Taxation and Intra/Intergenerational Equity

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1. Motivation

2. Structure of Stochastic OLG Model

3. Recent Applications
   - Should capital income be taxed? (with F. Kindermann)
   - Should pensions be progressive? (with M. Kallweit and F. Kindermann)

4. Conclusions and Outlook
Quantitative evaluation of tax policy and social security programs with life-cycle models is on the research agenda since almost 30 years.
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- labor supply vs. savings distortions;
- labor supply distortions vs. longevity insurance;
- intergenerational vs. intragenerational policy effects.
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- Elimination of capital income tax (consumption tax);
- Replace paygo pension system by funded system;
- Strong tax-benefit linkage in paygo pension system;
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⇒ Redistribution towards rich future cohorts optimal!
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- compare distortion cost and insurance benefits from government programs;
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→ Policy recommendations are different!
Households

→ belong to specific skill class within a cohort;
→ work for 45 years, retire at age 65;
→ live up to a maximum age of 100;
Households

- belong to specific skill class within a cohort;
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- face idiosyncratic lifespan, (disability) and income risk;
- are liquidity constraint (no borrowing).
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Incomplete market structure No insurance markets.
Should capital income be taxed?

Lucas (1990): Supply-Side Economics

"Capital income taxation will initially be high, imitating a capital levy on the initial stock. If the system converges to a balanced growth path, capital taxation will converge to zero."

Efficiency effects of immediate change to long-run optimal policy amount to 1% of aggregate consumption in any period.
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Conesa/Kitao/Krueger (2009):
Optimal long-run income tax structure:

- flat income tax with 23% tax rate and basic allowance of 7200$
- capital income tax rate 36%

Explanation: Insurance benefits dominate distortions!
Should capital income be taxed?

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What happens along the transition?
Who wins, who loses?
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Why is this optimal?
Should capital income be taxed?

Simulation methodology:

- Initial equilibrium synthetic income taxation

\[ (\tau_{k,0} = 0, \kappa_0 = 0.258 \text{ and } \kappa_1 = 0.768) \]
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  \((\tau_k, 0 = 0, \kappa_0 = 0.258 \text{ and } \kappa_1 = 0.768)\)
- One-time, unannounced change in income tax policy \((\tau_k, \kappa_0, \kappa_1)\)
- \(\kappa_2\) balances intertemporal budget
- Debt balances periodic budget
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- \(\kappa_2\) balances intertemporal budget
- Debt balances periodic budget
- Transition path and new long-run equilibrium
- Calculate welfare effects for different generations
- Determine efficiency effects of the income tax policy
Should capital income be taxed?

Simulation results: Long-run welfare

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Conesa et al. (2009)</th>
<th>Optimal scheme</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\tau_k$</td>
<td>0.36</td>
<td>0.43</td>
</tr>
<tr>
<td>$\kappa_0$</td>
<td>0.23</td>
<td>0.20</td>
</tr>
<tr>
<td>$\kappa_1$</td>
<td>7</td>
<td>$\infty$</td>
</tr>
<tr>
<td>$\kappa_2$</td>
<td>34711</td>
<td>12108</td>
</tr>
<tr>
<td>Hours worked</td>
<td>-0.66</td>
<td>0.69</td>
</tr>
<tr>
<td>Labor supply $N$</td>
<td>-0.18</td>
<td>1.18</td>
</tr>
<tr>
<td>Capital stock $K$</td>
<td>-6.50</td>
<td>-8.16</td>
</tr>
<tr>
<td>Debt $B/Y$</td>
<td>0.00</td>
<td>0.00</td>
</tr>
<tr>
<td>Output $Y$</td>
<td>-2.50</td>
<td>-2.29</td>
</tr>
<tr>
<td>Consumption $C$</td>
<td>-1.45</td>
<td>-0.34</td>
</tr>
<tr>
<td>Long run CEV</td>
<td>1.31</td>
<td>1.48</td>
</tr>
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</table>
Should capital income be taxed?
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<tr>
<td></td>
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<td>base case</td>
</tr>
<tr>
<td>( \tau_k )</td>
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<td>0.43</td>
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</tr>
<tr>
<td>( \kappa_2 )</td>
<td>34711</td>
<td>12108</td>
<td>12195</td>
</tr>
<tr>
<td>Hours worked</td>
<td>-0.66</td>
<td>0.69</td>
<td>0.72</td>
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<tr>
<td>Labor supply ( N )</td>
<td>-0.18</td>
<td>1.18</td>
<td>1.19</td>
</tr>
<tr>
<td>Capital stock ( K )</td>
<td>-6.50</td>
<td>-8.16</td>
<td>-8.02</td>
</tr>
<tr>
<td>Debt ( B/Y )</td>
<td>0.00</td>
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<td>-0.30</td>
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<td>1.48</td>
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</tr>
<tr>
<td>CEV(^c) (g.e.)</td>
<td></td>
<td></td>
<td>-1.66</td>
</tr>
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Conclusion:

- Immediate switch to optimal long-run policy comes at efficiency costs.
- High capital income taxation burdens current generations.
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- Efficiency perspective → still optimal to tax capital income, but at much lower rates
- Optimal capital income tax rate:
  - 14 percent in closed economy
  - 6 percent in open economy
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- Low interest elasticity of precautionary savings
  → the smaller the share of precautionary savings, the lower the interest rate tax
Pension reforms in recent years have mainly focused on labor market distortions

- Tax-benefit linkage increased;
- Progressivity of pension benefits decreased;
  (OECD progressivity index (average) in 2002: 51.5 in 2006: 39.8);
- The objective to prevent poverty in old-age received less weight.
Should pensions be progressive?

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Why Germany? Expected increase in old-age poverty!
Should pensions be progressive?

Government structure

Tax System

- consumption, (progressive) labor and capital income taxes, public debt
- consumption tax rate is used to balance budget

\[ \lambda = 0 \Rightarrow \text{perfectly earnings related} \]
\[ \lambda = 1 \Rightarrow \text{perfectly flat} \]
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Government structure

Tax System

- consumption, (progressive) labor and capital income taxes, public debt
- consumption tax rate is used to balance budget

Pension System

- pays old-age benefits and disability benefits

\[ p_j = AF(j_R) \times ep_{j_R} \times APA \]

\[ ep_{j+1} = ep_j + \left(1 - \lambda \right) \frac{y_j}{y} + \lambda \]

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## Should pensions be progressive?

### Table: Macroeconomic effects of flat pensions (base model)

<table>
<thead>
<tr>
<th>Year</th>
<th>2009</th>
<th>2020</th>
<th>2030</th>
<th>2050</th>
<th>∞</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Macroeconomic aggregates</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Labor input</td>
<td>-5.6</td>
<td>-4.9</td>
<td>-4.8</td>
<td>-4.7</td>
<td>-4.7</td>
</tr>
<tr>
<td>Capital</td>
<td>0.0</td>
<td>-2.2</td>
<td>-2.8</td>
<td>-3.0</td>
<td>-3.0</td>
</tr>
<tr>
<td><strong>Prices</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wage</td>
<td>2.1</td>
<td>0.9</td>
<td>0.5</td>
<td>0.4</td>
<td>0.4</td>
</tr>
<tr>
<td>Interest rate</td>
<td>-0.3</td>
<td>-0.1</td>
<td>-0.1</td>
<td>-0.1</td>
<td>-0.1</td>
</tr>
<tr>
<td>Consumption tax rate</td>
<td>1.6</td>
<td>2.0</td>
<td>2.2</td>
<td>2.4</td>
<td>2.4</td>
</tr>
<tr>
<td><strong>Pension system</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Expenditure (in % of GDP)</td>
<td>-0.1</td>
<td>0.1</td>
<td>0.4</td>
<td>0.5</td>
<td>0.5</td>
</tr>
<tr>
<td>Contribution rate</td>
<td>0.5</td>
<td>0.8</td>
<td>1.2</td>
<td>1.3</td>
<td>1.4</td>
</tr>
</tbody>
</table>
Should pensions be progressive?

Table: Welfare effects of flat pensions (base model)*

<table>
<thead>
<tr>
<th>Birth year</th>
<th>Age in year 2009</th>
<th>Retirees</th>
<th>Workers</th>
<th>Future Generations</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>low</td>
<td>mid</td>
<td>high</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1920</td>
<td>89</td>
<td>-2.44</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1940</td>
<td>69</td>
<td>-2.22</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1960</td>
<td>49</td>
<td>0.93</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1980</td>
<td>29</td>
<td>1.03</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2000</td>
<td>9</td>
<td>0.35</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2020</td>
<td>–</td>
<td>0.18</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2060</td>
<td>–</td>
<td>2.22</td>
</tr>
<tr>
<td></td>
<td></td>
<td>∞</td>
<td>–</td>
<td>0.20</td>
</tr>
</tbody>
</table>

*In percent of initial resources.
Should pensions be progressive?

Table: Aggregate efficiency of alternative progressivity levels*

<table>
<thead>
<tr>
<th>model version</th>
<th>0.10</th>
<th>0.20</th>
<th>0.30</th>
<th>0.40</th>
<th>0.50</th>
<th>...</th>
<th>0.90</th>
<th>1.00</th>
</tr>
</thead>
<tbody>
<tr>
<td>base</td>
<td>0.05</td>
<td><strong>0.08</strong></td>
<td>0.06</td>
<td>0.04</td>
<td>-0.00</td>
<td>...</td>
<td>-0.33</td>
<td>-0.46</td>
</tr>
<tr>
<td>+ disability</td>
<td>0.18</td>
<td>0.31</td>
<td><strong>0.35</strong></td>
<td>0.32</td>
<td>0.22</td>
<td>...</td>
<td>-0.45</td>
<td>-0.60</td>
</tr>
<tr>
<td>+ retirement</td>
<td>0.17</td>
<td>0.31</td>
<td><strong>0.37</strong></td>
<td>0.34</td>
<td>0.23</td>
<td>...</td>
<td>-0.43</td>
<td>-0.58</td>
</tr>
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</table>

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Should pensions be progressive?

- Positive insurance effect is stronger than the efficiency losses from labor supply distortions for a wide range of parameter combinations;
- Pensions should be more progressive at least in Germany;
- International trend towards less pension progressivity might be suboptimal;
Conclusions and Outlook

Central result of stochastic life-cycle models:

- Social security and progressive tax systems offer substantial insurance gains;
- Public policy has focussed too much on labor market and savings distortions!
- Trade-off between equity and efficiency might be overstated!
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Future work:

- Modelling institutional features such as housing and families;
- Modelling other sources of risk (aggregate risk) and intergenerational risk-sharing;