14.462
Problem Set 4

Problem 1

Consider the basic search model. Assume that an unemployed worker of identity z searches for a job with intensity $i_z \geq 0$ which entails a linear effort cost $\frac{1}{\gamma} i_z^{1+\gamma}$ for $\gamma \in (0,1)$. Let i represent the mean search intensity of all unemployed workers. The matching function is $m(iu, v) = \sqrt{iuv}$ and the probability of a given unemployed worker z acquiring a job is $\frac{i_z}{i} \frac{m(iu,v)}{u}$, so that the benefit of individual search intensity must be compared to aggregate search intensity. Consider a symmetric steady state equilibrium in which all unemployed workers search with the same intensity $i_z = i$. .

1. Characterize the level of search effort in steady state.

2. What is the effect of increasing the unemployment benefit b on the equilibrium? How is the response here different from a model in which search intensity is exogenously fixed?

3. How does equilibrium search intensity vary with bargaining power β? What is the intuition? Discuss how this can change the comparative statics of the standard model with respect to β.

Problem 2

Consider the basic search model again. Instead of having the sharing of the surplus being determined by the exogenous bargaining parameter β, consider a setting with efficiency wages. As in Shapiro-Stiglitz (1984), labor effort is endogenous. A worker can perform the job without shirking and this entails a utility loss e. If the worker shirks, he collects the wage w and he does not pay the cost e, though he is caught shirking with probability δ and is forced to enter the unemployment pool thereafter. Consider an equilibrium in steady state in which wages are such that workers are indifferent between shirking and not shirking.

1. Derive the continuation value to a given worker of shirking versus not shirking in steady state. Derive the no shirking condition.

2. Characterize the steady state taking into account the no shirking condition. Are the results different from the basic model?

3. Imagine if it becomes harder to detect shirking, so that δ decreases. What are the effects on equilibrium quantities?

Problem 3

Consider the introduction of political economy to the basic search model. The government can levy a distortionary proportional tax on firm output τ which destroys a fraction $C(\tau) = \tau^2$ of output in order to finance unemployment benefits, so that

$$\tau y (1 - C(\tau)) = b.$$

Workers vote in period -1 over a fixed tax rate τ forever. Once this τ is chosen, the economy begins and remains in the associated steady state. When they vote in period -1, each worker has a probability u of being unemployed and probability $1 - u$ of being employed in period 0. Since workers are identical, they will all cast the same vote.

1. Characterize (without solving) the program of the workers casting a vote.

2. Numerically solve for the optimal τ, using your own discretion to specify the exogenous parameters $\{m, s, c, y, \beta\}$. How does the chosen tax rate and level of unemployment protection depend on the exogenous parameters $\{m, s, c, y, \beta\}$?