Financial Crisis and Long-term Stagnation in Japan:
Fiscal Consolidation under Deflationary Pressures

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1. Introduction: current state of deflation in Japan

After the booming bubble economy of 1980s, the Japanese economy has been stagnant since early 1990. Besides the crush of the real estate bubble in the first half of 1990s, Japan faced three successive negative shocks: sharp appreciation of the yen in 1994-95, financial crisis in 1997-2002 triggered by the successive failures of big Japanese financial institutions, and the global financial crisis from 2008 to the present (Exhibit 1).

Exhibit 1

Industrial Production of Japan (2005=100)

The first shock was strong enough to start a mild deflation measured by the GDP deflator (Exhibit 2). But the economy started to recover in 1996-97 after successive fiscal spending packages and very low interest-rate policy by the Bank of Japan. However, the second shock, financial crisis in 1997, stopped the recovery and aggravated the deflation. Japan started to recover again in the mid 2000s due to a weaker yen and very strong export growth to China and other Asian countries.

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When many Japanese analysts felt that the long deflation may end soon, the global financial crisis hit Japan in late 2008. By the end of 2009, Japan’s GDP deflator fell by about 15 percent from the peak in 2004 (Exhibit 3).

Exhibit 2

Real Effective Exchange Rate of Japan
2005=100 BIS narrow index

Exhibit 3

GDP Deflator of Japan (2000=100 for unadjusted index)

Note: Adjusted for changes in consumption tax in April 1989 and April 1997.

After the global financial crisis, Japanese real GDP started to recover since early 2009. However, nominal GDP has been almost flat due to continuing deflation. Because of the falling general prices, the nominal GDP has not grown at all for almost two decades; the nominal GDP in early 2010 is about the same as the GDP in 1992 (Exhibit 4).
Even though Japanese deflation has been a mild one, it has been very damaging for the Japanese economy. Monetary policy has been constrained by the zero-lower-bound of market interest rate. The short-term market interest rate cannot become negative because there is a safe zero-interest rate asset called "bank note." If the Bank of Japan sets a negative interest rate on cash reserves of private financial institutions, banks can hold yen cash in their vault. If the Bank of Japan sets a negative interest rate on their lending to private banks, banks will not pass this negative interest rate to their borrowers because banks can always invest in yen cash with zero interest rate. Since the start of Japanese deflation in 1995, the Bank of Japan kept short-term market interest rate (overnight call rate) between 0 and 0.5 percent (Exhibit 5).

Data: Bank of Japan.
As we can see from the above Exhibits, Japan faces a number of problems. In this paper, we look into the following issues and try to come up with possible policy measures to re-start growth:

(i) Declining population due to very low fertility rate.
(ii) Deflation and slow growth of Japan since early 1990s,
(iii) Rapidly expanding government debts,

2. Declining Potential growth rate of Japan with deflationary gap

In addition to the persistent deflation, Japan also faces another big problem to solve; declining working-age population and increasing old-age population. Japanese fertility rate has been below the reproduction rate of 2.1 since 1974 and it has been below 1.4 since 1997 although the rate has recovered somewhat from the trough of 1.26 in 2005, it is 1.37 in 2008-09 (Exhibit 6). Suppose that the fertility rate would stay at 1.4 in the future and average one generation is 35 years, then the Japanese population will decline by half in 70 years. This is because 200 young Japanese, half men and half women, will raise 140 children and the next generation will raise 98 children (70 x 1.4 = 98). The annual rate of decline is -1.0 percent (0.5^{(1/70)} = 0.9901). Already, Japanese working-age population is declining by about 1 percent per annum and it is expected to continue indefinitely.

Exhibit 6

Fertility Rate in Japan

Data: Ministry of Health, Labor and Welfare of Japan.

Moreover, in view of the slow growth of domestic demand and the appreciating yen exchange rate, many Japanese companies are no longer investing in Japan. After the global financial crisis, the investment of the corporate sector declined and the amount of investment is less than the depreciation in recent years. Since the actual removal of old equipments is estimated to be lower than the depreciation for financial accounting, the capital stock in Japan is not declining yet but the contribution for growth from capital stock has shrunk to almost zero in recent quarters.

In order to analyze the growth potential of Japan and the future of the deflation rate, I estimated a macro production function for Japanese GDP with capital and labor inputs. From this
function, we can estimate the trend productivity growth rate as a residual factor. Moreover, we can also estimate the GDP gap and its relationship with the rate of deflation.

The estimation was made with the following steps.

1. A Cobb-Douglas production function was estimated with real GDP, labor input (man-hour based) and capital adjusted for capacity utilization. The factor-income share was used to calibrate the parameter of the production function. The trend of the residual of the production function corresponds to the growth of Total Factor Productivity (TFP) of the Japanese economy.

\[
\ln Y_t = 0.28 \ln K_t + 0.72 \ln L_t + \ln TFP_t
\]

*Y*: Real GDP,
*K*: Capital input adjusted for capacity utilization,
*L*: Labor input measured by man-hours,
*TFP*: Estimated total factor productivity.

This TFP growth rate is estimated from the residual of the above production function.

2. Estimate the maximum inputs by connecting the cyclical peaks of the labor hour and capacity utilization. In this process, the peaks of male and female labor forces were identified for the working age population and the retirement age population separately. The peaks of working hours were identified for overtime hours and normal working hours separately because the normal working hours declined due to the changes in the labor-relations law.

3. The maximum production potential is estimated from the production function in (1) and the maximum labor and capital inputs in (2). This estimated maximum production is the potential GDP. Exhibit 7 shows this potential GDP, actual GDP and the natural level of GDP which will be explained in the next step.

Exhibit 7  Real GDP, Potential GDP and Natural GDP for Price Stability

Note: Shaded periods indicate the cyclical downturns defined by the government.
This potential GDP is not a realistic target for macro policy because it assumes that both capital and labor are utilized at the historical peak levels continuously. Under such conditions, economy will be overheated and very inflationary. Indeed, only at the peak of the bubble economy in the late 1990, the actual GDP moved closer to this potential level. However, we can use the growth rate of potential GDP as an indicator of trend growth rate for Japan. Moreover the potential GDP is important because it also determines the natural GDP in the next step.

Exhibit 8 shows the estimated potential GDP growth rate. The potential growth rate has been on a declining trend since early 2000s due to an increasing negative contribution of labor. However, the growth rate declined sharply since 2008 due to a decline in investment. If investment recovers in the future, the potential growth rate may recover somewhat. However, it is difficult to imagine a potential growth rate of more than 1 percent if the working population continues to decline by 1 percent per annum. The large negative labor contribution from 1988 to 94 and from 1997 to 2000 was due to the phased introduction of five-day workweek for big companies and for the smaller companies respectively. The TFP was estimated from the smoothed residual term of the production function above and it was increasing at about one percent par annum in the recovery period of mid 2000s but fallen to about 0.5 percent in the late 2000s.

Exhibit 8

<table>
<thead>
<tr>
<th>%</th>
<th>Potential Labor Input</th>
<th>Potential Capital Input</th>
<th>Total Factor Productivity</th>
<th>Potential Growth Rate</th>
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<tbody>
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<td>1986</td>
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The “natural GDP” corresponds to the level of GDP that is consistent with the stable CPI inflation rate of 1 percent. The natural GDP was calculated with the estimated long-run Phillips Curve relationship. Since the Bank of Japan has an objective of aiming 0-2 percent consumer price inflation rate (CPI), we used core-core CPI to estimate natural level of GDP. This core-core CPI excludes all the food items and energy items in ordinary CPI.² This equation assumes that the

² In Japan, simple core CPI excludes only perishable food items.
expected rate of inflation depends on the past inflation rates and GDP gap.\(^3\)

\[
\pi_t = 0.459\sum_{i=1}^{4} \pi_{t-i}/4 + 0.239\sum_{i=5}^{8} \pi_{t-i}/4 + 0.137G_t + 0.865 + \epsilon_t
\]

\(\pi_t\): Core-core inflation rate  
\(G_t\): GDP gap defined as (Actual GDP - Potential GDP)  
\(\epsilon_t\): Error term.

In order to estimate the natural GDP that is consistent with one-percent core-core CPI inflation rate, this equation is solved for GDP gap, \(G\), at \(\pi = 1\). The result was -4.052. This means that when actual GDP is 4.052 percent below the potential GDP, the inflation rate converges to one percent (see Exhibit 9). At the natural level of GDP, the inflation rate will be steady at one percent per annum. If the real GDP is below this natural level, the inflation rate gradually decelerates and may become negative. If the real GDP is above the natural level, the inflation rate accelerates above one percent.

Exhibit 9

![GDP Gap and Core-core CPI inflation rate graph]

From this Exhibit 9, we can observe that the GDP gap has been much larger than the gap level that is consistent with one-percent inflation rate since 1992. Only two periods, 1997 and 2007, the gap was small enough to be consistent with one-percent inflation rate. At the second quarter of 2010, the actual GDP is about 5 percent below natural GDP and we cannot expect any improvements of deflation rate for at least a few years to come. The dynamic tracking performance of the Phillips curve equation is shown in Exhibit 10. Since this is a dynamic simulation, the performance of the equation is reasonably good.

\(3\) Note that the sum of the parameters on the past inflation rates is not constrained to be unity because Japanese data do not support Milton Freedman’s accelerationist long-run Phillips Curve.
3. Budget Deficit

Japanese government is running a massive budget deficit. IMF estimates that the deficit will be about 10 percent of GDP in 2010 and 2011. However, private surplus, which is equal to private saving minus private investment, is more than enough to absorb government borrowings. As a result, Japan has been running current account surplus over the past 30 years.

Note: IMF World Economic Outlook, April 2010.
Because of the large budget deficit, the general government gross debt is exceeding 200 percent of GDP and the net debt is exceeding 100 percent (Exhibit 12). This level of gross debt is the highest since the end of World Wart II. At the end of 1944, the debt of Japanese government reached 200 percent. After the war, the general price level increased by about 100 times in five years and the public debt was wiped out by this inflation.

It is obvious that the government has to raise taxes. Although many politicians have tried to raise taxes, especially consumption tax, they are rejected by the voters in elections after elections. So far, long-term government bond interest rate has been very low, somewhat above one percent for 10 year bonds at the time of writing (December 2010), reflecting the confidence of Japanese investors. A dominant part of the private savings is held by conservative old Japanese households. They have been sticking to the yen deposits and yen bonds both guaranteed by the government. Most risk takers who invested in foreign assets with higher nominal yields over the past two decades lost money due to the long-run appreciation of the yen.

Exhibit 12

Debt of Japanese Government
Ratios to GDP (%)

<table>
<thead>
<tr>
<th>Year</th>
<th>General government gross debt</th>
<th>General government net debt</th>
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<tbody>
<tr>
<td>1980</td>
<td>50</td>
<td>100</td>
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<tr>
<td>1982</td>
<td>100</td>
<td>150</td>
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<td>1984</td>
<td>150</td>
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Note: IMF World Economic Outlook, April 2010.

In most debtor countries with foreign-currency-denominated external debt, a deep depreciation often triggers a currency crisis. The domestic currency value of external debts will rise. This increase in the value of its debts will make it very difficult for the government and the private sectors of debtor countries to repay its debt in time. In the case of Japan, its public debts are denominated in yen and Japan is a creditor country (Exhibit 13). As a result, the Japanese economy will get some positive effects from the weaker yen:

(i) Japan's export will grow and stimulate the economy,
(ii) Tax revenue starts to grow as nominal GDP increases,
(iii) The government will get profit from foreign reserves (more than US$1 trillion),
(iv) Private investors will get profit from massive net foreign assets (about US$1.5 trillion)
(v) The Bank of Japan can start to use interest-rate policy to stabilize the economy.

As a result, the positive effects of a weaker yen are expected to be strong and they will mitigate the
negative effects. This may be the reason why the long-term interest rates on JGB are still very low in the face of rapidly increasing public debt.

Exhibit 13

External Assets and Liabilities of Japan
GDP Ratios (percent)

However, it is possible to write a scenario of Japanese fiscal crisis under certain conditions. If Japanese politicians postpone the necessary fiscal adjustments to appease electorates and the government debt-GDP ratio will become even higher. Then, the Japanese investors will lose confidence in the Japanese government and they will shift asset from the yen to the real assets and foreign currencies. This will trigger the following sequence of events:

(i) Bond prices will fall and market interest rates on JGB will rise.
(ii) The government will face a much higher cost of long-term debt and they try to minimize interest costs by shortening the term structure of national debt. This will make the financial position of the government much weaker.
(iii) In view of the more fragile position of the government, the market participants will accelerate the sifting of asset from yen bonds and deposits to real assets and foreign assets. The yen depreciates against foreign currencies and the yen prices of real estate and stocks will rise.
(iv) A very weak yen will stimulate the economy and push up wages and general prices.
(v) The Bank of Japan tighten its monetary policy and interest rates will rise sharply.
(vi) The government have to pay much higher interest rate on its debts,
(vii) The interest payments may surpass tax revenues and public confidence will be further eroded.
(viii) Households with variable-rate mortgage start defaulting and banks that own large amount of long-term bonds will face possible bankruptcy.

4. Fiscal consolidation under deflationary pressures
4.1 The limit for monetary policy
In order to consolidate budget deficits, it is necessary to offset the contractionary effect of tax hikes with other policy instruments such as monetary policy. However, monetary policy is
facing the zero lower bound of interest rates. Since short-term interest rates are already close to zero, conventional monetary policy tools have almost lost effectiveness. Usually a potent monetary policy weapon, an open market purchase of short-term government papers by the Bank of Japan is no-longer very effective because base money and zero-interest short-term government papers are perfect substitutes under zero-interest rate regime. Long-term bond yields have fallen to extremely low levels. A further injection of base money is not likely to push down long-term rates further.

4.2 Real asset purchases

Even a massive open-market purchase of long-term government bonds is no-longer effective to stop deflation unless it can somehow change expectations on future inflation rate. One possible instrument to push up general prices is to expand the assets bought by the Bank of Japan through its trading desk. The Bank of Japan may buy all kinds of securities, not just bonds, for its open market operation, and purchase real assets such as TOPIX based mutual funds and REIT (real estate investment trusts) up to a few trillion yen per month. This would stop the asset price deflation at least in the short run. However, its effect on real estate and stock prices is limited in the long run because they are fundamentally determined by the expected future cash flow from those assets. As long as the steady deflation of goods and services continues, the net present value of future cash flow from these assets will not change and the short term positive effects of open-market purchase will disappear in the long run.

4.3 Tax policies to stimulate the economy while increasing net tax revenue

Given the very high debt of Japanese government, it is necessary to raise taxes or to cut expenditures. However, a tighter fiscal policy is likely to weaken the economy at least in the short run. Therefore, it is necessary to minimize the negative effects of fiscal consolidation. There are a few possible ways to raise tax without too much hurting the economy. One such policy is a combination of gradual increases in indirect taxes and gradual cut in direct taxes such as payroll tax for public pension plans, poll tax and corporate income tax. By pre-announcing a series of increases in consumption tax, the government can raise inflation expectations with front loading effects on consumption and housing investment. At the same time, by reducing the payroll tax, the government can stimulate employment. The combined changes in taxes should be revenue enhancing.

The government can also use Green taxes to stimulate the economy. By pre-announcing a gradual increase in carbon emission tax to cut greenhouse gas, the government can increase inflation expectations. Using a part of this tax revenue, the government can cut corporate income tax and provides subsidies for green investment.

4.4. Gesell tax

We economist has to think hard to come up with a monetary policy instruments that will be effective even under a deflation. One such instrument is the idea of Gesell tax or famous stamp duty on money. By levying tax on the outstanding amount of government guaranteed financial assets, it is possible to set nominal return on safe assets at a negative number. In other words, it is possible to overcome zero lower bound on nominal interest rates by introducing a new tax on a part of financial assets. In the following, I summarize my proposal in my earlier paper.

The interest rate on safe assets can be made “negative” by taxing the balance of all government-backed financial assets such as bank deposits, government bonds, postal savings, cash, etc., at the rate that is slightly higher than the deflation rate until deflation is stopped. For example, when trend deflation rate is 1 percent par annum, the government may levy 2 percent tax on the

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4 Japanese consumption tax is levied on the new house excluding the value of land.
5 See Chapter 23 of Keynes (1936). Goodfriend (2000) also discussed the possible taxation on currency to fight against deflation.
6 See Fukao (2003) for the details of this proposal.
outstanding amount of government debts, yen deposits and cash each year until the deflation ends. By pre-announcing this policy, the real interest rate can be made negative. This policy is a modified version of Silvio Gesell’s stamp duty on currency proposed in Gesell (1906).

It is easy to tax yen deposits and government bonds. In order to levy tax on cash, the Bank of Japan may introduce new banknotes and charge fees for exchange with old notes. For example, the Bank can exchange 10200 yen in old money with 10000 yen in new money. In times of deflation, people are increasing their holdings of cash and bank deposits, because doing so is safest way to earn positive real return. A pre-announced introduction of Gesell tax would encourage investments in stocks and real estate. This negative interest rate policy is expected to decrease savings and stimulate investment. Moreover, this tax will stimulate bank lending and inter-corporate lending. If a bank keeps central bank deposits and government bonds, they will be taxed. In order to avoid this tax, the bank has to make loans to non-government entities. Companies also extend inter-corporate credits because cash will be taxed while receivables are not. The yen exchange rate would also depreciate against foreign currencies.

The government will also benefit by the massive revenue from this tax. 2-percent tax would amount to about 30 trillion yen or six percent of Japan's GDP. While such a novel tax might cause some confusion, the government could make use of the tax revenue to reduce its budget deficit, or to improve its anti-unemployment policy.

There are some negative side effects in this policy.

Firstly, this tax will have a negative effect on the credit rating of Japanese government. For example, Moody's Investors Service states that an imposition of tax on the government liabilities may constitute an event of partial default by the government even though the tax rate would be very low. Since deflation in Japan has been less than 2 percent, the required Gesell tax rate would be at most 3 percent per annum. This is comparable to a 30-percent withholding tax on 10 percent yield bond.

Secondly, this tax will impose a tax on the people and institutions that own a large mount of safe asset; mostly old age retirees and financial institutions. In order to offset this effect, it would be desirable to provide some fiscal relief measures. Regarding individuals, one possible measure is to distribute lump sum cash to all the legal residents in Japan. Assuming 2 percent tax rate, the government may give 100,000 yen per person as a one-time grant. The cost of this one-time cash distribution would be about 13 trillion yen and this is less than half of the tax revenue of about 30 trillion yen. Regarding institutional investors such as commercial banks and life-insurance companies, 2 percent tax on government bonds and Bank of Japan deposits would be a heavy burden. In order to partially offset this negative effect, the government may wave deposit insurance fees on banks and policy-holder protection insurance fee on life-insurance companies for several years.

Once deflation is overcome, the nominal interest rate would rise. Even if the real interest rate remains the same, an increase in the nominal interest rate would adversely affect cash flows of companies and households with large debt. Therefore, the government may have to take policy measures to allow a smooth debt restructuring in the private sector.

Gesell tax is a powerful but blunt policy instrument and it would be very difficult to pass a law to implement this tax through the Diet. However, if the current deflationary stagnation continues, it would be almost impossible to stabilize Japanese budget deficit that runs at almost 10 percent of GDP. Gesell tax is an unconventional fiscal tool that can achieve increased tax revenue and increased private expenditures at the same time.
5. Concluding Comments: Policies to Improve Japanese Growth Rate

Even if Japan succeeds to get out of deflation with the above policy options, it still faces a difficult task of stabilizing Japanese declining population. Given the declining working-age population, Japan has to impose higher and higher social security tax on workers. One possible policy option for Japan is the immigration policy. In order to partially offset the declining population, I have been proposing to encourage intelligent foreign workers to immigrate to Japan with the following policy measures:

(i) Give 5-year working visa to all foreign workers with good command of Japanese language and a job contract with a qualified Japanese company abroad or any company in Japan.

(ii) One simple screening method of Japanese proficiency is to require a foreigner to pass Japanese Language Proficiency Exam. This exam is carried out in 51 countries and more than 500,000 foreigners take this exam every year. About 50,000 pass the First Level each year. First Level is a fairly high score and it is usually required to study at Japanese Universities.

(iii) After 5 years of job experience either in Japan or abroad, Japanese government should give permanent working visa or allow naturalization.

(iv) Foreign workers should be allowed to invite his/her spouse and children provided that they also have a relatively good command of Japanese language. Young children should be allowed to study Japanese after their arrival to Japan.

Working age population in Japan is declining by about 600,000 persons per year. Therefore, the migration of 50,000 people and its relatives is not enough to stop declining population. However, Japanese-speaking foreign workers will help the expansion of Japanese companies in Asian markets. This policy will also expand the role of Japan as a trading and financial center in Asia.
**Data Appendix**

Potential GDP and GDP gaps are estimated from the following data.

1. **Real GDP, GDP Deflator**: Cabinet Office, Economic and Social Research Institute, quarterly series.


4. **Capacity utilization ratio for non-manufacturing sector**: Since there is no statistics on the capacity utilization for non-manufacturing sector, we estimated the ratio by using the Bank of Japan Tankan statistics on the diffusion index (DI) on the capacity utilization. First, we estimated the relationship between the capacity utilization ratio for manufacturing sector (METI data) and Tankan DI of the same sector.

\[
(\text{Manufacturing capacity utilization}) = 105.9 - 0.555 \times (\text{Manufacturing Tankan DI})
\]

By replacing Manufacturing Tankan DI with Non-manufacturing DI, we estimated the capacity utilization ratio for non-manufacturing after 1991 Q1. Since there is no Tankan DI data for non-manufacturing before 1990 Q4, we estimated non-manufacturing sector DI with the following equation and manufacturing Tankan DI:

\[
(\text{Non Manufacturing DI}) = -2.59 + 0.31 \times (\text{Manufacturing Tankan DI})
\]

Both capacity utilization ratios are normalized to be 100 at their peaks.

**Exhibit A1**

[Graph showing Estimated Capacity Utilization Ratios]
5. **Actual Capital Input**: Estimated from the following equation:

\[
(\text{Actual Capital Input}) = \left(\text{Manufacturing Sector Capital Stock} \times \text{Manufacturing Sector Capacity Utilization Ratio}\right) + \left(\text{Non-manufacturing Sector Capital Stock} \times \text{Non-manufacturing Sector Capacity Utilization Ratio}\right)/100
\]

6. **Potential Capital Input**: Estimated from the following equation:

\[
(\text{Potential Capital Input}) = (\text{Manufacturing Sector Capital Stock}) + (\text{Non-manufacturing Sector Capital Stock})
\]

7. **Actual labor input**: Actual labor input on a man-hour basis is estimated by the following equation.

\[
(\text{Actual labor input}) = (\text{Number of employees and self employed}) \times (\text{scheduled working hours} + \text{overtime working hours})
\]

**Number of employees and self employed**: Ministry of Public Management, Home Affairs, Posts and Telecommunications, Statistics on Labor, all industries.

**Working hours**: Ministry of Health, Labor and Welfare, Monthly Labor Survey, average monthly working hours per employee in all establishments of more than five workers. Because of the gradual introduction of 5-day work week in 1988 for large companies and in 1997 for small companies, the scheduled hours declined twice.

8. **Potential labor input**: Potential labor input is estimated by connecting the past peaks of all the variables in Actual labor input.
References


