QSPS Conference

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Long-run
Japanese Saving Rate

Net national saving rates
Perhaps we need:
Demographics
Borrowing constraints
Social Security
Taxes
Low initial capital stock
OLG?
Infinite Horizon?
Japanese Saving Rate

OLG
Japanese Saving Rate

Infinite Horizon
The effects of depreciation and tax rate
Japanese Saving Rate

Turned out that a simple neoclassical growth model with annual TFP, taxes and depreciation rate would account for the data.

Main determinants of the saving rate
U.S. Saving Rate

How about the U.S?
U.S. Saving Rate

Role of TFP - U.S.
U.S. Saving Rate

Model Properties with Constant Labor Wedge
For the U.S. need the labor wedge.
How about the future
U.S. Debt

Significant increase in projected debt to GDP by the CBO

Debt to GDP
Main reason for the differences in projections: Revenue assumptions

Tax Revenues/GDP
U.S. Debt

- In the CBO projections
  - D/Y stabilize if marginal tax rates on labor income increase from 25% in 2011 to 35% in 2035,
  - Labor supply effects are not incorporated into these projections
U.S. Debt

- How would things behave in a neoclassical growth model?
- Take into account behavioral responses to policy
There is a representative household with $N_t$ working-age members, facing the following problem:

$$\max \sum_{t=0}^{\infty} \beta^t N_t \left[ \log c_t + \alpha \log (1 - h_t) \right]$$

subject to

$$C_t + K_{t+1} \leq [1 + (1 - \tau_{k,t})(r_t - \delta_t)] K_t + (1 - \tau_{h,t}) w_t H_t + TR_t + N_t \pi_t^p]$$
Firm’s problem is to maximize profits.

- The production function is given by:
  \[ Y_t = A_t K_t^\theta H_t^{1-\theta}, \]

- Aggregate capital stock \( K_t \) follows
  \[ K_{t+1} = (1 - \delta_t) K_t + X_t, \]
Government Budget Constraint

\[ G_t + TR_t = \tau_{h,t} w_t H_t + \tau_{k,t} (r_t - \delta_t) K_t - N_t \pi_t^p. \]
Real Government Debt:

\[ B_{t+1}^g = (B_t^g + GB_t) \frac{P_t}{P_{t+1}} \]

where \( GB_t \) is net borrowing (revenues minus expenditures)
Framework

Solution

- Start from given initial conditions
- Compute an equilibrium transition path towards a balanced growth path
Constant Parameters: Standard

- capital share $\theta = 0.4$.
- subjective discount factor, $\beta = 0.969$
- share of leisure in the utility function, $\alpha = 1.45$
Calibration

Calibration of the 1960-2011 period and beyond:

Data and Assumptions for the Future
Calibration: Interest on government debt

- After 2010: Inflation rate: 2%; Nominal interest rate: 3.3%
Results: Past

Data and the Model
Results: Past

Data and the Model
How about the future?
Examine Debt/GNP

- with exogenous labor and higher taxes (CBO’s extended benchmark)
- with endogenous labor and higher taxes
Results: Exogenous versus Endogenous Inputs

- Hours per Capita
- Capital Output Ratio
- GNP per person
- Debt to Output Ratio

Exogenous versus Endogenous Inputs
## Results: Endogenous Labor - Higher Taxes

### Table 3: Economic Consequences of Higher Taxes

<table>
<thead>
<tr>
<th></th>
<th>Elasticity 1.0</th>
<th>Elasticity 0.5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>High tax</td>
<td>Hist. tax</td>
</tr>
<tr>
<td>D/Y in 2035 (%)</td>
<td>106</td>
<td>174</td>
</tr>
<tr>
<td>D/Y in 2080 (%)</td>
<td>215</td>
<td>420</td>
</tr>
<tr>
<td>Y/N growth (2011–2035)</td>
<td>0.92</td>
<td>1.27</td>
</tr>
<tr>
<td>Y/N growth (2011–2080)</td>
<td>1.19</td>
<td>1.33</td>
</tr>
<tr>
<td>Welfare</td>
<td></td>
<td>4.47%</td>
</tr>
</tbody>
</table>
Results

Counterfactual:

If labor could go back to good old days

![Graph showing GDP per person from 1960 to 2040 with two lines: one labeled Counterfactual and one labeled Benchmark. The graph illustrates the detrended output per person over time.]
Results

Counterfactual:

If labor could go back to good old days
Debt to GNP in 2035: 123%
Results
Counterfactual: Inflation!

4% inflation: Debt to GDP 133% by 2035
6% inflation: Debt to GDP shrinks down to 104% by 2035
Table 5: Summary Table

<table>
<thead>
<tr>
<th></th>
<th>Debt-to-GNP Ratio in 2035 (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CBO benchmark projections</strong></td>
<td>74</td>
</tr>
<tr>
<td><strong>High Tax Rates</strong></td>
<td></td>
</tr>
<tr>
<td>CBO exp.; exogenous inputs</td>
<td>63</td>
</tr>
<tr>
<td>CBO exp.; endogenous inputs</td>
<td>106</td>
</tr>
<tr>
<td><strong>Historical Tax Rates (Endogenous Inputs)</strong></td>
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<tr>
<td>CBO expenditures</td>
<td>174</td>
</tr>
<tr>
<td>CBO exp.; high labor wedge and TFP gr.</td>
<td>123</td>
</tr>
<tr>
<td>CBO exp.; 4% inflation</td>
<td>132</td>
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<tr>
<td>Bowles-Simpson expenditures</td>
<td>120</td>
</tr>
</tbody>
</table>
Conclusion

- Modern day back of the envelope calculations
  - High debt/gdp ratio likely to continue into 2035’s
  - Welfare cost of higher taxes between 3%-5%
If not taxes what?
Expenditures as Percentage of U.S. GDP

Expenditures/GDP

Health Care
Health Expenditures/GDP

Health Expenditures as Percentage of GDP for various countries from 1970 to 2005.
### Increase in Health Care Expenditures
1970-2009

<table>
<thead>
<tr>
<th>Country</th>
<th>Increase</th>
</tr>
</thead>
<tbody>
<tr>
<td>Canada</td>
<td>65%</td>
</tr>
<tr>
<td>Germany</td>
<td>93%</td>
</tr>
<tr>
<td>Japan</td>
<td>89%</td>
</tr>
<tr>
<td>Norway</td>
<td>118%</td>
</tr>
<tr>
<td>Spain</td>
<td>171%</td>
</tr>
<tr>
<td>Sweden</td>
<td>47%</td>
</tr>
<tr>
<td>UK</td>
<td>118%</td>
</tr>
<tr>
<td>US</td>
<td>145%</td>
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</tbody>
</table>
Health Care

Will do research on health care!
Thank you!