Tax-benefit revealed social preferences in Croatia

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Introduction

On-going debate on the optimal design of the tax-benefit system

Efficiency and fairness considerations (trade-off)

Started with Mirrlees' (1971) model

Saez (2002) optimal tax model

Both intensive and extensive labor supply margins

Optimal tax schedule for a given social preferences for redistribution

Possible to invert Saez (2002) model to retrieve tax-benefit implicit social welfare weights

Weights which make the actual tax-benefit system optimal

Represent the government’s attitude towards redistribution

The value of redistributing $e_1$ (uniformly) to households belonging to a certain income group
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Follow the inverse-optimal tax approach to derive the marginal social welfare weights of single-earner households in Croatia.
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Methodology
The Inverse-Optimal Tax Model of Saez (2002)

Social planner (SP) maximizes a social welfare function subject to the budget and efficiency (labor supply reactions) constraints.

Individual utility depends on disposable income ($C$) and leisure ($L$).

SP redistributes from high- to low-income households by setting a (marginal) tax rate.

Form

$I + 1$ discrete income groups (ranked by gross income ($Y_i$):

- $I$ groups ($i = 1, \ldots, I$) of individuals who work
- Group of individuals who do not work ($i = 0$)

The formula for the optimal level of taxes:

$$T_i - T_{i-1} = \frac{\zeta_i}{\sum_{i=0}^{I} s_i \left[ 1 - g_j - \eta_j T_i - T_0 \right]}$$

$T_i$ is the effective tax paid by group $i$.

$\zeta_i$ ($\eta_i$) is the intensive (extensive) elasticity of labor supply at $i$.

$s_i$ is the share of group $i$ in the population.

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Empirical Implementation

1. Data: Croatian component of EU-SILC 2018
   ▶ Consider potential salary workers 22-60
   ▶ Derive an optimal tax schedule for single men and women

2. Partition the population of singles into $I-1 = 6$ groups
   ▶ Group 0 (non-workers) have zero gross income
   ▶ Groups 1-5 calculated as quintiles of positive gross income

3. Use EUROMOD to simulate PIT, SSC and benefits
   ▶ Require tax levels ($T_i$) in net/effective terms

4. Construct an indirect-tax microsimulation model
   ▶ Simulate VAT, excises and ad valorem taxes
   ▶ Use HBS 2017 to impute expenditures into HR-SILC-2018
   ▶ Parametric survey-to-survey imputation (De Agostini et al. (2017))
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1. Labor Supply (LS) Model
   - Latent job discrete-choice model (Dagsvik(1994))
   - Individuals have preferences over jobs characterized as packages (working hours, wage rate and non-wage attributes)
   - Consider the individuals' opportunities (additional constraint)
   - LS model estimated using 6 working-hour-choices
   - Predict wages for non-workers (Heckman's (1979) model)

2. Labor Supply Elasticities
   - Numerically simulated by predicting LS
   - Translate $j$ working hours into responses over groups $i$
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Intensive and Extensive Elasticities

\[ \zeta_i = \frac{C_i - C_{i-1}}{s_i} \frac{\partial s_i}{\partial (C_i - C_{i-1})}; \quad \eta_i = \frac{C_i - C_0}{s_i} \frac{\partial s_i}{\partial (C_i - C_0)} \]
Effective Marginal and Participation Tax Rates

\[ EMTR_i = \frac{T_i - T_{i-1}}{Y_i - Y_{i-1}} \; ; \; EPT_i = \frac{T_i - T_0}{Y_i - Y_0} \]
Marginal Social Welfare Weights

Marginal Social Welfare Weights Table

Gross and (Real) Disposable Incomes and Net Taxes Table
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Relative Marginal Social Welfare Weights Graph

Gross and (Real) Disposable Incomes and Net Taxes Table
Marginal Social Welfare Weights: Sensitivity to Elasticities

Baseline Scenario: Males
- Estimated
- No extensive response
- Mean ext. and int. elasticities

Baseline Scenario: Females
- Estimated
- No extensive response
- Mean ext. and int. elasticities

Advanced Scenario: Males
- Estimated
- No extensive response
- Mean ext. and int. elasticities

Advanced Scenario: Females
- Estimated
- No extensive response
- Mean ext. and int. elasticities
Conclusion

Contrast marginal social welfare weights across different tax types
▶ Direct, indirect taxes, and their combination
▶ Results contingent on the LS-elasticities and effective tax rates
▶ The Croatian tax-benefit system (2017) is optimal only with a significantly higher welfare weight assigned to the workless poor compared to the working poor
▶ Holds in the setting of direct taxes
▶ Result re-enforced when both direct and indirect taxes are included
▶ Pareto improvements are feasible if the elasticities are overlooked
▶ The distribution of marginal social welfare weights flattens
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  ▶ Direct, indirect taxes, and their combination
  ▶ Results contingent on the LS-elasticities and effective tax rates

▶ The Croatian tax-benefit system (2017) is optimal only with a significantly higher welfare weight assigned to the workless poor compared to the working poor
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- Pareto improvements are feasible if the elasticities are overlooked
  - The distribution of marginal social welfare weights flattens
### Tax-Benefit System in 2017

<table>
<thead>
<tr>
<th>Instrument</th>
<th>Rate/Amount</th>
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<tr>
<td><strong>Personal Income Tax</strong></td>
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</tr>
<tr>
<td>Number of Tax Bands</td>
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<tr>
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</tr>
<tr>
<td>Min/Max Tax Rate [%]</td>
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<tr>
<td>Standard Rate [%]</td>
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<tr>
<td>Reduced Rates [%]</td>
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<tr>
<td><strong>Employer SSC (General and Occupational Health and Employment Contributions)</strong></td>
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</tr>
<tr>
<td>Floor (Monthly Level)</td>
<td>2940.82</td>
</tr>
<tr>
<td>Rate [%]</td>
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<tr>
<td>Ceiling</td>
<td>No</td>
</tr>
<tr>
<td>Taxable by PIT</td>
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</tr>
<tr>
<td><strong>Employee SSC (Pension Insurance Contributions)</strong></td>
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<tr>
<td>Floor (Monthly Level)</td>
<td>2940.82</td>
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<tr>
<td>Rate [%]</td>
<td>20</td>
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<tr>
<td>Ceiling</td>
<td>46434</td>
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<tr>
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<td><strong>Social Assistance</strong></td>
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<td>Maximum Amount (Monthly Level)</td>
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<td>Withdrawal Rate [%]</td>
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<td>PIT: No, SSC: No</td>
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<tr>
<td><strong>Unemployment Benefits</strong>*</td>
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<tr>
<td>Payment Rate</td>
<td>60% of Gross Income</td>
</tr>
<tr>
<td>Duration</td>
<td>3 - 15 Months</td>
</tr>
<tr>
<td>Ceiling</td>
<td>70% of Average Net Wage (3979.5)</td>
</tr>
<tr>
<td>Taxable</td>
<td>IT: No; SSC: No</td>
</tr>
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Notes: *Shown for the initial phase of unemployment for persons aged 30+ years. All monetary amounts are in HRK
## Intensive and Extensive Elasticities

<table>
<thead>
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<th>Men</th>
<th></th>
<th>Women</th>
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<tr>
<td></td>
<td>Baseline</td>
<td>Advanced</td>
<td>Baseline</td>
<td>Advanced</td>
</tr>
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<td>Intensive Margin</td>
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Notes: Income groups are defined by quintiles of the income distribution of single men and women. Group 0 denotes those with zero income (non-participants). Elasticities are obtained by simulating an increase of 1% of the difference in mean disposable/consumable incomes between a given income group \(i\) and the adjacent lower income group \(i - 1\) (intensive margin) or the group 0 of non-workers (extensive margin).
Effective Marginal Tax Rate (EMTR) and Participation Tax Rate (EPTR)

<table>
<thead>
<tr>
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<th>Men</th>
<th></th>
<th>Women</th>
<th></th>
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</thead>
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<td></td>
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<td>Advanced</td>
<td>Baseline</td>
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<td>EMTR (%)</td>
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<td>54</td>
<td>65</td>
<td>52</td>
<td>66</td>
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<td>EPTR (%)</td>
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Notes: Income groups are defined by quintiles of the income distribution of single men and women. Group 0 denotes those with zero income (non-participants). EMTRs are calculated as \( \frac{T_i - T_{i-1}}{Y_i - Y_{i-1}} \) while EPTRs are calculated as \( \frac{T_i - T_0}{Y_i - Y_0} \) for all income groups \( i > 0 \).
### Marginal Social Welfare Weights

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<tr>
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<th>Men</th>
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Notes: Income groups are defined by quintiles of the income distribution of single men and women. Group 0 denotes those with zero income (non-participants). In the baseline scenario, we estimated the behavioral labor supply reactions (elasticities) on the disposable income (income net of direct taxes) while the inverse-optimal tax model uses the (net) tax function consisting of direct taxes. In the advanced scenario, we estimated the behavioral labor supply reactions (elasticities) on the real disposable income (income net of direct and indirect taxes) while the inverse-optimal tax model uses the (net) tax function consisting of direct and indirect taxes. In the intermediate scenario, we estimated the behavioral labor supply reactions (elasticities) on the disposable income (income net of direct taxes) while the inverse-optimal tax model uses the (net) tax function consisting of direct and indirect taxes.
### Gross Income, (Real) Disposable Income and Net Taxes

<table>
<thead>
<tr>
<th></th>
<th>Men</th>
<th>Advanced/ Baseline</th>
<th>Intermediate</th>
<th>Women</th>
<th>Advanced/ Baseline</th>
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<tr>
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<td>Baseline</td>
<td>Advanced/ Intermediate</td>
<td>Baseline</td>
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<td><strong>Gross Income (Y)</strong></td>
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<td><strong>(Real) Disposable Income (C)</strong></td>
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<td><strong>Net Taxes (T)</strong></td>
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</tbody>
</table>

**Notes:** Income groups are defined by quintiles of the income distribution of single men and women. Group 0 denotes those with zero income (non-participants). Gross and disposable incomes, net taxes and population shares represent the averages computed at the group level. Incomes and taxes are expressed annually in HRK.
Relative Marginal Social Welfare Weights

Marginal Social Welfare Weights Graph