A Quantitative Analysis for Required Adjustments for Japan’s Fiscal Policy

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Abstract

The purpose of this paper is to examine the feasibility of Japan’s future fiscal and social security policies from the view of government’s inter-temporal budget constraint, given the current large debt outstanding.

Towards this end, we draw the long-run future trajectory of fiscal expenditure and revenue under the assumption that the current fiscal policies would be maintained throughout the future period. For that purpose, we adopt the methodology used by the European Commission (EC) which sorts out expenditure items that are automatically linked to demographic change, and obtain comprehensive bottom-up trajectories, accurately reflecting the indexation rule to price and wage levels.

In addition, by using the trajectory, we calculate what is called a dynamic fiscal imbalance indicator, measuring the magnitude of required fiscal adjustment to satisfy the government’s inter-temporal budget constraint. We follow the method first proposed by Blanchard et al. (1990), later used by the EC (2012a).

The calculated figure of required adjustment to achieve the same debt to GDP ratio target as the European Union is 19.9%. This magnitude and several sensitivity analyses clearly show that current fiscal policies in Japan are by far distracted from satisfying inter-temporal budget constraint and achieving efficient inter-temporal resource allocation, since the private agents must formulate expectations on uncertain significant policy change in the future.

Keywords: fiscal sustainability, public debt, primary fiscal balance

JEL classification codes: C53, E27

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1. Introduction

The purpose of this paper is to examine the feasibility of Japan’s current fiscal and social security policies from the view of government’s inter-temporal budget constraint, given the large debt outstanding and the evolution of demographic structure. If the current fiscal policy satisfies the government’s inter-temporal budget constraint, it is apparent that the government fiscal position is solvent. We can call this situation the government’s “dynamic fiscal control” being operative.

There has been growing concern about Japan’s large and increasing debt outstanding and its fiscal sustainability. The size of sovereign debt outstanding relative to the whole economy (gross domestic product) is the highest among the developed countries. In addition, it is well known that the demographic structure is dramatically changing in Japan with a declining birthrate and increasing longevity. Therefore, the government’s future fiscal activities should be carefully examined by consideration of these effects.

What we wish to show in this paper is to draw the long-run future trajectory of fiscal expenditure and revenue under the assumption that the current fiscal policies would be maintained throughout the future period in Japan. In order to make the future trajectory, we adopted the methodology used by the EC (2012a), which presents long-term projections of the budgetary impact of the aging population.

First we make the trajectories for “age-related expenditures”, which are directly linked to demographic structure, and incorporate indexation rules for them. Then non-age-related expenditures and revenues are extended under the assumption of no policy change and removing any cyclical and temporary factors. Next, by making use of the derived trajectories, we draw the trajectory of primary fiscal balance, i.e., revenue less non-interest expenditure, based on current policies.

Then, we calculate the required adjustment for satisfying government’s inter-temporal budget constraint. This method was first proposed by Blanchard et al. (1990), and later widely used to quantitatively assess the fiscal sustainability in a forward looking manner. The difference is called a ‘primary gap indicator’ by Chalk and Hemming (2000), and a ‘sustainability gap indicator’ by the EC (2006). We call this gap an indicator of ‘dynamic fiscal imbalance’, since it shows how far the current policies are from the situation of government’s ‘dynamic fiscal control’.

This calculation enables us to consolidate future demographic change, current deficit and debt outstanding
into a single framework for the analysis of fiscal sustainability. The Congressional Budget Office in the United States (CBO [2011]) uses this concept for U.S. federal budget sustainability, and IMF’s “Fiscal Monitor” releases the “Illustrated Adjustment Needs” for each country.\textsuperscript{4}

In this paper, we fully apply the methodologies adopted in the EC (2012a, 2012b) to Japan, incorporating the contents of the comprehensive reform of social security and tax, of which a law was passed in August 2012. Then we compare the magnitude of increments of age-related expenditures and dynamic fiscal imbalances with European Union member countries.

This paper is organized as follows. First, in Section 2, we explain the methodology of making trajectories of future expenditures and indicators for fiscal sustainability proposed by Blanchard et al. (1990), referring to the EC (2012a, 2012b). Then we briefly describe other preceding works for Japan’s fiscal policy, and explain the differences between them and the analysis in this paper. In Section 3, we show the results of future trajectories of expenditure and revenues, and point out the issues which will affect the results. The results of the calculation for the magnitude of Japan’s dynamic fiscal imbalance are shown in Section 4, and some sensitivity analyses are implemented in Section 5.

2. Methodologies and related preceding works

To examine the feasibility of Japan’s future fiscal policy, we focus on the appropriate future projections and the magnitude of required adjustment from the view of satisfying the government’s inter-temporal budget constraint. This is based on the theoretical framework proposed by Blanchard et al. (1990), and used by the EC (2012a, 2012b). These analyses make future trajectories of fiscal balance under the assumptions of no policy change and calculate the magnitude of required adjustment. The appropriately calculated indicators will provide useful quantitative guidelines to help us understand the required government policy, as well as to compare the fiscal situation among advanced countries in a comprehensive manner.

Next, we introduce several preceding works on future trajectories of government expenditures and the magnitude of required adjustment in Japan, and explain the differences in objectives, methodologies and data among them.

\textsuperscript{4} IMF (2013) discusses how the magnitude of the required adjustment are calculated.
2.1 How to construct the future trajectories of government expenditures and revenues: Coverage and classification

First, we explain the coverage of the projection in the whole public sector. In the analyses by the EC and other international organizations, it is common to focus on “general government” (GG), including central, local governments (CLG) and social security funds (SSF), according to the System of National Accounts (SNA). Since Japan’s fiscal system involves large transfers between CLG and SSF, it is important to look at the future evolution of social security benefits from SSF in order to obtain clear future trajectories of fiscal positions under demographic changes. The revenues of general government include tax and social contribution, and in the following analysis, we do not make any distinctions between them as financial resources for future expenditure.

The EC (2012b) classifies the expenditure items of general government into two categories, i.e., “age-related expenditures” (ARE) and “non-age-related expenditures” (NARE). The former includes pensions, health care, long-term care, education and unemployment benefits, and the projections for them, except for pensions, are run on a common projection model reflecting demographic change. The latter is assumed to stay constant as a share of GDP under the no-policy change assumption. We follow the EC’s method, and, in addition, treat the public assistance and child allowances as ARE in Japan.

There has not been a single projection of general government expenditures by Japan’s government. The Fiscal System Council (2007) conducted the CLG projection for 2050, and the Ministry of Health, Labor and Welfare (MHLW) showed the future trajectory of pension benefits and social contribution for pensions by 2105. In addition, National Congress of Social Security (NCSS, 2008) and MHLW (2011) show the future trajectory of medical and long-term care expenditure until 2025. Since they lack the common assumptions and methods for future projection, it is difficult to depict the whole picture.

Broda and Weinstein (2005) put out a future projection of Japan’s general government expenditures. But their analysis was different from the EC in that they separated all expenditures into “expenditures for those over the age

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5 The projection of unemployment benefit are based on the forecast for labor market in each country, but it is more affected by short- and medium-term cyclical fluctuations than by long-term demographic waves. Since its age-related feature is much weaker than other age-related expenditure items, “strictly-age-related spending” in the EC’s analysis does not include it.

6 The projections for pensions are run by the member states using their own national models, capturing the country-specific circumstances and different pension legislations.

7 The 2009 Actuarial Valuation of the Employees’ Pension Insurance and the National Pension, published by MHLW.

8 See the “Simulation Results of Future Medical Care and Long-Term Care Expenditures”.
of 65” (pensions, medical and long-term care) and others. The problem in their analysis was that they regarded the other expenditures as “expenditures for those under the age of 65”, and extended them in their projection by the sum of the growth rate (rate of decline) of the young population and GDP growth rate.\(^9\) It means that the size of other expenditures will shrink much faster than the GDP growth rate, although there is no firm theoretical explanation or empirical evidence that the expenditure can go along the way.\(^10\)

2.2 How to construct the future trajectories of government expenditures and revenues:

Linkages between age-related expenditures and macroeconomic variables

Secondly, we discuss the methodologies for making future trajectories of age-related expenditures. The model used in the EC (2012b) stipulates that under the assumption of “no policy change” the real values of benefits and costs per person (or per user) within each age group are assumed not to change in the future. In order to keep the real values fixed, it carefully considers the linkages between economic variables, especially inflation and change of wage, and per capita expenditures of each entitlement item. For example, as for health care expenditures, the EC (2012b) assumes that the unit cost will grow at the pace of GDP per capita, and for long-term care and education, it uses GDP per hours worked, i.e., growth rate of wage.\(^11\) Since the linkage reflects the evolution of cost of input in the long run, this methodology is appropriate when we focus on the long-term projection and we will adopt it in the following analysis. It should be noted that under the methodology the projected long-term social security benefits relative to GDP will not change under different macroeconomic variables (price or wage) in the long run.

The projections of Japan’s health care and long-term care expenditures by NCSS and MHLW are based on the methodology that the linkages between the unit costs and economic variables are much weaker. This causes significant differences in the long-term benefits to GDP ratio under different assumptions about future economic variables. For example, the higher the assumptions about the economic growth rate, the lower the ratio of health care and long-term care in those projections.

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\(^9\) According to growth accounting, the GDP growth rate already incorporates the decline of young people.

\(^10\) See Ueda and Sugiura (2011) for a detailed explanation.

\(^11\) The scenario adopted by the EC (2012a) assumes that the income elasticity of demand for health care expenditure exceed unity in the base year and converges to 1 by 2060. It considers growing expectations and social pressure to catch-up with the quality and coverage of health care and the development of medical knowledge and technologies.
2.3 How to construct the future trajectories of government expenditures and revenues:

**Focusing on structural budget deficits for initial budgetary position**

The magnitude of required fiscal adjustment in the EC (2012a) shows the necessary efforts by the government to achieve the debt target or fulfill the inter-temporal budget constraint. In order to figure up the size of the efforts which do not include the improvement of fiscal position due to economic recovery and the abolishment of temporary or one-off issues, it makes use of structural primary balance for the initial budgetary position of each country. The EC (2012a) uses the Commission’s official forecast for structural balance in 2014, which incorporates cyclical adjustment due to evolution of output gap.\(^{12}\)

There is no official figure or forecast for Japan’s structural budget deficit. We consider (1) cyclical fluctuation of tax revenues, (2) temporary stimulus measures by supplementary budgets and (3) one-off transfers, such as transfers of funds from the Special Account for Fiscal Loan Program (FILP) to be subtracted from the headline fiscal deficit to obtain the structural initial budgetary position in Japan.

2.4 How to calculate the required adjustment:

**Definition of government debt and its target level**

In calculating the required adjustment to stabilize debt, the EC (2012a) uses the same definition of government debt as the one adopted in its budgetary surveillance procedures. It is gross debt including currency and deposits, securities, loans and other accounts payable for general government at face value, consolidated between and within the sectors of general government.\(^{13}\)

The definition of Japan’s general government liability in the SNA is similar to the EC’s, but Japan’s number is not consolidated between the sectors of general government. This means that the number of general government liabilities includes the amount held by general government itself (such as government bonds held by social security funds). In order to adjust Japan’s number to the concept used in the EC, we estimated the quantity of government bonds held by local governments and social security funds, subtracted it and obtained 1,016 trillion yen (214.6% of GDP) at the end of FY2011. We have adopted this number as a baseline.

In addition, we consider an alternative definition of debt which does not include the whole amount of

\(^{12}\) The figures of the 2014 forecast include the improvement of fiscal positions due to ongoing fiscal consolidation measures by each country.

\(^{13}\) See the ESA95 manual on government deficit and debt, p197-198.
financial assets held by social security funds and foreign reserves, because those assets can be used for future pension expenditures and redemption of corresponding short-term financial bills. The size of the debt along with the definition was 793 trillion yen (167.6% of GDP) at the end of FY2011.

As for the definition of government debt, Broda and Weinstein (2005) pointed out that the other financial assets held by general government, net assets of entire public corporations, and the monetary base of central banks should also be deducted from the debt outstanding. They advocate that other financial assets and the net assets of public corporations (net of bad assets) can be used for future GG debt redemption, and the monetary base (cash and current account deposit that correspond to the government bonds held by central banks on the asset side) does not have to be reimbursed to the private sector in the future. We do not adopt their proposal for the following reasons. With regard to the first point, it is difficult to make a credible estimate for the future market value of other financial assets (including investment in public corporations) and net assets of public corporations. With regard to the second point, it is likely that the depressed opportunity cost of holding cash under the extremely low interest rate policy might be temporally boosting the demand for cash by private sectors. As a reference, we would like to use the size of debt which does not include all of the financial assets held by the government, which was 584 trillion yen (123.4% of GDP) at the end of FY2011.

3. Results of future trajectories of government expenditures

3.1 Demographic and economic assumptions

Future demographic and economic assumptions are key input variables for projection. As a demographic assumption, we use the intermediate estimate of the future population projection of the National Institute of Population and Social Security Research (NIPSSR) published in 2012 (NIPSSR [2012]).

Regarding assumptions about future economic variables including GDP growth rate and interest rate, we use the ‘Fiscal 2013 Economic Outlook’ until FY2013, and the projection results of the Cabinet Administration Office (CAO) in August 2012 (Economic and Fiscal Projections for Medium to Long Term Analysis) until FY2023. After FY2024, we use the same assumptions as those in the Actuarial Valuation Report of the public pension system (MHLW [2009]), the intermediate case (inflation rate is 1.0%, real wage growth rate is 1.5%, and rate of return on
investment is 4.1%).

If we follow the methodologies adopted in this paper, the future expenditures and revenues are linked to the GDP growth. The results of sustainability analysis are not affected by the assumptions about the level of economic growth rates, but strongly affected by the gap between economic growth rates and effective interest rates. The EC (2012a) uses the assumption that real interest rates will converge to 3% and the growth rate of labor productivity will converge to 1.5%, and the gap between interest rate and growth rate will be expected to stay around 1-1.5%. The IMF’s “Fiscal Monitor” uses a different method, where it assumes that the rate will be affected by the level of debt to GDP ratio and converge to a model-induced level. It should be noted that such differences in assumptions may cause large discrepancies between the figures of dynamic fiscal imbalances, and it is important to look into the sensitivity analysis regarding interest rate.

3.2 Results of future trajectories and comparison with European countries

Figure 1 depicts the projected change of age-related expenditures. For the pensions, the ratio to GDP is expected to remain unchanged for a while, because gradual increases in the eligibility age under current legislation and the execution of the ABM offset the increasing pressure by population aging. As for the expenditures of health care and long-term care, there is a clear increasing trend until 2060 due to aging, since per capita (user) costs are much larger for elderly people for these expenditures. The expected reduction in the number of children will result in a decrease in the expenditures on education and child allowances. However, the decrease is far less than the increase in health and long-term care expenditures.

14 The assumptions in the report are constructed on the growth accounting theory with a Cobb-Douglas production function. The long-term total factor productivity growth rate is assumed to be 1.0%, and the total investment rate (total investment divided by GDP) is assumed to be gradually declining in the future along with the reduced trend of labor force population. The growth rate of real wage is estimated to be the sum of the GDP growth rate per hour and the average employees’ hours worked. Since the real long-term interest rate has been proportional to the profit rate (profit divided by capital stock), the future interest rate is estimated by multiplying the estimated future profit rate by the average ratio of the real long-term interest rate to the profit rate. Since the rate of the diversified investment effect is assumed to be 0.3-0.5%, the interest rate of the 10-year maturity government bond is assumed to be 3.7% (4.1% - 0.4%) in the long run.
Figure 1 clearly shows that the increasing trend of the total age-related expenditure relative to GDP continues toward FY2060 in Japan. Figure 2 shows the comparison of projected change in strictly age-related expenditure (pensions, health care, long-term care and education) compared to European countries. The overall (strictly) age-related expenditure is expected to be 31.8 of GDP in FY2060, 8.7% points higher than FY2010. The amount of the projected change is one of the highest in Figure 2, mainly due to the increase of health care and long-term care expenditures.
3.3 Issues on each expenditure item

3.3.1 Public pension expenditure

The public pension system in Japan has a two-tier structure. The first-tier National Pension (NP) system caters to those who have made contributions for more than 25 years with a flat-rate basic pension. The second-tier system, which consists of Employees’ Pension Insurance (EPI) in the private sector and Mutual Aid Associations (MAAs) of civil servants, provides ex-employees with earnings-related pensions.

The government implemented an actuarial valuation in 2009 reporting the future perspective of the benefits and contributions of the public pension based on the assumptions of social and economic conditions. In the valuation, actual data about per capita amounts of pension benefits for each age in FY2007 were used as basic input, and the price and wage indexation rules and gradual increase in the EPI eligibility age under current legislation were fully incorporated.

The most important part for the projection of pension expenditure is the operation of the automatic balancing mechanism (ABM) introduced in the 2004 reform. The ABM stipulates that the pension indexation is modified to decrease the pension benefit level in line with the decrease in population and the increase in life expectancy in order to assure that the inter-temporal budget constraint of the public pension system can be satisfied.\(^{15}\) We calculated the future pension benefits which reflect the ABM under the assumptions of the demographic and economic variables in this paper.\(^{16}\) The result shows only the gradual increase until the 2030s, due to the operation of the ABM and the rise of the eligibility age of EPI, while the replacement ratio will go down to 43.8% after 2049.

It should be noted that there is a risk of increase in the future pension expenditure that does not appear in the projection. The future projection of the pension expenditure will be affected by the future decline or the volatile movements of price and wage level, because of the asymmetry of the indexation rules. If we face both conditions that the nominal wage inflation is lower than the CPI inflation (i.e., real wage deflation) and the nominal wage inflation is lower than zero (i.e., nominal wage deflation), the pension benefit is not lowered according to the

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\(^{15}\) The definition of satisfying the inter-temporal budget constraint is that the level of both reserve funds of NP and EPI after 95 years is expected to be enough for each one-year spending of the overall pension benefit with the future revenues under existing laws.

\(^{16}\) In making the projection, we omitted the requirements of keeping the replacement ratio more than 50% under the current law. It is stipulated in the law that the pension benefits should not be reduced excessively due to the ABM, and if the replacement ratio is expected to fall below 50% within the next five years, the ABM should be terminated and drastic reviews must be carried out for pension schemes as a whole, although any concrete measures are not mentioned.
deflation of nominal wage. This results in an increase in the relative size of the pension expenditure to GDP.

In addition, the current pension benefit level is higher than the permanent benefit level on a provisional basis, and the ABM will not be activated unless the permanent benefit level exceeds the provisional level. Even after the ABM is activated, full adjustment will not be made if the price and wage inflation rate stay low, because the ABM modified indexation rates (CPI or wage inflation rate: adjustment factors) are not allowed to be negative. Therefore, if the price and wage inflation rate become negative, or even volatile rather than as in the baseline assumptions, the spending projection of the pension expenditure can be upward shifting.

3.3.2 Health care expenditure

Regarding the future projection of health care expenditure, we use the average per capita total medical costs in FY2010 (National Medical Expenditure data) by age as basic input, and assumes that all the per capita costs grow at the growth rate of GDP per capita. By subtracting the expenses borne by the patient and the public support programs (such as the social assistance programs) from the total medical costs, we can obtain the magnitude of expenditure for health care benefits provided by the public insurance system.

The projections by the OECD (2006) and CBO (2007) use ‘excess growth costs’ that represent the additional costs in the future resulting from the introduction of advanced medical care, considering the past historical trends of medical care costs. It should be noted that if we consider these additional costs, the projection results would be much larger than the one in this paper.

3.3.3 Long-term care expenditure

The future prospects of long-term care spending uses the average costs per user in FY2011 by age, care level, and kind of service as basic input. The share parameters, such as the users for services and the numbers of people certified at each care level, are assumed to be constant, and all the costs per user will grow at the growth rate of wage, as in the EC (2012b).

3.3.4 Education

The expenditure for education consists of the costs for public schools, colleges, and universities, and the subsidies for private institutes. The future prospects for the expenditure are associated with the number of students
and the cost per student. We assume that the number of teaching staff per student is the same for each grade of education as in FY2011 and the cost per teaching staff will change at the rate of wage growth. It should be noted that the past trend of the number of teaching staff per student had been increasing in Japan, and the result in the projection may be rather optimistic compared to the past trend.

3.3.5 Unemployment benefits

We estimate the cyclical component of current expenditures as a whole and use the expected future expenditure corresponding to the evolution of the actual unemployment rate that will gradually converge to the equilibrium unemployment rate in the long run. The equilibrium unemployment rate was estimated using historical data and assumed to be constant in the future.

3.3.6 Child allowance and public assistance

Child allowance is cash payment from the government to parents with children that have yet to graduate from a junior high school. The amount of allowance per child is 10,000 yen or 15,000 yen per month after FY2012. The future expenditures can be simulated under the assumption that the nominal amount per child will not change in the future.

The public assistance system provides cash and transfers in kind, i.e., health and long-term care services, for those who have trouble making a living despite utilizing all their assets and abilities. The ratio of beneficiaries varies by age and the application ratio for public assistance programs is much higher for elderly people. This is the reason why we should treat this expenditure as age-related. We use the data on the proportions of beneficiaries to the total population by age group in FY2010, under the assumption that the future amounts of payments per beneficiary are growing with the wage growth rate.

Due to the increase of elderly people without right to receive a sufficient level of pension, it is expected that the application ratio of beneficiaries to public assistance will rise in the future in Japan. In this respect the projection may entail a risk of under-estimation of future fiscal needs.

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17 The amount of allowance is dependent on the number and the age of children.
3.4 Trajectory of non-age-related expenditures

The non-age-related expenditures are assumed to grow with the same rate as the GDP growth rate, as in the EC (2012a). This means that the total share of the non-age-related public goods to GDP does not change in the long run. It is consistent with Japan’s historical data, because major changes in the whole size of government expenditure relative to GDP have occurred due to the upward shifting of age-related expenditures.

In order to get rid of temporary and one-off issues, we regard supplementary budgets and the spending for recovery and reconstruction from the earthquake in 2011 as temporary measures. Since large supplementary budgets were formulated in FY2012 and most of the expenditures will be carried over to FY2013, the headline fiscal deficit numbers in FY2012 and FY2013 are far from the structural one. It is assumed that the expenditures corresponding to the initial budget and local financing program of FY2013 except for recovery and reconstruction spending will grow along with the GDP growth rate after FY2014. This means that the relative size of non-age-related expenditure to GDP is assumed to be kept at 14.8%, while its historical average for the last 30 years was 16.1%.

3.5 Trajectory of general government revenues

The conventional method of extracting the cyclical component of the tax revenues is multiplying the elasticity of tax to GDP to output gap. However, it has been pointed out that the elasticity of the tax base to GDP may be time-varying, and such a simple method may cause serious misunderstandings as summarized by Larch and Turrini (2009). Ueda, Ishikawa and Tsutsui (2011) analyzed the factors affecting the volatile movements of Japan’s corporate income tax revenue and found that the sticky movements of the compensation of employees and the fluctuations of asset prices had caused time varying fluctuations in the corporate income tax base, and calculated the structural level of tax revenue relative to GDP.

In this paper, we use the result of their analysis, and assume that the tax revenue will be changing along with the output gap until 2023, and after 2024, the ratio of tax revenue to GDP remains constant at the structural level. Since we also incorporate the results of the tax reform in FY2014 and FY2015, the ratio of tax revenue to GDP will be gradually increasing and reach 19.3% in FY2016.

As for the social contribution, under the current legislation, the contribution rate for public pension is determined to be increased every year until 2017 (18.3% of the compensation of the employees for EPI). Pension
contribution after 2018 and other contributions after 2014 are assumed to grow at the GDP growth rate. Figure 3 shows the results of the government revenue projection, and we can understand that the level of structural burden under the assumptions after 2024 in this paper is 34.7% of GDP.

**Figure 3: The result of the revenue projection (relative to GDP)**

4. Magnitude of Japan’s dynamic fiscal imbalance

The total primary expenditure can be calculated as the sum of the age-related expenditure items and the non-age-related expenditure. The difference between the primary revenues and expenditures shows the path of the future primary balance of GG as in Figure 4.

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18 It is also stipulated that social contributions for health and long-term care should be set linked to the increase in the corresponding benefits. However, it is not widely understood or anticipated due to lack of official projections.
Until the mid-2010s, the primary balance is expected to improve, since the tax revenue to GDP ratio will increase along with the rise of the consumption tax rate and gradual elimination of negative GDP gap. The withdrawal of additional spending measures also contributes to the improvement. However, after the mid-2010s, the results of the primary balances directly reflect the progress of aging and the increase in age-related spending. As a result, the primary balance will deteriorate in the long-run, and reach -11.4% to GDP in FY2060.

Based on future trajectories of primary balance, the EC (2012a) makes two indicators which assess medium-term and long-term fiscal sustainability. The former indicator, S1, shows the magnitude of adjustment effort required to be gradually introduced until 2020 and then sustained to bring debt ratios to 60% of GDP in 2030. The latter, S2, shows the required adjustment to fulfill the inter-temporal budget constraint.

The calculated figure of Japan’s S1 is 19.9% to GDP. This means that the structural primary balance is assumed to be linearly improving by 2.5% to GDP through 2020 to achieve the same debt target as the European Union. Figure 5 shows the comparison of S1 indicators in Japan and EU member countries in 2012, and its components.19 It is apparent that Japan’s number is much larger than all of the EU member states, due to Japan’s extremely high debt to GDP ratio and large current fiscal deficit.

19 The EC (2012a) does not show the indicators for Greece, Ireland or Portugal, because these are under frequent assessment of the EU’s programs.
The alternative definition of debt target significantly changes the magnitude of the S1 indicator. Here we consider adjusted debt level which does not include the whole amount of financial assets held by social security funds and foreign reserves. The initial position of debt to GDP ratio is 167.6% at the end of FY2011, and the corresponding S1 indicator is 16.3% (“adjusted debt 1” in Figure 5).

As a reference, we show the number (“adjusted debt 2” in Figure 5) if we adopt the other definition of debt, which does not include all of the financial assets held by the government, currently 123.4% of GDP at the end of FY2011, and the target level is the same as the level in FY2012 (133.4%), not 60%. The number of 13.0% is much smaller than the one calculated by the same method as the EC, but the magnitude of required adjustment is still larger than any other EU member country.

According to the methodology used by the EC (2012a), Japan’s S1 indicator number (19.9%) can be decomposed into four elements. The first one is IBP (initial budgetary position), which is 7.7%, shows the gap between the current structural primary balance and the long-term debt-stabilizing primary balance, which includes current structural primary balance and size of adjustment in order to keep the debt to GDP ratio constant at the current level. The second element is COD (cost of delay), which is the additional adjustment due to gradual improvement of balance until 2020, and the number is 4.2%. The third element, COA (cost of aging, or long-term
cost) component, contributes to 0.1% points of the S1, which shows that in the short term age-related expenditures do not play an important role, if the ABM fully works in the pension system. The fourth element is the adjustment necessary to reach the debt target in FY2030 (DR, debt requirement), which is 7.9% of GDP.

The calculated figure of Japan’s S2 is 12.9% to GDP. Figure 6 shows the comparison of S2 indicators in Japan and EU member countries in 2012. The decomposition shows that the IBP is 9.7% and the COA is 3.2%. It clearly reveals that age-related costs are the main risk of Japan’s fiscal position from the long-term perspective.

![Figure 6: The comparison of S2 indicators with European countries](image)

5. Sensitivity analysis for dynamic fiscal imbalance

The results of the primary gap indicators are heavily dependent on the projections of future expenditures. We have to note that the impact of the projected increase in the age-related expenditures on the indicators is non-linear and subject to the time path of the future expenditures as well as the discount factor of the growth adjusted interest rate.
5.1 Sensitivity analysis (1): interest rates

Figure 7 shows the results of S1 and S2 indicators under different assumptions about interest rate. The assumption about the interest rate affects the results of the dynamic fiscal imbalances through several routes. A clear channel is that lower interest rates reduce the cost of finance of the current debt and deficit, but increases the discounted value of future spending. The other channel through the pension system is that the declining yield of the reserve makes it difficult to satisfy the inter-temporal budget constraint, and restrains the future benefit by extending the ABM period.

**Figure 7: Indicators under alternative interest rate assumptions**

<table>
<thead>
<tr>
<th>Interest rate</th>
<th>S1</th>
<th>Initial Budgetary Position(1)</th>
<th>Initial Budgetary Position(2)</th>
<th>Cost of Delay</th>
<th>Debt Requirement</th>
<th>Cost of Ageing</th>
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</thead>
<tbody>
<tr>
<td>+1.0%</td>
<td>22.3%</td>
<td>5.1%</td>
<td>4.8%</td>
<td>5.0%</td>
<td>7.2%</td>
<td>0.2%</td>
</tr>
<tr>
<td>+0.5%</td>
<td>21.1%</td>
<td>5.1%</td>
<td>3.7%</td>
<td>4.5%</td>
<td>7.5%</td>
<td>0.2%</td>
</tr>
<tr>
<td>Baseline</td>
<td>19.9%</td>
<td>5.1%</td>
<td>2.6%</td>
<td>4.2%</td>
<td>7.9%</td>
<td>0.1%</td>
</tr>
<tr>
<td>-0.5%</td>
<td>18.8%</td>
<td>5.1%</td>
<td>1.6%</td>
<td>3.8%</td>
<td>8.2%</td>
<td>0.1%</td>
</tr>
<tr>
<td>-1.0%</td>
<td>17.7%</td>
<td>5.1%</td>
<td>0.5%</td>
<td>3.5%</td>
<td>8.6%</td>
<td>0.0%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Interest rate</th>
<th>S2</th>
<th>Initial Budgetary Position(1)</th>
<th>Initial Budgetary Position(2)</th>
<th>Cost of Ageing</th>
</tr>
</thead>
<tbody>
<tr>
<td>+1.0%</td>
<td>14.7%</td>
<td>5.1%</td>
<td>6.6%</td>
<td>3.1%</td>
</tr>
<tr>
<td>+0.5%</td>
<td>13.8%</td>
<td>5.1%</td>
<td>5.6%</td>
<td>3.1%</td>
</tr>
<tr>
<td>Baseline</td>
<td>12.9%</td>
<td>5.1%</td>
<td>4.7%</td>
<td>3.2%</td>
</tr>
<tr>
<td>-0.5%</td>
<td>12.1%</td>
<td>5.1%</td>
<td>3.7%</td>
<td>3.3%</td>
</tr>
<tr>
<td>-1.0%</td>
<td>11.3%</td>
<td>5.1%</td>
<td>2.8%</td>
<td>3.4%</td>
</tr>
</tbody>
</table>

Since the value of the primary gap indicators is determined by the sum of these effects, even the direction of the change of the indicators is not theoretically clear. As a result of simulation, under the assumption of a 1% lower interest rate, the S1 decreases from 19.9% to GDP to 17.7 % to GDP. On the other hand, under the 1% higher interest rate, the S1 increases to 22.2% to GDP.
5.2 Sensitivity analysis (2): inflation

It is not obvious whether inflation has effects on fiscal sustainability. It is true that unexpected inflation can reduce the real value of nominal debt, but the impact is just one time. If we recognize that expenditures and revenues will grow along with inflation, such as application of indexation rules for pensions, the effects of inflation are rather limited. Here we look at the results of simulation with 1% higher and lower inflation rates. In long-term analysis, inflation may be reflected in nominal interest rate, and there is no significant change of indicators under the different scenario.

The possible effect on the ratio of expenditure to GDP is that we cannot operate the ABM in the pension system under the lower inflation rate. This will cause relatively higher pension benefit for a while, and deterioration of primary balance relative to GDP. This is the reason why the indicators under lower inflation rates become larger than the baseline cases.

**Figure 8: Indicators under alternative inflation and wage growth rate assumptions**

<table>
<thead>
<tr>
<th>S1</th>
<th>Initial Budgetary Position(1)</th>
<th>Initial Budgetary Position(2)</th>
<th>Cost of Delay</th>
<th>Debt Requirement</th>
<th>Cost of Ageing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inflation and wage growth rate +1%</td>
<td>19.7%</td>
<td>5.1%</td>
<td>2.6%</td>
<td>4.1%</td>
<td>7.9%</td>
</tr>
<tr>
<td>Baseline</td>
<td>19.9%</td>
<td>5.1%</td>
<td>2.6%</td>
<td>4.2%</td>
<td>7.9%</td>
</tr>
<tr>
<td>Inflation and wage growth rate -1%</td>
<td>20.4%</td>
<td>5.1%</td>
<td>2.7%</td>
<td>4.3%</td>
<td>7.9%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>S2</th>
<th>Initial Budgetary Position(1)</th>
<th>Initial Budgetary Position(2)</th>
<th>Cost of Ageing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inflation and wage growth rate +1%</td>
<td>12.8%</td>
<td>5.1%</td>
<td>4.6%</td>
</tr>
<tr>
<td>Baseline</td>
<td>12.9%</td>
<td>5.1%</td>
<td>4.7%</td>
</tr>
<tr>
<td>Inflation and wage growth rate -1%</td>
<td>13.2%</td>
<td>5.1%</td>
<td>4.7%</td>
</tr>
</tbody>
</table>

It should be noted that the expected increase in the tax revenue to GDP ratio due to the economic recovery is already incorporated into the calculation of the indicators in the baseline scenario. If we assume that the non-age-related expenditures are not linked to the GDP growth rate but follow other restraint rules, the assumptions about the GDP growth rate will directly affect the results of the indicators.
5.4 Sensitivity analysis (3): population

If we consider the different scenarios for the future population, we have to take into account their effects on government expenditures and economic assumptions. In this paper, we consider the economic growth rate to be the sum of the wage inflation rate and the change in labor force based on alternative demographic assumptions. Under this hypothesis, the pessimistic (that is, with lower birthrate and increasing longevity) demographic assumptions will apparently lead to a rise in the relative size of the age-related expenditures to GDP due to the higher costs of medical and long-term care for the elderly people. As for pensions, however, since increasing longevity means less overall benefit by the ABM, the differences between the alternative demographic assumptions will be small. The results of the age-related expenditure are shown in Figure 9.

Figure 9: Age-related expenditures under alternative population assumptions

Figure 10 shows S1 and S2 indicators under different demographic assumptions. In the case of high birth rate and high mortality rate along with the NIPSSR optimistic scenario, the S2 decreases from 12.9% points to 11.9% points. Similarly, in the case of low birth rate and low mortality rate along with the NIPSSR pessimistic scenario, the S2 increases to 14.0% points.
Figure 10: Indicators under alternative population assumptions

<table>
<thead>
<tr>
<th></th>
<th>S1</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Initial</td>
<td>Initial</td>
<td>Cost of Delay</td>
<td>Debt</td>
<td>Cost of Ageing</td>
</tr>
<tr>
<td></td>
<td>Budgetary</td>
<td>Budgetary</td>
<td></td>
<td>Requirement</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Position(1)</td>
<td>Position(2)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>High birth rate and</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>High mortality rate</strong></td>
<td>19.7%</td>
<td>5.1%</td>
<td>2.6%</td>
<td>4.1%</td>
<td>7.9%</td>
</tr>
<tr>
<td><strong>Baseline</strong></td>
<td>19.9%</td>
<td>5.1%</td>
<td>2.6%</td>
<td>4.2%</td>
<td>7.9%</td>
</tr>
<tr>
<td><strong>Low birth rate and</strong></td>
<td></td>
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<td></td>
</tr>
<tr>
<td><strong>Low mortality rate</strong></td>
<td>20.2%</td>
<td>5.1%</td>
<td>2.7%</td>
<td>4.2%</td>
<td>7.8%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>S2</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Initial</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Budgetary</td>
<td></td>
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<td></td>
</tr>
<tr>
<td></td>
<td>Position(1)</td>
<td>Position(2)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>High birth rate and</strong></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td><strong>High mortality rate</strong></td>
<td>11.9%</td>
<td>5.1%</td>
<td>4.1%</td>
<td></td>
<td>2.7%</td>
</tr>
<tr>
<td><strong>Baseline</strong></td>
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<td>4.7%</td>
<td></td>
<td>3.2%</td>
</tr>
<tr>
<td><strong>Low birth rate and</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Low mortality rate</strong></td>
<td>14.0%</td>
<td>5.1%</td>
<td>5.2%</td>
<td></td>
<td>3.7%</td>
</tr>
</tbody>
</table>

6. Concluding remarks

In this paper, we have shown the volume of required fiscal adjustments to achieve particular debt level targets similar to the European Union or fulfill inter-temporal budget constraint according to the methodologies adopted by the EC (2012a, 2012b). In the medium-term, the extensive debt level and large structural primary deficit brings the S1 indicator to 19.9%, while in the long-term the increase of health and long-term care results in bringing the S2 indicator to 12.9% under standard assumptions. Those numbers are quite large and surpass the ones in European countries where they have medium-term objectives and plans for implementing fiscal consolidation year by year.

Therefore, it is apparent that Japan’s government does not satisfy inter-temporal budget constraint without a significant amount of adjustment for expenditures and revenues under future demographic change. It means that households and firms in Japan must formulate some uncertain expectations on future policy changes by the government in deciding their activities. For any positive analyses of the behavior of consumers and firms in Japan, it is critical to consider their expectations for future policy changes.
In the future, the government has to implement such policy changes. It requires a clear quantitative guideline for the policymakers and the public people. The indicator of dynamic fiscal imbalance which shows the required figures to achieve ‘dynamic fiscal control’ for the whole government is a good candidate for it. In order to clarify what the number means and make it understood, it is important to define what the “current policy” means, and show the effects of economic growth and inflation on these numbers. It requires further careful consideration for the interaction between macroeconomic variables and fiscal expenditures and revenues.

Reference


