Search Theory and Aggregate Outcomes

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1 Job Search

The labour markets has frictions and the match between workers looking for a job and firms looking to hire a worker is not instantaneous nor certain. Moreover, the search process is costly for the firm. Finally, an employed worker has a certain probability to lose its current job.

1.1 Matching Mechanism and Matching Function

Workers looks for a job and firms looks to hire work. The actual matches depend on the number U of unemployed workers looking for a job and the number V of vacant firms looking for a worker to hire. The number of matches is determined by a function $M()$ representing the matching technology. Assuming constant return to scale we can specify the following function:

$$M = M(U, V) = KU^{1/2}V^{1/2}$$

The parameter K measures the technology of matching and is strictly related to the equality of employment services offered.

It is also useful to define a few more variables: L is the total labour force, u is the unemployment rate ($u = U/L$) and v ($v = V/L$) as the vacancy rate. Finally γ is the probability to lose a job.

Given that not all workers find a job we can define the probability of finding a job (λ) as the ration between the amount of individuals looking for a job (U) and the amount of matches that happens:

$$\lambda = \frac{M}{U} = K\left(\frac{V}{U}\right)^{1/2} = K\left(\frac{V}{U}\right)^{1/2}$$

the above can also be expressend in term of unemployment and vacancy rates:

$$\lambda = K\left(\frac{v}{u}\right)^{1/2}$$

If we define $\frac{v}{u} = \theta$ we have

$$\lambda = K\left(\theta\right)^{1/2}$$

The parameter θ represents how tight is market: if θ is high it means that many positions are vacant relatively to the amount of people that are looking for a job

In equilibrium unemployment must be stable and then:

$\dot{U} = \gamma (L - U) - \lambda U$

and an equilibrium is reached for $\dot{U} = 0$, that is, for $\alpha U = \gamma (L - U)$: dividing both side of the latter by L we have:

$\lambda u = \gamma (1 - u)$

$u = \dfrac{\gamma}{\lambda + \gamma}$

and then (given the equation for λ):

$K u^{1/2} v^{1/2} + \gamma u = \gamma$

$v^{1/2} = \dfrac{\gamma (1 - u)}{K u^{1/2}} = \dfrac{\gamma}{K} \dfrac{(1 - u)}{u^{1/2}}$

$$v = \left(\frac{\gamma}{K}\right)^2 \frac{(1 - u)^2}{u}$$

which defines the Beveridge curve (Figure 1). Note that Beveridge curve has a negative slope in fact, from the above, v is decresing in u. Given the above equation an increase in the quality of employment services K shifts the curve down.

1.2 Workers Behaviour

Suppose that in the market there is a certain vacancy rate v and a certain unemployment rate u. Consider now the ratio $\theta = v/u$: when θ is high it means that there are relatively more vacancies than unemployed workers: this favours the workers and therefore they will ask a higher wage w.

Suppose that in the economy there is an unemployed benefit b: the presence of this benefits makes unemployment less painful and favours workers: therefore they will ask a higher wage w.

These two mechanism that the wage asked by workers (W_S) is an increasing function of θ and an ìncreasing function of b:

$W_S = f(\theta, b)$

with

$f'(\theta) > 0$

$f'(b) > 0$

1.3 Firm Behaviour

From the firms point of view a higher θ means that it is difficult to recruit workers (there are a lot of vacancies and fewer workers) and hire is a lengthy and costly process: therefore they can afford to offer a lower wage. On the contrary if the productivity A is high then they can offer a higher wage. The wage they offer W_O is then:

$W_O = f(\theta, A)$

with

$g'(\theta) < 0$
$f'(A) > 0$

1.4 Wage Determination

We know that W_S is increasing in θ and W_D is decreasing in θ. Therefore the in equilibrium $W_S = W_D$ and this determines the actual θ (see figure 2a). The actual θ determines, together with the Beveridge curve, the equilibrium unemployment (see figure 2b).

Consider now an increase in unemployment benefits: if b increases then the W_S curves increase and the resulting θ decreases (see figure 3a): accordingly, the lower θ produces a higher unemployment rate (see figure 3b).

Consider now an improvement in employment services: K increases, the beveridge curve shift down and unemployment rate becomes smaller (see figure 4).

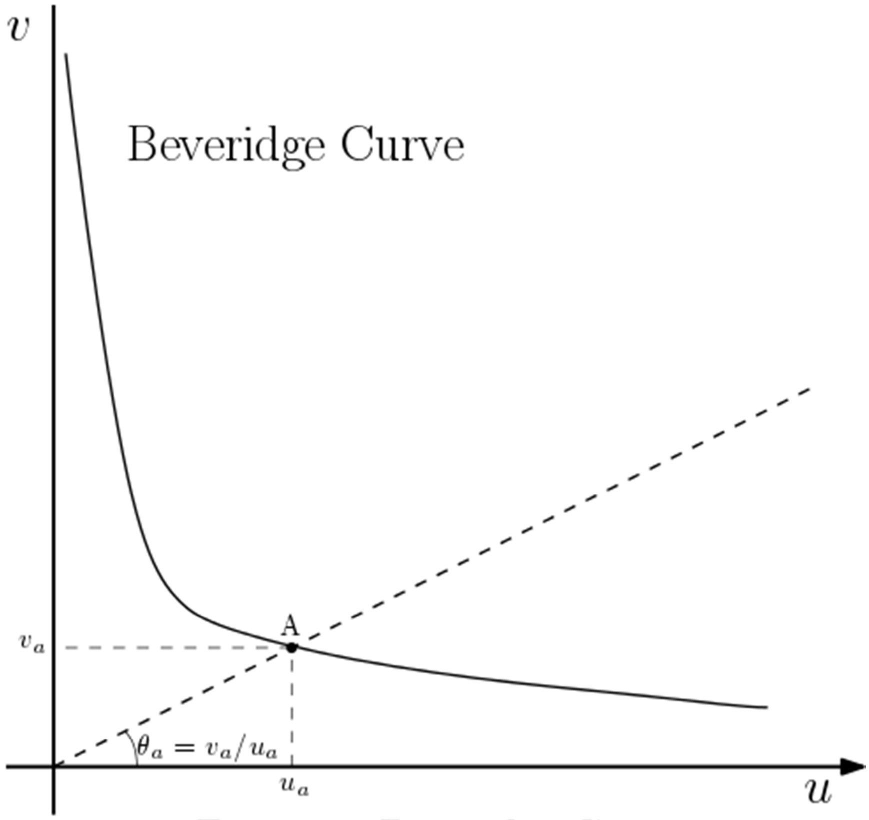

Figure 1: Beveridge Curve

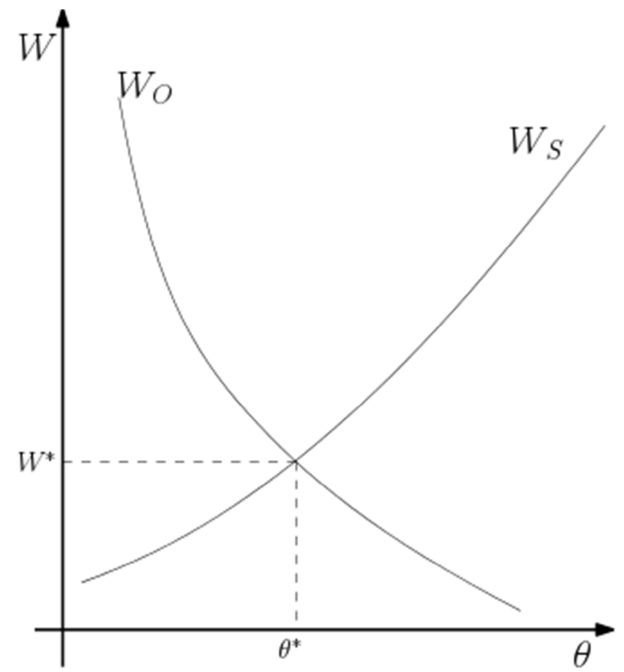

Figure 2a: Wage and Tightness Determination

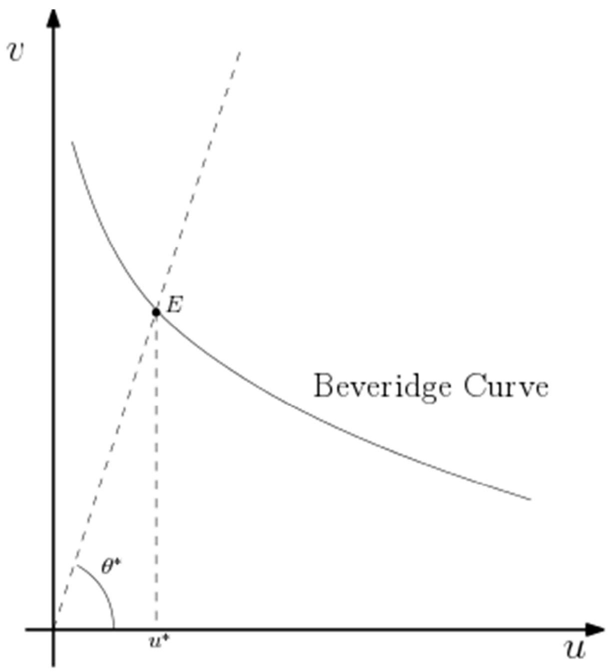

Figure 2b: Equilibrium unemployment

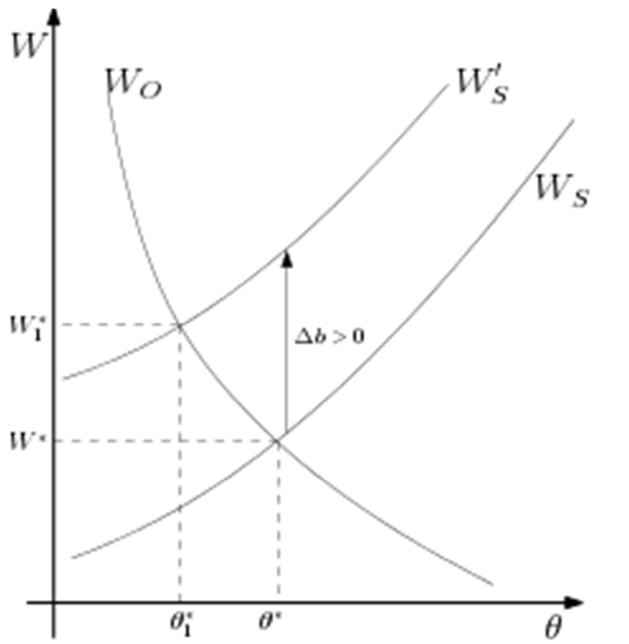

Figure 3a: Increase in benefits and Tightness

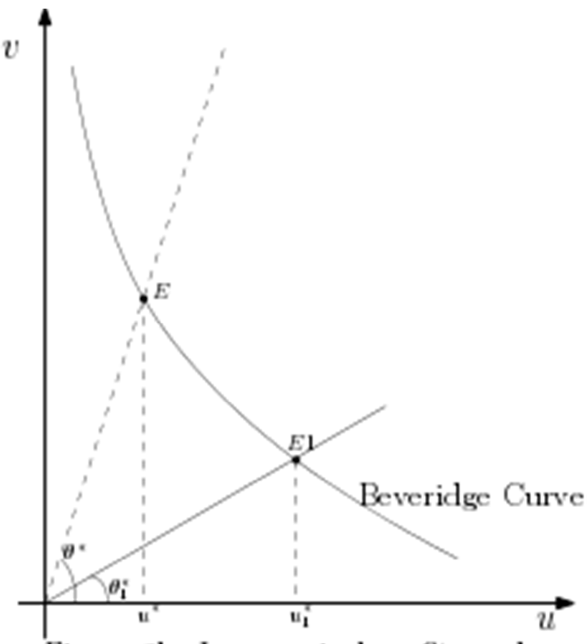

Figure 3b: Increase in benefits and new equilibrium unemployment

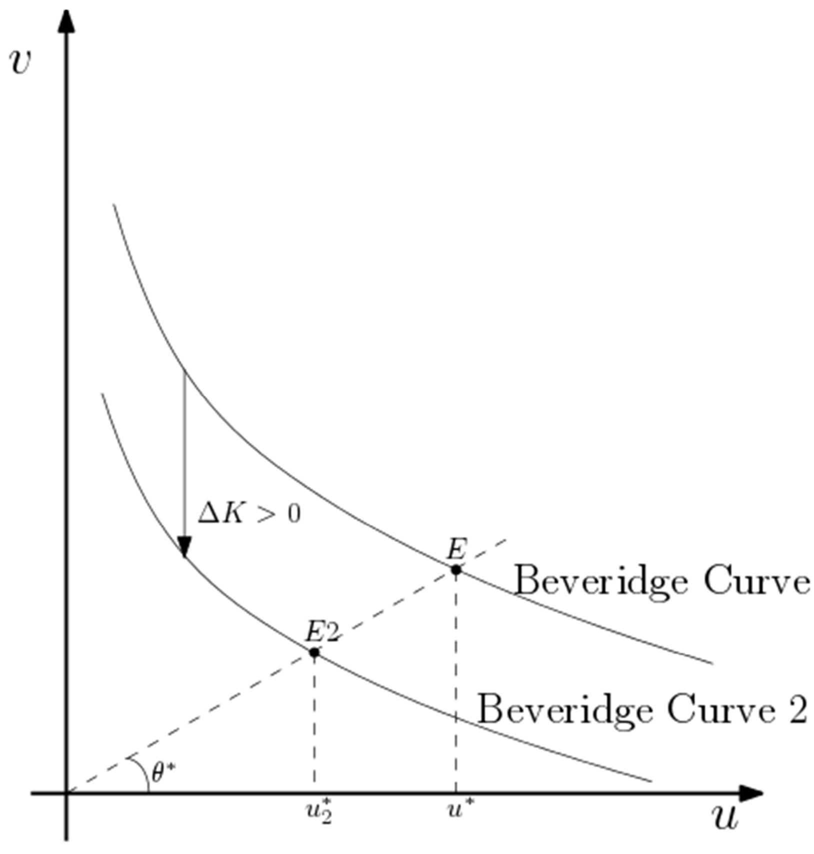

Figure 4: Increase in Employment Services