# Modelling Involuntary Unemployment in a Micro-Macro Model

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# Overview

Setting our respective modelling approach in perspective

- Micro-macro approaches in other fields of research:
  - What can we learn from them?
  - Are there analogous problems?
- Other linkage options
  - What would we lose?
  - Do we really need as complicated a model as we have?

# Micro-Part of PACE-L: Labour Supply MS module

- Households choose between a (relatively small) number of different discrete labour supply options.
- Quadratic utility function with leisure and expected household income (involuntary unemployment).
- Error term IID extreme value distributed → explicit expression for the probability of choosing a certain working time option → logit estimation.

$$p(U(k) \geq U(m), \forall m) = \frac{\exp(u(k))}{\sum_{m} \exp(u(m))}$$

# Micro-Part of PACE-L: Labour Supply MS module

- Estimation of utility function parameters using SOEP data.
- Labour supply simulation based on conditional probabilities (Duncan and Weeks).
- Interpretation of option-specific utility as expected utility from different labour market states: employed (e) and unemployed (u):

$$u(k) = (1 - p_u)u(c_{k,e}, l_k) + p_u u(c_{k,u}, l_k)$$

# Macro-Part of PACE-L: Wage Formation

- Sectoral wage bargaining (Nash bargaining) for low and medium skilled workers.
- Result: involuntary unemployment.
- Wage bargaining is separate for these two skill groups
- Insider model (labour demand elasticity does not appear in the bargaining FOC)
- Sectoral wage differentails are compensated by hypothetical sectoral differences in unemployment („dual labour markets“ approach)

# Linkage of the Two Modules

- Top-down:
  - Skill-specific wages
  - Skill-specific unemployment rates
  - Public budget surplus or deficit (depends on recycling)
- Bottom-up:
  - Skill-specific labour supply
  - Average income of the employed and the unemployed
  - Average marginal tax rate
  - Disposable income as percentage of gross income

# Micro-Macro Iteration

- Implement policy measures in microsimulation module, calculate labour supply
- Transfer bottom-up variables to CGE module
- Solve CGE module with fixed labour supply
- Transfer top-down variables to MS module
- Calculate household-type-specific unemployment probabilities
- Back to step one: calculate labour supply

# Remaining inconsistency between estimation and simulation

- In the simulation we assume:
  - Household choose labour-supply option according to expected disposable income (weighted average of employment and unemployment).
  - Zero-hours option is only voluntary unemployment (non-participation), involuntarily unemployed persons do supply positive amounts of labour.
- The estimation is based on the assumptions:
  - Household choose labour-supply option according to disposable income in the case of employment.
  - All persons who work zero hours choose the zero-hours option.

# Remaining inconsistency between estimation and simulation

- Alternative estimation method: double hurdle model:
  - Examples are Blundell, Ham and Meghir (1987), Duncan and McCrae (1999), Bargain, Caliendo, Haan and Orsini (2005).
  - Relies on information about reported desired hours of work.
  - Possible states increase from n (simple model) to 2n - 1 (double hurdle model).

$$p(k,e) = \frac{\exp(u(k))}{\sum_{m} \exp(u(m))}(1 - p_u)$$

# Remaining inconsistency between estimation and simulation

- Usual approach in double hurdle model:
  - Choice between hours options depends only on disposable income in the case of employment.
  - Estimation of unemployment probabilities is separable.
- Alternative approach (in line with model):
  - Interaction of labour supply and unemployment:

$$p(k) = \frac{\exp((1-p_u)u(k,e) + p_u u(k,u))}{\exp(u(0)) + \sum_{m \neq 0} \exp((1-p_u)u(m,e) + p_u u(m,u))}$$

  - Is this numerically feasible?