The benefits of linking CGE and Microsimulation Models
Evidence from a Flat Tax analysis

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IAB, Nürnberg, 15/12/2008
1. Background and motivation
2. MSM vs. CGE
3. FiFoSiM
4. Flat Tax example
5. Conclusion
1. Introduction
"A notable and troubling feature of discussion of the flat tax is that it has been marked more by rhetoric and assertion than by analysis and evidence."

(Keen et al. (2008))
Mircrosimulation models (MSM) and Computable General Equilibrium models (CGE) have both been widely used in economic research and policy analysis.

Combining these two model types allows the utilisation of the advantages of both types.

The aim of this paper is twofold:

- Describe possibilities to link both models types
- Show the benefits of linking using a Flat Tax example for Germany.
Flat rate tax systems recently successful: 24 countries in 2008 (half in Eastern Europe, only Iceland (2007) in Western Europe)

Potential benefits:
- Enhance labour supply incentives
- Improve tax compliance and reduce tax evasion
- Simplify system decrease the costs of administration and compliance

Main disadvantage: Increasing inequality → less support from low & middle income class?
Introduction

Evidence: Hypothetical reforms

- **MSM:**
  - Flat rate tax reforms cannot avoid the fundamental equity efficiency trade-off

- **CGE:**
  - further efficiency gains when taking general equilibrium effects into account

**Linked MSM-CGE model:** Aaberge et al. (2007):
GE effects of flat rate tax are larger than pure LS reactions
2. MSM vs. CGE
See Stefan’s presentation
3. FiFoSiM
FiFoSiM Database and Model

- Behavioural tax benefit microsimulation model for Germany
- FiFoSiM uses two micro data sets:
  - FAST2001: micro data from the federal income tax statistics containing income tax data of nearly 3 million households.
  - GSOEP: household panel survey.

- Discrete choice household labour supply model: estimation of extensive and intensive labour supply elasticities.
- Simple CGE module
FiFoSiM

Basic Setup

Microsimulation

GSOEP  Imputation of missing values  FAST
Enhanced samples of households: GSOEP* and FAST*

Simulation of households net incomes

(discrete) household labour supply model: econometric estimation of labor supply elasticities

Fiscal effects  Distributional effects  Labour supply effects

CGE

SAM

Consistency

Government

Households

Firms

Rest of the World

Employment effects  Growth effects
Bottom-up: representative household in CGE module (income, labour supply, tax payments) is calibrated based on results from MSM.

Top-down: changes of wage or price level from CGE model used MSM for the calculation of real disposable incomes and the labour supply estimation.

Top-down bottom-up: start with MSM, recompute both models until they converge, i.e. changes to previous equilibrium are "small".

Software:

- MSM: Stata
- CGE: GAMS / MPSGE
- Link: manual execution of bottom-up and top-down
4. Flat Tax Application
Flat rate tax: indirect progressive tax schedule with a basic tax allowance and a uniform marginal tax rate.


Reform proposal by Joachim Mitschke (2004) for Germany:

- Combination of flat rate tax on earned income with a S-base cash flow tax on business income.
- Introductory phase (flat rate personal income tax) and final phase (flat rate personal income tax + cash flow corporate tax).
4 steps:

1. MSM: fiscal effects without taking into account behavioural reactions (first round effects).
2. MSM: labour supply responses (second round).
3. CGE: labour demand (third round).
4. Linked MSM-CGE: computation of the overall employment and GDP effects.
## Flat Tax

### Results I: Summary

<table>
<thead>
<tr>
<th>Model</th>
<th>Step</th>
<th>Effect</th>
<th>PIT</th>
<th>PIT + CIT</th>
</tr>
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<tbody>
<tr>
<td>MSM</td>
<td>1</td>
<td>Tax revenue</td>
<td>-2 billion €</td>
<td>-13 billion €</td>
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<tr>
<td>MSM</td>
<td>2</td>
<td>Labour supply</td>
<td>+103,000</td>
<td>+251,000</td>
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<td>CGE</td>
<td>3</td>
<td>Labour demand</td>
<td>+370,000</td>
<td>+540,000</td>
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<td>Link</td>
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<td>Tax revenue after adj.</td>
<td>+3 billion €</td>
<td>-6 billion €</td>
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<td>Employment</td>
<td>+337,000</td>
<td>+471,000</td>
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<td>Link</td>
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<td>Unemployment</td>
<td>-0.9 p.p.</td>
<td>-1.3 p.p.</td>
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<td>Link</td>
<td>4</td>
<td>Welfare</td>
<td>+1.3%</td>
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<tr>
<td>Link</td>
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<td>GDP</td>
<td>+1.1%</td>
<td>+1.7%</td>
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<tr>
<td></td>
<td>Coup m</td>
<td>Coup f</td>
<td>Sing m</td>
<td>Sing f</td>
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<td>------</td>
<td>--------</td>
<td>--------</td>
<td>--------</td>
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<td>LS</td>
<td>PIT</td>
<td>27,208</td>
<td>39,607</td>
<td>1,950</td>
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<td>PIT+CIT</td>
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<td>Emp.</td>
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<td>118,753</td>
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<td>96,094</td>
<td>148,075</td>
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<td>Decile</td>
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<td>DPI with adj.</td>
<td>Equivalent variation</td>
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<td>PIT+CIT</td>
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<td>9</td>
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<td>1.88</td>
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<td>10</td>
<td>2.70</td>
<td>6.54</td>
<td>2.38</td>
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<td>Gini / Sum</td>
<td>1.51</td>
<td>4.90</td>
<td>-2.38</td>
<td>1.73</td>
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5. Conclusion
The combination of CGE and MSM models allows the utilisation of the advantages of both types of models.

Applying the linked model to a flat tax proposal:

- Overall employment effects are larger than the labour supply reactions (because of reduced costs of labour and capital resulting in increasing labour and investment demand)
- ⇒ it is important to take these general equilibrium effects into account.
- Personal income flat tax can overcome the familiar equity efficiency trade-off, but only in the long-run.
- The adverse immediate distributonal effects still dominate in the short-run.
• Effects on human capital accumulation?
• Effects on tax compliance (Russia...)?
• Indirect taxes?
• Dynamic effects?
- Complexity?
- Manual vs. automatic linkage?
- Model horizon of static model: Long-run vs short-run?
- Alternative approaches to incorporate GE / labour demand effects into micro analysis?
Thank you for your attention!

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