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The Fiscal Stance in Japan

A Model-based Analysis

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ABSTRACT: This paper assesses Japan's fiscal stance in the past and the future with a stochastic structural model called the Buffer-Stock Model of the Government. Our retrospective analysis suggests that the fiscal stance in the 1990s and the early 2000s was overall looser than the model recommendations. As for the future, the model advises the near-term fiscal policy to be supportive with a view to narrowing the output gap and minimizing hysteresis, while recommending a fiscal consolidation over the medium-term at a gradual pace.

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WORKING PAPERS

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1. Introduction

Since the asset price bubble burst in the early 1990s, the Japanese government have run fiscal deficits throughout business cycles, with repeated episodes of fiscal consolidation being interrupted or delayed by shocks. As a result, the public debt to GDP ratio quadrupled from about 60 percent of GDP in 1990 to about 240 percent of GDP in 2019. Furthermore, Japan has responded decisively to the COVID-19 pandemic by deploying sizeable fiscal packages several times, which, combined with the recession, has put its debt even higher to about 260 percent of GDP. These developments beg a question of if the past fiscal stance has been too lax[1].

Looking ahead, the landscape surrounding Japan's fiscal policy is changing rapidly. The economic recovery is expected to continue, but the lingering COVID-19 pandemic and the war in Ukraine pose a significant uncertainty to the outlook. Under such an elevated uncertainty, Japan's fiscal policymakers face a difficult question of when and how they should unwind the stimulus, and switch gears towards fiscal consolidation.

To address these questions, this paper assesses the appropriateness of Japan's fiscal stance in the past and the future, in view of balancing output stabilization and debt sustainability. We do so with a normative stochastic structural model called the Buffer-Stock Model of the Government (Fournier, 2019a). Following the seminal work of Lucas and Stokey (1983), the theoretical literature is rife on normative models for fiscal policy that speak to fiscal stance discussions (see for instance Chari, Christiano and Kehoe, 1994 for fiscal policy advice in a real business cycle model, or Aiyagari et al., 2002, for fiscal policy advice with a debt limit). Recently, instead of relying on these theoretical models, several applied papers have reflected closely the policy debates, evaluating fiscal stances in advanced economies with an objective function balancing debt sustainability and cycle stabilization, especially in the euro area (for example, Kanda, 2011, Carnot, 2014; Bankowsky and Ferdinandusse 2017). Fournier (2019a) aims at embedding this applied discussion in a model that provides a utility-maximizing fiscal stance path, accounting for several key motives for debt reduction and for cycle stabilization.

In the context of Japan, a series of papers by Yoshino, Taghizadeh-Hesary, and Mizoguchi (for example, Yoshino et al. (2015) and Yoshino et al. (2018)) is the closest to our attempt. Analogous to the Taylor's rule for monetary policy, they developed the objective function of fiscal policy where the government aims to stabilize debt at its desired level and make GDP close to the full employment level of GDP, with smooth changes in government spending, taxation and the flow of funds (i.e., a change in debt). In comparison to the Buffer-Stock Model of the Government, Yoshino et al. (2018) provide a rich analysis on the demand for government bonds. On the other hand, our model permits a more granular analysis about fiscal policy's role in output stabilization, because (i) output is subject to a shock process, (ii) the government chooses structural primary balance in the model—thereby distinguishing automatic stabilizers from discretional policies—and (iii) the model explicitly takes account of scarring effects of widely negative output gaps ("hysteresis"). Also, Yoshino et al. (2018) refrain from backward-looking assessment, while our paper analyzes Japan's fiscal stance both retrospectively and ahead consistently within one model framework.

The remainder of the paper is structured as follows: In Section 2, we present the model economy and its calibration to Japan. In Section 3, we discuss Japan's fiscal policy developments since 1990, and evaluate the

[1] Some argue that running large deficits was the right policy, given that Japan has experienced weak aggregate demand, with the monetary policy being constrained by the effective lower bound for long (for example, Blanchard and Tashiro, 2019).

past fiscal stance via the lens of the model. In Section 4, we present optimal future fiscal policy path suggested by the model, together with several scenario analyses. Section 5 concludes.

2. The Buffer-Stock Model of the Government

A. The Concept

The model is built on an analogy with the buffer-stock model of the consumer (Deaton, 1991).[2] In that model, a risk-averse forward-looking consumer faces a borrowing limit. He or she saves in good times for a precautionary purpose, and dissaves in bad times. In the Buffer-Stock Model of the Government, the forward-looking benevolent government faces a risk of losing market access beyond a debt limit. A low debt level is like a buffer, as the government has the possibility to increase debt in case of a shock without paying excessive interest rates or facing market-access risk. The government decides the fiscal stance (defined as a change in the structural primary balance) to maximize household welfare, while being cognizant of debt sustainability concerns. Output is affected by an exogenous shock, which can persist. Recessions reduce potential output, reflecting human and physical capital losses of economic downturns (hysteresis or scarring effect). The model incorporates feedback effects between fiscal policy and output, in that the primary balance affects output through the fiscal multiplier, and output affects the primary balance through the automatic stabilizer. The stabilizing role of fiscal policy is constrained by adverse effects of higher debt—a rise in risk premium—and an implementation lag. Based on this set-up, the model recommends an optimal fiscal stance reflecting the following principles:

- **Governments should smooth the cycle.** Counter-cyclical fiscal policy dampens recessions and avoids distortions during overheating, thus improving short-term utility as well as reducing hysteresis.

- **Governments need to react to rising debt.** Governments should generate surpluses to restore buffers when public debt is high, while this is not needed when debt is low.

- **Highly indebted governments should react less to adverse shocks.** The debt buffer has an insurance value—it is the "reserve" of debt that the government can issue to smooth shocks. When the buffer is small, the probability of market stress is high and the marginal value of an extra unit of buffer is large. This provides an incentive to preserve buffers to guard against future shocks. As a result, when debt is higher, the optimal policy response to offset a negative shock is smaller than when debt is lower.

B. The Structure

The main objective of the model is to provide a fiscal stance advice reflecting the optimization process of a benevolent government considering both cycle stabilization and sustainability concerns. The government thus maximizes household utility by choosing a change in the structural primary balance pb_t^{st} to stabilize output fluctuations intertemporally under constraints:

[2] A comprehensive description of the model is provided in Fournier (2019a).

$$V_t(d_{t-1}, gap_{t-1}, pb^{st}_{t-1}) = \max_{\Delta pb^{st}_t} E_t\left[u(c_t, L_t) + \beta V_{t+1}(d_t, gap_t, pb^{st}_t)\right]$$

where t is the year, d_t is the gross-government-debt-to-potential-GDP ratio, gap_t is the output gap, c_t is aggregate consumption,[3] L_t is labor, u(.,.) is the instantaneous utility function, and β is the discount factor. The optimization is subject to the structure of the economy and the government budget constraint that takes the form of a risk to losing market access rising with debt (see below).

The value function consists of the per-period utility function u(.) and the expected continuation value discounted by β. The per-period utility function is:

$$u(c_t, L_t) = \frac{{c_t}^{1-\sigma}}{1-\sigma} - \xi {y_t^*}^{1-\sigma} \frac{L_t^{1+\eta}}{1+\eta}$$

which is a standard constant relative risk aversion utility function in consumption c_t and labor L_t where σ is the parameter of risk aversion and η is the inverse of the Frisch labor supply elasticity. Households enjoy consumption, but also face labor disutility. ξ is calibrated so that utility peaks when output y_t is equal to its potential y_t^*. Utility thus declines if output increases above potential, reflecting distortions associated with overheating.

The model features rising market pressure when debt is rising. First, the interest rate increases in public debt, with a calibration in line with empirical evidence (as discussed in Fournier (2019a)). This sensitivity of the interest rate to debt reflects a risk premium, which can be regarded as the consequence of an excess of supply of government bonds. Furthermore, the risk premium increases in the change in debt. Symmetrically, even at a high debt level, the risk premium may be moderate if the government shows its capacity to reduce debt. Second, the risk of losing market access rules out unbounded debt paths. The probability of losing market access also depends on the level and the change of government debt:

$$P(lma) = [1 + exp(\, d_1(1 - d_t/\overline{d} - d_2(d_t - d_{t-1})))]^{-1}$$

where d_1 governs the debt limit uncertainty, d_2 governs the effect of a debt change on the risk to lose market access, and $\overline{d}$ is the debt level at which the probability of losing market access is 50 percent (given no change in the debt level). If the government loses market access, the government has to keep debt constant under an adverse scenario of a shock of $d_3\sigma$, where σ is the standard deviation of economic shocks.

Output is driven by a long-term exogenous potential growth path to which long-run endogenous hysteresis costs can be subtracted. Output is produced by a linear production function in labor. Productivity is affected by a permanent hysteresis effect of crisis. If production is below its perceived potential, unemployed workers can face a decay in their skills, their network, and their morale (Blanchard and Summers, 1987; DeLong and Summers, 2012). Output deviates from its potential because of a process of shocks $\boldsymbol{v_t}$ and because of the primary balance. The derivative of the output gap with respect to the primary balance is set equal to a usual fiscal multiplier m_1 when the economy is at output equilibrium. The fiscal multiplier depends on the output gap itself, reflecting recent

[3] Public and private consumption are not distinguished, and hence assumed to provide the same utility.

empirical literature on larger multipliers in downturns (Baum et al., 2012; Auerbach and Gorodnichenko, 2013), corroborated by modeling with financial frictions (Canzoneri et al., 2016). An additional term governed by coefficient m_2 thus magnifies the multiplier in downturns:

$$\frac{\partial gap(pb_t, v_t)}{\partial pb_t} = -m_1(1 - m_2 gap(pb_t, v_t))$$

The primary balance is the sum of a cyclical component and of a structural component:

$$pb_t = pb_t^{st} + a.gap_t$$

Finally, the aggregate resource constraint[4] is:

$$c_t = y_t(1 - \chi(\Delta pb_t^{st})^2)$$

where c_t denotes aggregate consumption, and the last term represents fiscal adjustment costs, reflecting the implementation costs of changes, or the costs associated with tax uncertainty (e.g., Skinner, 1988). This can also reflect the difficulty in reversing fiscal decisions (IMF, 2017). This adjustment cost is relative to output.

C. Calibration to Japan

The model is calibrated to the Japanese economy, which is summarized in Table 1. Key parameters that reflect Japan-specific estimates are discussed below.

Table 1. Baseline Calibration

Welfare function	
Discount factor β	0.99
Risk aversion σ	2
Labor elasticity η	1/0.3
Weight of labor ξ	1
Fiscal parameters	
Fiscal multiplier when the gap is null m_1	0.65
Fiscal multiplier sensitivity to shocks m_2	5
Automatic stabilizers (primary balance semi-elasticity to the gap) a	0.41
Adjustment cost χ	3
Interest rate and debt parameters	
Growth-adjusted interest rate at current debt level	0%
Effect of debt level on the risk premium α	1.0%
Effect of debt change on the risk premium α_2	0.5%
Debt level at which the risk to lose market access is 50% $\overline{d}$	300%
Debt limit accuracy d_1	3
Effect of debt change on the risk to lose market access is d_2	1
Adverse scenario coefficient in case of loss of market access d_3	-1%
Economy parameters	
Potential GDP per capita growth	0.9%
Shock persistence ρ	0.60
Shock size σ	3.8%
Hysteresis	10%
Hysteresis threshold	-1%

[4] The model does not distinguish between private and public consumption, which is equivalent to assuming perfect substitutability between the two. This simplification is made because of inherent difficulties to estimate the utility of government consumption.

- **Effect of debt level on the risk premium (α).** This parameter represents the impact of debt increasing by one percent of GDP on the risk premium measured in basis points (bps). A simple regression is estimated following Tokuoka (2010) which studied the sensitivity of Japanese Government Bond (JGB) yields to public debt:

$$nominal\ 10\ year\ bond\ yield\ =\ \beta_0\ +\ \beta_1\ gross\ debt\ +\ control\ variables$$

The selection of control variables broadly follows Tokuoka (2010), except for the U.S. long-term interest rate that is added to capture global financial conditions. An increase in the gross-debt-to-GDP ratio by one percentage point is associated with a rise in JGB yields by one basis point (Table 2). This sensitivity is close to the estimate of 0.7 in Mochida (2019), and stands in the middle of the model calibration used in recent Article IV consultations for France (1.5)—a country in a monetary union—(Fournier, 2019b) and for the US (0.5)—the country with the largest reserve currency (Box 7 of IMF, 2020)[5].

Table 2. Regression Results

Dependent variable: nominal 10 year bond yield	
Explanatory variables	*Coefficients*
Gross debt	0.01 **
BOJ's holdings of JGBs	-0.01 ***
Private sector financial assets	-0.01
Share of foreign JGB holdings	-0.05 **

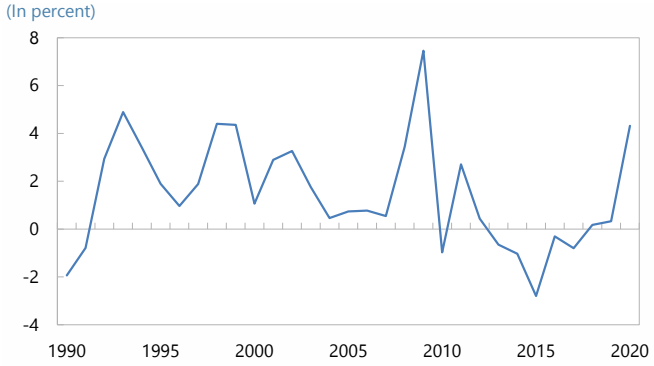
(Notes)
1. *** p < 0.01, ** p < 0.05, * p < 0.1.
2. R square: 0.93, Observations: 80 (quarterly data from Q4 2000 to Q3 2020)
3. Data sources:
- 10-Year Benchmark Government Bond Yield (EOP, % p.a.): MOF
- General Government Gross Debt in percent of GDP (excluding the bonds issued to finance the Fiscal Investment and Loan Program): Flow of Funds (FoF)
- Central government debt held by the BoJ in percent of GDP: FoF
- Share of foreign holdings of JGBs: FoF
- Private net financial assets held by the household and corporate sectors in percent of GDP: FoF
4. Other control variables: short-term interest rate, inflation, real GDP growth rate, and the US long-term interest rate.

- **The fiscal multiplier (m_1).** The fiscal multiplier calibration reflects the country's economic structure such as trade openness, labor market rigidity, business cycle, and monetary policy stance. These elements are combined with the bucket approach proposed by Batini et al. (2014). Following this approach, we first categorize Japan into the "Medium-multiplier" group (multiplier of 0.4~0.6). Next, both the lower and upper bounds are increased by 30 percent to reflect that the Bank of Japan's policy rate has been close to the effective lower bound for a long time. As a result, we arrive at 0.5~0.8 as a range of multiplier for Japan and use the mid-point value of 0.65 as the baseline multiplier. Alternative values of multiplier are considered in the sensitivity analysis (4.B.).
- **Growth-adjusted interest rate.** Figure 1 shows Japan's interest rate-growth differentials (r-minus-g) between 1990 and 2020. The differential was negative in many years in the 2010s, which contributed to the stable debt-to GDP ratio during the Abe administration. However, it was positive for most of the 1990s and

[5] This relatively low sensitivity of the risk premium to debt for Japan is partly attributable to the stable domestic investor base of Japan's public debt; the share of JGBs held by foreign investors gradually increased, but is still low at about 13 percent in 2021 (IMF, 2022).

the 2000s. This turnover in the sign of the differential illustrates a high uncertainty around its long-run value. Given this uncertainty, we assume zero as the long-run value of r-minus-g in the baseline of the model, and run the model under both positive (+0.3) or negative (-0.3) r-minus-g scenarios to study sensitivity of the results.

Figure 1. Interest Rate-Growth Differential



Sources: Cabinet Office, IMF staff calculations.
Note: Interest rate-growth differential is calculated as nominal effective interest rate minus nominal GDP growth rate.

- **Automatic stabilizer (a).** Automatic stabilizer, which is the semi elasticity of the primary balance to the output gap, is set at 0.4, per the estimate for Japan by Price et al. (2015).

Data are based on the WEO (World Economic Outlook) April 2022 database. Beyond the WEO projection horizon (beyond 2027), key variables are assumed to gradually converge over 2028~2030 to long-run values, which are: 0.3 percent for the potential growth rate, 1 percent for inflation, and 1.3 percent for the 10-year JGB yield. These are consistent with the assumptions in the Debt Sustainability Analysis in the 2022 Article IV Consultation Staff Report (IMF, 2022), except for the 10-year JGB yield which deviates from the assumption in the DSA (2.0 percent) in order to match the baseline r-minus-g assumption discussed above. In addition, we also use the WEO database's vintage data of output gap from 1994 for the retrospective analysis on fiscal path in Section 3.

3. Japan's Fiscal Policy since 1990

A. Overview

Japan's primary balance has been mostly negative over the last three decades amid rising expenditures (Figure 2). After recording a surplus from 1990 to 1992, Japan's primary balance turned negative and deficits widened in the 1990s. In the 2000s before the Global Financial Crisis, expenditure mildly declined while revenues edged up, gradually narrowing the primary deficits. In the 2010s, the primary balance followed a similar upward path as in the preceding decade, helped by continuous revenue increases. The following summarizes Japan's fiscal policy during these three decades[6]:

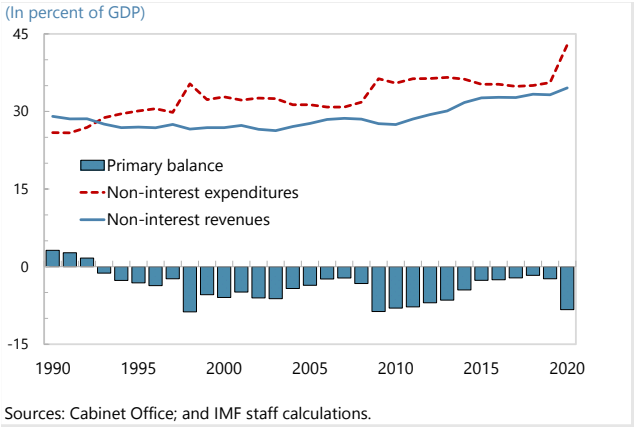
[6] See Miyazaki (2006), Takahashi and Tokuoka (2011), and Eichengreen et al. (2021) for a detailed discussion of the past fiscal management in Japan. For discussion about monetary policy developments, see Cargill and Parker (2004) and Westelius (2020).

- **Repeated stimuli in the 1990s.** In the wake of the bubble burst in the early 1990s, the government repeatedly assembled stimulus packages to prop up the aggregate demand, mainly through increases in public investments and cuts in personal income taxes. Prime Minister Hashimoto, inaugurated in 1996, veered towards fiscal consolidation by raising the consumption tax rate from 3 to 5 percent as scheduled in April 1997 and enacting in 1997 the Fiscal Structural Reform Act which targeted a cut in the fiscal deficit from 6 percent of GDP in FY 1997 to 3 percent of GDP by FY 2003. However, his efforts of austerity halted after the Asian currency crisis and the domestic financial crisis hit the economy in 1997 and 1998, which led to the suspension of the Act and large-scale stimulus in 1998.
- **Expenditure-based fiscal consolidation in the 2000s.** After Prime Minister Koizumi took office in 2001, a momentum for medium-term fiscal consolidation was re-ignited by setting a target to achieve a primary surplus by the early 2010s. The focus was on spending cuts, particularly reduction in public investments, resulting in a stable expenditure-to-GDP ratio despite a rise in age-related spending. On the revenue side, he refrained from a further consumption tax rate increase, though social security contributions increased steadily in the 2000s. This rise in social security contributions reflects two social security reforms that took place in the early 2000s: (i) the introduction of the Long-term Care Insurance System in 2000, and (ii) the pension reform in 2004 that legislated a gradual increase in pension contribution rates until FY (fiscal year) 2017. The primary balance target was revoked in the wake of the Global Financial Crisis.
- **Flexible fiscal policy in the 2010s[7].** In 2010, the DPJ (Democratic Party of Japan)-led government drew up the Medium-term Fiscal Strategy, which re-set a target to halve a primary deficit by FY 2015 relative to FY 2010, and to achieve a primary surplus by FY 2020. To follow-through on this commitment, the DPJ-led Noda administration legislated in 2012 a two-step consumption tax rate increase, first to 8 percent in April 2014, second to 10 percent in October 2015. Upon taking office in late 2012, the LDP-led Abe administration advocated for “Flexible Fiscal Policy” as a part of the three-pronged economic policy dubbed Abenomics[8], and rolled out a sizeable stimulus package in 2013. While the first consumption tax rate increase was implemented in April 2014 as scheduled, the second rate increase was postponed twice—first to April 2017 and then to October 2019. Prime Minister Abe decided in 2017 to spend a part of additional revenues from the second-rate increase on free pre-school and childcare education. As a result, the earlier commitment to achieve a primary surplus by FY 2020 became unviable, and the primary balance target year was put off to FY 2025.

[7] A critical event in the 2010s that is undiscussed above is the Great East-Japan Earthquake in 2011. Even though it incurred sizeable reconstruction and recovery costs, its long-term fiscal impact has been mitigated, because fiscal costs for the reconstruction were to be financed mainly by proceeds from privatization of the Japan Post, and the post-earthquake reconstruction tax. The post-earthquake reconstruction tax consisted of two surcharges: a surcharge of 10 percent of taxable income added to the corporate income tax in FY 2012 and FY 2013, and a surcharge of 2.1 percent of tax obligations added to the personal income tax until 2037.

[8] See Ito (2021) for insightful assessment of Abenomics.

Figure 2. Expenditures, Revenues, and Primary Balance

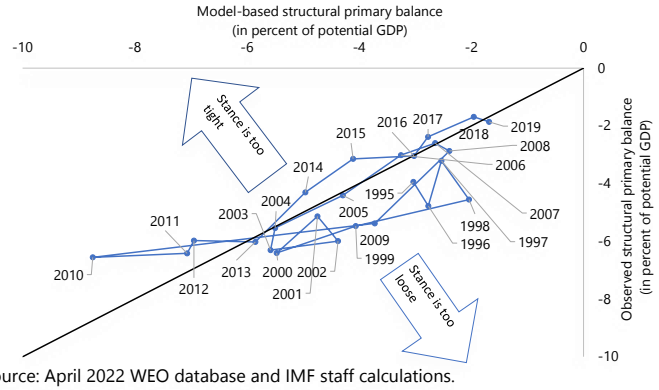


Sources: Cabinet Office; and IMF staff calculations.

B. A Model Assessment

In order to assess appropriateness of the past fiscal stance in Japan, we compare the structural primary balance implemented by the government during 1995 and 2019[9] with the one that the model would recommend based on the output gap estimates in the WEO April 2022 database. In Figure 3, an observation above (respectively below) the 45-degree line indicates that the fiscal stance was too tight (respectively too loose) relative to the model recommendation. The analysis suggests that the fiscal stance in the late 1990s and early 2000s could have been tighter[10]. On the other hand, the fiscal stance in the first half of the 2010s was slightly too tight, suggesting that several shocks such as the Great East-Japan Earthquake in 2011 warranted larger fiscal responses. The fiscal stance in 2004 through 2007 and the second half of the 2010s was broadly aligned with the model recommendations.

Fgure 3. Structural Primary Balance: Observed vs. Model Recommendations



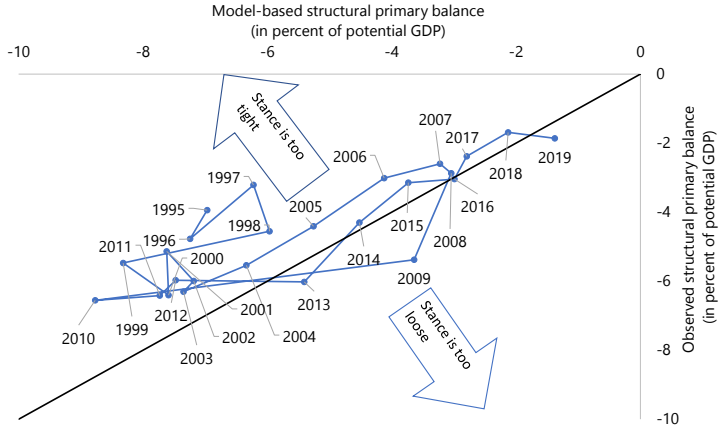
Source: April 2022 WEO database and IMF staff calculations.
Note: These results reflect past output gap (estimated by IMF staff), debt and primary balance positions, using the same model setting over the full sample to ensure full comparability. Year-specific in-depth studies of fiscal stance advice may lead to fine-tune such results to account for more considerations beyond this model.

[9] We start from 1995 because the national account data based on the 2008 SNA is available only from 1994. 2020 and 2021 are not included because it is still early to estimate ex-post output gap during the pandemic with accuracy, given that the supply side was severely constrained.

[10] Relatedly, many studies that conducted the Bohn sustainability test (Bohn, 1998) on Japan find that the primary balance failed to improve in response to rising public debt in Japan (Takahashi and Tokuoka, 2012, Doi et al., 2011, and Mauro et al., 2015).

This looser-than-recommended fiscal stance in the late 1990s and the early 2000s might have been driven by mismeasurement of the output gap—a difference between the ex-post output gap (obtained from the April 2022 WEO database) and the real-time measure of output gap (obtained from the WEO database as of the fall of the preceding year). To illustrate the role of this mismeasurement, the model prescription is re-calculated with the real-time output gap measure, with the results shown in Figure 4. The model recommendations for the late 1990s and the 2000s are shifted to the left. Negative real time output gap estimates lead to more deficits since these reflect a policymakers' belief that the economy would have had a potential to bounce back to the higher potential output that was perceived at that time[11]. This shift illustrates the critical role of real time output gap estimation to inform fiscal stance decisions.

Figure 4. Structural Primary Balance: Observed vs. Model Recommendations with Real-time Output Gap Measures



Source: WEO databases and IMF staff calculations.
Note: This chart reports the fiscal stance advice with the output gap measure as was estimated in the IMF World Economic Outlook in September or October of the previous year. All other inputs are the same as those used in Figure 3.

C. Demographic Challenge

The demographic transition has long been an underlying challenge for Japan's fiscal policy. Figure 5 shows Japan's social security benefits since 1990. As the Japanese government provides universal healthcare coverage and universal public pension insurance which is essentially run on a pay-as-you-go basis, aging has a direct impact on the health of public finance. The introduction of the long-term care insurance system in 2000 adds to pressure on the social security spending.

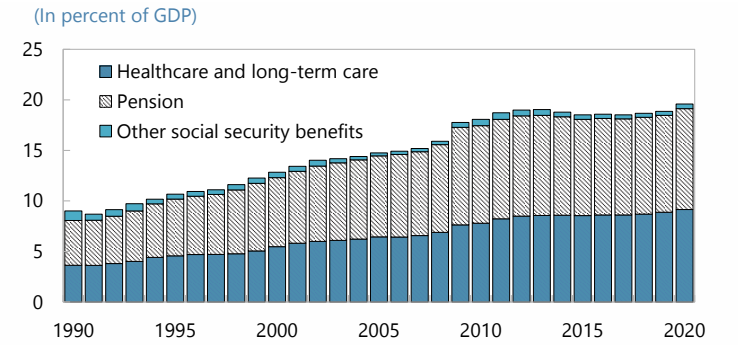
As for the pension, the reform in 2004 introduced an automatic adjustment mechanism which adjusts benefits in response to demographic changes (i.e., an increase in life expectancy and a decline in the working-age population).[12] However, this mechanism was not activated until 2015 because the adjustment was not designed to operate under deflation. Reflecting a rise in pensioners and this halfway implementation of the automatic

[11] Mauro et al. (2015) argues that significant economic slow-down after a period of rapid growth could explain Japan's fiscal profligacy from the late 1990s, to the extent that policymakers base their fiscal policy decisions on contemporary perception of long-run economic growth prospects.

[12] See Box 1 of Arbatli et al. (2016) for description of the automatic adjustment mechanism. See also Kashiwase et al. (2012) for overview of the Japan's pension system.

adjustment, aggregate pension benefits increased from 4½ percent of GDP in 1990 to 10 percent of GDP in 2020. The public expenditures for the healthcare and long-term care increased continuously from 3½ percent of GDP in 1990 to 9 percent of GDP in 2020, due to aging as well as excess cost growth[13] (non-age factors including technological advances).

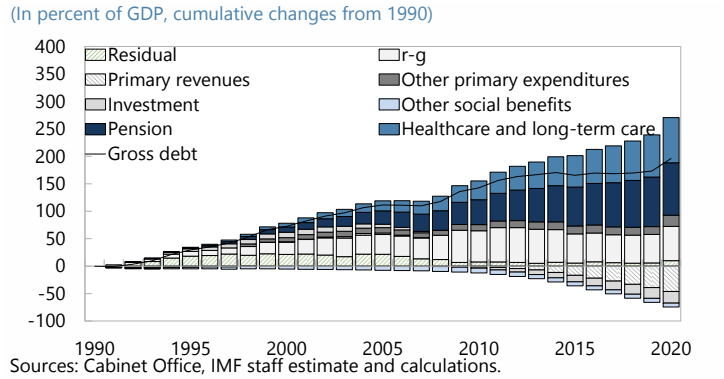
Figure 5. Social Security Benefits



Sources: Cabinet Office; and IMF staff calculations.
Note: Since data on pension benefits are available only on fiscal-year basis, those FY data are converted to calendar-year data in our analysis. Healthcare and long-term care expenditures correspond to social benefits of "Social Transfers In-kind (purchased market production)" in the National Accounts. Other social security benefits are calculated as a residual.

To illustrate how the demographic headwinds have played a role in pile-up of the debt, we calculate contribution of the age-related spending to accumulation of the public debt since 1990. See Appendix I for details of the methodology. Figure 6 and Table 3 show the results of our calculation. Japan's public debt to GDP ratio rose by about 200 percentage points (ppts) over the past three decades. The pension expenditures and the healthcare and the long-term care expenditures are the two largest contributors to this debt accumulation, with contributions of 96 ppts and 82 ppts, respectively.

Figure 6. Contribution to Changes in Gross Public Debt



Sources: Cabinet Office, IMF staff estimate and calculations.
Note: Contribution of each expenditure/revenue item is calculated as cumulative changes from the 1990 level adjusted for the primary surplus in 1990. "Residual" includes stock-flow adjustment and interest revenues. Pension benefits are estimated from the National Account data.

[13] Nozaki et al. (2014) documents that, out of the average annual spending increase (in percent of GDP) of 3.1 percent over 1990-2011, about two-thirds (1.8 percent) resulted from ageing, while the rest is from excess cost growth. It also finds that Japan's excess cost growth of about 1.3 percent annually is comparable to that in other OECD countries.

Table 3. Cumulative Contribution to changes

(In percent of GDP)

Increase in debt to GDP ratio	196.0	
Primary deficits	123.7	
Healthcare and long-term care		82.2
Pension		95.6
Other social benefits		-7.2
Public investments		-21.0
Other primary expenditures		20.3
Primary revenues		-46.2
r-g (interest rate-growth differential)	62.4	
Residual	9.9	

Sources: Cabinet Office; IMF staff estimates and calculations.

D. Japan's Fiscal Policy during the Pandemic, and beyond

Japan responded strongly to the COVID-19 pandemic. The government deployed four large supplementary budgets in 2020 and 2021, amounting to about 18 ½ percent of GDP (see Annex III of IMF, 2022)[14]. As a result, primary deficits rose sharply from 2½ percent of GDP in 2019 to 8 and 7 percent of GDP in 2020 and 2021, respectively. Looking ahead, Japan's fiscal authorities will have to strike a fine balance between achieving a strong, durable recovery and maintaining debt sustainability. Amid elevated uncertainty emanating from the pandemic and the war in Ukraine, premature fiscal support withdrawal would risk derailing the recovery. On the other hand, wider fiscal deficits, the unprecedented level of public debt, and an expected rise in age-related spending call for fiscal consolidation to put debt on a sustainable path. We illustrate this trade-off and derive policy implications in the next section.

4. Post-pandemic Fiscal Policy Path

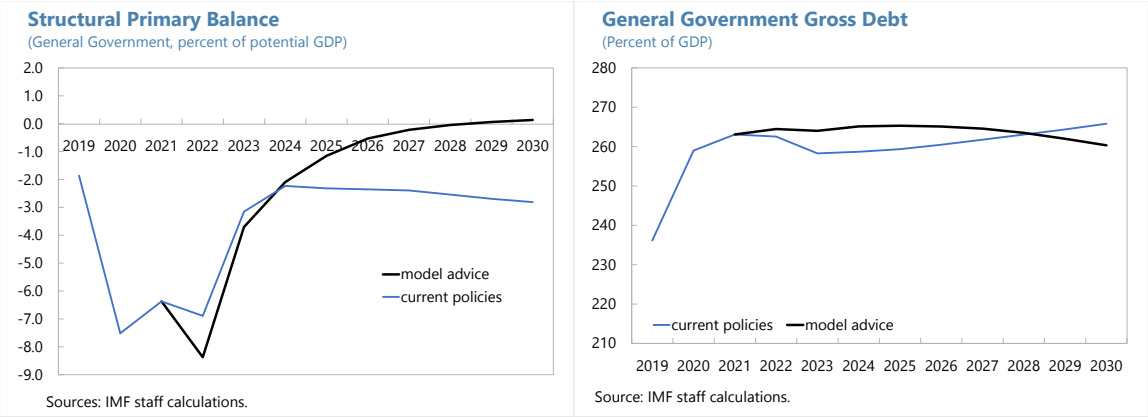
A. Baseline Model Advice

Figure 7 shows the paths of the structural primary balance and debt recommended by the model. In comparison to the current policy plans, the model suggests a wider deficit in the near term, driven by a stronger focus on narrowing output gap and minimizing hysteresis. This model result could be interpreted as a policy recommendation to disburse the contingent measures included in the November 2021 and April 2022 economic packages decisively in response to two major shocks that struck the economy in early 2022, namely the Omicron wave and the war in Ukraine. It is noteworthy that, while the primary consideration underlying the model suggestion is to close the output gap through multiplier effect, a desirable size of fiscal support depends also on other considerations such as the need to provide lifeline assistance to those who are adversely affected by the pandemic and spillovers from the war in Ukraine.

[14] In April 2022, in order to mitigate external shocks including from the war in Ukraine, the government announced another small-scale stimulus package which featured an extension of the fuel subsidy till September.

In the medium term, the model advice deviates from the current policy scenario after 2024, calling for a gradual fiscal adjustment. In contrast to the upward path of public debt in the medium- to long-term in the current policy scenario, the model discerns a need to anchor public debt on a downward path and rebuild fiscal buffers to create room for policy support in case further shocks arise.

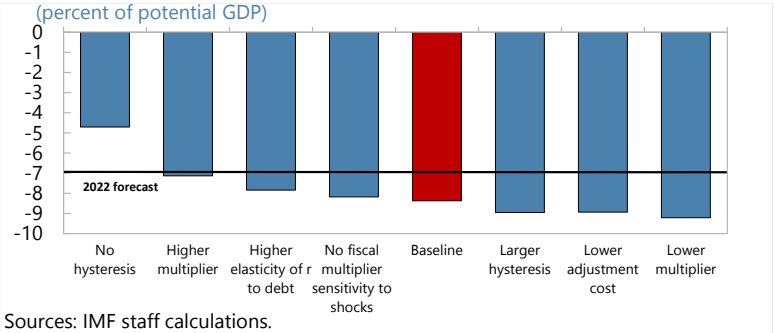
Figure 7. Structural Primary Balance and Debt Under the Baseline



B. Sensitivity Analysis

To check the sensitivity of the advice to assumptions, we change parameters one by one. Figure 8 reports the recommended structural primary balance in 2022, with the baseline scenario in red. The argument for a wider near-term fiscal deficit broadly holds under most of the alternative parameters, suggesting that the baseline results are robust to sensitivity checks. That said, three observations are noted. First, the model recommends less rather than more stimulus in an alternative scenario without scarring, since the main motivation for additional stimulus is to avoid hysteresis. Second, if the fiscal multiplier is lower, a wider fiscal deficit is called for, highlighting the importance of targeted support to households and firms which tends to have a higher multiplier than untargeted one. Third, sensitivities to the elasticity of interest rate to debt and to the adjustment cost are small.

Figure 8. Recommended Structural Primary Balance in 2022

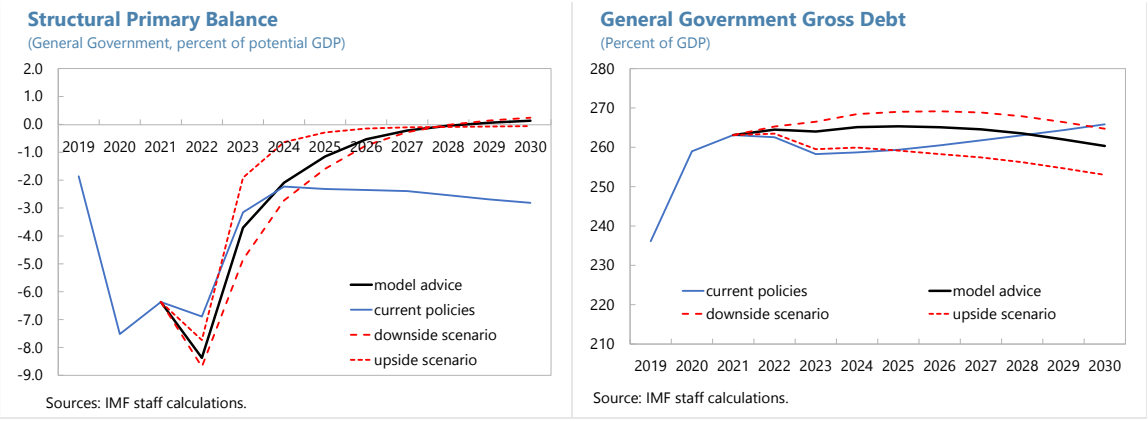


Sources: IMF staff calculations.
Note: In the lower (higher) multiplier scenario, the multiplier (m1) is 0.5 (0.8). In the lower adjustment cost scenario, the adjustment cost is set at 1.5. In the larger hysteresis scenario, hysteresis is 100% larger than in the baseline. In the higher elasticity of interest to debt scenario, alpha is set at 1.5.

C. Scenario Analyses for Near-term Fiscal Policy

Two alternative scenarios are considered to illustrate large uncertainty surrounding the pandemic and the war in Ukraine (Figure 9). The upside scenario envisages a quicker and stronger recovery underpinned by the pent-up demand from households with large savings. In this scenario, temporary support would be smaller and phased out sooner while private demand takes over, leading to frontloaded fiscal consolidation. In the downside scenario, where recovery is hindered further by the pandemic or escalation of the war in Ukraine, more stimulus is advisable even if it increases public debt, followed by a larger fiscal adjustment in order to reduce debt afterwards. These results suggest that the scale of additional fiscal support should be attuned flexibly to epidemiological, economic and geopolitical developments. Automatic stabilizers, which react quickly and accurately to economic developments, can help in this respect.

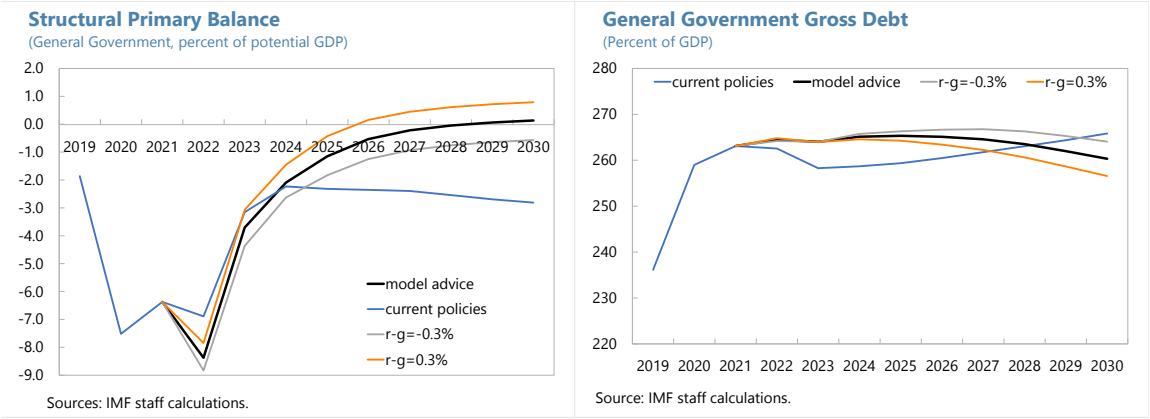
Figure 9. Structural Primary Balance and Debt under Different Recovery Scenarios



D. Pace of Medium-term Fiscal Consolidation

While the model recommends fiscal consolidation after the pandemic, its pace depends largely on the assumptions on the interest rate-growth differential, as shown in Figure 10. For instance, with a small downward change to the interest rate-growth differential (r-g=-0.3), the model suggests a more gradual fiscal consolidation. Public debt can be reduced even with a negative structural primary balance. On the other hand, with a positive interest rate-growth differential (r-g=0.3), the structural primary balance should be higher than in the baseline. This is driven by two considerations. First, a higher balance is required to achieve the same debt level target under this scenario. Second, since debt is costlier, the model suggests the need to reduce the debt-to-GDP ratio faster in the medium run.

Figure 10. Structural Primary Balance and Debt under Alternative r-g Scenarios



5. Conclusions

Over the past three decades, the Japanese government ran chronic primary deficits, driven by repeated stimuli after the bubble burst, a rise in age-related spending, and large shocks that halted the momentum for fiscal consolidation. Accordingly, the public debt piled up to the unprecedented level, to which the pension and healthcare and long-term care expenditures made the largest contribution. Our retrospective analysis suggests that the fiscal stance in the 1990s and the early 2000s was overall looser than the model recommendations.

Looking ahead, Japan's fiscal policymakers will face a difficult challenge. Premature fiscal support withdrawal would risk derailing the recovery, while large fiscal imbalances point to a need for fiscal consolidation. The model indicates that the near-term fiscal policy should be supportive with a view to narrowing the output gap and minimizing hysteresis. Over the medium term, however, the model recommends a fiscal consolidation at a gradual pace, driven by a need to stabilize debt and rebuild fiscal buffers gradually in the face of the intensifying demographic pressures. The recommended pace of adjustment is sensitive to the r-minus-g assumptions, reaffirming the critical role the interest rate-growth differential plays in debt dynamics for highly indebted countries like Japan.

While theoretical models providing optimal fiscal policy results is rife, the literature that is making use of their insights to derive applied fiscal stance recommendations for practitioners remains scarce and more could be done to embed the numerous insights of the theoretical literature in applied discussions. First, it would be interesting to extend our analysis to distinguish between different fiscal instruments: revenue versus expenditure. Second, while in this paper monetary policy is implicit, including with a higher multiplier reflecting the zero lower bound context, it would be interesting to study an explicit interaction between fiscal and monetary policy. Specific topics of interest include fiscal space in a low interest rate environment, the link between price stability and fiscal credibility, or fiscal consequences when there is an uncertainty in interest rate movement (such as when policy makers face a situation with inflation and employment moving in different directions). Further, in addition to the discretional fiscal response, the optimal design of automatic stabilizers is a promising avenue for consideration.

Appendix I. Methodological Note on Decomposition of Debt Accumulation

This addendum explains the methodology to decompose the debt accumulation presented in 3. C.

First, we follow the same methodology as in the IMF Debt Sustainability Framework for Market Access Countries to calculate contribution of the following three factors to changes in debt since 1990:

- Primary balance
- Interest rate-growth differential (automatic debt dynamics[15])
- Residual, which includes asset-side changes and interest revenues

Second, in order to allocate contribution of primary balance to each spending and revenue category of interest, we use the amount of each category (in percent of GDP) in 1990 adjusted for the primary surplus in 1990 (+3.2 percent of GDP) as a benchmark, and treat cumulative changes of each category from the benchmark level as its contribution to changes in debt. Adjustment of the primary surplus is done by revising up each expenditure category and revising down the revenue category on a pro-rata basis, so that the primary balance for 1990 after adjustment becomes zero. For example, we adjust the benchmark level of the non-interest revenue from 29.1 percent (actual data for 1990) to 27.4 (=29.1-3.2/2). Then we count the difference between actual non-interest revenue in each year (e.g. 28.6 in 1991) and 27.4 as contribution of primary revenue to changes in debt (i.e. -1.2 ppt contribution in 1991).

Table A.1. enumerates six categories (five expenditure and one revenue categories) considered in this analysis, together with the benchmark levels used for each category.

Table A.1. Benchmark for Each Spending and Revenue Component

Expenditure/Revenue categories	Benchmark (in percent of GDP)
Primary (non-interest) revenue	27.4
Primary expenditures	27.4
- Healthcare and long-term care expenditures[1]	3.8
- Pension[2]	4.7
- Other social benefits (which include public assistance and unemployment benefits)	2.8
- Public investment, including land acquisition fees	5.9
- Other primary expenditures	10.2

[1] Healthcare and long-term care expenditures correspond to social benefits of "Social Transfers In-kind (purchased market production)" in the National Accounts.

[2] Since data on pension benefits are available only on fiscal-year basis, those FY data are converted to calendar-year data in our analysis.

[15] There is no exchange-rate contribution as Japan's public debt is all denominated in yen.

References

Aiyagari, S. R., A. Marcet, T. J. Sargent, and J. Seppala, 2002, “Optimal Taxation without State-Contingent Debt” Journal of Political Economy 110 (6):1220–1254.

Arbatli, E., C. Feher, J. J. Ree, I. Saito, and M. Soto, 2016, “Automatic Adjustment Mechanisms in Asian Pension Systems?” IMF Working Paper No. 16/242.

Auerbach, A. J. and Y. Gorodnichenko, 2013, “Fiscal Multipliers in Recession and Expansion,” Fiscal Policy after the Financial Crisis, National Bureau of Economic Research, Inc.: 63-98.

Bankowsky, K., and M. Ferdinandusse, 2017, “Euro Area Fiscal Stance,” European Central Bank, Occasional Paper Series 182.

Batini, N., L. Eyraud, L. Forni, and A. Weber, 2014, “Fiscal Multipliers: Size, Determinants, and Use in Macroeconomic Projections,” IMF Technical Notes and Manuals 14/04.

Baum, A., M. Poplawski-Ribeiro, and A. Weber 2012, “Fiscal Multipliers and the State of the Economy,” IMF Working Paper No. 12/286.

Blanchard, O., and L. H. Summers, 1987, “Hysteresis in Unemployment,” European Economic Review 31: 288–95.

Blanchard, O., and T. Tashiro, 2019, “Fiscal policy options for Japan,” Peterson Institute for International Economics Policy Brief, 19-7, May 2019.

Bohn, H., 1998, ”The behavior of U.S. public debt and deficits,” The Quarterly Journal of Economics, 113, pp. 949-963.

Carnot, N., 2014, “Evaluating Fiscal Policy. A Rule of Thumb,” European Commission, Economic Papers 526.

Cargill, T., and E. Parker, 2004, “How Can the Bank of Japan Contribute to Japan’s Economic Recovery?,” prepared for the SMU Asian Studies Symposium.

Canzoneri, M., F. Collard, H, Dellas, and B. Diba, 2016, “Fiscal Multipliers in Recessions,” The Economic Journal, 126: 75–108.

Chari, V. V., L. J. Christiano and P. J. Kehoe, “Optimal Fiscal Policy in a Business Cycle Model”, Journal of Political Economy, 102(4): 617-652.

Deaton, Angus S. 1991, "Saving and Liquidity Constraints." Econometrica 59(5): 1221-48.

Delong, J. B. and L. H. Summers, 2012, “Fiscal Policy in a Depressed Economy,” Brookings Papers on Economic Activity.

Doi, T., T. Hoshi, and T. Okimoto, 2011, "Japanese government debt and sustainability of fiscal policy," Journal of the Japanese and International Economies, Elsevier, vol. 25(4), pages 414-433.

Eichengreen, B., A. El-Ganainy, R. Esteves, and K. J. Mitchener, 2021, “Missed opportunities” (Chapter 11 of “In Defense of Public Debt” (Oxford University Press)).

Fournier, J.M., 2019a, “A Buffer-Stock Model for the Government: Balancing Stability and Sustainability ,” IMF Working Paper No. 19/159.

————, 2019b, “The Appropriate Fiscal Stance in France: A Model Assessment”, IMF Selected Issues, No. 19/246.

International Monetary Fund, 2017, Fiscal Monitor 2017/1.

————, 2020, “United States: Article IV Consultation—Staff Report,” IMF Country Report No. 20/241.

————, 2022, “Japan: Article IV Consultation—Staff Report,” IMF Country Report No. 22/99.

Ito, T., 2021, “An Assessment of Abenomics: Evolution and Achievements” Asian Economic Policy Review 16.

Kanda, D., 2011, “Modeling Optimal Fiscal Consolidation Paths in a Selection of European Countries,” IMF Working Paper No. 11/164.

Kashiwase, K., M. Nozaki, and K. Tokuoka, 2012, “Pension Reforms in Japan,” IMF Working Paper No. 12/285.

Lucas R. E. and N. L. Stockey, 1983, “Optimal fiscal and monetary policy in an economy without capital,” Journal of Monetary Economics, Vol. 12(1), pp. 55–93.

Mauro P., Romeu R., Binder A., Zaman A., 2015, “A Modern History of Fiscal Prudence and Profligacy,” Journal of Monetary Economics, 76 , pp. 55-70.

Miyazaki, M., 2006, “Framework for Fiscal Consolidation: Successes and Failures in Japan” OECD Journal on Budgeting Volume 6 No. 4.

Mochida, N., 2019, “Japan’s Public Finance and Social Security System,” Toyo Keizai Inc. (in Japanese)

Nozaki, M., K. Kashiwase, and I. Saito, 2014, “Health Spending in Japan: Macro-fiscal Implications and Reform Options” IMF Working Paper No. 14/142.

Price, R., T. Dang and J. Botev, 2015, "Adjusting fiscal balances for the business cycle: New tax and expenditure elasticity estimates for OECD countries," OECD Economics Department Working Papers, No. 1275.

Skinner, J., 1988, “The Welfare Cost of Uncertain Tax Policy,” Journal of Public Economics, 37(2), pp.129–145.

Takahashi, K., and K. Tokuoka, 2011, “Japan: Fiscal Adjustment Plans and Macroeconomic Shocks,” Chapter 7 of Mauro, P. (ed), 2011, “Chipping Away at Public Debt – Sources of Failure and Keys to Success in Fiscal Adjustment,” London: J Wiley & Sons, Inc.

Tokuoka, K., 2010, “The Outlook for Financing Japan's Public Debt,” IMF Working Paper No. 10/19.

Westelius, N., 2020, “Twenty Years of Unconventional Monetary Policies: Lessons and Way Forward for the Bank of Japan,” IMF Working Paper No. 20/226

Yoshino, N., T. Mizoguchi, and F. Taghizadeh-Hesary. 2015, “Optimal Fiscal Policy Rule for Achieving Fiscal Sustainability: A Japanese Case Study,” ADBI Working Paper 531.

Yoshino, N., F. Taghizadeh-Hesary, and T. Mizoguchi. 2018, “Fiscal Policy Conditions for Government Budget Stability and Economic Recovery: Comparative Analysis of Japan and Greece,” ADBI Working Paper 851.

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