soepy toy model @ Hackathon

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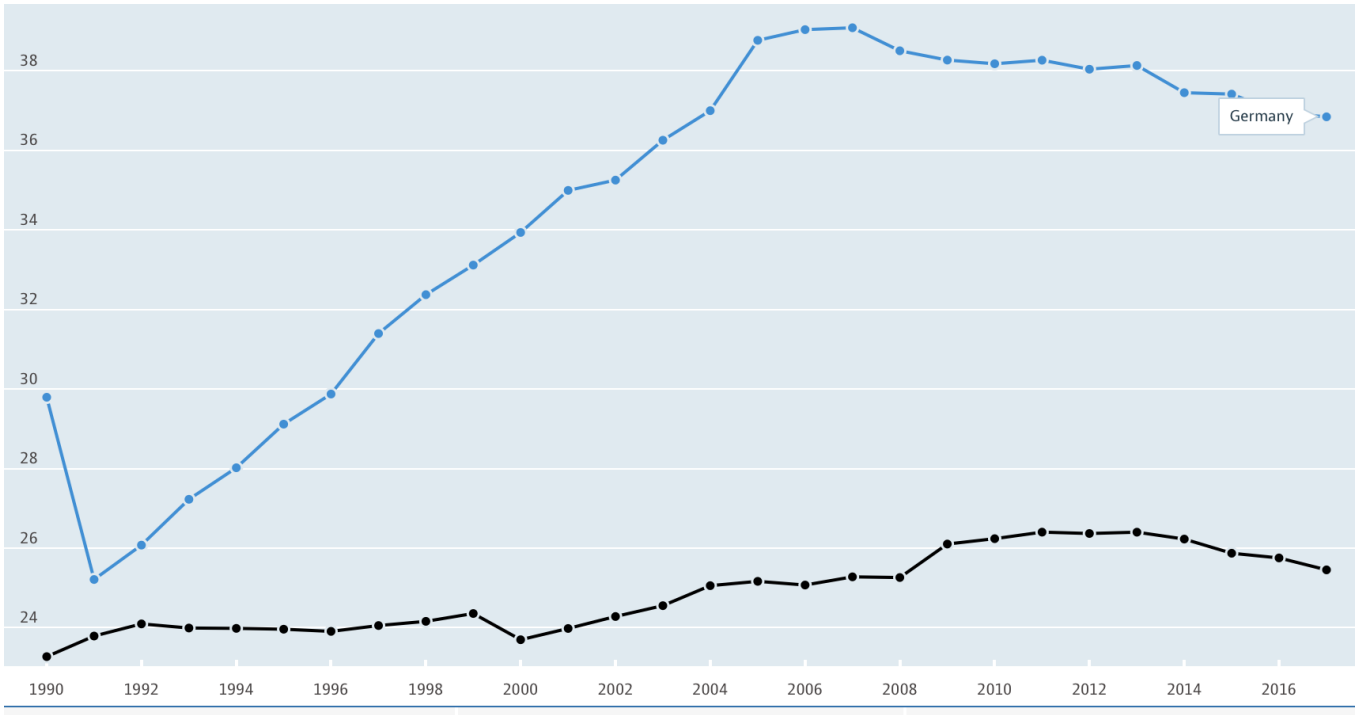
Outline

Research question

- Investigate:
  - part-time penalty based on data for Germany,
  - the role of biased beliefs regarding returns to experience in the choice between part-time and full-time employment.
- Develop a dynamic model of female earnings and labor supply to apply to SOEP-Core and SOEP-IS data.
- Use the model in Blundell et. al. (2016) as a benchmark and introduce biased beliefs and potential further extensions.

Motivation

From 1991 until 2017 the percentage of part-time employed in Germany has risen from 11.8% to 22.2% in total, and from 25.2% to 36.9% for women.



OECD: Part-time employment rate indicator; female; % of employment

Motivation II

- Recent economic literature has highlighted the 'part-time penalty' phenomenon: one important channel through which part-time employment contributes to worse labor market outcomes compared to full-time employment.
- Terminology: workers who are employed part-time experience only moderate increases in hourly wages over the life cycle in comparison to full-time workers.
- Paul (2016), Blundell at. al. (2016), and Adda et. al. (2017):
  - the effects of part-time employment on wages unfold over time;
  - channel: almost no experience accumulation in part-time employment

Method choice

- In a reduced form analysis, Paul (2016) finds no difference in hourly wage rates for part-time and full-time employed women in Germany once previous experience in part-time and full-time is taken into account.
- Blundell at. al. (2016) and Adda et. al. (2017) find that wage paths diverge over the life-cycle based on estimation of dynamic structural models.
- A quasi-experiment would require an exogenous shock to force two otherwise perfectly identical individuals to take and follow different employment history paths for a number of consecutive periods.
- Dynamic structural model - make employment choices endogenous and model the choice process explicitly.
- Disadvantage - assumptions on primitives
- Advantage - construct life-cycle employment paths and wage profiles, perform welfare calculations and counterfactual simulations

Data

- SOEP panel data:
  - an unbalanced panel of women present in the SOEP from 1991 onwards
  - data on hourly wages, occupation, experience, education, family characteristics, etc.
  - 1st version of a minimalistic dataset available for estimation trials
- Elicited beliefs data:
  - data from the SOEP Innovation sample survey
  - SOEP-IS asks a fraction of SOEP respondents additional survey questions
  - relevant questions for our project concern women's expected earnings in 1,2, and 10 years for full-time and part-time jobs

Model Base

In developing a structural model to apply to the data and answer our research question, we build on Blundell et. al. (2016).

The model in a nutshell:

- dynamic life-cycle model of consumption and labor supply choices
- partial equilibrium in finite discrete time with both discrete (labor supply) and continuous (savings) choice variables
- unobserved heterogeneity modelled as types in utility cost of part-time and full-time work
- tax and welfare system, labor market frictions and credit constraint
- exogenous components: childbirth, marriage, divorce, male wage process

Extensions

Beliefs in the female wage equation:

- The model assumes that the individual wages are governed by a rich wage process specification centred around distinguishing between experience accumulated in part-time and full-time employment.
- Introduce subjective beliefs about wage increases given periods of full-time and part-time employment.
- Estimate an additional parameter informing about wether or not agents have biased beliefs about the returns to experience in part-time spells.

Discrete-continuous choice set:

- Implement endogenous grid method for discrete-continuous dynamic models (Ishakov et. al., 2017)

Toy model setup

- The model spans 10 periods.
- In each period individuals choose between three mutually exclusive occupational alternatives: non-employment (N), part-time (P), or full-time (F) work.
- Level of education is an initial condition.
- Abstract from: types, tax function, labor market frictions, exogenous processes, etc.

Structural equations: Utility function

Individuals' flow utility:

$$u(c_t, l_t; \theta) = \frac{c_t^{\mu}}{\mu} exp \begin{cases} 0, & \text{if } l_t = O, \\ \theta_P, & \text{if } l_t = P, \\ \theta_F, & \text{if } l_t = F, \end{cases}$$

with consumption c_t, hours l_t, CRRA coefficient μ, and labor disutility θ_l.

Budget constraint in the toy model is given by: $c_t = h_t w_t$.

Structural equations: female wage process

The wage equation is given by:

$$
\begin{aligned}
ln\, w_t^m &= \gamma_{s,0} + \gamma_{s,1} ln(e_t + 1) + \xi_t, \\
ln\, w_t &= ln\, w_t^m - \xi_t, \\
e_t &= (e_P * g_{sP} + e_F)(1 - \delta_s),
\end{aligned}
$$

where e_P and e_F measure the total years in part-time and full-time experience accumulated up to period t.

Specification in Blundell (2016) is richer:

- e_t in depends on the entire employment history (choice sequence matters!) which requires discretisation of experience.
- additional AR (1) wage shock process whose initial values depend on the type.

Soepy current capabilities

Simulation:

- Simulate a data frame according to the toy model specification presented above.
- Core functions are very similar to respy's counterparts: creation of state space arguments, backward induction, simulation.

Estimation:

- Run a SMM estimation procedure based on moments from the simulated data set using Py-BOBYQA.

Have a great day!

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