The Effects of a Lower Capital Income Tax Rate on the Japanese Economy (Very Preliminary and Incomplete)

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In April 2014:
- the Japanese government announced plans to reduce the corporate income tax rate from 35% to 25%
- a medium term goal of achieving a primary surplus in 2020

In this paper, we study the impact of a lower capital income tax rate on the Japanese economy.
We also calculate the size of fiscal adjustment needed to deliver a primary surplus in 2020.
Capital Income Tax and the Japanese Economy
Where Are We Now?

- Net debt to GDP ratio at about 150% in 2013
- Dependency ratio projected to rise from 40% in 2013 to 92% in 2092
- We study the long run impact of the proposed policies but focus on the short run from 2014 to 2020
Macroeconomic Outlook in Japan: ESRI Estimates
Deficits: Reference vs Revitalization

* Excluding the expenditures and the fiscal resources for the recovery and reconstruction measures.

* Excluding the reconstruction bonds.
Fundamental Problem 1: Aging Population

Figure: Dependency Ratios
Fundamental Problem 2: High Debt

Figure: Net Debt to GNP Ratio
Implications of Aging Population
Fukawa and Sato (2009)

Figure: Government Expenditures to GNP Ratios
What We Do

- Formulate and calibrate a neoclassical growth model of Japan.
- What is the effect on the Japanese economy from a reduction in the capital income tax rate?
- What is the implications of this tax reform on the fiscal imbalance?
- How much revenue must be raised to achieve a primary surplus in 2020?
- How much spending must be cut to achieve a primary surplus in 2020?
What We Do

- Standard growth model.
- Characterize how model performs from 1981-2013.
  - Take as exogenous TFP, tax rates, government consumption, transfers and population.
  - Use observed values 1981-2013.
- Use model to forecast from 2014 and beyond; perfect foresight and also 'MIT' simulations.
  - Government projections for population to 2050.
  - Forecasts of Fukawa and Sato (2009) of $G/Y$ and $TR/Y$ to 2050. [Consistent with independent projections of İmrohoroğlu, Kitao, and Yamada (2013)]
Features of Model

- Endogenous labor choice \(\Rightarrow\) consumption and labor income taxes are distorting.
- Primary balance is endogenous and produces a path for debt.
- Produce deterministic and stochastic simulations.
Related Literature

- İmrohoroğlu and Sudo, “Productivity and Fiscal Policy in Japan: Short Term Forecasts from the Standard Growth Model”
  - Experiment with policies to eliminate budget deficit in near future by increasing consumption tax. 15% not enough.

- İmrohoroğlu and Sudo, “Will a Growth Miracle Reduce Debt in Japan”
  - Assess possibility that high TFP growth could eliminate government debt. China-like growth for a decade not enough.
Model: Household’s Problem

\[
\max \sum_{t=0}^{\infty} \beta^t N_t \left[ \log C_t - \alpha \frac{h_t^{1+1/\psi}}{1 + 1/\psi} \right]
\]

subject to

\[
(1 + \tau_{c,t}) C_t + \eta_t K_{t+1} = (1 - \tau_{h,t}) W_t h_t \\
+ [(1 + (1 - \tau_{k,t})(r_t - \delta)) K_t + l_t \\
+ TR_t - \tau_t + \pi p, t
\]
Model: Firm’s Problem

\[ N_t Y_t = A_t (N_t K_t)^\theta (N_t h_t)^{1-\theta} \]
\[ N_{t+1} K_{t+1} = (1 - \delta) N_t K_t + N_t X_t \]
\[ A_{t+1} = \gamma_t A_t \]
Model: Government Budget

\[ G_t + TR_t + I_t = \tau_{c,t} C_t + \tau_{h,t} W_t h_t + \tau_{k,t} (r_t - \delta) K_t + \tau_t - \pi_{b,t} \]
\[ G_t + TR_t = \tau_{c,t} C_t + \tau_{h,t} W_t h_t + \tau_{k,t} (r_t - \delta) K_t + \tau_t - \pi_{p,t} \]
\[ I_t = (1 - \tau_{b,t}) r_{b,t} B_t \]
\[ B_t = B_{1980} + \sum_{s=1981}^{t} \pi_{b,s} \]
Stationary Equilibrium Conditions

Given a per capita variable $Z_t$ we obtain its detrended counterpart

$$z_t = \frac{Z_t}{A_t^{1/(1-\theta)}}.$$

- First order conditions and market clearing conditions combine to give equations to solve for $
\{c_t, x_t, h_t, y_t, k_{t+1}, w_t, r_t\}$ for each period $t$.

- Computation Objective: Find value for $k_1$ such that sequence converges to steady state.
Population and Labor Input

- $N_t =$ working age population between the ages of 20 and 69
- Use actual values for 1981-2013
- Use official projections for 2014-2050
- Population constant after 2050
- $h_t$ is employment per working age population multiplied by average weekly hours worked divided by 98 (discretionary hours available per week).

Table: Adjustments to National Account Measurements

\[
\begin{align*}
C &= \text{Private Consumption Expenditures} \\
I &= \text{Private Gross Investment} \\
&\quad + \text{Change in Inventories} \\
&\quad + \text{Net Exports} \\
&\quad + \text{Net Factor Payments from Abroad} \\
G &= \text{Government Final Consumption Expenditures} \\
&\quad + \text{General Government Gross Capital Formation} \\
&\quad + \text{Government Net Land Purchases} \\
&\quad - \text{Book Value Depreciation of Government Capital} \\
Y &= C + I + G
\end{align*}
\]
Government Accounts

- Public health expenditures in Japan are included in $G_t$.
- $TR_t$, includes social benefits (other than those in kind, which are in $G_t$,) that are mostly public pensions, plus other current net transfers minus net indirect taxes.
- 5% of output is added to $TR_t$ since modeling of flat tax rates ignores deductions and exemptions.
Tax Rates

- $\tau_{h,t}$, are average marginal labor income tax rates estimated by Gunji and Miyazaki (2011).
  - Last value is 0.324 for 2007 and we assume that this remains constant thereafter.

- $\tau_{k,t}$, is constructed following methodology in Hayashi and Prescott (2002).
  - Last value is 0.3557 for 2010 and we assume that this remains constant thereafter.
Tax Rates, continued

• Tax Rate on Consumption, $\tau_{c,t}$
  • 0% 1981-1988
  • 3% 1989-1996
  • 5% 1997-2013
  • 8% 2014
  • 10% 2015 and beyond.
Tax Rates, continued

Consumption Tax Rate

Transfer Payments to GNP Ratio

Capital Income Tax Rate
Technology Parameters

• $A_t = Y_t / (K_t^\theta h_t^{1-\theta})$.

• $\theta = 0.378$, which is the average value from 1981-2013.

• $\gamma_t = A_{t+1}/A_t$, comes from the actual data between 1981 and 2013.

• $\gamma_t = 1.015^{1-\theta}$ for 2014 and beyond.

• $\delta = 0.0842$, which is the average value from 1981-2013.
Technology and Population Parameters

Depreciation rate

Population

TFP
Preference Parameters

- Three preference parameters, $\beta$, $\alpha$, $\psi$.
- $\psi = 0.5$, the Frisch elasticity of labor supply estimated by Chetty et al (2012).
For $\beta$ and $\alpha$, use equilibrium conditions to obtain a value for each year, and then average over the sample:

$$\beta_t = \frac{(1 + \tau_{c,t+1}) \gamma_t^{1/(1-\theta)} c_{t+1}}{(1 + \tau_{c,t}) c_t \left[ 1 + (1 - \tau_{k,t+1}) \left( \theta \frac{y_{t+1}}{k_{t+1}} - \delta \right) \right]}$$

$$\alpha_t = h_t^{-1/\psi} \frac{(1 - \tau_{h,t})(1 - \theta) y_t}{(1 + \tau_{c,t}) c_t h_t}$$
### Calibration of Structural Parameters

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
<th>Source</th>
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<tr>
<td>$\theta$</td>
<td>0.3783</td>
<td>Data Average</td>
</tr>
<tr>
<td>$\delta$</td>
<td>0.0842</td>
<td>Data Average</td>
</tr>
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<td>$\beta$</td>
<td>0.9677</td>
<td>FOC, 1981-2013</td>
</tr>
<tr>
<td>$\alpha$</td>
<td>22.6331</td>
<td>FOC, 1981-2013</td>
</tr>
<tr>
<td>$\psi$</td>
<td>0.5</td>
<td>Chetty et al (2012)</td>
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Model versus Data
Consumption, Investment, Output, and Capital Output Ratio
Model versus Data
Primary Balance to GNP and Debt to GNP Ratios
Long Run Comparison
Reducing the Capital Income Tax Rate

- Lower $\tau_k$ from 35%
  - to 25% starting in 2015, 2 percentage points each year
  - to 0 starting in 2015
# Long Run Comparison

Reducing the Capital Income Tax Rate

<table>
<thead>
<tr>
<th></th>
<th>$\tau_k = 0.35$</th>
<th>$\tau_k = 0.30$</th>
<th>$\tau_k = 0.25$</th>
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<td>Labor Supply $H$</td>
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<tr>
<td>Output $Y$</td>
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<td>114.9</td>
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<tr>
<td>Consumption $C$</td>
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<td>Wage Rate $W$</td>
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<td>104.0</td>
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Long Run Comparison

Laffer Curve: Labor Income Tax
Long Run Comparison
Laffer Curve: Capital Income Tax

\[ \psi = 0.5 \]
Sensitivity to Frisch Elasticity of Labor Supply

Laffer Curve: Labor Income Tax

![Graph showing the relationship between labor income tax rate and steady state revenue for different values of psi.](image-url)
Sensitivity to Frisch Elasticity of Labor Supply

Laffer Curve: Capital Income Tax

\[ \psi = 0.1 \quad \psi = 0.5 \quad \psi = 1.0 \quad \psi = 2.0 \]
Projections of Key Indicators
Consumption, Investment, Output, and Primary Balance to Output Ratio
Quantitative Experiments

Short Run Analysis

Short Run Analysis: Effect on $K$
Reducing the Capital Income Tax Rate: The Next Ten Years

<table>
<thead>
<tr>
<th>Year</th>
<th>$\tau_k = 0.30$</th>
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<td>2023</td>
<td>104.4</td>
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<td>123.4</td>
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## Short Run Analysis: Effect on $H$

Reducing the Capital Income Tax Rate: The Next Ten Years

<table>
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<th>Year</th>
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### Short Run Analysis: Effect on $Y$

Reducing the Capital Income Tax Rate: The Next Ten Years

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<tr>
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<td>108.7</td>
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## Short Run Analysis: Effect on $\frac{\pi_p}{Y}$

Reducing the Capital Income Tax Rate: The Next Ten Years

<table>
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<tr>
<th>Year</th>
<th>$\tau_k = 0.35$</th>
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<th>$\tau_k = 0.25$</th>
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<td>-0.0826</td>
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<td>2014</td>
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</table>
# Short Run Analysis: Primary Surplus in 2020

**What Will It Take?** $\tau_c = 0.24$

<table>
<thead>
<tr>
<th>$\tau_c$</th>
<th>Base</th>
<th>Slow $\tau_k = 0.25$</th>
<th>Fast $\tau_k = 0.25$</th>
<th>$\tau_k = 0.35$</th>
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<tbody>
<tr>
<td>20%</td>
<td>−0.0691</td>
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<td>+0.0380</td>
<td>+0.0320</td>
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<tr>
<td>24%</td>
<td>−0.0691</td>
<td>+0.0044</td>
<td>+0.0092</td>
<td>+0.0013</td>
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<tr>
<td>25%</td>
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<td>+0.0090</td>
<td>+0.0140</td>
<td>+0.0060</td>
</tr>
<tr>
<td>30%</td>
<td>−0.0691</td>
<td>+0.0340</td>
<td>+0.0380</td>
<td>+0.0320</td>
</tr>
</tbody>
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Sensitivity to various assumptions TBD
Conclusions
What We Did

- High debt to output ratio combined with looming public expenditures due to rapid societal aging
- Use the standard growth model to
  - measure the impact of a lower capital income tax on the Japanese economy
  - calculate the needed consumption tax rate to produce a primary balance in 2020
Conclusions

Long Run Results

- Sizable gains in aggregate capital, output and consumption
  - $K$ rises 12.1% with $\tau_k = 0.25$ and 37.6% with $\tau_k = 0$
  - $Y$ rises 5.0% with $\tau_k = 0.25$ and 14.9% with $\tau_k = 0$
  - $H$ does not change much except for $\tau_k = 0$ when it increases 3%
  - $C$ increases 3-5%
Conclusions

Short Run Results

- Relative to the baseline transition of no change in the capital income tax rate, there are immediate and significant gains in aggregate capital.
- With $\tau_k$ scheduled (surprise announcement) to decline to 25%, capital increases 2.9% in the first year.
- By the end of the 5th year of reform when $\tau_k$ reaches 25%, the increase in $k$ is 7%.
- $Y$ rises 1-2%.
- There is a significant improvement in primary balance in the first year (1.6 percentage points) but the gain erodes fast.