PREDICTING EFFECTS OF TAX POLICY BY EXTERNAL EVIDENCE OF BEHAVIORAL EFFECTS

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OVERVIEW OF THE PRESENTATION

1. Introduction
2. Behavioral response estimates
3. The external evidence approach
4. Illustration of the approach
5. Comparison to a structural labor supply model
6. Summary and remaining work
1. Introduction
Introduction

- Standard tax-benefit microsimulation models are non-behavioral
  - Compute revenue and distributional effects under the assumption that people’s decisions are not changed by the policy
- A common method to add behavioral labor supply effects to static microsimulation models
  - Discrete choice structural models
- An alternative approach is to use "external evidence" of behavioral effects from the literature, e.g. quasi-experimental evidence
- Provide ex-ante information about expected effects on labor supply, revenue and distributional effects
Feeding evidence from the literature into tax-benefit model has been done before


In the present paper we explore this approach

- Addressing effects on the extensive margin and intensive margin of labor supply
2. Behavioral response estimates
Behavioral adjustments - intensive margin

Elasticity of taxable income ($\varepsilon$):

$$\varepsilon = \frac{\Delta y/y}{\Delta (1 - MTR)/(1 - MTR)}$$

Adjustment of income:

$$\Delta y_i = \varepsilon \frac{(1 - MTR_{1i}) - (1 - MTR_{0i})}{(1 - MTR_{0i})} y_{0i}$$
Behavioral Adjustments - Extensive Margin

Extensive margin elasticity ($\eta$):

$$\eta = \frac{\delta P / P}{\delta (1 - PTR)/(1 - PTR)}$$

Adjustment of number of labor market participants:

$$\Delta FR = \eta \frac{(1 - PTR_1) - (1 - PTR_0)}{(1 - PTR_0)} FR_0.$$
### Intensive Margin Elasticity Estimates ($\varepsilon$)

#### Table 1: A selection of ETI estimates of the literature: Studies of the Nordic countries and average US and Scandinavia

<table>
<thead>
<tr>
<th>Study</th>
<th>Country</th>
<th>Income concept</th>
<th>Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>US studies (Neisser, 2021)</td>
<td>US average</td>
<td>Broad income</td>
<td>0.49</td>
</tr>
<tr>
<td>Scand. studies (Neisser, 2021)</td>
<td>Scand. aver.</td>
<td>Broad income</td>
<td>0.18</td>
</tr>
<tr>
<td>Kleven and Schultz (2014)</td>
<td>Denmark</td>
<td>Taxable wage-income</td>
<td>0.05</td>
</tr>
<tr>
<td>Kleven and Schultz (2014)</td>
<td>Denmark</td>
<td>Taxable self-empl. income</td>
<td>0.1</td>
</tr>
<tr>
<td>Matikka (2018)</td>
<td>Finland</td>
<td>Taxable income</td>
<td>0.21</td>
</tr>
<tr>
<td>Aarbu and Thoresen (2001)</td>
<td>Norway</td>
<td>Taxable income</td>
<td>0.2</td>
</tr>
<tr>
<td>Thoresen and Vattø (2015)</td>
<td>Norway</td>
<td>Taxable labor income</td>
<td>0.04–0.06</td>
</tr>
<tr>
<td>Vattø (2020)</td>
<td>Norway</td>
<td>Taxable labor income</td>
<td>0.09–0.15</td>
</tr>
<tr>
<td>Berg and Thoresen (2020)</td>
<td>Norway</td>
<td>Taxable self-empl. income</td>
<td>0.17</td>
</tr>
<tr>
<td>Hansson (2007)</td>
<td>Sweden</td>
<td>Taxable earned income</td>
<td>0.4–0.5</td>
</tr>
<tr>
<td>Holmlund and Söderström (2011)</td>
<td>Sweden</td>
<td>Taxable male labor income</td>
<td>0.1–0.3</td>
</tr>
</tbody>
</table>

**Notes:** Broad income refers to a before deduction income concept. The estimation technique applied in Holmlund and Söderström (2011) is somewhat different from the others, as they estimate a dynamic model.
EXTENSIVE MARGIN ELASTICITY ESTIMATES ($\eta$)

- Chetty et al (2013) summarizes 0.13-0.43
- Discussion on to which extent the responsiveness on the extensive margin is larger than on the intensive margin
  - Contrary to consensus, Kleven (2023) finds that the EITC expansions (in the US) basically have had no clear and significant effects on employment
- Fewer quasi-experimental extensive margin elasticity estimates for Scandinavia
  - Bastani, Moberg and Selin (2021) find $\eta = 0.13$
3. The external evidence approach
**The external evidence approach**

1. Pick relevant responses estimates (elasticities) from the empirical literature
2. Simulate MTR and PTR, before and after the prospective policy change, using a (non-behavioral) tax-benefit microsimulation model
3. Adjust affected individuals pre-tax income to account for the expected behavioral adjustments. Measure revenue effects and distributional effects.
4. Illustration of the approach
Introduction of a fifth step in the step-tax in Norway in 2022
- Top marginal tax rate increased from 46.4 to 47.4 for income over NOK 2 million (EUR 200,000)

Intensive margin elasticity
- $\varepsilon = 0.2$

Extensive margin elasticity
- $\eta = 0.1$
Simulate MTR and PTR in a static microsimulation model

- Marginal tax rates (MTR)
  - Increase observed earnings marginally and simulate the change in taxes
- Participation tax rates (PTR)
  - Assumptions on income in the counterfactual state of participation/non-participation
**Effects on tax revenue**

**Table.** Tax revenue effects of introducing a fifth step in the step-tax, million NOK

<table>
<thead>
<tr>
<th>Total tax revenue</th>
<th>Diff. to benchmark</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benchmark: 2023 tax-rules without 5th step</td>
<td>578,134</td>
</tr>
<tr>
<td>2023 tax-rules</td>
<td></td>
</tr>
<tr>
<td>Mechanical effect</td>
<td>578,402</td>
</tr>
<tr>
<td>Intensive margin behavioral effect</td>
<td></td>
</tr>
<tr>
<td>Extensive margin behavioral effect</td>
<td></td>
</tr>
<tr>
<td>Mechanical and behavioral effects</td>
<td>578,290</td>
</tr>
<tr>
<td>Behavioral counteracting effect ratio</td>
<td></td>
</tr>
</tbody>
</table>

**Notes:** Simulations by Norwegian tax-benefit model LOTTE-Skatt, data for 2019 projected to 2023. Behavioral effects are accounted for by an ETI estimate of 0.2 at the intensive margin and 0.1 at the extensive margin.
5. Comparison to a structural labor supply model
**Comparison to a Structural Approach**

- Individuals make choice from a set of finite number of working hours, such as
  
  \[ h \in \langle 0 - 5, 5 - 10, 10 - 15, \ldots, 45 - 50, 50+ \rangle \]

- Random utility set-up
  
  \[ U(C, h) = \nu(C, h) + \varepsilon(C, h) \]

- Get a simple expression of the probability for the individual choosing working hours \( h \)
  
  \[ P(h) = \frac{\exp \nu(f(hW, I), h)}{\exp \nu(f(0, I), 0) + \sum_{h \in D} \exp \nu(f(hW, I), h)} \]

- Estimate the multinomial logit model on cross-sectional data of the Norwegian Labor force survey

- Include individuals in age group 25-62, exclude self-employed, disabled, unemployed, students
Wage elasticities

Table. Simulated labour supply elasticities with respect to the wage rate for individuals in couples and singles, 2014.

<table>
<thead>
<tr>
<th></th>
<th>Female own wage</th>
<th>Male own wage</th>
<th>Female cross wage</th>
<th>Male cross wage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individuals in couple</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Participation (ext. margin)</td>
<td>0.135</td>
<td>-</td>
<td>-0.048</td>
<td>-</td>
</tr>
<tr>
<td>Hours cond. on working (int. margin)</td>
<td>0.197</td>
<td>0.095</td>
<td>-0.043</td>
<td>-0.009</td>
</tr>
<tr>
<td>Total elasticity</td>
<td>0.332</td>
<td>0.095</td>
<td>-0.091</td>
<td>-0.009</td>
</tr>
<tr>
<td>Single individuals</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Participation (ext. margin)</td>
<td>0.012</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hours cond. on working (int. margin)</td>
<td>0.057</td>
<td>0.009</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total elasticity</td>
<td>0.069</td>
<td>0.009</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Notes: The elasticities reflect the simulated percentage change (average across individuals) in the probability of participation (extensive margin) and working hours conditional on working (intensive margin) when the hourly wage rate is increased by one percent for all wage earners.
**Effects on tax revenue using the structural approach**

**Table.** Tax revenue effects of introducing a fifth step in the step-tax, million NOK. Results from structural labor supply model simulation (LOTTE-Arbeid)

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-behavioral revenue change</td>
<td>247</td>
</tr>
<tr>
<td>Effects on revenue from changed behavior</td>
<td>-74</td>
</tr>
<tr>
<td>Behavioral counteracting effect ratio</td>
<td>0.3</td>
</tr>
</tbody>
</table>

**Notes:** Simulations by the structural labor supply model LOTTE-Arbeid, data for 2019 projected to 2023. Difference between simulations, 2023 tax-rules vs 2023 tax-rules without the 5th step (benchmark).
Differences to the "external evidence" approach

- Estimation technique
- Response heterogeneity
- Population coverage
- Margins of response - working hours vs taxable income
6. Summary and remaining work
We explore an approach to incorporate behavioral responses in microsimulation models using external evidence of elasticity estimates.

The external evidence approach serve as a practical alternative to a fully specified structural labor supply model.
REMAINING WORK

- Illustrate the approach by an additional tax change example - a tax deduction for low-earnings, which is expected to primarily affect responses at the extensive margin of labor supply
- Improve the "external evidence" approach at the extensive margin
  - Predict counterfactual labor marked state based on individual characteristics
  - Compute participation tax rates at the individual level
  - Measure (weighted) average effect of expected switchers on tax revenues and changes in disposable income