Structural Econometrics in Labor and IO
Job search - Problem Set 2

June 30, 2022

1. **Please read *Burdett & Mortensen (1998)*.**
2. Please attempt all sections of the problem set. Selectively consult Train (2009) chapter 9 on inverse probability sampling and van den Berg & Ridder (1998) on estimation (the appendix is helpful).
3. Please send your answers complete with **carefully documented code** to LHaywood@diw.de **by Wednesday 6th July 2pm** at the latest. Note: Don't worry if you encounter difficulties, try to explain exactly what is difficult and move on to next question.
4. Next class Thursday, 7th July at 2.15pm in Karl-Popper-Room (2.3.020)

A simplified Burdett-Mortensen Model

Consider the following labour market: Workers are equally productive, firms post job offers with fixed wages and the aggregate offer distribution is given by $F(w)$.
Job offers arrive at Poisson rates λ_0 and λ_1 for unemployed and employed workers. Search is random. Jobs end with some exogenous rate δ. Unemployed workers engage in home production with flow value b. Workers maximize lifetime income and discount the future with rate $r = 0.005$.

1 Theory

1. What is the lowest wage in the market?
2. Briefly describe the strategies of employed and unemployed workers.

3. How long do people stay in one job on average?

4. What is the probability of observing an employed worker earning wage w'?

5. What would happen if firms could adapt their wage (counteroffer) when workers receive an offer from another firm?

2 Simulation

Assume the labour market follows the model described above with $\delta = 0.1$, $\lambda_0 = 2$, $\lambda_1 = 1$, $\mu = 7$, $\sigma = 2$.
Create a dataset with 10,000 spells. For every spell:

1. Split your sample into spells of employment and unemployment. What is the unemployment rate?

2. Using inverse probability sampling, simulate wages for every employment spell. Plot these wages and compare to the distribution of wage offers.

3. Using inverse probability sampling, simulate (completed) *job* tenures for every employment spell.

3 Estimation

Assume you observe labour market data with the following information for every person in the sample (every person observed once): labour market status, duration in labour market state, wage if employed, and two dummies for whether the spells ends in a job-to-job transition or job-to-unemployment transition. Labour market status may be unemployed or employed ($emp \in [0, 1]$), the duration of the spell is given by dur. The destination after the spell is given by dummies for transition to unemployment ($j2u = 1$) and job-to-job transition ($j2j = 1$).

1. Provide expressions for the following likelihood contributions:

   - an unemployment spell of duration t'
   - a job spell of duration t' with wage w' that ends in unemployment

- a job spell of duration t' with wage w' that ends in a job-to-job transition

2. How would you go about estimation?

3. What advantage in estimation may you have if could also observe *previous* labour market status and wage?

References

Gerard van den Berg & Geert Ridder (1998), "An Empirical Equilibrium Search Model of the Labor Market", *Econometrica*, Vol. 66, No. 5, pp. 1183-1221

Kenneth Burdett & Dale T. Mortensen (1998), "Wage Differentials, Employer Size, and Unemployment", *International Economic Review*, Vol. 39, No. 2, pp. 257-273

Kenneth Train (2009), "Chapter 9 - Drawing from Densities" *in* "Discrete Choice Methods with Simulation", Cambridge University Press & https://eml.berkeley.edu/books/choice2.html