Macroeconomics 2-Assignment 9

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December 16, 2020

Lise (2012)'s paper is entitled "On-the-Job Search and Precautionary Savings" and was published in the Review of Economic Journal in 2012.

In that paper, Lise develops and then estimate a model of on-the-job search. She assumes workers to be risk averse and to select search effort. In addition, they can borrow or save exploiting a single risk free asset.

Workers' savings behavior depends intuitively on the rate at which offers got jobs destruction's rate as well as the current rank occupied by the worker in the wage distribution. In fact, considering two workers with same preferences and opportunities, their history and current position in the wage distribution will dictate their difference in savings behavior through the dynamic of the 'wage ladder'.

Furthermore, in low paying jobs, expectation of wage growth regulates behavior of workers while the possibility of job loss controls workers' behavior when the later are closer to the top of the distribution.

Assume the workers' planning horizon to be infinite and let streams of consumption and search effort be ordered according to:

$$\mathbb{E}_0 \int_0^\infty \exp(-\rho t)\big(u(c_t) - e(s_t)\big) \tag{0.1}$$

Where:

- ρ is the subjective rate of time preference
- c_t is the instantaneous consumption flow at time t

- s_t is the search effort at time t
- Period utility has the Constant Relative Risk Aversion (CRRA) form.
- $u(c_t) = \frac{c_t^{1-\gamma}-1}{1-\gamma}$ if $\gamma > 0$ and $u(c_t) = \log(c_t)$ if $\gamma = 1$.
- γ is the coefficient of relative risk aversion.
- Search costs have the power form: $e(s_t) = \frac{\mu s_t^{\eta}}{\eta}$
- $\eta > 1$ is the elasticity of search costs with respect to effort.
- $\mu > 0$ is a scaling parameter.
- Workers are impatient in that the subjective rate of time preference exceeds the risk free rate, $\rho > r$.

The workers' planning horizon can be rewritten in discrete form as:

$$\mathbb{E}_0 \sum_{t=0}^{\infty} \beta^t \big(u(c_t) - e(s_t)\big) \tag{0.2}$$

With $u(c_t)$ and $e(s_t)$ defined as above.

Definition 1. *A stationary RCE is a list of policy functions for the unemployed* $\big\{S^*(h), w^R(h)\big\}$, *values functions for the employed and unemployed* $\{W(w,h), U(h)\}$, *a stationary distribution for employed and unemployed agents* $\big\{G^U, G^W\big\}$, *and a tax* $\{\tau\}$*such that:*

1. *Given taxes and the value function of the employed, policy functions are optimal for the unemployed, and the value function satisfies the Bellman equation.*
2. *Given taxes and the value function of the unemployed, the value function of the employed satisfies the Bellman equation.*
3. *Given policy functions the distributions are stationary.*
4. *Given distributions tax rate balances the government budget.*

Solution algorithm

1. Discretize wages (or discretize the offer distribution F)
2. Choose a tax rate
3. Solve for the value functions using VFI. In each VFI step solve the policy functions of the unemployed.
4. Use histogram method to update the distributions. Two options:
    - List all states in a vector.

      $$\left\{(U,\underline{h}),\ldots,(U,\bar{h}),(W,w_1,\bar{h}),\ldots,(W,w_N,\underline{h}),\ldots,(W,w_1,\bar{h}),\ldots,(W,w_N,\bar{h})\right\}$$

    - Use loops to update
5. Compute the government deficit
6. Update tax rate using golden-section or any root-finding