

1. Consider an economy where a representative household maximizes utility given by:

$$\sum_{t=0}^{\infty} \beta^t U(C_t)$$

Where $\beta < 1$ is the discount factor and C_t is consumption. Households supply labor inelastically. Firms are heterogeneous and produce using the production function:

$$Y_{it} = A_i(n_{it} - f)^\gamma, \gamma < 1$$

Where Y_{it} is output for firm i in time t , n_{it} is employment for firm i at time t , f is the amount of overhead labor the firm must employ regardless of the amount of output produced, and A_i is the time invariant idiosyncratic productivity of the firm. The latter is drawn from a distribution (specified below) and is unknown to the firm prior to entry but upon paying an entry fee the firm learns this productivity. In this economy, there are distortions in the production process so that the profit maximizing firm maximizes:

$$\Pi_{it} = A_i(1 - \tau_i)(n_{it} - f)^\gamma - w_t n_{it}$$

Where τ_i is the time invariant idiosyncratic distortion faced by this firm and w_t is the wage in period t . Prior to entry the firm does not know its τ_i but upon paying the entry fee the firm learns its distortion. The entry fee is given by c_e and the joint ex ante distribution for the productivity and distortions is given by $G(A, \tau)$. There is free entry in this economy subject to the information constraints and firms face a real interest rate, R , such that $\beta = 1/(1+R)$. There is also an exogenous probability of firm exit each period given by λ . In a steady state equilibrium, aggregate labor demand will equal aggregate labor supply and aggregate output will equal total consumption plus resources spent on entry.

Answer the following questions:

- (i) Derive the optimal employment for each firm.
 - a. How does optimal employment differ from the non-distorted economy?
 - b. What role does overhead labor play in the relationship between labor productivity and A_i at the micro level?
- (ii) Derive the condition for free entry.
 - a. What role does the exogenous exit rate play?
 - b. What role does the learning process play in the free entry condition?
- (iii) Characterize the market clearing conditions for this economy. What role does the wage play in clearing markets in this economy?
- (iv) Discuss the impact of the distortions in this economy on aggregate labor productivity and welfare.
 - a. Suppose that the average distortion is zero but there is dispersion in τ_i . Will the economy mimic the zero distortion economy? Discuss.
- (v) Compare and contrast the impact of τ_i relative to a model with labor adjustment costs. That is, suppose τ_i is equal to zero but firms' face adjustment costs for employment.
 - a. Write down the alternative model with labor adjustment costs.
 - b. Without solving the model analytically, characterize the solution with adjustment costs and compare and contrast the impact of adjustment costs with the model with distortions.