Tax on Consumption,’ and ‘Tax on Wealth’ using National Accounts. Second, age-income profile, age-consumption profile and age-wealth profile are made using Household Expenditure Survey and Government Benefits, Taxes and Household income. Third, tax rate for each tax base are calculated for every year t, as
\[
\tau_i' = \frac{(\text{Tax on Income})_i}{\sum_{i=20}^{100} \text{Income}_i \times \text{average tax rate}_i},
\]
\[
\tau_i^C = \frac{(\text{Tax on consumption})_i}{\sum_{i=20}^{100} \text{consumption}_i},
\]
\[
\tau_i^W = \frac{(\text{Tax on Wealth})_i}{\sum_{i=20}^{100} \text{Wealth}_i}.
\]

4.2 Results

Benefits and tax burdens are summing up for each generation over their lifetime. Figure 5 shows net payments to government for selected generations. Net payment means tax burden minus benefits over the lifetime, and is defined as present value discounted by interest rate which is assumed to be constant 5%.

Negative net payments for 70+ Australian and 50+ Japanese mean that they will receive net benefits for their lives from now. The largest net benefit is around 500 thousand dollars for Japanese age 70. Younger generations and future generations pay tax more than they receive benefits. The largest net payment is around 400 thousand dollars for Australian age 20.

Fig. 5 Net Payments to the Government
Comparing net payment for same generation, we find that Australia’s are larger for 20+ and Japan’s are larger for younger than 20. This result reflects both age-benefit profile and age-tax profile. Excluding benefits, we find in figure 6 that Australian tax burdens are larger for only 60+. This suggests that Japan’s benefits for elderly would be larger. There may be two factors explaining larger tax burden for Japanese younger generations. One is the amount of needed tax revenues in the future to meet government expenditures in Fig. 3, which is in fact larger for Japan. The other is concerning tax structure including both tax composition in table 2 and age-tax profile.

Fig. 6 Tax Burden over the Lifetime

To examine the latter presumption, let the tax composition and age-tax profile exchange for each other. Fig. 7 and Fig. 8 indicate that tax structure affects tax burden over lifetime for all generations. Applying Japan’s tax for Australia, tax burdens for age 0 and future generations would increase. Whereas Australia’s tax would increase tax burden for age 20+ Japanese. Therefore Japan’s tax structure imposes more for young generations.
Fig. 7 The Effect of Tax Structure on Tax Burden

Fig. 8 The Effect of Tax Structure on Tax Burden

5 Conclusion

Tax burdens estimated in this paper are determined by total amount of tax revenue and tax structure. The assumption that tax revenue is equal to government expenditure in every year makes diminish the intergenerational inequality of net payments which has suggested by many studies
concerning Generational Accounting. Generational Accounting assumes not balanced budget in every year but balanced over long term, because the main purpose of Generational Accounting is to show that the inequality of net payments between living generations and future generations would arise if going policy unchanged.

On the contrary, this paper assumes tax policy would be changed to equalize revenue and expenditure. Balanced budget constraint imposed in this paper enables to compare Australia and Japan, since leaving Japan’s budget imbalance would underestimate Japan’s tax burden.

If Japan’s government could design tax system freely, Australia’s tax structure would be attractive in the sense that it could reduce tax burden for young and future generations.
References
OECD (2005) OECD in Figures