The Search Model of Unemployment

Key Premise: Unemployment is Frictional, meaning that it is time spent searching for an “acceptable” wage.

Intuition: As an LSE Economics graduate you wouldn’t accept a minimum wage job at McDonalds if it was the first one you were offered. You would rather be unemployed and search for a better wage.

Unemployment is a “stock variable” (just like the capital stock in the Solow model). Therefore, we can study how it changes by understanding the inflow and the outflow of Unemployment.

The Change in Unemployment over time:

\[ U_{t+1} - U_t = \text{Inflow} - \text{Outflow} = s(L - U_t) - fU_t \]

Glossary:

- \( s \) is the job separation rate (we would call this the firing rate, but \( f \) is being used for finding)
- \( f \) is the job finding rate (or the hiring rate)
- \( U_t \) is an amount (stock) of unemployment at a particular time
- \( L \) is the total Labour force
- \( (L - U_t) \) is the number of people employed because it is those who are not unemployed
- \( u \) is the unemployment rate at a particular time. This the amount of people unemployed as a fraction of the Labour Force: \( u = \frac{U}{L} \)
At the Steady State: \(^1\)

\[ u^* = \frac{s}{s + f} \]

Therefore, the unemployment rate increases when either \(s \uparrow\) or \(f \downarrow\)

Intuitively this makes sense. The unemployment rate increases when the rate at which people are fired is increased, of the rate at which people are hired is decreased.

At the Steady State with new entrants:

\[ u^* = \frac{s + n}{s + f + n} \]

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\(^1\) The Maths:

Inflow: \(s(L - U_t)\)  
Outflow: \(fU_t\)

\[ U_{t+1} - U_t = s(L - U_t) - fU_t \]

This simply tells us that the change in unemployment is the number of employed people “\((L - U_t)\)” times by the rate at which employed people are fired “\(s\)”, minus the number of unemployed people “\(U_t\)” times by the rate at which the unemployed find a job “\(f\)”.

Now we are looking for a rate, and we have totals, so we divide by \(L\) to get:

\[ u_{t+1} - u_t = s(1 - u_t) - fu_t \]

The steady state is defined as the point at which unemployment no longer changes. This is when \(u_t = u_{t+1}\) and we notate this \(u^*\) (\(=u_t = u_{t+1}\))

\[ u^* - u^* = s(1 - u^*) - fu^* \]

\[ fu^* = s - su^* \]

\[ su^* + fu^* = s \]

\[ u^*(s + f) = s \]

\[ u^* = \frac{s}{s + f} \]
When does a worker accept a job offer?

When an unemployed worker receives a job offer at a particular wage they decide whether to accept it or else to keep searching. They will accept it if it is above some minimum threshold, called the reservation wage. Essentially, the reservation wage is just the value of being unemployed, meaning that a worker will work whenever the value of being employed exceeds the value of being unemployed. Let’s show this on a graph:

Glossary:

\( V_e(w) \) This is a function for the value of being employed. The higher the wage, the more the worker values their job, but at a diminishing rate (oh another billion? Whatever will I do with it?)

\( V_u \) This is a function for the value of being unemployed. Notice that it does not depend on the wage. It is the intrinsic value that we all get from sitting on the couch watching daytime TV whilst everyone we know is out working hard.

\( w \) is the wage that the worker is offered

\( w^* \) is the reservation wage. The lowest wage that someone will accept because it is the wage at which being the value of being employed equals the value of being unemployed. Higher wages will be accepted. Lower wages aren’t worth it.
<table>
<thead>
<tr>
<th>Factors that increase $V_e(w)$</th>
<th>Explanation:</th>
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<tbody>
<tr>
<td>$s$ ↑</td>
<td>When the chance of being fired increases, we are more grateful that we still have a job</td>
</tr>
<tr>
<td>$t_e$ ↓</td>
<td>When income taxes decrease, we keep more of our wage, so value our jobs more</td>
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<th>Factors that increase $V_u$:</th>
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<tr>
<td>Unemployment benefits ↑</td>
<td>When we get paid more for sitting on the couch, we are more less willing to get off it</td>
</tr>
<tr>
<td>$p$ ↑</td>
<td>When the probably of finding a suitable job increases, we are less concerned about long term unemployment, so are more willing to take a few extra days on the couch</td>
</tr>
<tr>
<td>$t_u$ ↓</td>
<td>When taxes that affect unemployed people decrease, such as the taxes on cigarettes, there is even less incentive to work, and so more incentive so stay on the couch</td>
</tr>
<tr>
<td>Expected market income ↑</td>
<td>Similar to $p$, if we are expecting to become über-rich bankers when we do get off the couch, we might as well stay a little longer, or even take a gap year, yaah?</td>
</tr>
</tbody>
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The worker will keep searching and receiving job offers until they are offered a wage at which $V_e(w) > V_u$ ie the wage they are offered, $w$ is greater than the reservation wage, $w^*$. 
Finding the Job Finding Rate, $f$

We could investigate either the job separation rate or the job finding, but studies have shown that $f$ is more influential so we’ll stick to $f$ and take $s$ as given (exogenous).

$$f = pH_{(w^*)}$$

**Glossary:**

- $f$ is the job finding rate (or the hiring rate)
- $p$ is the probability/fraction of workers receiving a job offer
- $H_{(w^*)}$ is the probability/fraction of job offers that are accepted - that is, they are above $w^*$

Quick example: if 50% of the unemployed are offered jobs and 50% of those jobs are above $w^*$ then:

$$f = 0.5 	imes 0.5 = 0.25$$

the job finding rate is 25%.

So the job finding rate decreases as the reservation wage increases because people are less willing to accept their job offers (e.g. if benefits increase).

**A Quick Look into $H_{(w^*)}$**

**Wage Offer:**

When the reservation wage is 0, all job offers are above it, so it is 1.

As the reservation wage offer increases, the probability of receiving a job offer above it decreases.
The Steady State Unemployment Rate

At the Long Run Equilibrium - the Steady State - $U^* = \frac{s}{s+f}$ and we can determine the stock level of unemployment as it is determined by $w^*$, $s$, $p$ and $H(w^*)$. The reservation wage, $w^*$ is itself determined by $V_e(w)$ and $V_u$ so we must first look at the individual’s value functions as shown below.
Playing around with the Search Model of Unemployment:

1) benefits are decreased (or taxes of unemployed people are increased)

When $b \downarrow$ the value of being unemployed decreases (relative to the value of being employed) because unemployed people now have less to live on. This causes the reservation wage to decrease because people are now more willing to work, and so will accept lower offers:

A fall in the reservation wage, $w^*$, causes the fraction of wage offers higher than $w^*$, $H(w^*)$, to increase
Putting this all together, the original cut in unemployment benefits caused the value of being unemployed to decrease, leading to a fall in \( w^* \) to \( w^{**} \) because unemployment people are now more willing to will at lower rates. This caused an increase in \( H_{(w^*)} \) to \( H_{(w^{**})} \) because a lower reservation wage means that a higher fraction of job offers will now be above the reservation wage. Therefore, the job finding rate, which is given by \( f = pH_{(w^*)} \) will fall and so the number of outflows to our unemployment will increase as the unemployed accept lower wages and become employed. Overall, the number of unemployed people will decrease:

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**Bottom Line:** When you cut unemployment benefits, unemployment decreases.

**Economics:** Overcomplicated solutions to uncomplicated problems.