Chapter 2

Sustanability of Japanese Sovereign Debt

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March 2011

This chapter should be cited as
Ito, T. (2011), 'Sustanability of Japanese Soverign Debt', in Ito, T. and F. Parulian (eds.), *Assessment on the Impact of Stimulus, Fiscal Transparency and Fiscal Risk*. ERIA Research Project Report 2010-01, pp.29-76. ERIA [online]. Available at: www.eria.org/publications/research_project_reports/images/pdf/y2010/no1/ch2Sustainabil_of_Japanese_Sovereign_Debt_Ito.pdf

CHAPTER 2

Sustainability of Japanese Sovereign Debt

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1. Introduction

The Japanese government debt to GDP ratio has steadily increased in the 1990s and 2000s to reach a level unprecedented during peace time for any advanced countries. As of March 2011, the outstanding balance of Japanese government bonds (JGB) is estimated to be 160% of GDP, and total central government liabilities reach 200% of GDP. Although mild fiscal consolidation took place from 2003 to 2007, which was mostly due to economic recovery, the fiscal balance took a turn for worse in 2008 in the wake of the global financial crisis. The global financial crisis made all major advanced countries to apply large fiscal stimuli from the last quarter of 2008 to fiscal years of 2009, and again in 2010, and Japan was no exception. With the already large debt, continuing fiscal deficits look like a perfect case of an unsustainable fiscal situation. The timing of the global financial crisis (GFC) was could not be worse.

In the 2010 budget of the central government, tax revenues were less than half of the total expenditures (budget size). The amount of new debt issues became larger than that of tax revenues. This is an extraordinarily bad fiscal situation.

A puzzling feature of the Japanese situation is that the JGB yield came down as the debt continued to mount in the 1990s and 2000s. It came down to 1%-2% by mid-2000s, and has stayed in that range until now. Investors seem to be content with large

debt and do not demand special risk premium. Several factors have been several factors that have been pointed out for what seems to be a puzzle, too low yield for bonds that are on the unsustainable course.

However, even with optimistic investors, an eventual insolvency of Japanese government cannot be avoided, if the current pace of debt increases continues. The question is under what condition the default may become unavoidable, "if" the current pace of deficits continues for an indefinite future.

In the rest of the paper, we examine the following three questions: Why did the government fail to control deficits since 1990?; Why has the bond yield stayed so low, despite the high debt-GDP ratio?; When will the Japanese debt become really unsustainable? These questions will be answered in Sections 2, 3, and 4, respectively. Section 5 describes fiscal responses to GFC. Section 6 discusses the possibility of the exit. Section 7 concludes the paper.

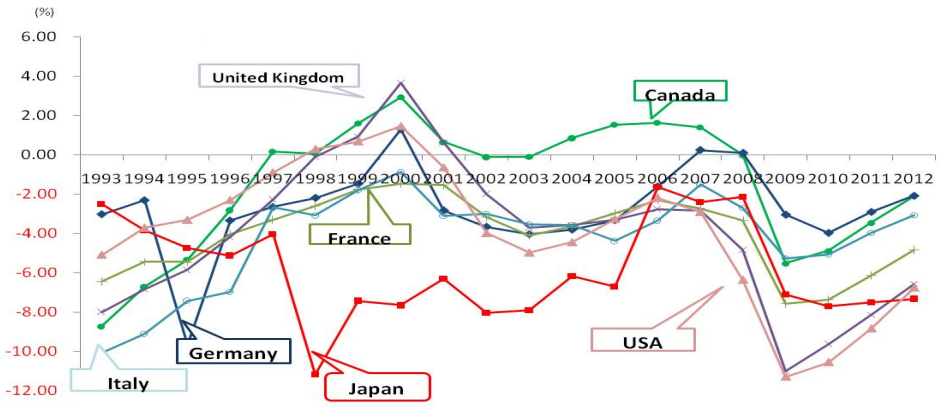
2. Deficits and Debt

2.1. International comparison

The fiscal deficits and debt situation in Japan is first depicted in the international context. The OECD compiles fiscal statistics for its member countries. The international comparison is taken from OECD, Economic Outlook No. 88 (November 2010) and earlier issues. Figure 1 shows the fiscal deficits of general government to GDP ratio for G7 countries. It shows that Japan continued to run large deficits throughout the 1990s and 2000s.[1]

[1] For an earlier overview, comparing fiscal issues and challenges of Japan and the United States, see Hubbard and Ito (2006).

Figure 1. General Government Financial Balances

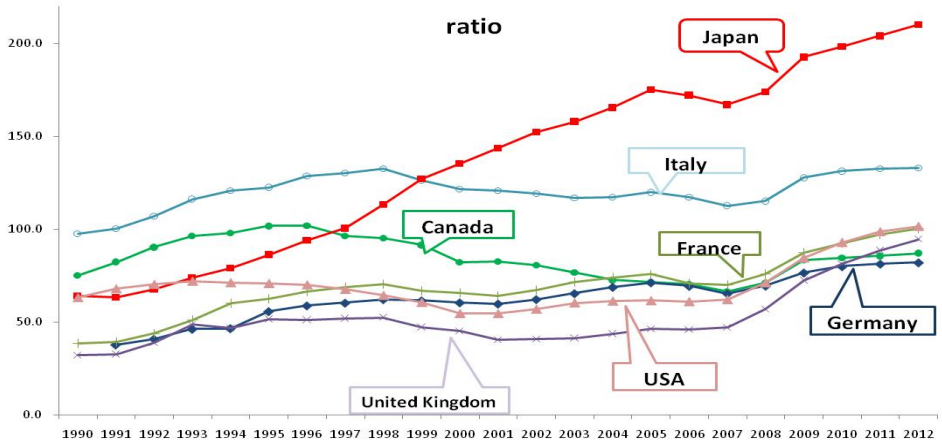


Data Source: OECD Economic Outlook, No.88, November 2010

Although the fiscal situation was deteriorating steadily from 1990 to 1997, other G7 countries were much worse than Japan. In the spring of 1997, the consumption tax rate was raised from 3% to 5% under the fiscal consolidation package that Prime Minister Hashimoto was pushing. The timing was the worst, *ex post*. The Asian currency crisis started three months later, and Japan's own banking crisis started 7 months later. What had thrown Japan off track of fiscal consolidation path were the banking crisis of November 1997, the Asian currency crisis and consequently, the severe recession of 1998. The government put priority on fiscal stimulus, rather than fiscal consolidation in 1998. As a result, fiscal deficits, larger than 6% of GDP continued from 1998 to 2005. The Japanese fiscal deficits shrank from 2006 to 2008. However, the size of fiscal deficits became much larger (about 8%) in 2009 and 2010 (not shown in the Figure 1, current version).

As fiscal deficits continued to be large, and economic growth rate continued to stagnate—being dubbed as "lost two decades"—in the 1990s and 2000s, the debt to GDP ratio became larger and larger. Figure 2 shows the gross debt-GDP ratio of general government for G7 countries.

Figure 2. Gross Government Debt-GDP

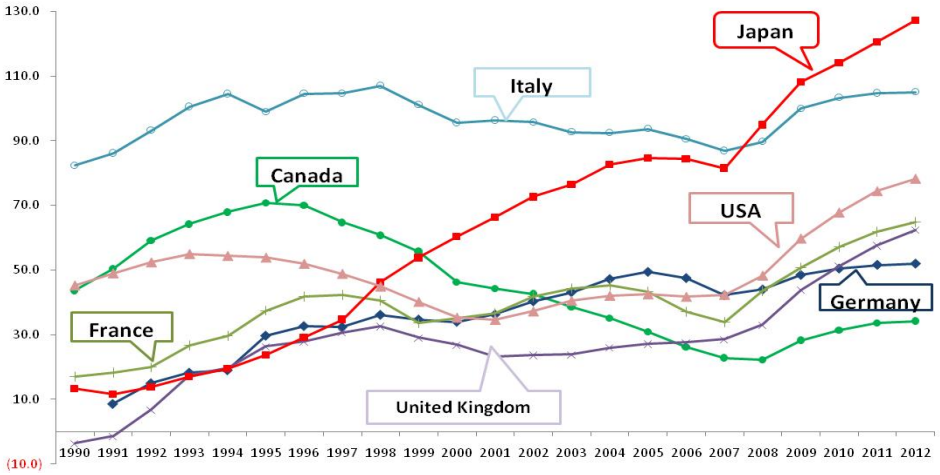


Data Source: OECD Economic Outlook, No.88, November 2010

It shows that Japan was in the middle of G7 countries in terms of the debt-GDP ratio in 1990. However, the ratio continued to rise, as other countries managed to keep the ratio stable or to make it lower. In 1998, the 100% percent mark was crossed and by 2000, Japan surpassed Italy to assume an infamous position of the most indebted government among advanced economies (OECD members). With the exception of the 2005-2008 years, the debt to GDP ratio has continued to rise.

Some scholars—such as Broda and Weinstein (2004)—argued that although the Japanese government has accumulated large debts, it also owns a large amount of financial assets. Hence, the "net" debt-GDP ratio would not look that bad. Figure 3 shows the net debt-GDP ratio. Indeed, it was only 2008 when Japan surpassed Italy, and the ratio remained only at around 110% in 2009. Does this observation offer any comfort?

Figure 3. Net Government Debt-GDP



Data Source: OECD Economic Outlook, No.88, November 2010

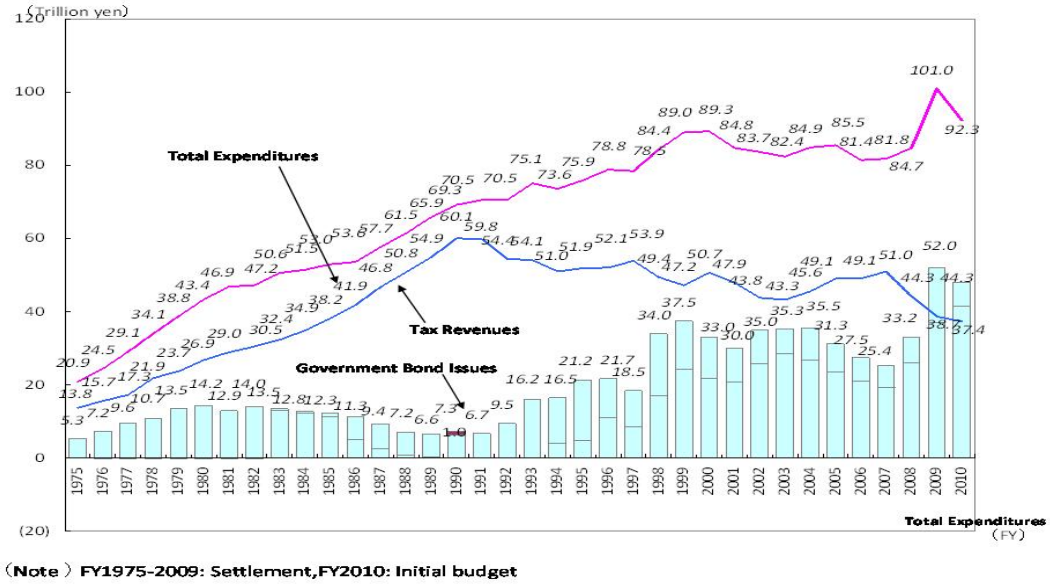
At the first sight, the net debt-GDP ratio may be a correct measure, since the government can sell those financial assets to buyback debts. However, it may not be so simple. Some of financial assets are held with non-JGB liabilities being behind it. For example, the Government Pension Investment Fund (GPIF) holds a large amount of government debts, but they are the reserve for future spending down for increasing pensioners. What is today's assets may be covering future liabilities.

However, the distinction between the gross and net measures is not getting any attention, lately. The question, which is the right measure to judge the Japanese situation, has become a moot point, as both gross and net measures continue to skyrocket. The trend and the speed of deterioration is the same in both measures, since no financial assets were gained. Sooner or later, the Japanese government would become insolvent, in any measure.

2.2. Revenues and Expenditures

In this subsection, major budget items of the general budget of the central government will be examined in order to see what really happened (or not happened) to increase deficits. In this subsection, the Japanese government statistics are used. Figure 4 shows the movements of the total expenditure and total revenues.

Figure 4. Revenue and Expenditure



Data Source: OECD Economic Outlook, No.88, November 2010

It shows that the both lines moved in parallel, as they should be, until 1990, the peak of the Japanese bubble. However, since 1991, the expenditure has been slightly increasing, while tax revenues has been continuously declining. As a result the gap between the expenditure and revenue has steadily widened. The gap is mostly financed by new issues of Japanese government bonds (JGBs). In 2009-10, tax revenues are financing less than half of expenditures—quite an unusual situation.

Examining the Figure closely, a few phases in the twenty year period of deficit widening can be identified. Expenditures continued a gradual increase throughout the

1990s. This may reflect a series of economic stimuli throughout the 1990s by the government believing that the economy was experiencing output gap. From 2000 to 2008, expenditures were finally under control, apparently capped and on a slight decreasing trend. However, any restraint was off in 2009, responding to sharp output declines due to the global financial crisis.

Tax revenues started to decline immediately after the bubble burst in the early 1990s. It continued to decline until 2003. Tax revenues increased from 2003 to 2007, by about 20 percent. During the period of recovery, with expenditures being capped, new issues of JGBs declined for three years in a row—the first time since 1990. The improvement was cut short in 2008. In 2009, tax revenues plummeted, and issues of JGBs soared. New issues of JGBs in the 2009 and 2010 initial budget reached 44 trillion yen, about 8.8 percent of GDP.

Figure 5 shows the movements of consumption tax (which is value-added tax), individual income tax and corporate income tax. The consumption tax was introduced, replacing various excise taxes in 1989 and the rate increased from 3% to 5% in 1997. It clearly shows that during the lost two decades, revenues from individual income and corporate income taxes declined steadily. They are quite sensitive to wage income and GDP growth rates. Revenues from the consumption tax remained steady.

Figure 6 shows the major expenditure items of the general budget of the central government. The social security related spending show a steady increase, due to the aging of the society. The debt interest payments have been increasing since 2001, reflecting a continuous increase in the size of debts. This contrasts the steady decrease in the interest payments in the 1990s due to the declining interest rate outpacing the increase in the principal of debts (to be analyzed later). Transfers to local governments

has been stable. Although other items, including education and science and public works, have decreased slightly, the pace of increases in the social security was faster.

Whether the budget size has been increasing in ratio to the GDP growth rate is examined in Figure 7. The top line of Figure 7 shows the movement of the central government budget to GDP ratio. Throughout the 1980s, the ratio has been declining, reflecting a successful effort of fiscal consolidation in the 1980s, and high economic growth rates that are shown in the second and third lines. The budget/GDP ratio remained at around 15% from 1990 to 1997, that is, the level higher than that in the 1980s. However, the budget to GDP ratio decisively went up in 2008-2009. In 2009, the ratio went above 20% for the first time in the postwar Japanese history.

The increase in the size of the budget was partly due to negative growth rates that reflected the global financial crisis. Fiscal stimulus was applied to help the economy not to decline further.

Figure 5. Tax Revenues by Category

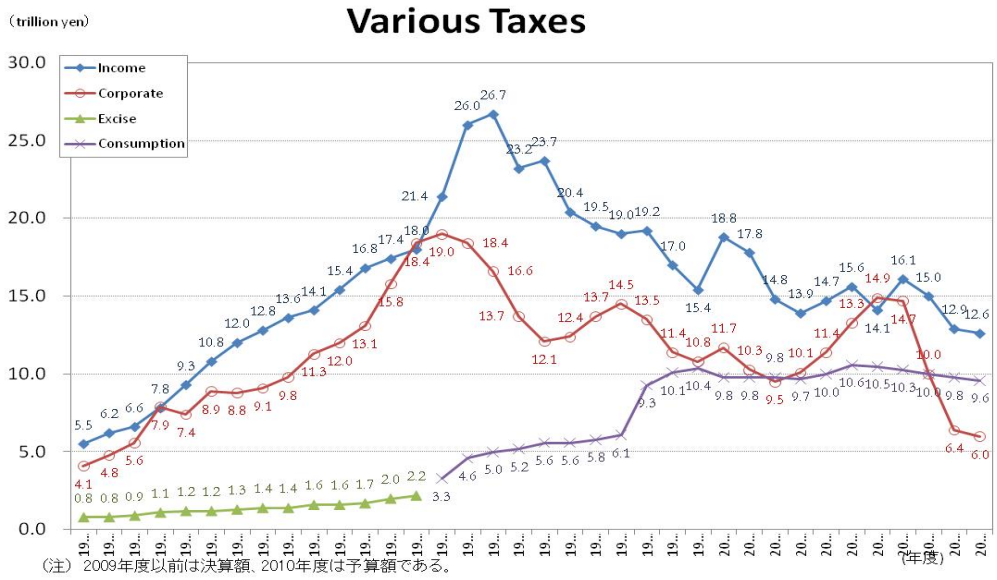


Figure 6. Expenditure Items, 1997-2010

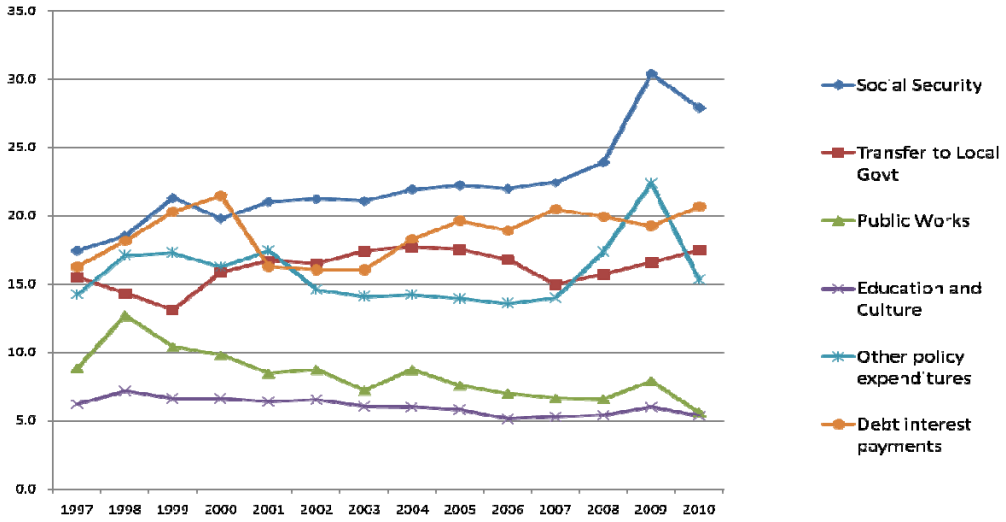
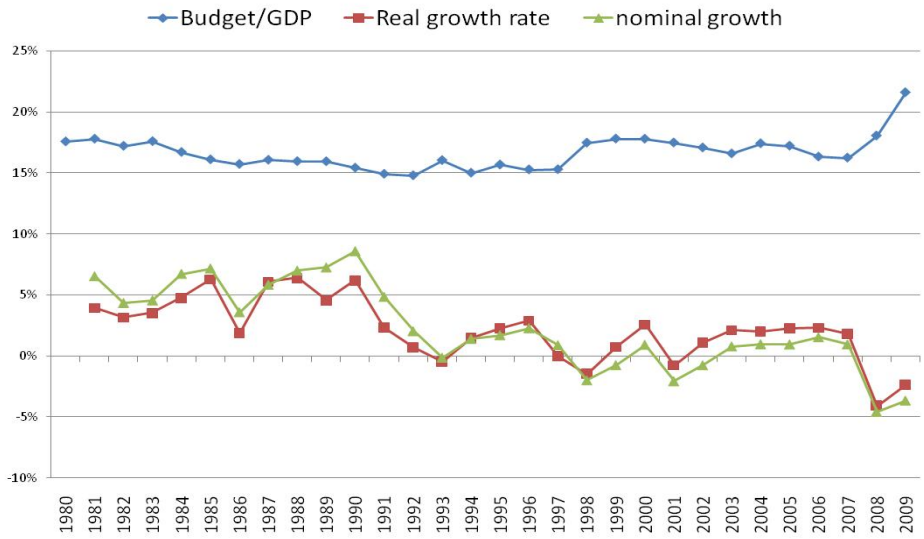


Figure 7. Budget/GDP and growth rate



2.3. Keynesian countercyclical policy

One of the reasons why expenditures continued to rise in the post-bubble period, especially from 1990 to 2000, is the extended use of traditional, discretionary countercyclical Keynesian fiscal policy. Although Japan had used the countercyclical policy, issuing government bonds, between 1965 and 1990, there was a successful

consolidation effort during the 1980s.[2] When the government responds to downturn by applying discretionary fiscal stimulus, while it fails to withdraw it during a boom period, it results in accumulating debts as a trend. In order to analyze countercyclical policy, the government reaction to "unexpected" fall in activities should be examined. First, the Japanese government routinely produces various stimulus packages when the economy is hit by negative shocks. Table 1 shows the list of stimulus packages. It shows the large stimulus packages in 1993, 1995, 1998, 1999 and 2008. The total of stimulus package from 1992 to 2000 was 130 trillion yen, while that from 2001 to 2008 was 57 trillion yen.

However, these amounts include budget items that had been appropriated before the package was announced and other measure that are not included in the central government budget. Hence, a pure incremental part of central government budget—that is, often called *Mamizu*, real water—is much less. However, it clearly shows that the stimulus packages have been applied when the growth rate is lower than the average of the decade.

Table 1.

Fiscal Year	Prime Minister	Total Size (trillion yen)	Major items (trillion yen)				
			Infrastructure	Tax cut	Land Purchase	SME	Housing Investment
1992			-	-	-	-	-
1992	Miyazawa	10.7	5.7	-	1.6	2.1	-
1993		13.2	6.6	-	1.6	2.4	0.8
1993	Hosokawa	6.2	2.0	-	-	0.8	2.9
1993		15.3	3.9	5.9	2.8	1.3	1.2
1995			-	-	-	-	-
1995	Murayama		-	-	-	-	-
1995		14.2	9.1	-	3.2	1.3	0.5

[2] See Asako, Ito, and Sakamoto (1991) for an analysis with similar method for data up to 1990.

1997	Hashimoto		-	-	-	-	-
1998		16.7	7.7	4.6	-	2.0	0.7
1998	Obuchi	23.9	8.1	6.0	-	-	1.2
1999		18.0	6.8	-	-	7.4	2.0
2000	Mori	11.0	4.7	-	-	4.5	1.1
2001			-	-	-	-	-
2001	Koizumi	4.1	1.1	-	-		
2001	Koizumi	4.4	2.6			0.5	-
2008	Fukuda						
2008	Aso	11.5				9.1	
2008	Aso	26.9				21.8	0.4
2008	Aso	10.0		1.1			
1992-2008	TOTAL	186.1					
1992-2000	TOTAL	129.2					

Another way to measure countercyclical policies is to look at the "supplementary budget." The supplementary budget is normally for the natural disaster and other unforeseen budget items. However, it also reflects the mid-year correction of budget, in response to higher- or lower-than-expected growth rate.

The Japanese government routinely forms a supplementary budget every year. Most of the time, a supplementary budget is formed in the third or fourth quarter of the year based on the GDP performance up to the second or third quarter of the year. For the first approximation, let us assume that a supplementary budget is formed in the third quarter of the year, based on the mid-year forecast error in growth, namely, the difference between the year-on-year growth rate of the second quarter of calendar year t (or the first quarter of fiscal year) and the government forecast that was announced in January of year t (that is about 10 months earlier).

Every year, the supplementary budget has been formed, some year being large, and some other not so large. A good countercyclical Keynsian government will form a large supplementary budget if the economy is performing less than the forecast at the time of initial budget formation. Table 2 shows the forecast error and the size of supplementary

budget (ratio to the initial budget size), where forecast error, FError, is defined as the year-on-year growth rate of the second quarter of year t (the information available at the time of mid-year correction on the part of the government) minus the forecast of the growth rate for fiscal year t as of January of year t (time when the government made the forecast); the supplementary budget of fiscal year t, SBudget, is defined as the size of the supplementary budget of fiscal year t in the ratio to the initial budget size.

Table 2

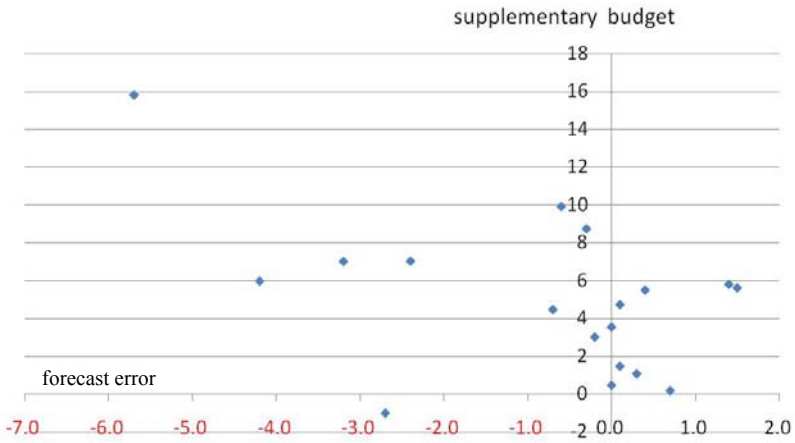
	FErrors	SBudget
1992	-2.7	-1.01
1993	-3.2	7.02
1994	0.0	0.48
1995	-0.6	9.93
1996	0.0	3.55
1997	0.1	1.48
1998	-4.2	5.98
1999	-0.3	8.75
2000	1.5	5.63
2001	-0.7	4.48
2002	-0.2	3.03
2003	0.7	0.18
2004	1.4	5.81
2005	0.4	5.50
2006	0.1	4.73
2007	0.3	1.08
2008	-2.4	7.04
2009	-5.7	15.82

The average of forecast errors is minus 0.9 percent, suggesting that the government's forecast was too optimistic. Hence, as the actual growth rate tends to fall short of expectation, it prompts the mid-year stimulus package as a supplementary budget. The positive bias of the supplementary budget can be viewed as a response to systematic optimism about the growth rate. It seems that a positive supplementary budget has been institutionalized in the Japanese budgetary process—always finding ways to spend on something in the middle of the year, in some years, heavily on public works and in some years, on tax cut. The over-estimating the potential growth rate

causes the *ex post* upward bias in supplementary budget, given the Keynesian counter-cyclical behavior of the government. Thus, fiscal deficits tend to remain high.

Figure 8 shows the scatter diagram showing the relationship between forecast errors of the government forecasts of growth and the supplementary budget, where the forecast is made in January, year t, and the supplementary budget in year t in ratio to initial budget of year t.

Figure 8. Forecast Error (t) and the Supplementary Budget ratio



In order to test a hypothesis of the systematic bias and the counter-cyclical behavior, the supplementary budget (SBudget) is regressed on growth forecast errors (FError). Definitions are:

FError: year-on-year growth rate of the second quarter of year t

－government growth forecast of year t, as of January, year t

SBudget: {the size of supplementary budget of Fiscal year t}/{initial budget size}

The sample period is from 1992 to 2009.

The estimated coefficients are as follows:

SBudget(t) = 4.09 – 1.02FError(t)

(4.36) (2.28)

[0.000] [0.036]

adjusted R-sq=0.24, and DW=1.61,

where t-statistics in the (bracket), and the p-value in the [square brackets].

According to the estimate, the 1 percent surprise in growth forecasts turns into an increase in the supplementary budget by 1 percent of the initial size of the budget. Moreover, even without the forecast error, there is always supplementary budget, that is, the systemic bias toward fiscal stimulus.

In sum, a part of explanations why fiscal deficits persisted in the 1990s and 2000s was the systemic bias in supplementary budget and too optimistic forecast of growth rate, which results in larger supplementary budget given the countercyclical policy.

Then the next question is why growth forecasts turned out to be on average too bullish. Three years stand out as large negative forecast errors, that is, 1992, 1993 and 1998, prior to the GFC. The growth rates in 1992 and 1993 turned out to be lower that forecasts, because the government underestimated the negative effects of collapse of the bubble. The growth rate of 1998 turned out to be much lower than the forecast, because of the government underestimated the damage to the financial system from the banking crisis of November 1997.

In the beginning of the global financial crisis of 2007-09, the Japanese economy as well as the Asian economy did not suffer much, because the Japanese financial institutions and investors did not hold “toxic assets,” that is, the subprime-related financial products. It was only after September 2008, when Japan and Asian economies

experienced a sharp decline in their exports to the United States and Europe. The export decline triggered output decline and unemployment. The crisis contagion to Japan and Asia from the United States, the epicenter, was mainly through the trade channel. As exports to the United States experienced the sharp decline, an entire production/supply chain in Japan and Asia suffered a sudden stop. The growth rate dropped sharply in 2008 and 2009. This prompted large supplementary budget in these years.

2.4. Deficit Ratio

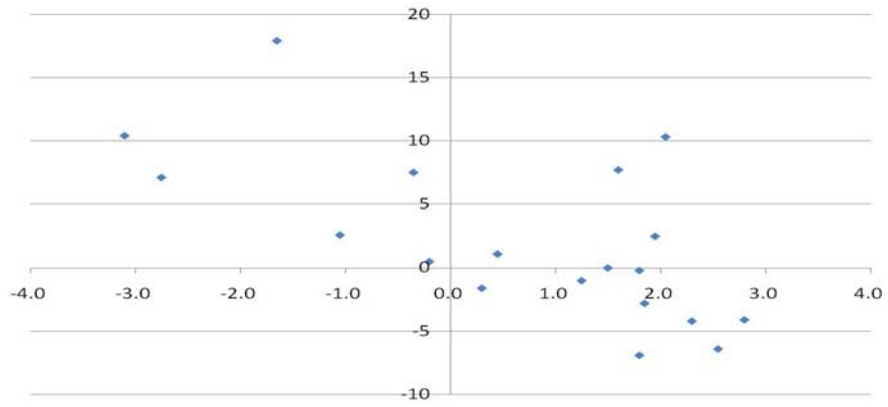
The growth performance of fiscal year t not only affects the supplementary budget but the initial budget of fiscal year t+1. However, by the time the initial budget of Fiscal Year t+1 is being formed, that is November and December of t, more information about the economy is available, compared to the time when a supplementary budget of Fiscal year t is formed.

Let us form a hypothesis that the deficit ratio of the initial budget tends to increase when the growth rate known at the time of fiscal year t-1 is lower. The change in the deficit ratio from t-1 to t, DefRatio(t), is defined as the amount of government bond "new" issues (that is, fiscal deficits) in the initial budget. For the growth rate known at the time of budget formation, the average of the year-on-year growth rates of Q3 and Q4, GQ34Av, is used. The growth rate of Q3 is known at the time of budget formation, but partial information that is helpful in predicting Q4 growth rate is known. Therefore the average of the two quarters is used.

Figure 9 shows the scatter graph of the average growth rate of Q3 and Q4 of year t-1 and the change in the deficit ratio in the initial budget of fiscal year t. It shows the negative correlation between the two variables, indicating that the hypothesis is

supported by data. A regression, with the sample period is from 1992 to 2010, produces the following estimates:

Figure 9. Growth(t-1) and change in deficit ratio from t-1 to t, 1992-2010



1992-2010

DefRatioChg(t) =	3.75	–2.36 GQ34Av(t-1)
	(2.95)	(– 3.44)
	[0.009]	[0.003]

Adjusted R sq = 0.376

DW = 2.63

where t-statistics in the (bracket), and the p-value in the [square brackets].

The regression confirms the implication of the hypothesis. When the growth rate is lower at the time of budget formation, the deficit ratio in the initial budget goes up. The result implies that a decline in the growth rate by 1 percentage point prompts an increase in the deficit ratio by 2.4 percentage point over the level of t-1. The fact that the constant term is estimated as 3.75 is worrisome. The deficit ratio tends to rise if the growth rate is less than 1.39%. This happened all too often.

2.5. Effectiveness Debate

Although Japan repeatedly adopted large fiscal stimulus, both in the initial budget and the supplementary budget almost every year, as shown in the preceding subsection, the growth rate in the 1990s and 2000s never rose to the level observed prior to 1990. Any increase in the growth rate proved to be short-lived.

One possible reason for the low growth rate is that the potential growth rate somehow declined in the 1990s (cf. Hayashi and Prescott (2002)). This explanation is consistent with the finding that countercyclical Keynesian policy had a bias toward fiscal deficits. Another possible reason is that a combination of several factors including a burst bubble problem and associated nonperforming loans in the beginning of the 1990s; tighter than optimal monetary policy throughout the 1990s and possibly in the 2000s (c.f. Ito and Mishkin (2006)); the shocks like the Hanshin Earthquake in 1995, the banking crisis of 1997-98 and 2002-03; premature fiscal tightening in 1997; diminished fiscal multiplier due to pork-barrel projects. It is difficult to quantify each of these possible reasons.

Those who believe that Keynesian policies continue to be effective argue that when fiscal expenditure is applied, they do work. They point out that many stimulus packages indeed include those expenditures that have been already budgeted for other purposes. The real incremental budgetary increases, or *mamizu*, was in general not large (recall Table 1). Posen (1998) and Kuttner and Posen (2001) argue that when *mamizu* is large, fiscal policy has large impacts. They take a large stimulus introduced in 1995 as a main driver of higher economic growth in 1996.

Case 1 [Fiscal consolidation of April 1997].

In April 1997, the consumption tax rate (VAT rate) was raised from 3% to 5%; special income tax credit was repealed, and social security contribution rate was increased. The total contractionary effect was about 7 trillion yen or about 1.5% of GDP. The significant fiscal consolidation of April 1997 had been planned for two years. When a significant stimulus, such as a special income tax credit, was applied in 1995 (as budgeted in 1994), consolidation in the near future was committed.

The economy plunged into a recession in 1998. There are two different groups of people with regard to the association between the fiscal consolidation of April 1997 and a recession in 1998. Those who believe that fiscal stimulus/contraction has a strong power on the economy make a close association between the consumption tax hike and a recession in the next year. They use this case as an example of large multiplier effect. Those who deny the large multiplier effect of the consumption tax attributes the recession of 1998 to Asian currency crisis of 1997-98 and Japanese banking crisis of 1998. They think that the association of the consumption tax rate increases of 1997 and the recession of 1998 is quite misleading and unfortunate for the need for fiscal consolidation.

Case 2 [Shopping voucher plan of 1999]:

The shopping voucher program was a platform of the coalition government in 1999 to help families with children. 0.7 trillion yen was distributed to families with children and with elderly in the form of 20,000 yen per child or an elderly. Vouchers were distributed in April 1999, and had to be used in a participating stores in the same municipality before end of September 1999.

Theoretically, the total impact of incremental government expenditure on GDP is

larger than the total impact of tax cut by the same magnitude. Hence, handing out shopping voucher is not as effective of government expenditure in terms of stimulating GDP.

A survey was conducted by an agency of the government in June-July 1999, asking questions regarding how people were using the distributed vouchers. Of course, it is difficult to identify which consumption goods were bought from salary or existing saving and which consumption goods were bought especially from the shopping voucher. Questions were framed like: "Did you buy something extra? Or more expensive items than otherwise? Is by how much?" Then, the survey concluded that an incremental expenditure was 32% of the voucher they received. Therefore, the marginal consumption propensity (=c) is 0.32 and the multiplier (=c/(1-c)) turns out to be 0.47.

A more comprehensive study was conducted by Hori, et. Al (2002) using the individual responses of the household expenditure survey, which was available only to the specially approved researchers. They compare consumption patterns of two different groups: families with kids who received 20,000 yen per child; and families without a kid, which did not receive cash. After carefully estimating the consumption behavior controlling for many factors, they came up with estimates that the marginal consumption propensity (=c) to be 0.2 – 0.3 at the time they receive the voucher. This is consistent with the simpler survey just mentioned above. There are two additional notable conclusions from the study. First, the incremental consumption drops in the medium term to 0.1. The authors argue that shopping vouchers was used for a purchase of semi-durable goods, such as bicycles, by moving forward the planned purchase, but in the medium run, the consumption pattern does not change much. This makes sense from permanent income hypothesis. The amount of voucher is probably a very small

portion from their life time income. Second, families with low assets had higher consumption rate from the voucher. This is consistent with the consumption pattern of liquidity-constrained households.

Those who are skeptical of Keynesian type discretionary policy would argue these cases as a failed attempt of discretionary tax cut and consumption voucher plan is the evidence of low multiplier effects. When the stimulus measure is temporary, it does not stimulate spending, since the permanent income does not change. When the stimulus is funded by the government deficits (like the Japanese government in the1990s), then the families view these additional income to be cancelled out by the future increase in tax. This is the well-known theory of the Ricardian effect. There are many theoretical reasons that the Ricardian effect may not apply. But if it has any chance that may hold true, Japan in the 1990s and 2000s is the one, because of already high government debt level, which cannot be possibly paid back without increase in tax in the future, declining population and rather homogeneous households with strong intergenerational family ties.

Those who argue against discretionary fiscal policy also are skeptical of public works program—typical supplementary budget items. They divert resources to low productive projects (e.g., a "bridge to nowhere" project) and a sector (construction) itself. They are dynamically, cross-sectionally inefficient, because they divert the resources to relatively low productivity, and relatively stagnant, if not declining, industry. There was some interest in considering a non-Keynesian effect (cf Alesina and Perroti (1995), Giavazzi and Pagano (1996) and Giavazzi, Jappelli, and Pagano (2000)). There are some episodes in Europe that a major fiscal consolidation produces expansionary effects. But there was no serious study that took into account responses of

households and firms to permanent increases in various taxes and bond issues. The structural shift in fiscal balance (government bond issues), as distinct from cyclical automatic stabilizers, needs a careful examination.

3. Bond Yield Puzzle

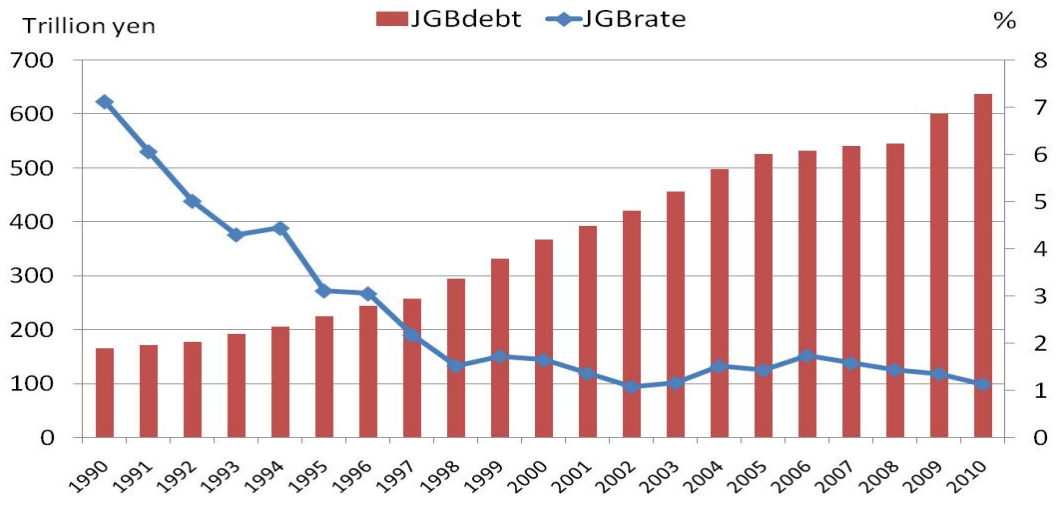
3.1. Bond Yield, Facts and Hypotheses

As fiscal deficits continued to be large in the last twenty years, the debt-to-GDP ratio has soared (recall Figure 2). The sustainability of these debts has been debated in Japan for more than a decade. The discussion of sustainability will be summarized in the next section.

Usually, the possible breach on the sustainability is forewarned by the market, in terms of rising bond yield and downgrading by credit rating agencies, and the rising level of credit default swap (CDS). Usually when the solvency of the government is questioned, the bond yield starts to move up. This has been the case in Latin American debt crisis in the 1990s and European sovereign crisis in 2009-2010. Did the bond yield move up in Japan, as the stock of sovereign debts soared? Not really.

Figure 10 shows the stock of government bonds and the average nominal yield of 10-year government bonds. It appears that there is negative correlation, rather than theoretically predicted positive correlation.

Figure 10. Debt and Interest Rate (Debt&Yield.xlsx)



One might think that the size of government bonds should be scaled by the nominal GDP, but the nominal GDP in Japan has been basically flat since 1995. Hence, this is an approximately correct figure to discuss the burden to government bonds to the economy. Similarly, the correct measure of the bond yield may be the expected real bond yield that is the nominal yield minus the expected inflation rate of the following ten years. We just assume that the investors' expected inflation rate over the following ten years has not changed much. The inflation rate linked bonds (J-TIP) have been available in Japan in the last ten years, but many regard the market being not reflecting the investor' expectation.

Hence, it is fair to say that the Japanese bond rate has declined, *despite* the rising stock of government bonds, a major puzzle, unless one thinks that the almost 200 percent debt-GDP ratio is no concern to the Japanese economy.

3.2. Hypotheses to Solve the Bond Yield Puzzle

Several reasons have been mentioned in the financial press regarding why the

Japanese bond yield has stayed low. Let us list them first:

(1) Domestic saving surplus;
(2) Domestic investors' home bias; and Domestic investors' risk aversion
(3) Low policy (short-term) interest rate
(4) Deflation
(5) Trust in the (future) government actions
(6) Room to increase the VAT

First, the domestic saving—the sum of savings of household, corporate, and the government—is still in the surplus. Although the government sector is in the large deficits, household and corporate savings more than offset deficits of the government sector. In the 1970s, the huge household surpluses were financing corporate borrowing, while the government was only slightly in the deficits. Household savings rate has precipitously declined in the 1980s and 1990s. In the 1990s, corporate savings increased more than the decline in household saving. Since, Japan does not have to borrow in net from abroad for its investment, the influence of external factors, such as long term interest rate of other major countries, is small.

The 95% of Japanese government bonds (JGBs) are owned by domestic residents, mainly Japanese financial institutions. Hence, foreigners' sentiment plays little in formation of the bond yield. Any sudden capital inflows and outflows and possible exchange rate concerns (either appreciation or depreciation) would not spillover to the JGB market.

Hence, for the JGB yield formation, it is critically important how domestic investors regard JGB as part of their portfolio. Japanese institutional investors and retail investors are known to have high "home bias," that is, the proportion of the yen-denominated domestic assets is extremely high, compared to other investors of major advanced

countries. They are also risk-averse, the proportion of "safe" assets in their portfolio is typically high. The bank deposits are most favorite assets of individuals. The proportion of equities in the portfolio of a typical household is very low.

So, a large proportion of household savings, and more recently corporate savings also, are invested in the banking sector usually as deposits. Banks tend to buy more JGBs when more funds are deposited. Banks regard the currency risk of foreign bonds to be high (i.e, the volatility of the yen has been historically high). It is remarkable that corporations have paid back their borrowing from banks more than they newly borrow. Decreasing demand for bank loans is partly due to the reduced investment activities in the 1990s. Corporations have been fattening their cash reserves themselves, rather than investing, paying out as dividends, or increasing the wages. Constrained by the Basle capital adequacy requirements (Basle I, II, and III), banks regard JGBs to be ideal investment vehicle—zero risk weight.

Pension funds and insurance companies are also happy to hold JGBs, since their liabilities are also in the yen. Table 3 shows the portfolio distribution of households and the share of JGBs held by different institutional investors.

The Bank of Japan policy rate (overnight call rate) has declined quickly in the 1991-95 period. The policy rate has been at or below 0.5% since 1995. The long-term JGB rates follow a trend of the policy rate. The yield curve shifted down in the 1990s, but also it became flattened in 2000s.

Table 3. Household Portfolio and JGB Holders

Household Portfolio	Tril. Yen
Cash and Deposits	800
Bonds	42
Mutual Funds	50
Equities	93
Insurance and Pension Reserves	395
Others	62
Total	**1442**

JGB investors	%
Banks	19.6
Insurance co.	17.1
Post Banks and likes	20.9
Pension funds	9.0
Government Public Investment Fund	3.1
Bank of Japan	8.9
Households	3.9
Overseas	6.5
Others	11.0
Total	**100.0**

Japanese investors therefore have huge faith in the future government to stop the JGB runaway. Where does this optimism come from?

Most European countries have the VAT rate more than 15%, and some as high as 25%. The Japanese VAT (consumption tax) rate is 5%. There is a huge room for increasing VAT rate to the European norm. Just for the illustration, deficits (i.e., new issues of JGBs) of the central government initial budget was 44 trillion yen in Fiscal Year 2010, and this can be brought down to zero, if the consumption tax rate was raised to 20%. So, the difficulty of the Japanese situation is more of the political will than the hard economic calculation.

Tokuoka (2010) has investigated various measures of "JGB" as a determinant of the JGB yield, controlling for various macroeconomic factors. Since there is an apparent negative correlation between JGB stock and the JGB rate, it seems difficult to obtain a theoretically predicted positive coefficient on the JGB stock in explaining the JGB rate. He triesd several different specifications. The best regression result of his is as follows:

Dependent Variable. 10-year yield, quarterly, 1998Q1 – 2009Q1

Variable	Gross debt including FILP	JGB held by Bank of Japan	Net financial wealth held by household and corporate sectors	Share of foreign holdings of JGBs	R square
Estimate	0.02	0.01	-0.02	0.11	0.38
t-stat	(3.52)***	(0.36)	(-3.37)***	(2.06)**	

Tokuoka (2010) Table II.6

Notes: FILP is the government investment program, which used to be in the special account that were funded by Postal Bank surplus funds, and later became a part of government bond issues

The result shows that the increase in the stock of JGB indeed increases the yield and the household and corporate net savings matter for the JGB yield, namely more surpluses lower the JGB yield, presumably because they increase demand for JGBs. It also shows that the more foreigners hold the JGBs, the higher the yield should be.

Household savings are expected to decline, due to the aging society, and corporations would not keep increasing their net saving forever. If their savings start diminishing, then the JGB rate will start increasing. The share of foreigners also matter, if JGB had to be sold to foreigners as domestic investors' total assets go down, then the foreigners would demand a higher JGB rate. In any case, the prospect of decreasing domestic population and aging is not good news for the JGB rate. Thus, he is not optimistic for the future development. His assessment is summarized below:

> "Historically, Japan's public debt has been financed in a fairly smooth manner. The large pool of household savings and the stable domestic institutional investor base have contributed to keeping yields steady despite the rapid rise in public debt. However, Japan is undergoing rapid population aging, which will likely limit the market's absorptive capacity of public debt. In addition, shifts in institutional

investors' behavior could serve to reduce inflows to the market. To maintain market stability, sound public debt management and fiscal consolidation will be critical." (p.19)

How much more time does Japan have to avoid a fiscal disaster if the current loose fiscal policy continues? Once the JGB yield starts increasing, a selloff by domestic institutional investors would happen. If selloff happens, the yield would go higher, and the government budget for interest payments would be heavier and heavier until the government cannot issue any refinancing as well as new bonds. It is difficult to estimate how domestic institutional investors would behave. Unless corporations continue to repay their borrowings from banks and banks continue to purchase JGBs, the turning point would come sooner or later.[3]

4. Sustainability

There are enough worrying signs about the Japanese fiscal situation as depicted in the preceding sections. In this section, the issue of "sustainability" will be examined. Several authors have proposed tests of sustainability. However, there is no definite test that could determine one way or another to declare sovereign debts to be unsustainable.

In what follows, major tests of sustainability will be reviewed, and then one particular test is applied.

[3] Ostry *et al*. (2010) attempts to define "fiscal space" and shows that Japan is losing the space quickly.

Methodology

Let us define B(t) as Government debt at the end to period t, maturing in one period, Δ is the first difference operator:

$$\Delta B(t) = B(t) - B(t-1)$$

Thus, $\Delta B(t)$ is the amount of new issues of government debt at t. Let i(t) be the interest rate at the time of issue, t-1, to be payable at time t for debt B(t-1). Total interest payment in period t, contracted at time of issue in t-1: i(t)B(t-1). The debt at the beginning of time t is B(t-1), which equals the amount of debt at the end of t-1. The interest rate i(t) is applied as the interest rate on B(t-1), and this is known in t-1.

G(t) denotes Government expenditures. Then the government budget constraint is written as:

$$T(t) + \Delta B(t) = G(t) + i(t)B(t-1) \qquad (1)$$

The Primary Balance is defined as PB(t) = T(t) – G(t). The surplus in primary balance means PB>0, while primary deficit means PB<0.

From eq. (1)

$$G(t) + (1 + i(t))B(t-1) = T(t) + B(t)$$

For the stationary economy:

$$(1 + i(t))B(t-1) = \{T(t) - G(t)\} + B(t)$$

$$(1 + i(t))B(t-1) = \{T(t) - G(t)\} + B(t)$$

$$B(t-1) = \frac{1}{(1+i(t))}\{T(t) - G(t)\} + \frac{1}{(1+i(t))}B(t)$$

Solving forward,

$$B(t-1)=\sum_{j=0}^{\infty}\{\prod_{s=0}^{j}\frac{1}{1+i(t+s)}\}\{(T(t+j)-G(t+j)\}$$
$$+\lim_{j\to\infty}\prod_{s=0}^{j}\frac{1}{1+i(t+s)}B(t+j)$$

In order to have the current bond as the discounted value of the future primary balance, the second term on the right-hand-side (RHS) of (2), sometimes called the bubble term, should converge to zero. Then from the remaining relationship (LHS and the first term of RHS), the debt and primary balance have to be stationary, or if not, co-integrated with I(1).

For growing economy, all variables can be scaled by GDP. Denoting GDP by Y(t), the debt-GDP ratio is the ratio of B(t) to Y(t). The change in the debt-GDP ratio is defined as

$$\Delta\{\frac{B(t)}{Y(t)}\}\equiv\frac{B(t)}{Y(t)}-\frac{B(t-1)}{Y(t-1)}$$
$$=\frac{\Delta B(t)}{Y(t)}-\frac{B(t-1)}{Y(t-1)}$$
$$=\frac{\Delta B(t)}{Y(t)}-\frac{B(t-1)}{Y(t-1)}[\frac{Y(t)-Y(t-1)}{Y(t)}]$$

$$=\frac{\Delta B(t)}{Y(t)}-\frac{B(t-1)}{Y(t-1)}[\frac{g(t)Y(t-1)}{Y(t)}]$$

$$=\frac{-PB(t)+i(t)B(t-1)}{Y(t)}-g(t)\frac{B(t-1)}{Y(t)}$$

$$=-\frac{PB(t)}{Y(t)}+\{i(t)-g(t)\}\frac{B(t-1)}{Y(t)}$$

Therefore whether the debt-GDP ratio increases or decreases depends on the two terms, primary balance and the interest-growth rate differential weighted by the previous year's debt. Even if primary balance is held zero, the debt-GDP ratio may become higher (or lower), when the interest rate is higher (or lower, resp.) than the growth rate.

$$\frac{\Delta B(t)}{Y(t)} = -\frac{PB(t)}{Y(t)} + \{i(t) - g(t)\}\frac{B(t-1)}{Y(t)}$$

$$= -\frac{PB(t)}{Y(t)} + \{i(t) - g(t)\}\frac{B(t-1)}{(1+g(t))Y(t-1)}$$

$$= -\frac{PB(t)}{Y(t)} + \frac{(i(t) - g(t))B(t-1)}{(1+g(t))Y(t-1)}$$

$$= -\frac{PB(t)}{Y(t)} + \frac{(i(t) - g(t))B(t-1)}{(1+g(t))Y(t-1)}$$

Rewriting the left-hand-side,

$$\frac{B(t)}{Y(t)} - \frac{B(t-1)}{Y(t-1)} = -\frac{PB(t)}{Y(t-1)} = -\frac{PB(t)}{Y(t)} + \frac{(i(t) - g(t))}{(1+g(t))}\frac{B(t-1)}{Y(t-1)}$$

$$\frac{B(t)}{Y(t)} = -\frac{PB(t)}{Y(t)} + \frac{B(t-1)}{Y(t-1)} + \frac{(i(t) - g(t))}{(1+g(t))}\frac{B(t-1)}{Y(t-1)}$$

$$\frac{B(t)}{Y(t)} = -\frac{PB(t)}{Y(t)} + [1 + \frac{(i(t) - g(t))}{(1+g(t)}]\frac{B(t-1)}{Y(t-1)}$$

$$\frac{B(t)}{Y(t)} = -\frac{PB(t)}{Y(t)} + [\frac{(1+i(t))}{(1+g(t))}]\frac{B(t-1)}{Y(t-1)}$$

Or, using the approximation

$$\frac{1+i(t)}{1+g(t)} = 1 + i(t) - g(t)$$

(3) can be rewritten as

$$\frac{B(t-1)}{Y(t-1)} = \frac{1}{1+i(t)-g(t)}\frac{PB(t)}{Y(t)} + [\frac{1}{(1+i(t)-g(t))}]\frac{B(t)}{Y(t)} \qquad (4)$$

Denoting

$$b(t) = \frac{B(t)}{Y(t)} \text{ and } s(t) = \frac{PB(t)}{Y(t)}; \text{ and } r(t) = i(t) - g(t)$$

Eq. (4) can be written as

$$b(t-1) = \sum_{j=0}^{\infty} \{\prod_{s=0}^{j} \frac{1}{1+r(t+s)}\} \{(s(t+j)\} + \lim_{j\to\infty} \prod_{s=0}^{j} \frac{1}{1+r(t+s)} b(t+j) \qquad (5)$$

Eq. (4) can be solved as Eq. (2), replacing (1+i(t)) by (1+i(t)-g(t)). Note that if i(t)<g(t), for all t, then any debt level can be supported by shifting the burden to future generation, since the growth rate is higher than the interest rate.

The stationarity of the debt level (LHS) of Eq. (2) or the primary surpluses has been first proposed as a test of fiscal sustainability by Hamilton and Flavin (1986). They applied unit root tests to the US data, 1962-84, and obtained the result, the null hypothesis of nonstationarity was rejected, so that "investors rationally expected the budget to be balanced in present-value terms." (Hamilton and Flavin, (1986), p.816.) However, the work has been criticized by Trehan and Walsh that the rejection is only

due to the significance of 10 percent and it is not rejected at 5 percent. The annual data for 22 years seems to be too short for robust unit root test.

Intuitively speaking, even in case of nonstationary of debt, if both debt, B(t-1), and discounted sum of the future primary surplus, {T(t+j) – G(t+j)} are growing at the same speed, then it can be regarded that the debt is sustainable. Technically, the cointegration test proposed by Trehan and Walsh (1988, 1991) tests this intuition. They propose to test cointegration among G+iB and T. The reason for using G+iB instead of G is derived from the tax smoothing hypothesis. They indeed showed that the variables are cointegrated so that sustainability is judged to be satisfied.

Te cointegration test falls into the same trap, in that the power of the test is very weak, if the data series is not long. Trehan and Walsh (1988) uses the long time series from 1890 to 1986. However, the US policy may have experienced the structural break(s) as the data set spans over the two World Wars.

The direct test of this condition is to test the second term of RHS of (2). Ihori, Nakazato, and Kawade (2003), tested the existence of the bubble term assuming that the future interest rate and the growth rate stay constant. Along with constructed the optimal deficit level for the Japanese economy in the 1990s. They evaluated the fiscal consolidation efforts of the Hashimoto government in 1997. They conclude that by late 1990s, the sustainability condition in Japanese data was seriously questioned.

<Bohn test>

Bohn (1998, 1991) proposed a test that is quite different from the above unit root and cointegration tests. He consider the reaction function of the government, in response to the debt level. If the government reacts to the increase in the debt level by

increasing taxes or curtailing expenditures, that would work against a runaway debt. In specification, the test is whether primary balance (in ratio to GDP), s(t), rises, when debt (in ratio to GDP) b(t), rises, then the debt is defined to be sustainable. The regression is as follows:

$$s(t) = \alpha + \beta b(t) + \varepsilon(t) \ldots\ldots\ldots\ldots\ldots\ldots (6)$$

If β> 0, then the debt is sustainable. Bohn (1998) foundβ> 0 in a univariate regression using the long US data.

Broda and Weinstein (2005)

Broda and Weinstein (2005) made three kinds of innovation to the application of fiscal sustainability to Japan. First, they aggregated the public sector to define the government debt. The public sector includes the Bank of Japan. Second, it emphasized the *net* debt rather than *gross* debt. They subtracted public sector financial assets from gross debt. Therefore B(t) for them is net debt. At the time of their writing, the net debt to GDP ratio they calculated was 46% as opposed to gross debt of 161%. Third, they adopted the Blanchard, et. al (1990) definition of fiscal sustainability. Roughly speaking, fiscal situation is sustainable, if the debt-GDP ratio in the future (t+n) comes back to the debt-GDP ratio of now (t-1). Recall the relationship.

$$\frac{B(t)}{Y(t)} = -\frac{PB(t)}{Y(t)} + [\frac{(1+i(t))}{(1+g(t))}]\frac{B(t-1)}{Y(t-1)}$$

Calculate forward

$$\frac{B(t+n)}{Y(t+n)} = -\sum_{j}^{n} \prod_{s=0}^{j} \left[\frac{(1+i(t+s))}{(1+g(t=s))}\right]^{s} \frac{PB(t+n-s)}{Y(t+n-s)}$$

$$+ \prod_{s=0}^{n} \left[\frac{(1+i(t+s))}{(1+g(t+s))}\right]^{s} \frac{B(t-1)}{Y(t-1)}$$

Broda and Weinstein (2005) then assumes that the interest rate and the growth rate being constant: i(t+s)=i and g(t+s)=g for all s. They add complexity by differentiating workers and retirees in order to take into consideration the aging society of Japan. Then, by assuming future path of PB(t-s), the future path of B/Y can be simulated.

They argue that by raising tax burden to the average European level gradually, the Japanese debt is sustainable. By raising the tax rate to 34.6 percent, the debt-to-GDP ratio surpasses 160 percent around 2070, but will be reduced to the near 50% by year 2100.

There are several critical remarks. First, financial assets of the public sector include the government pension funds. Hence by deducting them from gross assets means the contingent liability of social security increases. So, it is questionable that the financial asset is really genuine asset (equity). Second, the interest rate is assumed to be constant (2 percentage point higher than the growth rate). However, there may be a case that as the debt-GDP ratio becomes higher, investors may require risk premium. Then before the debt-GDP ratio starts to decline, it may jump to an unsustainable path of a vicious cycle of higher debt and higher interest rate (risk premium). Third, the definition of sustainability may be politically too comfortable. Even when the debt level has risen, the government may say that it is possible to come back to the "current" level in the future. Every year, the base, the "current" year, becomes higher and higher. Put

differently, the sustainable path that is calculated at year t is not time-consistent. Indeed, after six years of their paper, the debt-GDP ratio in Japan has gone up much higher than their assumed sustainable path back then.

Application of the Bohn Test to the Japanese Data

In the rest of this section, we apply the Bohn test to the Japanese data. Recall

$$s(t) = \alpha + \beta b(t) + \varepsilon(t) \quad \text{.....(6)}$$

The sustainability is defined as $\beta > 0$. As the concept of primary surplus and debt, we use two different concepts: (A) The general account of the central government budge; and (B) the general government (central and local combined) primary balance and public debt. The data set of (A) is constructed from the budget data obtained from the Ministry of Finance; and the data set of (B) is constructed from the GDP statistics of Cabinet Office. The primary balance in GDP is obtained in the Appendix table, the Government sector. The central government and the local government is added, but the social security account is not included for our purpose.

First, the relationship between Debt/GDP ratio (x-axis) and Primary Balance/GDP ratio (y-axis) is plotted in the Figures 11 (Budget basis) and 12 (GDP statistics basis). The sustainability implies the positive-slope relationship, which we cannot find for the entire sample period. However, if only the mid-1970s to 1990s is taken, there seems to exist a positive slope.

Figure 11. Debt and Primary Balance (Central Government, general budget base), 1969-2009

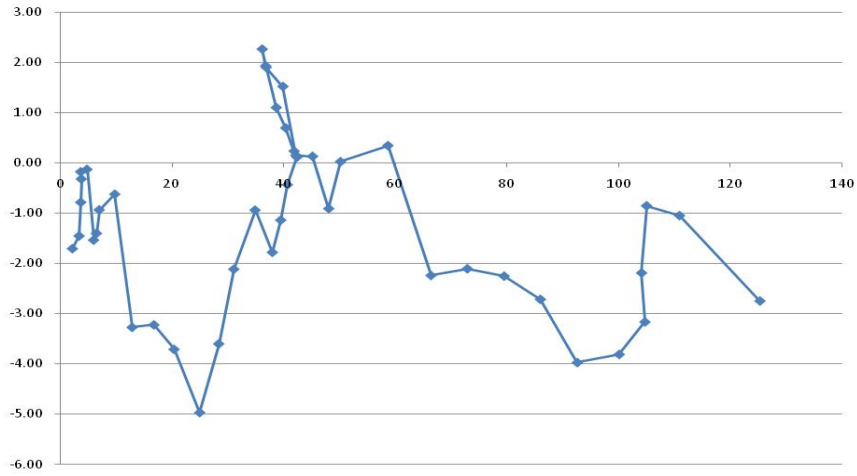
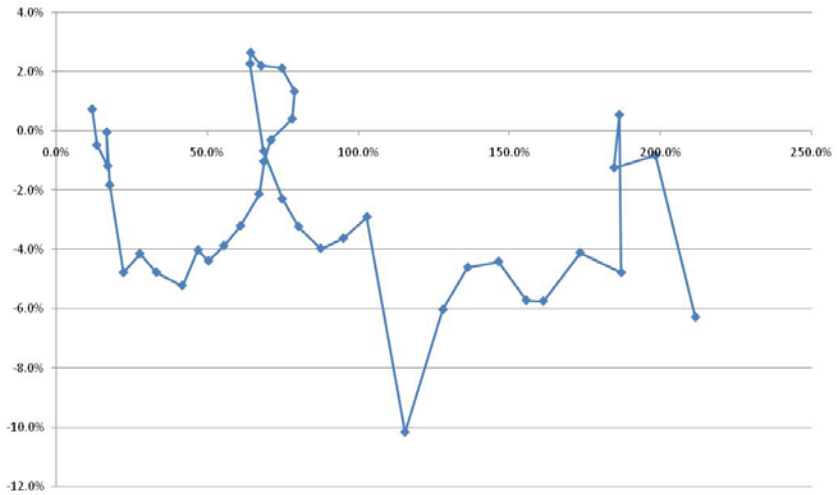


Figure 12. Debt and Primary Balance (General Government), 1970-2009



In order to bring out the time-varying coefficient of β for a series of regressions as follows:

I. Budget basis, starting in Year 1969, ending in Year Y

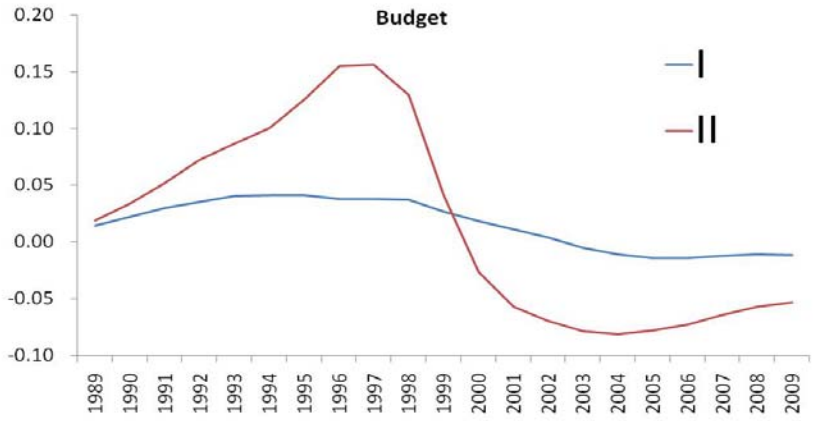
II. Budget basis, rolling regression, starting in Year Y-20, ending in Year Y

III. General Government, starting in Year 1970, ending in Year Y

IV. General Government, rolling regression, starting in Year Y-20, ending in Year Y

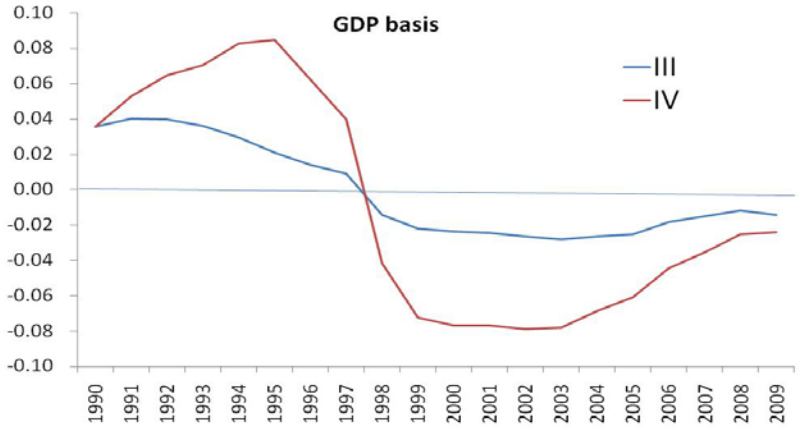
Figures 13 and 14 shows the changing β.

Figure 13. Changing Coefficient: Budget



Note: Author's calculation

Figure 14. Changing Coefficient: General Government



Note: Author's calculation

The following conclusions can be drawn from these graphs. First, the Japanese fiscal sustainability was maintained until about 2000 in the budget of the central government, and about 1998 in the general government basis. However, the sustainability was very much lost in the general government sector between 1998 and 2003, as both primary deficits went to large and growing in the negative territory, as the debt became bigger and bigger. Even in the central government budget, sustainability was lost by 2003.

In both budget and general government, the severity of unsustainability became

lightened between 2003 and 2009, but still it is unsustainable, that is $\beta<0$, as of 2009.

All the above literature assumes there is no limit in tax rate or expenditure cut. In fact, there is the income or VAT tax rate, somewhere between 0 and 1, that generates the highest revenue. The maximum revenue tax rate is the rate that makes the highest point of the Laffer curve. The expenditure also has the minimum rate that is essential to citizen's subsistence. However, the political constraint may be imposed even before those max tax rate or min expenditure rate is achieved. Ihori, Kato, Kawade and Besso (2006) is a paper that explore the limit for the debt sustainability from these extreme rates in the framework of an overlapping generation model.

5. Responses to GFC

During the GFC and in its aftermath, Japan adopted large stimulus packages. Most of the packages came after the failure of the Lehman Brothers in September 2008. Stimulus packages in 2008-2010 are listed in Table 4.

Table 4. Japan's Government Response to GFC

	Announcement date	Title of the package	New Fiscal Expenditure (Trillion Yen)	Total package size (Trillion Yen)	Notes
2008	4/4	Growth Policy	0	0	Explicitly No new fiscal expenditure
	8/29	Comprehensive Immediate Policy Package Easing Public Anxiety -	5.0	11.7	Of the 2 trillion yen, 0.1 is faster implementation of existing budget, 0.1 is by local government, and 1.6 is for various policies, plus additional expenditure of 0.2 for FY2009 budget.
	10/30	Economic Policy Package Measures to support People's Daily lives Supported by Supplementary Budget No. 1 (1 trillion Yen), approved 2008/10/16:	10.0	26.9	
	12/19	Immediate Policy Package to Safeguard People's Daily lives Supported by Supplementary Budget No. 2 (4.8 trillion Yen), approved 2009/1/5	15.4	NA	Measures include (for employment, 1.1 tril.); for transfer to local government (1), special reserve (1); tax cut (1.1), for Safeguard people's daily life (6)
2009	4/10	Policy Package to Address Economic Crisis Supplementary Budget No. 1 (13.9 trillion yen), 05/29	15.4	56.8	Measures include for immediate employment (1.9/2.5); for preventing financial meltdown (3.0/41.8); for growth strategy (6.2/8.8); for peace of mind and revitalization (4.3/5.0) and tax reform (0.1/0.1)
	10/23	Immediate Employment Package	0	0	
	12/8	Immediate Economic Package for Tomorrow's Peace of Mind and Growth Supported by Supplementary Budget (2010/01/28), 0.085 trillion yen	7.2	24.4	Measures include for employment (0.6/0.6 trillion); for environment (0.8/4.1 trillion), for output activities (1.7/18.6 trillion); for peace off mind (0.8/1.0); for local communities (3.5/3.5)
2010	9/10	3-stage economic package to realize New Growth Strategy - Immediate Response to Yen Appreciation and Deflation	0.9	9.8	Measures include for employment (0.175); for promoting investment (0.12), for consumption ("eco points) (0.45); for earthquake/flood proof (0.165)
	10/8	Immediate Comprehensive Economic Package to respond yen appreciation and deflation (supported by Supplementary Budget, 10/28, size 4.4 trillion yen)	5.1	21.1	Measures include for employment (0.3/0.3 trillion); for growth strategy (0.4/1.3), for childcare and health (1.1/1.4), for social infrastructure and SME (3.1/17.8). Measures also include Transfer to Local Government, (1.3/1.3) Frontloading of public works, (0.2/0.25)
TOTAL			45.6	150.7	

Source: Author's compilation from Cabinet Office website: http://www5/cao.go.jp/keizai1/mitoshi-taisaku.html

It started modestly, with fiscal expenditure of 2 trillion yen, in August 2008, and 5 trillion yen in October 30. Up to this point, reserves in the budget were used, and no new issues of bonds were planned. However, Japanese exports took a nose dive from October to December, as the US economy and the European economies were very much affected by the failure of Lehman Brothers. Alarmed by declines in exports, output, and employment, the Japanese government decided to have a supplementary budget right after the failure of the Lehman Brothers. The (first) supplementary budget was proposed in September 29 and approved in the Diet in October 16. The size of the supplementary budget was 1 trillion yen, of which 0.4 trillion was financed by the new bond issues, and 0.6 trillion yen was financed by surpluses of the preceding year's budget. The government immediately started another plan for supplementary budget, as exports nose dived, and the yen started to appreciate (as a safe haven currency). The second supplementary budget was proposed in December 20, 2008, along with the stimulus package, "Immediate Policy Package to Safeguard People's Daily Lives" The size of the package was 10 trillion, and the size of supplementary budget was about 4.8 trillion yen. What is remarkable in this supplementary budget is to decrease tax revenue by 7.1 trillion yen, and increase bond issues by 7.6 trillion yen. Non-taxation revenues (basically shifting revenues from special accounts to general accounts) is 4.5 trillion yen. Mid-year correction on the decreased tax revenue by more than 7 trillion yen (more than 1 percent of GDP) is remarkable. The economy growth getting into a negative territory made the government realize that it would not receive taxes as planned. So, increased bond issues replaced a decline in tax revenue. In the end (final budget), the tax revenue declined by 10 trillion yen, from 53.5 trillion yen to 44.2 trillion yen, and bond issues increased by 7 trillion yen, from 25 trillion yen to 33

trillion yen.

In the 2009 budget, which was formed by the cabinet in January 2009 and approved by the Diet at end-March 2009, economic assumptions became unrealistic as soon as the new fiscal year started. The first stimulus package was announced on April 10; and the first supplementary budget was proposed in April, and approved on May 29. The total size of supplementary budget was 13.9 trillion yen, more than 2.5% of GDP. This supported the stimulus package of 15 trillion yen. The supplementary budget was largely by increased issue of the JGBs. The expenditure of stimulus package included items to maintain employment, to prevent financial meltdown, and to promote renewed growth. This was a significant push toward bond-financed fiscal spending. This was partly encouraged by the internationally-concerted fiscal expansion, committed in the G20 London Summit: "We are undertaking an unprecedented and concerted fiscal expansion, which will save or create millions of jobs which would otherwise have been destroyed, and that will, by the end of next year, amount to $5 trillion, raise output by 4 per cent, and accelerate the transition to a green economy. We are committed to deliver the scale of sustained fiscal effort necessary to restore growth." (Leaders' Statement, April 2, 2009)

Economic downturn did not stop despite large stimulus packages. The general election held at the end of August turned out to be a landslide victory for Democrats, the opposition party until the election. The new government quickly wanted to abolish some programs to introduce their agenda. First they suspended some items to get funds for their election promised, without increasing the budget size. This was the Immediate Employment Package in October. Later, the Democratic government proposed the second supplementary budget, after realizing that there would be shortfall for tax

revenue, just like the year before.

By the fall of 2009, it became clear that the economy is shrinking faster than expected. As a result, the tax revenue has declined so that there will be unanticipated deficits. With this in mind, the second supplementary budget is planned in December (voted on January 28, 2010). In the second supplementary budget, prospective tax revenue was reduced by more than 9 trillion dollars and almost same amount was financed by increased issues of bonds.

Combining increases of bond issues in the first and second supplementary budgets, it amounted to 20 trillion yen, almost 60% increase from bond issues in the initial budget. This was significant erosion in fiscal discipline. In the final (ex post) budget, tax revenue was less than 40%, and new bond issues accounted more than 50%. The final budget size became more than 100 trillion yen, more than 10 percent increase from the initial budget. See Table 5 to compare the initial and final budgets in 2008 and 2009.

Table 5. Initial, Supplementary, and Final Budget

		Initial	1st Sup	2nd Sup	Final	Final − Initial
2008	Total size	830,613	10,641	47,858	846,973	16,360
	Tax Revenue	535,540		−71,250	442,673	−92,867
	Bond Issue	201,632	3,950	74,250	191,664	−9,968
2009	Total size	885,480	139,256	846	1,009,734	124,254
	Tax Revenue	461,030		−92,420	387,330	−73,700
	Bond Issue	332,940	108,190	93,420	519,549	186,609
2010	Total size	922,992	44,292			
	Tax Revenue	373,960	22,470			
	Bond Issue	443,030				
2011	Total size	924,116				
	Tax Revenue	409,270				
	Bond Issue	442,980				

In the 2010 initial budget of 92 trillion yen, the tax revenue was lowered to 37 trillion yen (down from 46 trillion yen, a year earlier), and bond issues became 44 trillion yen. The bleak picture of finance—namely, less-than-half tax revenue and nearly half of the budget being financed by new bond issues—is similar to the final budget of the previous year than the initial budget of previous year. Year 2010 finally had a reasonably strong rebound from the deep recession of 2009, so the budget did not need large supplementary budget financed by bond issues.

The initial budget of 2011 is very similar to that of 2010. The heavy reliance on bond issues that was established during the trough of GFC was carried over to the post-GFC years. The lost fiscal discipline is hard to be reversed.

6. Exit

Year 2010 turned out to be a good year for Japan in terms of growth rate. The growth rate of 2010 reached 3.9%, recovering from -6.3% in 2009 and -1.2% in 2008. Year 2011started out to be reasonably well. Prime Minister Kan asked Minister Yosano to form a reform plan of Tax and Social Security by June 2011. It was speculated among some scholars and observers that the reform plan would include a proposal of consumption tax increase and earmarking it for the future increase in social security. The contribution from the government to Basic Pension (Kokumin Nenkin) Account was raised in 2010 from one-third to one-half, without securing a permanent source of income. It had been anticipated that consumption tax increase was inevitable to pay for increasing deficits in social security funds.

However, the mega earthquake and tsunami on March 11 made the all political discussions focused on reconstruction from the devastation of the affected area. In addition, the near melt down and radiation leaks at the Fukushima Daiichi Nuclear Power Plant added great uncertainty about the condition of the economy in the near future. The direct loss in assets from the earthquake and tsunami is estimated by the cabinet office to be between 16 and 25 trillion yen. This does not include large losses resulting from radiation leaks at the Fukushima nuclear power plant.

If we take only the earthquake and tsunami, that would cause an investment boom, that would be a process to make up the loss by the disaster. There will be a medium-term increase in investment demand to rebuild and repair infrastructure, structures and private-sector capital stock; the increase amount will depend on how much of this loss value will be reconstructed by governments and businesses. If all of the estimated losses are reconstructed (to the value of 16 -25 trillion yen), there will be a big boom in reconstruction of 5 – 7.75 trillion yen in FY2011 (1 to 1.5 % GDP), then a further 6 – 9.5 trillion yen in FY2012, and a further 5 - 7.75 trillion yen in FY2013. This translates into up to 2% GDP increase in 2012. But, this depends on the assumption that all stock losses will be made up by new investment in the next 3 years; this may be an overly optimistic assumption. The government must be spending, very roughly, about 10 trillion yen.

There are further losses that are expected. First, production losses due to the broken supply chain are happening, which resulted from the wipe-out small companies producing irreplaceable key components for auto-makers and electronics firms.

Second, power shortage is likely this summer. Tokyo is now under the government-led campaign of save-electricity. It is projected that electricity supply may be less than

the peak demand in a summer hot day. With this in mind, corporations are shifting production out of the Tokyo area, and those in Tokyo are told to save electricity.

And, of course, the huge damages from nuclear leaks are making it unclear how to proceed to recover. It has forced relocation of many people, abandonment of agriculture, dairy farms, and fishery near the nuclear plant. There is not estimate for these losses.

How to fund government investment and assistance to tsunami-affected families is an important question. Some argue that they should be funded through JGB issues, possibly earmarked as disaster recovery. Others argue that they should be funded through increases in various taxes: VAT, real estate tax, income tax, corporate income tax. Principal reasons for tax increases are as follows. First, according to the reconstruction scenario, next year will be a reconstruction boom, so that raising consumption tax would not send the economy to a recession. Second, since population is decreasing, increasing outstanding balance of JGBs mean that burden of maturing debts is shifted to future generation with a fewer people. Issuing bonds means shifting burden to the future generation. Burden on the already-overly indebted government may finally makes the market participants worry over the sustainability. Puzzles of the low yield on JGB may finally come to an end, if the government hesitates to be raise revenues. The worst-case scenario would be a sudden jump in the JGB interest rate (flee from the sovereign) due to continuing large deficits Once the high interest rate occurs, the government finds it difficult to issue JGB to meet spending needs. None of politicians is courageous enough to insist a logical solution. However, in order to avoid the worst-case scenario of unsustainable debts, it will become necessary to raise taxes. The exit from deficits may be hastened due to the increasing need for government

spending.

When G20 Toronto Summit, June 26-27, changed the gear and declared fiscal consolidation: “Reflecting this balance, advanced economies have committed to fiscal plans that will at least halve deficits by 2013 and stabilize or reduce government debt-to-GDP ratios by 2016.” However, Japan was explicitly exempted: “Recognizing the circumstances of Japan, we welcome the Japanese government’s fiscal consolidation plan announced recently with their growth strategy.”

Whether earthquake, tsunami and nuclear disasters turn into a window of opportunity to do a tax reform or they turn into a “last straw” that breaks back of a camel (fiscal sustainability) depends on politicians’ will.

7. Concluding Remarks

The above analysis made it clear the following conclusions. The Japanese fiscal situation has deteriorated steadily since 1990. The major unexpected developments include (1) unexpected slow down in the growth rate after the bubble burst; (2) failure of implementing structural reform on tax revenues; (3) unexpected shock from the banking crisis of 1997/98 and 2002/03

The trend (potential) growth rate became lower in the beginning of the 1990s, and this affected tax revenues, and the government failed to implement either expenditure cut or finding tax revenue sources. The situation got much worse between 1998 and 2003 when the country fights the banking crisis. The Bohn regression shows the sustainability was lost during this time period.

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