Capital Income Tax Reform and the Japanese Economy (Very Preliminary and Incomplete)

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Capital Income Tax and the Japanese Economy

Less is More?

- In April 2014, the Japanese government announced plans to gradually reduce the corporate income tax rate from 35% to 25%
- In April 2015, the government reduced the tax rate by 3.29% from an effective rate of 35%
- In this paper, we study the impact of a lower capital income tax rate on the Japanese economy.
  - We present long run and short run effects on the economy.
  - We also provide a welfare analysis.

Capital Income Tax and the Japanese Economy

Where Are We Now?

- Net debt to GDP ratio at about 150% in 2015
- Dependency ratio projected to rise from 40% in 2013 to 92% in 2092
- We study the long run impact of the proposed policies and also document the short run effects from 2015 to 2050

Fundamental Problem 1: Aging Population

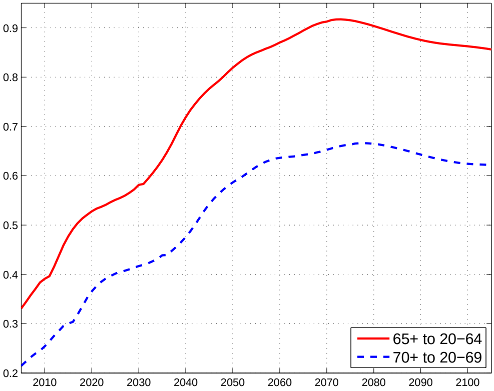


Figure : Dependency Ratios

Fundamental Problem 2: High Debt

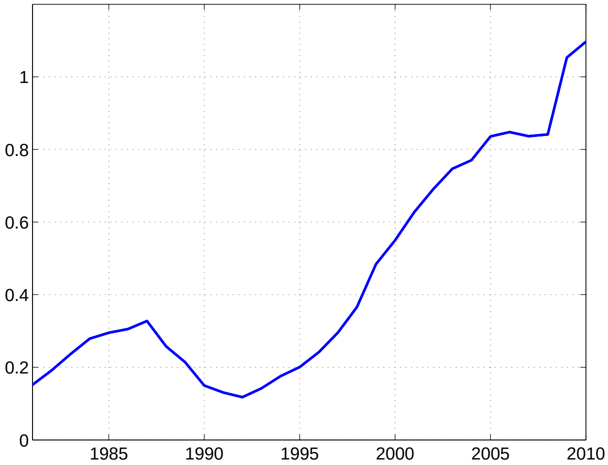


Figure : Net Debt to GNP Ratio

Implications of Aging Population

Fukawa and Sato (2009), consistent with İmrohoroğlu, Kitao and Yamada (2015)

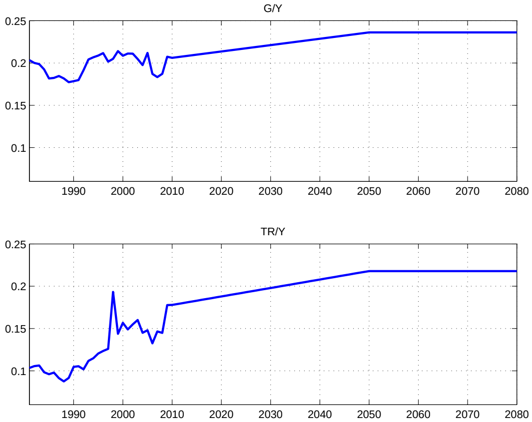


Figure : Government Expenditures to GNP Ratios

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?
- Both in the long run, and, especially in the short run.
- Are there welfare gains?
- What is the optimal capital income tax rate in this environment?
- How does the economy look like if the optimal tax policy is implemented?

What We Do

- Hayashi and Prescott (2002), Chen, İmrohoroğlu and İmrohoroğlu (2006), Hansen and İmrohoroğlu (2013)
- Standard growth model.
- Characterize how model performs from 1981-2014.
    - Take as exogenous TFP, tax rates, government consumption, transfers and population.
    - Use observed values 1981-2014.
- Use model to forecast from 2015 and beyond; perfect foresight and also 'MIT' simulations.
    - Government projections for population to 2060.
    - 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 labor supply
- Capital income tax distorts the saving decision
- When reduced, investment rises, capital accumulates faster, output increases.
- Produce unanticipated simulations.

Related Literature

- İmrohoroğlu and Sudo (2011): Will a 15% consumption tax or a growth miracle save Japan? No.
- Doi, Hoshi and Okimoto (2011): Combination of reforms.
- Hoshi and Ito (2015): Back-of-the-envelope calculations.
    - İmrohoroğlu and Hansen (2015): Given the projected increases in government expenditures and the decline in working age population, how high must the consumption tax rate go to achieve fiscal sustainability? Very, very high.
- İmrohoroğlu, Kitao, and Yamada (2015): Accounting exercise to measure which policies/outcomes help achieve fiscal sustainability. Pension reform, increase in FLFP.
    - Braun and Joines (2015): Raise co-pay for the elderly to the level of working age people.
    - Kitao (2015): Raise normal retirement age to 70.

Model: Government Budget

$$
\begin{aligned}
G_t + TR_t^* + B_t &= \eta_t q_t B_{t+1} + \tau_{c,t} C_t + \tau_{h,t} W_t h_t \\
&\quad + \tau_{k,t}(r_t - \delta) K_t + \tau_{b,t}(1 - q_{t-1}) B_t.
\end{aligned}
$$

Implementation of Tax Increases

$$\tau_{c,t} = \begin{cases} \tau_{c,t}^{B} & \text{if } t < T_1 (B_s/Y_s \leq b_{\max} \text{ for all } s \leq t) \\ \overline{\tau}_c + \pi & \text{if } T_1 \leq t < T_2 (B_s/Y_s > b_{\max} \text{ for some } s \leq t \text{ and } B_t/Y_t > \overline{b}) \\ \overline{\tau}_c & \text{if } t \geq T_2 (B_t/Y_t \leq \overline{b}), \end{cases}$$

.

- π is chosen as the smallest increment that leads to the activation of the second trigger (convergence to steady state).
- $TR_t^* = TR_t^B$ *for* $t < T_1$
- $TR_t^* = TR_t - 0.08 Y_t^B$ *for* $t \geq T_1$

Model: Household's Problem

$$\max \sum_{t=0}^{\infty} \beta^t N_t [\log C_t - \alpha \frac{h_t^{1+1/\psi}}{1+1/\psi} + \phi \log(\mu_t + B_{t+1})]$$

subject to

$$\begin{aligned}
&(1+\tau_{c,t})C_t + \eta_t K_{t+1} + q_t \eta_t B_{t+1} \\
&= (1-\tau_{h,t}) W_t h_t + \left[(1 + (1-\tau_{k,t})(r_t - \delta)\right] K_t \\
&\quad + [1 - (1-q_{t-1})\tau_{b,t}] B_t + TR_t,
\end{aligned}$$

Model: Firm's Problem

$$
\begin{aligned}
N_t Y_t &= A_t (N_t K_t)^{\theta} (N_t h_t)^{1-\theta} \\
N_{t+1} K_{t+1} &= (1-\delta) N_t K_t + N_t X_t \\
A_{t+1} &= \gamma_t A_t
\end{aligned}
$$

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 10 equations in 10 unknowns $\{c_t, x_t, h_t, y_t, k_{t+1}, b_{t+1}, d_t, q_t, w_t, r_t\}$ 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 1981-2014
- Use official projections for 2015-2060
- Population constant after 2060
- h_t is employment per working age population multiplied by average weekly hours worked divided by 98 (discretionary hours available per week).

National Accounts: Hayashi and Prescott (2002)

Table : Adjustments to National Account Measurements

$C =$	Private Consumption Expenditures
$I =$	Private Gross Investment
	+ Change in Inventories
	+ Net Exports
	+ Net Factor Payments from Abroad
$G =$	Government Final Consumption Expenditures
	+ General Government Gross Capital Formation
	+ Government Net Land Purchases
	− Book Value Depreciation of Government Capital
$Y =$	$C + I + G$

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.
- 8% 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 0.3409 for 2014.

Tax Rates, continued

- Tax Rate on Consumption, $\tau_{c,t}$
  - 0% 1981-1988
  - 3% 1989-1996
  - 5% 1997-2013
  - 8% 2014
  - 10% 2017 and beyond, until it endogenously rises to achieve fiscal sustainability
- Tax Rate on Bond Interest, τ_b, 20% for all time periods.

Tax Rates, continued

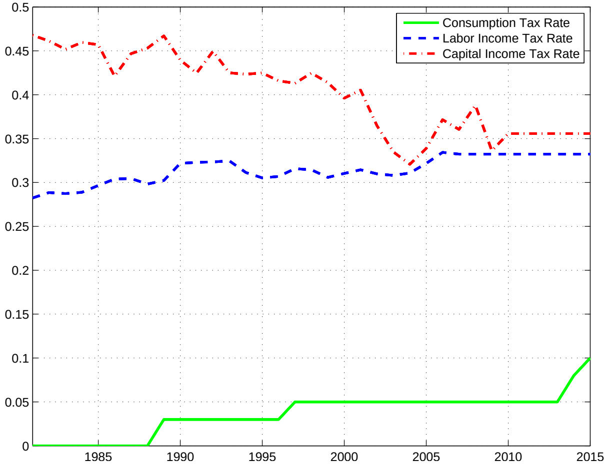


Figure : Tax Rates

Technology Parameters

- $A_t = Y_t / (K_t^{\theta} h_t^{1-\theta})$.
- $\theta = 0.3798$, which is the average value from 1981-2014.
- $\gamma_t = A_{t+1}/A_t$, comes from the actual data between 1981 and 2014.
- $\gamma_t = 1.015^{1-\theta}$ for 2015 and beyond.
- $\delta = 0.0816$, which is the average value from 1981-2014.

Preference Parameters

- Five preference parameters, $\beta, \alpha, \psi, \phi$, and μ.
- $\mu = \mu_t / A_t^{1/(1-\theta)} = 1.1$.
- $\psi = 0.5$, the Frisch elasticity of labor supply estimated by Chetty et al (2012).

Preference Parameters, continued

For β, α, and ϕ, use equilibrium conditions to obtain a value for each year, and then average over the sample:

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

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

$$\phi_t = \eta_t(\mu + b_{t+1}) \left[\frac{q_t \gamma_t^{1/(1-\theta)}}{(1+\tau_{c,t})c_t} - \frac{\beta_t \left[1 - (1-q_t)\tau_{b,t+1}\right]}{(1+\tau_{c,t+1})c_{t+1}}\right].$$

Bond Price

Need empirical counterpart to q_t :

$$q_t = \frac{B_{t+1}/F_t}{(B_{t+1}+P_{t+1})/F_{t+1}}.$$

- B_t is beginning of period debt.
- P_t is interest payments made in period t.
- F_t is the GNP deflator.

Structural Parameters

Table : Calibration of Structural Parameters

Parameter	Value	
θ	0.3798	Data Average
δ	0.0816	Data Average
β	0.9671	FOC, 1981-2014
α	23.05	FOC, 1981-2014
ψ	0.5	Chetty et al (2012)
ϕ	0.12	FOC, 1981-2013
μ	1.1	fit q_t for 1981-2014

Long Run Comparison

Reducing the Capital Income Tax Rate

- Unanticipated reduction in τ_k from 35%
  - to 30% in 2015
  - to 25% in 2015
  - to 0% in 2015
  - We report long run results with higher capital income tax rates for comparison

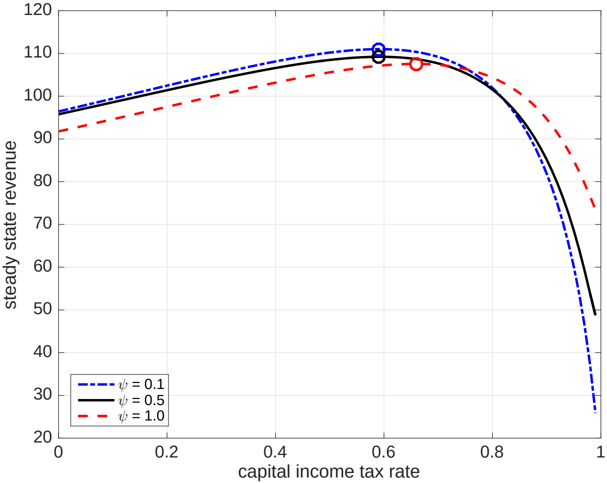
Long Run Comparisons

Changing the Capital Income Tax Rate

τ_k	K	H	Y	C	τ_c
0.00	133.62	100.54	111.99	107.95	0.3439
0.25	110.25	100.20	103.91	102.91	0.3203
0.30	104.75	100.10	101.84	101.44	0.3175
0.34	100.00	100.00	100.00	100.00	0.3160
0.50	79.21	99.37	91.16	92.35	0.3241
0.60	64.04	98.66	83.71	84.78	0.3535
0.70	47.16	97.39	73.95	73.47	0.4336

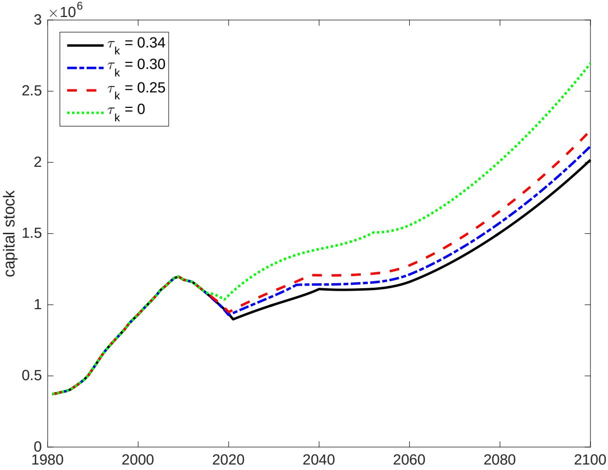
Long Run Comparisons

Laffer Curves: Capital Income Tax



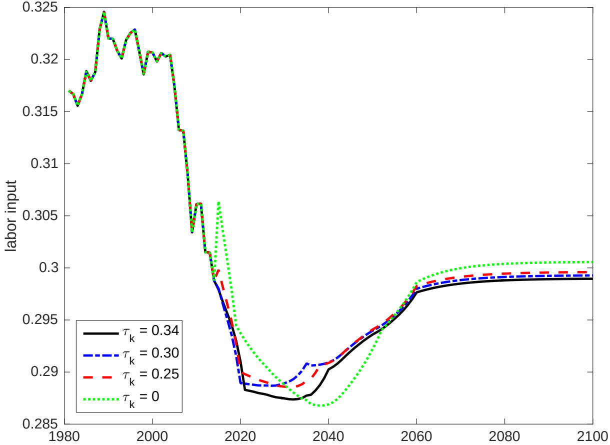
Transition Paths

Capital Stock



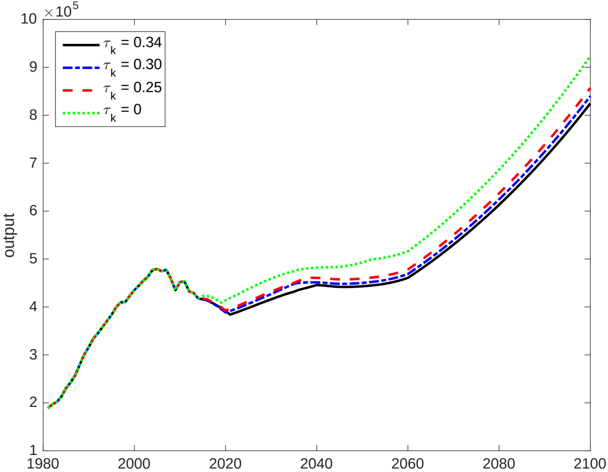
Transition Paths

Labor Input



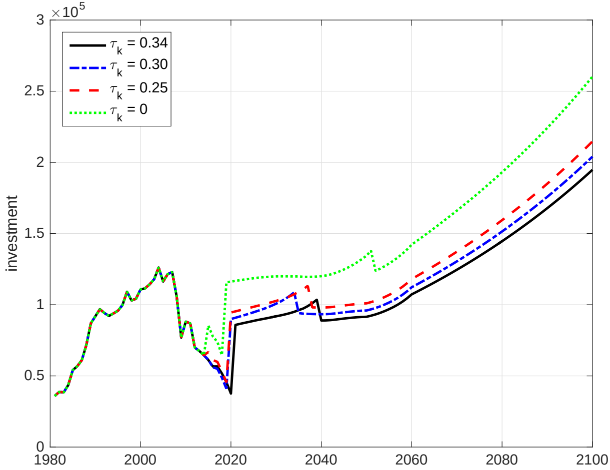
Transition Paths

Output



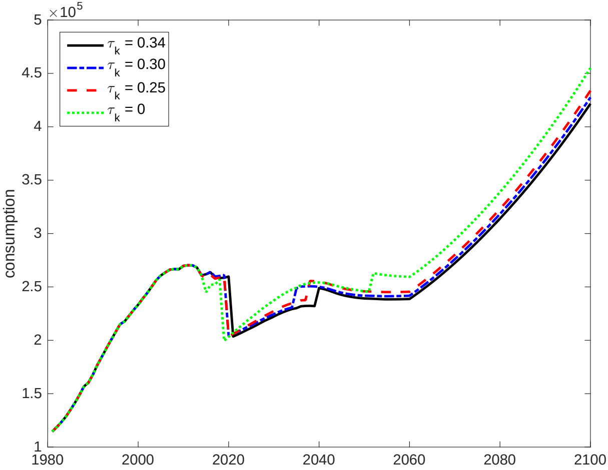
Transition Paths

Investment



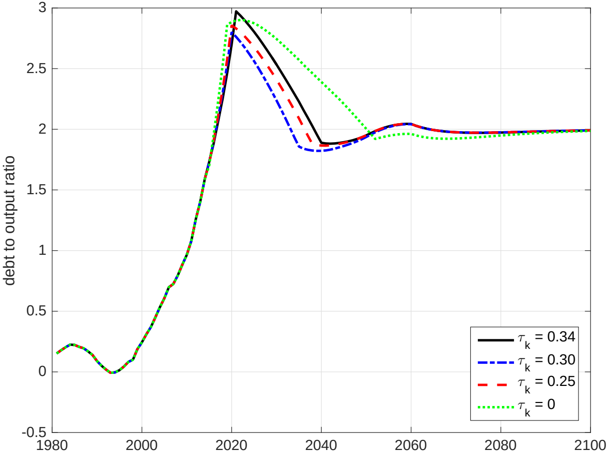
Transition Paths

Consumption



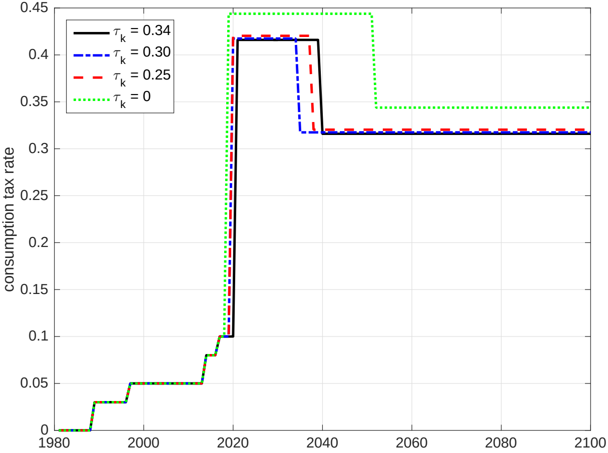
Transition Paths

Debt to Output Ratio



Transition Paths

Consumption Tax Rate



Short Run Analysis: Path of K

Reducing the Capital Income Tax Rate: The Next Ten Years

	$\tau_k = 0.34$	$\tau_k = 0.30$	$\tau_k = 0.25$	$\tau_k = 0.00$
2015	97.65	97.65	97.65	97.65
2020	84.37	83.55	85.39	96.08
2025	85.24	89.78	92.63	107.67
2030	90.15	95.81	98.89	116.00
2035	94.67	102.68	104.81	121.68
2040	100.02	102.91	108.76	125.31
2045	99.53	103.10	108.74	128.42
2050	99.84	103.84	109.40	133.09

Short Run Analysis: Path of H

Reducing the Capital Income Tax Rate: The Next Ten Years

	$\tau_k = 0.34$	$\tau_k = 0.30$	$\tau_k = 0.25$	$\tau_k = 0.00$
2015	99.71	99.74	100.35	102.55
2020	97.39	96.70	97.06	98.31
2025	96.36	96.63	96.77	97.35
2030	96.21	96.70	96.59	96.65
2035	96.31	97.34	96.78	96.15
2040	97.15	97.37	97.36	96.02
2045	97.73	97.88	97.90	96.69
2050	98.27	98.39	98.43	97.80

Short Run Analysis: Path of Y

Reducing the Capital Income Tax Rate: The Next Ten Years

	$\tau_k = 0.34$	$\tau_k = 0.30$	$\tau_k = 0.25$	$\tau_k = 0.00$
2015	99.55	99.57	99.94	101.29
2020	93.70	92.95	93.93	99.02
2025	95.19	97.25	98.50	104.68
2030	99.52	102.18	103.34	109.83
2035	103.32	107.27	107.72	113.55
2040	106.66	107.97	110.25	115.36
2045	105.75	107.28	109.48	115.73
2050	106.04	107.73	109.90	117.93

Welfare Gains

CEV relative to the baseline transition with $\tau_k = 34\%$

τ_k	CEV
0.70	-0.0578
0.60	-0.0313
0.50	-0.0177
0.30	-0.0004
0.25	$+0.0035$
0.00	$+0.0150$

Sensitivity to various assumptions TBD

- Frisch elasticity 0.1 and 1.0
- Bonds are not in the utility function
- Small, open economy

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

Conclusions

Long Run Results

- Sizable gains in aggregate capital, output and consumption
  - K rises 10.3% with $\tau_k = 0.25$ and 34.8% with $\tau_k = 0$
  - Y rises 3.9% with $\tau_k = 0.25$ and 12.1% with $\tau_k = 0$
  - C rises 3.0% with $\tau_k = 0.25$ and 8.1% with $\tau_k = 0$

Conclusions

Short Run Results

- Relative to the baseline transition of no change in the capital income tax rate of 34%, there are significant gains in aggregate capital and output in the short run.
- In 2020
  - K is 1.2% higher if $\tau_k = 0.25$ and 13.9% higher if $\tau_k = 0$
  - Y is 0.2% higher if $\tau_k = 0.25$ and 5.7% higher if $\tau_k = 0$
- In 2025
  - K is 8.7% higher if $\tau_k = 0.25$ and 26.3% higher if $\tau_k = 0$
  - Y is 3.5% higher if $\tau_k = 0.25$ and 10.0% higher if $\tau_k = 0$