Putting subjective well-being to use for ex-ante policy evaluation

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Motivation

- Most studies on ex-ante policy evaluation have focused on the effects of policy reforms on the income distribution only.
- However, it is increasingly recognised that focusing exclusively on income provides a limited picture of social progress (e.g. Stiglitz, Sen, Fitoussi report).
- Other life dimensions (e.g. health, employment, leisure, housing quality) are also highly valued as determinants of a good life and should be taken into account in policy evaluation.
Aim

- Illustrate how microsimulation can be used for the ex-ante evaluation of policy reforms within a richer evaluative framework.
Plan of the talk

- Introduction
- Measures of individual well-being
- Data and methods
- Results
- Conclusion
Introduction

- Tax-benefit microsimulation models are a powerful tool for ex-ante evaluation of policy reforms.
- Most applications consider the effect of potential reforms on the income distribution only.
- Here, we evaluate the effect of hypothetical reforms on three measures of individual well-being:
  - Disposable income
  - Life satisfaction
  - Equivalent income
- We assess whether the choice of well-being measure has an impact on the evaluation results
Measures of individual well-being: **disposable income**

Disposable income \( (y_i) \) is given by:

\[
y_i = d(\omega_i, z_i, p_y),
\]

- \( d(\cdot) \) represents the tax-benefit function
- \( \omega_i \) is market income
- \( z_i \) is a vector of individual and household characteristics
- \( p_y \) is a set of parameters of the tax-benefit system
Measures of individual well-being: life satisfaction

- Subjective well-being measures, such as life satisfaction have become increasingly popular
- Numerous studies show that income and non-monetary life dimensions are important determinants of life satisfaction
- Life satisfaction ($S_i$) is given by:

$$S_i = S_i(y_i, l_i).$$

- Individuals with identical vectors ($y, l$) may experience different levels of satisfaction for two reasons:
  - Differences in their preferences over life dimensions
  - Differences in their scaling of satisfaction (e.g. aspirations, expectations)
Measures of individual well-being: equivalent income

- Equivalent income is…
  
  “the hypothetical income that, if combined with the best possible value of all non-income dimensions, would place the individual in a situation that s(he) finds equally good as his/her actual situation.”
Measures of individual well-being: equivalent income

Equivalent income can be calculated deriving preference information from subjective well-being regressions (e.g. Decancq et al., 2015).

We estimate a life satisfaction regression:

$$S_i = \alpha + \pi \ln(y_i) + (\beta + \gamma'z_i)'l_i + \delta'z_i + \epsilon_i.$$  

The interaction between $z_i$ and $l_i$ capture differences in preferences.

The direct effect of $z_i$ and the disturbance term $\epsilon_i$ are interpreted as capturing aspirations and expectations.
Measures of individual well-being: equivalent income

Let $\bar{l}$ be the reference values of the non-income dimensions, equivalent income ($y_i^*$) is defined as:

$$S_i = \alpha + \pi \ln(y_i) + (\beta + \gamma'z_i)'l_i + \delta'z_i + \varepsilon_i = \alpha + \pi \ln(y_i^*) + (\beta + \gamma'z_i)'\bar{l} + \delta'z_i + \varepsilon_i$$

which yields

$$y_i^* = y_i \exp \left[ \left( \frac{\beta + \gamma'z_i}{\pi} \right)'(l_i - \bar{l}) \right]$$
Methods and data

- Use EUROMOD version G2.35 to simulate disposable income
  - in the baseline (2013 policies)
  - and in the counterfactual policy reform scenarios.
- Use EU-SILC 2013 for Sweden
  - to estimate life satisfaction and calculate equivalent income
  - additional information from the ad-hoc module on well-being is used in the estimation of life satisfaction
Methods and data

- We consider four life dimensions:
  - Disposable income (log equivalised household disposable income)
  - Self-Assessed Health (1 “poor health to 5 “excellent health”)
  - Being unemployed (binary)
  - Housing quality (from a regression of imputed rent an a series of housing characteristics)

- Life satisfaction estimated by 2SLS to account for potential endogeneity of self-assessed health.

- We use information about self-rated affects (being nervous, feeling down in the dumps, feeling calm and feeling downhearted) as a third best solution to control for individual-specific time-invariant characteristics
  - Because it is not possible to implement panel methods (a single wave)
  - Because of lack of information on personality traits

- Sample: 5,336 observations
Methods and data

- Market income and household characteristics $(\omega_i, z_i)$
- EUROMOD $(p_y)$
- Disposable income $y_i = d(\omega_i, z_i, p_y)$
Methods and data

Market income and household characteristics \((\omega_i, z_i)\)

EUROMOD \((p_y)\)

Other life dimensions
\[ l_{ij} = l(y_i, l_{i(-j)}, z_i, p_{1j}) \]

Disposable income
\[ y_i = d(\omega_i, z_i, p_y) \]

Life Satisfaction
\[ \hat{S}_i = S_i(y_i, l_i) \]

Equivalent income \((\hat{y}_i^*)\)
Methods and data

Market income and household characteristics $(\omega_i, z_i)$

EUROMOD $(p_y^c)$

Other life dimensions
$
\hat{l}_{ij}^c = l(y_i^c, l_i(-j), z_i, p_{lj})
$

Disposable income
$y_i^c = d(\omega_i, z_i, p_y^c)$

Life Satisfaction
$\tilde{S}_i^c = S_i(y_i^c, \hat{l}_{ij}^c)$

Equivalent income $(\tilde{y}_i^{c*})$
Results

- Life satisfaction estimation
- Portrait of the deprived
- Distributional effects of hypothetical reforms
- Well-being inequality
- Social Welfare
## Life satisfaction in Sweden (2SLS)

<table>
<thead>
<tr>
<th></th>
<th>Model 1</th>
<th>Model 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disposable Income (log)</td>
<td>0.142*** (0.044)</td>
<td>0.081** (0.039)</td>
</tr>
<tr>
<td>Self-reported health</td>
<td>0.669*** (0.085)</td>
<td>0.248*** (0.082)</td>
</tr>
<tr>
<td>Unemployed</td>
<td>-0.870*** (0.189)</td>
<td>-0.621*** (0.170)</td>
</tr>
<tr>
<td>Housing (in 1000SEK)</td>
<td>0.129*** (0.048)</td>
<td>0.036 (0.043)</td>
</tr>
<tr>
<td>Health x Male</td>
<td>0.114 (0.085)</td>
<td>0.143* (0.077)</td>
</tr>
<tr>
<td>Health x High. Education</td>
<td>0.018 (0.104)</td>
<td>0.095 (0.093)</td>
</tr>
<tr>
<td>Health x Age over 40</td>
<td>0.145** (0.067)</td>
<td>0.041 (0.059)</td>
</tr>
<tr>
<td>Unempl. x Male</td>
<td>0.337* (0.203)</td>
<td>0.326* (0.182)</td>
</tr>
<tr>
<td>Unempl. x High. Education</td>
<td>-0.504* (0.282)</td>
<td>-0.328 (0.253)</td>
</tr>
<tr>
<td>Unempl. x Age over 40</td>
<td>0.117 (0.202)</td>
<td>0.196 (0.181)</td>
</tr>
<tr>
<td>Housing x Male</td>
<td>0.012 (0.028)</td>
<td>0.021 (0.025)</td>
</tr>
<tr>
<td>Housing x High. Education</td>
<td>-0.037 (0.030)</td>
<td>-0.018 (0.027)</td>
</tr>
<tr>
<td>Housing x Age over 40</td>
<td>-0.112* (0.059)</td>
<td>-0.015 (0.052)</td>
</tr>
<tr>
<td>Down in the dumps</td>
<td>-0.195*** (0.032)</td>
<td></td>
</tr>
<tr>
<td>Calm</td>
<td>0.341*** (0.028)</td>
<td></td>
</tr>
<tr>
<td>Nervous</td>
<td>-0.130*** (0.025)</td>
<td></td>
</tr>
<tr>
<td>Downhearted</td>
<td>-0.345*** (0.029)</td>
<td></td>
</tr>
<tr>
<td>cons</td>
<td>4.153*** (0.572)</td>
<td>6.808*** (0.566)</td>
</tr>
<tr>
<td>$N$</td>
<td>5336</td>
<td>5336</td>
</tr>
<tr>
<td>$R^2$</td>
<td>0.203</td>
<td>0.361</td>
</tr>
</tbody>
</table>

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$
### Health regression (first stage of 2SLS)

<table>
<thead>
<tr>
<th></th>
<th>Model 1</th>
<th>Model 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chronic Illness</td>
<td>-0.360*** (0.021)</td>
<td>-0.327*** (0.019)</td>
</tr>
<tr>
<td>Limitation in activities</td>
<td>-0.523*** (0.018)</td>
<td>-0.448*** (0.017)</td>
</tr>
<tr>
<td>Unmet need for treatment</td>
<td>-0.243*** (0.028)</td>
<td>-0.163*** (0.027)</td>
</tr>
<tr>
<td>Unmet need for dental treatment</td>
<td>-0.251*** (0.033)</td>
<td>-0.164*** (0.031)</td>
</tr>
<tr>
<td>Disposable Income (log)</td>
<td>0.101*** (0.020)</td>
<td>0.064*** (0.019)</td>
</tr>
<tr>
<td>Unemployed</td>
<td>-0.162*** (0.048)</td>
<td>-0.032 (0.046)</td>
</tr>
<tr>
<td>Housing (in 1000SEK)</td>
<td>0.019** (0.007)</td>
<td>0.010 (0.007)</td>
</tr>
<tr>
<td>Down in the dumps</td>
<td></td>
<td>-0.099*** (0.015)</td>
</tr>
<tr>
<td>Calm</td>
<td></td>
<td>0.098*** (0.014)</td>
</tr>
<tr>
<td>Nervous</td>
<td></td>
<td>-0.065*** (0.012)</td>
</tr>
<tr>
<td>Downhearted</td>
<td></td>
<td>-0.075*** (0.014)</td>
</tr>
<tr>
<td>_cons</td>
<td>4.130*** (0.193)</td>
<td>4.506*** (0.199)</td>
</tr>
<tr>
<td>_N</td>
<td>5336</td>
<td>5336</td>
</tr>
<tr>
<td>_R²</td>
<td>0.353</td>
<td>0.419</td>
</tr>
</tbody>
</table>

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$
Portrait of the deprived

- We assess whether our three well-being measures identify the same population as the most deprived.
- We consider as satisfaction poor 383 individuals reporting life satisfaction equal to 5 or less in the 0 to 10 scale.
- We select the 383 individuals with the lowest disposable income and equivalent income.
- Is there an overlap? What are the characteristics of the most deprived?
## Portrait of the deprived

<table>
<thead>
<tr>
<th></th>
<th>Income</th>
<th>Satisfaction</th>
<th>Eq. Income</th>
</tr>
</thead>
<tbody>
<tr>
<td>Income poor</td>
<td>1.00</td>
<td>.</td>
<td>.</td>
</tr>
<tr>
<td>Satisfaction poor</td>
<td>0.16</td>
<td>1.00</td>
<td>.</td>
</tr>
<tr>
<td>Eq. income poor</td>
<td>0.18</td>
<td>0.32</td>
<td>1.00</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Income (SEK/month)</th>
<th>Satisfaction</th>
<th>Eq. Income</th>
</tr>
</thead>
<tbody>
<tr>
<td>Income</td>
<td>7,692</td>
<td>16,396</td>
<td>16,336</td>
</tr>
<tr>
<td>Satisfaction</td>
<td>7.55</td>
<td>4.25</td>
<td>6.59</td>
</tr>
<tr>
<td>Health</td>
<td>4.06</td>
<td>3.26</td>
<td>2.66</td>
</tr>
<tr>
<td>Unemployment</td>
<td>0.16</td>
<td>0.13</td>
<td>0.23</td>
</tr>
<tr>
<td>Housing (1,000 SEK)</td>
<td>4.17</td>
<td>4.61</td>
<td>4.17</td>
</tr>
</tbody>
</table>
Four counterfactual policy reforms are simulated:

- **A:** Additional Social Assistance payment
  Additional 4,000 SEK per month for recipients of social assistance

- **B:** Increase of Child Benefit Amount
  Increase of basic amount of child benefit from 1,050 SEK to 2,000 SEK per month for children aged 0-15.

- **C:** Additional Payment of Housing Allowance for Pensioners
  Additional 2,000 SEK per month for recipients of housing allowance for pensioners

- **D:** Improvement in Housing quality
  Improvement of ½ standard deviation in housing quality for the 4% of individuals with the lowest housing quality

All reforms are simulated under budget neutrality by increasing the top tax rate of government income tax.
Evaluation of counterfactual policy scenarios

- For life satisfaction and equivalent income two sets of results can be produced:
  - Effect of policy reforms without indirect effects of income and housing quality on health (S1 and EI1)
  - Effect of policy reforms accounting for indirect effects of income and housing quality on health (S2 and EI2)

- Here, we focus on results S2 and EI2.
  - The overall results and policy ranking is consistent with or without accounting for indirect effects of income and housing quality on health
  - The effect of policy reforms is in general larger under S2 and EI2
Distributional effects of counterfactual scenarios: disposable income

Percentage change in household disposable income by income decile group
Distributional effects of counterfactual scenarios: life satisfaction

Percentage change in life satisfaction by satisfaction decile group

![Graph showing life satisfaction (S2) by decile groups.](#)
Distributional effects of counterfactual scenarios: equivalent income

Percentage change in equivalent income by equivalent income decile group

Equivalent Income (EI2)

decile groups

A B C D

-5 0 5 10 15
Well-being inequality

- We consider the effects of the reforms on inequality for each of our well-being concepts
- Results are provided for:
  - Gini coefficient (generalised Gini with $\rho = 2$)
  - Generalised Gini with $\rho = 5$, which gives more weight to individuals at the bottom of the distribution.
Well-being inequality: disposable income

Percentage change in income inequality (generalised Gini)
Well-being inequality: life satisfaction

Percentage change in satisfaction inequality (generalised Gini)
Well-being inequality: equivalent income income

Percentage change in equivalent income inequality (generalised Gini)
Social Welfare

- Ultimately, we are interested in the ranking of policies in terms of social welfare
- We calculate social welfare as:

\[ SW_\rho = A(1 - I_\rho) \]

- \( A \) is average well-being
- \( I_\rho \) is the Generalised Gini for inequality aversion \( \rho \)
- For \( \rho = 0 \) we get \( I_\rho = 0 \), hence social welfare reduces to average well-being, \( A \).
### Social Welfare

#### Ranking of policies according to Social Welfare

<table>
<thead>
<tr>
<th>disposable income</th>
<th>life satisfaction (S2)</th>
<th>equivalent income (EI2)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>( \rho = 0 )</td>
<td>( \rho = 2 )</td>
</tr>
<tr>
<td>C</td>
<td>C</td>
<td>A</td>
</tr>
<tr>
<td>A</td>
<td>A</td>
<td>C</td>
</tr>
<tr>
<td>base</td>
<td>B</td>
<td>B</td>
</tr>
<tr>
<td>B</td>
<td>base</td>
<td>base</td>
</tr>
<tr>
<td>D</td>
<td>D</td>
<td>D</td>
</tr>
</tbody>
</table>
Conclusion

- We illustrate a simple way to perform ex-ante policy evaluation on well-being measures which account for other life dimensions than income
  - Interesting for evaluation of non-monetary policy reforms
- Analysis beyond disposable income and subjective well-being is important
  - The equivalent income poor are more deprived in some dimensions than the income and satisfaction poor
- Hypothetical reform simulations confirm that the choice of well-being measure matters for the welfare ranking of policies
Acknowledgements and further information

- The process of extending and updating EUROMOD is financially supported by the Directorate General for Employment, Social Affairs and Inclusion (DG-EMPL) of the European Commission.

- EUROMOD is made generally available for academic and not-for-profit use. Contact euromod@essex.ac.uk

- For more information see www.iser.essex.ac.uk/euromod

Thank you!
Measures of individual well-being: equivalent income

Figure 1: Equivalent income