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

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1. Background and motivation
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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))

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- 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.

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- 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 $\rightarrow$ less support from low & middle income class?

- MSM:
  - ▶ Aaberge et al. (2000), Caminada and Goudswaard (2001), González-Torrabadella and Pijoan-Mas (2006), Decoster and Orsini (2007), Fuest/Peichl/Schaefer (2008), Paulus and Peichl (2008)
  - ▶ ⟹ Flat rate tax reforms cannot avoid the fundamental equity efficiency trade-off

- CGE:
  - ▶ Browning and Browning (1985), Stokey and Rebelo (1995), Gale et al. (1996), Ho and Stiroh (1998), Dunbar and Pogue (1998), Ventura (1999), Altig et al. (2001), Heer and Trede (2003), Cassou and Lansing, Cajner et al. (2006), or Jacobs et al. (2007)
  - ▶ ⟹ 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

- 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

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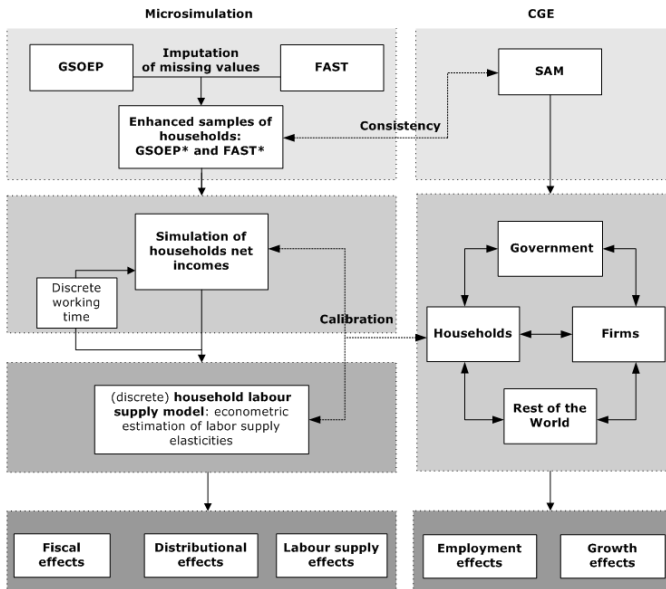
- Bottom-up: representative household in CGE module (income, labour supply, tax payments) is calibrated based on results from MSM
- Top-down: changes of wage or price level from CGE model used MSM for the calculation of real disposable incomes and the labour supply estimation.
- Top-down bottom-up: start with MSM, recompute both models until they conerge, 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 Tax   Flat Rate Tax vs. "Flat Tax"

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- Flat rate tax: indirect progressive tax schedule with a basic tax allowance and a uniform marginal tax rate.
- Famous "Flat Tax" of Hall/Rabushka (1983, 1985): combination of cash flow tax on business incomes with the same single marginal tax rate on labour income (R-Base tax).
- 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

Model	Step	Effect	PIT	PIT + CIT
MSM	1	Tax revenue	-2 billion €	-13 billion €
	2	Labour supply	+103,000	+251,000
CGE	3	Labour demand	+370,000	+540,000
Link	4	Tax revenue after adj.	+3 billion €	-6 billion €
	4	Employment	+337,000	+471,000
	4	Unemployment	-0.9 p.p.	- 1.3 p.p.
	4	Welfare	+1.3%	+2.5%
	4	GDP	+1.1%	+1.7%

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		Coup m	Coup f	Sing m	Sing f	Total
LS	PIT	27,208	39,607	1,950	34,706	103,471
	PIT+CIT	46,681	73,649	55,957	74,921	251,208
Emp.	PIT	79,754	118,753	30,238	108,900	337,645
	PIT+CIT	96,094	148,075	82,558	144,689	471,416

Decile	DPI without adj.		DPI with adj.		Equivalent variation	
	PIT	PIT+CIT	PIT	PIT+CIT	PIT	PIT+CIT
1	0.69	0.88	79.48	79.73	65	45
2	0.01	-0.33	12.42	12.05	-28	-163
3	-0.22	-1.82	6.20	4.35	-67	-454
4	-0.64	-2.53	3.16	1.41	90	-387
5	-1.33	-2.63	0.61	-0.59	282	-126
6	-1.92	-2.35	-0.55	-0.63	291	770
7	-2.30	-1.49	-2.13	-0.89	-516	596
8	-2.42	0.03	-3.19	-0.23	-251	3,323
9	-1.83	1.45	-2.63	1.88	-557	4,802
10	2.70	6.54	2.38	7.24	6,906	15,559
Gini / Sum	1.51	4.90	-2.38	1.73	6,215	23,965

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)
  - ▶ $\implies$ 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 distributional 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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