How to Reduce Unemployment Without Creating Poverty

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Problem Set 6

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Question 0 (PS5 Q2)

(c) Given the relation that defines the reservation wage x:

$$\Phi(x, z, r, \lambda, q) \equiv x - z - \frac{\lambda}{r+q} \int_x^\infty (w - x) dH(w) = 0, \tag{1}$$

compute partial derivatives of $\frac{\partial \Phi}{\partial x}$ and $\frac{\partial \Phi}{\partial q}$. Use the Leibniz rule for computing the derivative of the integral function $\Phi(x, z, r, \lambda, q)$.

(d) Using an infinitely small change in the function Φ,

$$\frac{\partial x}{\partial q} = -\frac{\frac{\partial \Phi}{\partial q}}{\frac{\partial \Phi}{\partial x}}, \tag{2}$$

discuss the direction of the variations in the reservation wage x as a function of the job separation rate q, $\frac{\partial x}{\partial q}$.

Question 1 (Rogerson, Shimer, Wright (2005))

Consider a one-period model with large numbers of unemployed workers and vacancies, u and v respectively. A queue length is denoted $q = u/v$. Each firm with an open vacancy pays costs k. Any match produces output y which is split between the worker and firm according the wage w. At the end of the period, unmatched workers get b, while firms with empty vacancies get 0. Then the model stops.

Suppose that $\alpha_w(q)$ denotes the job arrival rate for an unemployed, U is the highest value that the unemployed can get by applying for a job at a firm, and w is an offered wage. In equilibrium the constraint

$$U \leq \alpha_w(q)w + [1 - \alpha_w(q)]b \tag{3}$$

becomes binding.

Given the value function of an employer,

$$V = \max_{\{w,q\}} \{-k + \alpha_e(q)[y - w]\}, \tag{4}$$

and the binding constraint (3), determine the equilibrium value of the queue length, given via

$$\alpha_e'(q^*)(y - b) = U - b, \tag{5}$$

as well as the market wage

$$w^* = b + \varepsilon(q^*)(y - b), \tag{6}$$

where the elasticity of $\alpha_e(q^*)$ is given by $\varepsilon(q^*) = \frac{q^* \alpha_e'(q^*)}{\alpha_e(q^*)}$, $0 < \varepsilon(q^*) < 1$.