Wage Search Intensity*

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Abstract

In this paper I propose a model of wage-specific search intensity in an environment of random job and on-the-job search. I move on from the usual search intensity setup that increases the arrival rate associated with all possible wage draws. In the proposed framework agents can choose the segments of the wage offer distribution where they want to search more intensively. Compared to the classic search intensity setup, this framework saves agents the effort to search for jobs that are not meant to be accepted or are less attractive because they pay too little or they are to difficult to get. This increase in efficiency implies that total search intensity is lower than in the classic setup. The wage-specific search intensity becomes a displaced and rescaled version of the original wage offer distribution, while hazard rates by current wages are higher than in the classic setup for higher wages. Understandably, the higher the current wages the higher the efficiency gains from having a choice of search intensity by wage levels.

Keywords: job search, search intensity, unemployment

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In this paper

- I propose a model of job search in which agents can optimally choose the search intensity for each possible wage.
- I analyze the implications of this framework with respect to a setup in which the arrival rate is constant with respect to possible wage draws
- This framework eliminates the inefficiency of increasing the search intensity also for low wages or wages that are unlikely to be offered to the agent.

Model

- Unemployment transfers b
- Total available leisure is dependent on employment status, $l_i, i = \{u, e\}$.
- The wage offer distribution is known and the same for unemployment and employment: F defined over $x \in [\underline{w}, \overline{w}]$.
- In this model the agent hast to choose an optimal search function over wages. To simplity the exposition, I will assume a discretized wage offer distribution, so that each of N possibles wages is offered with probability mass $f(x)$. Accordingly, agent chooses over N possible wage-specific search intensities. A next step is to take a limit and make wages continuous.
- There is on-the-job search: agents can look for a jobs while they are unemployed or employed.
- Employed agents lose their jobs with separation rate θ.

Model (cont)

- To be well-behaved and economically relevant this model needs that costs have increasing returns in wage-specific search effort. Increasing returns just in total search costs would imply a degenerate solution in that the agent will put all his or her search effort in just one wage level.
- Search effort is specific to the possible wage draws: $s(x)$.
- Arrival rate dependent on search effort s for each possible wage x: $\lambda(s(x))$.
- The cost function is convex in wage-specific search effort and common to all wages: $as^{\alpha}(x)$, with $\alpha > 1$.
- Total search cost is the sum of wage-specific search efforts: $a\sum_x s^{\alpha}(x)$.

Model (cont)

- There is a constraint: the total cost of searching cannot exceed the level of available leisure:

$$l_i \geq a \sum_x s^{\alpha}(x), i = \{u, e\}$$

The arrival rate is linear in search effort:

$$\lambda(s(x)) = \underline{\lambda} + \lambda_s s(x)$$

Value function unemployed

$$
\begin{aligned}
V^{u} &= \max_{s(x)} \left\{ b \left[l_u - a \sum_{x \geq w^*} s^{\alpha}(x) \right] \right. \\
&\quad \left. + \frac{1}{1+r} \sum_{x \geq w^*} \lambda(s(x)) \left[V^{e}(x) - V^{u} \right] f(x) + \frac{1}{1+r} V^{u} \right\} \\
s.t. &\quad l_u \geq a \sum_{x \geq w^*} s^{\alpha}(x).
\end{aligned}
$$

Value function employed

$$
\begin{aligned}
V^{e}(w) \quad &= \quad \max_{s(x)} \left\{ w \left[l_e - a \sum_{x \geq w} s^{\alpha}(x) \right] \right. \\
&\quad + \frac{1}{1+r} \sum_{x \geq w} \lambda(s(x)) \left[V^{e}(x) - V^{e}(w) \right] f(x) \\
&\quad \left. - \frac{1}{1+r} \theta \left[V^{e}(w) - V^{u} \right] + \frac{1}{1+r} V^{e}(w) \right\} \\
s.t. \quad &\quad l_e \geq a \sum_{x \geq w^{*}} s^{\alpha}(x)
\end{aligned}
$$

Solution to this problem

Interior, if $l_i > a\sum\left[s^{i*}(x)\right]^{\alpha}$:

$$
\begin{aligned}
s^{e}(x) &= s^{e*}(x) \equiv \left[\frac{\lambda_s\left[V^{e}(x)-V^{e}(w)\right]f(x)}{\alpha aw(1+r)}\right]^{\frac{1}{\alpha-1}}. \\
s^{u}(x) &= s^{e*}(x) \equiv \left[\frac{\lambda_s\left[V^{e}(x)-V^{u}\right]f(x)}{\alpha ab(1+r)}\right]^{\frac{1}{\alpha-1}}.
\end{aligned}
$$

Corner, if $l_i = a\sum\left[s^{i*}(x)\right]^{\alpha}$:

$$
s^{i}(x) = \frac{l_i s^{i*}(x)}{a\sum s^{i*\alpha}}.
$$

To be continued...