

Handout 6

(Questions of the Unemployment Search Model¹)

The *Pissarides unemployment model* explains the dynamics of workers searching for jobs and firms searching for workers in the labor market. It utilizes a matching function, similar in form to the production functions used in the long-term growth models.

1. To describe how it easy it is for firms with vacancies and unemployed workers to find each other, creating a new job, we use a matching function typically takes the form

$$H(U, V) = A \cdot U^\alpha V^{1-\alpha}. \quad (1)$$

Suppose that the likelihood of a match is equally determined by the availability of unemployed workers as it is by firms creating vacancies. We denote f as the job finding rate, λ the separation rate, and $\theta = \frac{V}{U}$ the market tightness (number of vacancies per unemployed).

- (a) Write down the job finding rate and the equilibrium unemployment rate as functions of market tightness.
- (b) Let worker's productivity be y , the real wage be w , and the cost of creating a new vacancy be k . Firms will open vacancies until the marginal cost of doing so is equal to the profit earned from doing so. Using this concept, write down the free-entry condition or so called the vacancy-supply condition.
- (c) Find the expression for market tightness as a function of the real wage (w). Is this upward sloping or downward sloping?
- (d) To simplified the model, suppose the wage is a weighted average of worker's productivity (y) and the benefit given to the unemployed workers (b)

$$w = \beta y + (1 - \beta)b \quad (2)$$

where $\beta \in [0, 1]$ is the workers' bargaining power. Explain how an increase in worker's productivity y affects market tightness and unemployment.

- (e) Suppose the unemployment benefits b are proportional to wages (w)

$$b = \rho \times w \quad (3)$$

where ρ is called the replacement ratio. Show that both unemployment benefits (b) and wages (w) are proportional to worker's productivity (y).

This model has the exact same settings as what we did in lecture. Solving this problem help you to check if you understand the unemployment search model and the relevant derivations.

¹ Explanations are taken from my colleague, Kurt Horner, currently an Economics Ph.D candidate at UCI.

2. Consider the unemployment search model with the following matching function

$$H(U, V) = AV. \quad (4)$$

We denote f the job finding rate, λ the separation rate, and $\theta = \frac{V}{U}$ the market tightness.

- (a) Find the expression for the job finding rate and the equilibrium unemployment rate as functions of market tightness.
- (b) The cost to open a vacancy is k . Workers' productivity is y and the real wage is w . Firms open vacancies until their expected profits net of the cost of entering the labor market is zero. Write down the free-entry condition and substitute out the vacancy filling rate (q).
- (c) The wage is negotiated between the worker and the firm. Recall that the outcome of the negotiation is the following

$$w = \beta(y + \theta k) + (1 - \beta)b \quad (5)$$

where β is workers bargaining power. Find the expression for market tightness in terms of only exogenous variables given that the worker's bargaining power is one half.

- (d) What is the slope of the vacancy supply curve (VS curve)?
- (e) How does an increase in unemployment benefits (b) affect market tightness (θ), the real wage (w), and unemployment (u)?