Structural Econometrics in Labor and IO
Job Search - Problem Set 1

1. **Please read *McCall (1970)* and *Rogerson, Shimer & Wright (2005)***.
   Please **attempt the problem sets**: Try to formalize your ideas in problem set section (1). Use Matlab for problem set section (2), please **document your code very well** (!) and send me your answers **with code** to LHaywood@diw.de **by Wednesday 29th June 2pm**.
   Note: If you encounter difficulties, try to clarify what is difficult and move on. We will discuss in class. If you have questions, email me.

2. We will meet on **Thursday 30th June at 2pm** in **Anna J. Schwarz room** on the 5th floor (5.2.010)

Model

Assume that in any discrete time period, unemployed individuals receive a job offer w with probability λ_0 from an offer distribution $F(w)$. When they accept the offer, they receive wage w. If they reject, they receive constant unemployment benefits b. Employed workers may be laid off exogenously with probability δ, then they become unemployed. Individuals discount the future at rate $\beta \equiv \frac{1}{1+r}$ and care only about current and future earnings.

1 Value functions & Strategies

Let $V(w)$ denote the present value of holding a job of wage w, and B denote the present value of unemployment.

1. What are the values of unemployment U and employment $W(w')$ in this model?

2. Explain why the reservation wage satisfies $W(w^r) = U$.

3. Show that the reservation wage is defined by:

$$[1 - \beta(1 - \delta)](w^R - b) = \beta\lambda \int_{w^R}^{\infty} (w - w^R) dF(w) \tag{1}$$

4. When is it not a good idea to adopt a reservation wage strategy?

5. A mass layoff occurs somewhere. In which period after becoming unemployed do the maximum number of layed-off workers find a new job?

6. What defines the "steady state equilibrium" of this model (no more than three sentences or equations).

2 Simulation

Assume workers find on average one job offer per month. Assume the (latent) distribution of offered monthly wages is given by $\log(w) \sim \mathcal{N}(\mu, \sigma)$ where $\mu = 7$ and $\sigma = 1$. If they do not find a job offer, they receive unemployment benefit of 100 euros. Assume they lose their job exogenously every 30 years. Simulate labor market spells for a cross-section of 1000 individuals. Assume people discount the future using monthly discount rate $r = 0.005$.

1. Numerically solve for the reservation wage (w^R).

2. Present an alternative, simple, way of approximating the integral.

3. Normalize the population measure to 1. Let u and e be the unemployment and employment rate ($u + e = 1$). How many individuals are unemployed?

4. Simulate the duration in employment of a cohort of workers employed at the same time. Show the histogram of the durations. Show the histogram. (Consider Train (2009) and use your knowledge of the density to simulate effectively.)

5. Using your knowledge of the wage distribution, simulate the wages employed workers receive. Show the histogram. Calculate the mean wage of employed workers.

6. Interpret how your results change if people lose their job every 10 years.

References

John McCall (1970) "The Economics of Information and Job Search, *Quarterly Journal of Economics*, 84, p.113-126

Richard Rogerson, Robert Shimer & Randall Wright (2005), "Search-Theoretic Models of the Labor Market: A Survey", *Journal of Economic Literature* 43, 115-168.

Kenneth Train (2009), "Chapter 9 - Drawing from Densities" *in* "Discrete Choice Methods with Simulation", Cambridge University Press

Christopher Flinn & James Heckmann (1982) "New Methods for Analyzing Structural Models of Labor Force Dynamics", *Journal of Econometrics* 18, 115-168.