Search Frictions and Labor Market Participation

*** Preliminary and Incomplete ***

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Abstract

This paper explores the link between lengthy search durations and labor market participation. Evidence on worker flows suggests that many workers, particularly women, frequently flow between participation and non-participation. The participation decisions of these workers are sensitive to frictions that reduce job-finding rates, since the frictions may cause the cost of a lengthy job search to outweigh the benefits of an employment spell that is expected to last only a short time. To study this idea, we extend the standard worker search model so that workers face stochastic participation costs. The results show that when job offers are more difficult to come by, workers’ participation behavior becomes more polarized: they are more likely either to never participate or to participate relatively consistently. Moreover, the results suggest that the large cross-country differences in average search durations may contribute to the observed cross-country differences in participation rates.

1 Introduction

Modern models of the labor market emphasize worker flows between employment and unemployment. The US labor market is also characterized by significant flows into and out of labor market participation. This is especially
true for women. Abowd and Zellner (1985), after adjusting the CPS gross labor flows for several potential reporting errors, find that each month there are flows of women into and out of participation averaging 3.5% of the female labor force (1.9% for men). The flows into and out of the labor force are of roughly equal importance to the flows into the other two states: women who leave employment are more likely to transit to non-participation (a flow rate of 2.2% per month) than to unemployment (1.4% per month); and unemployed women are nearly as likely to transit to non-participation (17%) as to employment (21%).

The fact that these large gross flows coexist with relatively little change in aggregate participation suggests the importance of idiosyncratic shocks to the relative payoffs that individual workers attach to working and non-participation. In other words, these gross flows suggest that individuals, and women in particular, experience frequent changes in their circumstances that motivate them to alter their labor market status by entering or withdrawing from the labor force. For example, individuals often leave the labor force to care for family members with health problems, to raise children, to pursue educational opportunities, to travel, etc. These withdrawals can last months, years, or decades. The large gross flows suggest that at any point in time a significant part of the aggregate labor force consists of workers whose attachment to the labor force is short-lived.

In a frictionless world, i.e., a world in which individuals can move costlessly and instantaneously between working and not working, these idiosyncratic reversals in the value of market work relative to nonparticipation would be perfectly matched with flows into and out of the labor market. In a world with frictions, this situation is altered. Reversals in relative payoffs are no longer perfectly mirrored by flows into and out of the labor force. In particular, frictions would be expected to diminish both the flow into and out of the labor force. And unless these changes are perfectly offsetting the aggregate participation rate will also change.

This paper seeks to explore this issue by examining the relationship between a specific friction—the random arrival of job offers—and labor force participation. To do this we extend the standard worker search problem to allow for idiosyncratic shocks to the costs of labor market participation. In the model, participation costs stochastically switch between a high and low value. If a worker chooses to participate they receive random job offers from an exogenous wage distribution that arrive according to a Poisson process. Employment spells end either when an exogenous separation occurs or when
participation costs switch to the high value and the worker as a result chooses to leave the labor market.

A worker’s optimal search strategy consists of three components: a decision of when to search, a decision of which wages to accept when searching, and a decision of which jobs to retain if participation costs increase. Depending on parameter values, workers’ optimal decisions may dictate that they always search, that they search only when participation costs are low, or that they never search. For the cases in which workers do choose to search, their acceptance strategy is characterized by a reservation wage. And if an employed worker experiences an increase in participation costs, the decision about whether to remain employed is also characterized by a reservation wage. We characterize optimal decisions analytically and derive a simple diagram that demonstrates how workers’ optimal decisions—about when to search and about reservation wages—are determined.

To examine the impact of increasing frictions we analyze the impact of changes in the offer arrival rate. In accordance with intuition, we show analytically that search frictions have two effects. First, they expand the set of circumstances under which an individual chooses not to participate. Second, it expands the set of jobs that individuals choose to retain when participation costs increase. However, depending upon the distribution of wages and the distribution of individuals across types, the aggregate effect on participation and labor market flows is ambiguous. To explore the issue further we carry out a simulation based on a reasonable parameterization. We find that increasing frictions lead to lower participation and lower labor market flows.

Our analysis focuses entirely on how the labor supply side of the market responds to particular changes. More generally, these results may be particularly relevant to discussions about the effects of different labor market policies such as firing costs, unemployment benefits, and minimum wages on cross-country labor market outcomes. It is frequently noted (see, for example, Pries and Rogerson (2001)), that these policies, which are more common in the more heavily regulated labor markets of Western Europe, often lead to significantly lower offer arrival rates. Our model suggests, that this may be associated with lower aggregate participation rates and lower levels of flows into and out of the labor force, as we in fact do observe.\footnote{Regarding the cross-country evidence on flows into and out of participation, see, for example, Blanchard and Portugal (2001). They show that flows from employment to} Further support for
this channel is offered by the fact that it is participation by women in particular, that is significantly lower in countries with longer search durations.

The paper is organized as follows. The next section lays out the model’s assumptions. Section 3 examines the optimal decision rules, and derives the diagram mentioned above. Section 4 examines the model’s comparative statics and section 5 presents a simulation of the model. Section 6 concludes.

2 Model

The model extends the standard worker search problem to consider an individual who faces stochastic costs associated with labor market participation. These stochastic costs may represent stochastic elements of family responsibilities such as care for a child or an elderly family member, stochastic elements of educational commitments, health shocks that affect the disutility associated with working, or simply preference shocks.\(^2\)

We consider a model in continuous time. An individual seeks to maximize the discounted present value of consumption and leisure net of the costs of labor force participation:

$$\int e^{-rt} (c_t - x_t I_t^E + (z^u - x_t) I_t^U + z^n I_t^N) dt$$

where \(c_t\) is consumption at time \(t\), \(r\) is the rate of time discount, \(x_t\) is the cost associated with labor force participation at time \(t\), \(z^u\) is the value of leisure (net of search costs and inclusive of any monetary transfers) while unemployed, and \(z^n\) is the corresponding value when the individual is neither working nor searching. \(I_t^S\) is an indicator function that takes on the value 1 at time \(t\) if the individual is in labor market state \(S\) and 0 otherwise, where \(S\) can take on the values of \(E\) (employed), \(U\) (unemployed) or \(N\) (not participating). It follows that in state \(N\) the individual receives the value \(z^n\), in state \(U\) they receive \(z^u\), while in both the \(E\) and \(U\) states the individual suffers the participation cost \(x_t\).\(^3\)

\(^2\)More generally, the issues that we address would also be relevant for all individuals who find themselves in a situation in which they would like to find employment for a specific duration. This could include workers on temporary layoff, seasonally unemployed workers and students.

\(^3\)It is straightforward to generalize the setup so that only a fraction of the participation

non-participation are four times higher in the US compared to Portugal.
As already noted, we allow for stochastic costs of participation; in particular, we assume that they follow a two state process with poisson arrivals. We assume that $x_t$ takes on values in the set $\{x^g, x^b\}$ with $x^b > x^g$. We will refer to the $x^b$ state as the bad state and the $x^g$ state as the good state, since all else equal a worker will always prefer to be in the good state. The probability of transiting into the good state from the bad state will be denoted as $p^g$ and the probability of transiting into the bad state from the good state will be denoted as $p^b$. These transition rates are independent of the labor market state (i.e., $E$, $U$, or $N$) that the worker occupies.

A worker without a job who chooses to search incurs the participation cost and receives wage offers that arrive according to a Poisson process with arrival rate $\alpha$ and are drawn from a wage distribution with $cdf \ F(w)$. Wages drawn from $F(w)$ are iid and lie in the interval $[0, \infty)$. Once a wage is accepted, it remains unchanged until either there is an exogenous separation or the worker chooses to leave the job. Exogenous job separations occur according to a Poisson process with arrival rate $s$. Workers may choose to leave a job at any point, though it will become evident that the only time workers might elect to leave a job is when the costs of labor force participation increase from the low value to the high value. There is no on-the-job search and there is no recall of past offers.

3 Decision Rules

3.1 Bellman Equations

We formulate the worker’s optimal search problem recursively. There are three basic decisions that individuals face. If they are unmatched, they must decide whether to engage in search. If they decide to search, then they must decide which wage offers to accept. And if they are matched (i.e., employed), then they must decide under what circumstances (if any) they would choose to leave the job. As is standard in search problems, if a worker accepts a job in a given state, they will never find it optimal to leave the job in that same state. So the only time that an individual might vacate a job is if their participation costs change.

The worker’s state is characterized by the value of his participation costs cost is incurred while searching rather than working. Since the analytic results are not affected by this, we have abstracted from this possibility for notational convenience.
\(x^g\) or \(x^b\), whether he is currently matched, and, if he is matched, the value of his wage. Let \(E^g(w)\) and \(E^b(w)\) represent the value to working in the good and bad state respectively when the wage is \(w\). Similarly, let \(U^g\) and \(U^b\) represent the value to search in the good and bad state respectively, and let \(N^g\) and \(N^b\) represent the value to non-participation in the good and bad state respectively. Let \(V^g\) and \(V^b\) represent the maximum value for an unmatched individual in the good and bad states, respectively. Following are the continuous time Bellman equations for the worker’s maximization problem:

\[
\begin{align*}
    rE^g(w) &= w - x^g + s[V^g - E^g(w)] + p^b \max \{E^b(w) - E^g(w), V^b - E^g(w)\} \\
    rE^b(w) &= w - x^b + s[V^b - E^b(w)] + p^g \max \{E^g(w) - E^b(w), V^g - E^b(w)\} \\
    V^s &= \max \{N^s, U^s\}, \quad s = g, b \\
    rN^g &= z^u + p^b(V^b - N^g) \\
    rN^b &= z^u + p^g(V^g - N^b) \\
    rU^g &= z^u - x^g + p^b(V^b - U^g) + \alpha E_w \max \{E^g(w) - U^g, 0\} \\
    rU^b &= z^u - x^b + p^g(V^g - U^b) + \alpha E_w \max \{E^b(w) - U^b, 0\}
\end{align*}
\]

\(E_w\) denotes the expectation operator with respect to the distribution of wage offers.

It is straightforward to show that these equations define a contraction mapping and hence have a unique solution. Using standard methods one can show that both \(E^g(w)\) and \(E^b(w)\) are increasing in \(w\). It follows that all decisions about job acceptance and retention will be characterized by reservation wages. In principle, there are four such reservation wages (a job acceptance reservation wage and a job retention reservation wage for both the good and bad states) though we will see that the optimal solution is always simpler than this. Without restrictions on parameters, there are several different qualitative forms that the solution may take. For example, it may be optimal for the individual to search in both the good and the bad state, or it may be optimal for the individual to never search. If we are interested in flows into and out of participation, then the more interesting case is one in which the individual only chooses to search in one of the states. Not surprisingly, we will see that if it is optimal to search in the bad state then it is also optimal to search in the good state, implying that if the individual only searches in one state it will be the good state.
In what follows we will derive a simple diagrammatic exposition of the optimal decision rules, including both the decision of when to search and the relevant reservation values. However, to derive this it is instructive to proceed in several steps. First we assume an individual searches in both states and characterize optimal behavior conditional upon this. We then ask under what circumstances it is optimal for this individual to not search in the bad state. Next, we examine the case of an individual who is assumed to only search in the good state and characterize their optimal behavior under this condition. We then ask under what circumstances it is optimal for this individual to not search even in the good state. Combining these results gives us a complete characterization.

3.2 Always Search

We begin by examining the case in which the individual is assumed to search in both the good and the bad states. First we derive the optimal search strategy given this behavior and later derive a condition which tells us if it is indeed optimal for the individual to search in both states. As noted above, an optimal decision rule is in general four dimensional: two reservation values for each state. However, assuming that the individual searches in both states, we can show that the worker’s optimal search strategy is defined by a single, state-independent reservation wage that we denote simply as $w_a$. To see this, combine (1) and (6) to yield

$$\begin{align*}
(s + r)[E^g(w) - U^g] &= w - z^u + p^b \max \{E^b(w) - U^b, 0\} - p^b(E^g(w) - U^g) \\
&\quad - \alpha E_w \max \{E^g(w) - U^g, 0\}
\end{align*}$$

and (2) and (7) to yield

$$\begin{align*}
(s + r)[E^b(w) - U^b] &= w - z^u + p^g \max \{E^g(w) - U^g, 0\} - p^g(E^b(w) - U^b) \\
&\quad - \alpha E_w \max \{E^b(w) - U^b, 0\}
\end{align*}$$

In each expression the first max operator refers to the decision of whether to vacate a job when the state changes, and the second max operator refers to the decision of whether to accept a job when searching. One can show that $E^g(w) - U^g$ and $E^b(w) - U^b$ are equal whenever either term is non-negative. It follows immediately that $w_a$ satisfies $E^g(w_a) = U^g$ if and only if it also satisfies $E^b(w_a) = U^b$.

4Even without resorting to the equations, this result can be seen intuitively. Because participation costs are exogenous, enter the utility function additively, and do not influence
It is then straightforward to solve for the optimal reservation wage \( w^a \) using either equation (8) or equation (9) (since they are actually the same). For \( w \geq w^a \) equation (8) becomes
\[
(s + r)[E^g(w) - U^g] = w - z^u - \alpha E_w \max\{E^g(w) - U^g, 0\}
\]
which implies that \( E^g(w) - U^g \) is linear with derivative \( 1/(s + r) \) for \( w \geq w^a \). Given that \( E^g(w^a) = U^g \) it follows that
\[
E^g(w) - U^g = \frac{1}{r + s}(w - w^a) \text{ for } w \geq w^a
\]
Evaluating equation (10) at \( w = w^a \) and using equation (11) to evaluate the expected value gives:
\[
w^a = z^u + \frac{\alpha}{r + s} \int_{w^a}^{\infty} (w - w^a) dF(w)
\]
Note that this equation implicitly gives the value of the optimal reservation wage \( w^a \) as a function of the primitives of the model. For future reference we will refer to the value of \( w^a \) that solves this equation as \( \hat{w}^a \). Note that this is the exact same equation derived in a standard worker search problem without stochastic participation costs—conditional upon searching in both states the stochastic participation costs affect the flow of payoffs but are irrelevant to any decisions.

Combining equation (12) with equations (6) and (7) and substituting \( V^s = U^s \) for all \( s \), one can derive the following expressions for \( U^b \) and \( U^g \):
\[
r U^b = \hat{w}^a - \left[ \frac{r + p^b}{r + p^b + p^g} x^b + \frac{p^g}{r + p^b + p^g} x^g \right]
\]
\[
r U^g = \hat{w}^a - \left[ \frac{p^b}{r + p^b + p^g} x^b + \frac{r + p^g}{r + p^b + p^g} x^g \right]
\]
the wage distribution or arrival rates of job offers, if the individual searches in both states then the value of the participation costs will not influence behavior—they simply represent an additive stochastic term to utility. Deriving optimal behavior in this case simply amounts to solving a standard worker search problem for a worker with flow utility \( z^u \) while unemployed, discount rate \( r \), arrival rate \( \alpha \), offer distribution described by \( F(w) \) and facing a constant separation rate of \( s \). There will be a single reservation acceptance wage and no jobs will ever be vacated, just as in a standard worker search problem.
In both cases the flow value of unemployment is equal to the reservation wage minus a convex combination of the participation costs. Note that the value of unemployment is always greater in the good state.

Is it optimal for this worker to search in both states, as we have assumed? We turn next to this issue. The principle of improvability tells us that it is enough to consider single deviations from the decision rule just derived. Hence, it is enough to ask if the individual can be made better off by not searching in the good state or in the bad state, holding the reservation wage constant. As we will see, it is sufficient to check this condition for the bad state. We proceed by solving for the loci of points in parameter space for which the individual is indifferent between searching and not searching in the bad state, holding the reservation wage constant.

If the individual were to search only in good times, then the value of nonparticipation in the bad state is given by

\[ rN^b = z^n + p^g(U^g - N^g) \]  

which implies

\[ N^b = \frac{z + p^gU^g}{r + p^g} \]  

Using (16) with equations (13) and (14) and imposing that \( N^b = U^b \) we obtain:

\[ \hat{w}^a - x^b = z^n \]  

(Similarly, \( N^b > U^b \) if and only if \( \hat{w}^a - x^b < z^n \).) Recall that \( \hat{w}^a \) is implicitly a function of the model’s primitives so that this expression is actually an expression containing only the model’s primitives. In fact, substituting this expression into the expression for \( \hat{w}^a \) gives:

\[ z^n = z^u - x^b + \alpha \int_{z^n + x^b}^\infty \frac{w - z^n - x^b}{r + s}dF(w). \]  

which defines the loci of primitives for which the individual is indifferent between searching and not searching in the bad state. Recall that the parameter \( z^n \) does not enter into the determination of \( \hat{w}^a \), so that one way to interpret the condition in equation (17) is that it is optimal to never search in the bad state if and only if \( z^n \) is greater than \( \hat{w}^a - x^b \). This condition has a natural interpretation. It says that the individual will be just indifferent between searching and not searching in the bad state if the reservation wage
net of participation costs is exactly equal to the flow value of nonparticipation. Perhaps surprisingly, this condition does not explicitly contain \( z^u \). The influence of \( z^u \) is exerted entirely through its effect on \( \hat{w}^a \): holding all else equal a higher value of \( z^u \) will increase \( \hat{w}^a \) and hence increase the left hand side of equation (17), thereby making it more attractive to search in bad times.

Note that we could also have asked if it were optimal to deviate from the strategy of searching in the good state. This would have produced a condition equivalent to that in equation (17), except with \( x^g \) in place of \( x^b \). It follows that if it is optimal to search in the bad state it is also optimal to search in the good state.

### 3.3 Search Only in the Good State

We next consider the case in which the worker is assumed to search in the good state but not in the bad state. As in the previous section, we derive optimal decision rules assuming this pattern of search and then derive a condition which tells us if this is the optimal pattern of search. In the previous subsection the optimal decision rule was one dimensional—it could be completely summarized by the state-independent reservation wage for the acceptance decision. In the current situation the optimal decision is two dimensional. In particular, not only must the individual make a decision regarding which job offers to accept when searching, but the individual is also now confronted with a decision of which jobs to vacate if the state goes from good to bad. This did not arise in the previous scenario because if the individual always searches then there is no effect of the participation cost. But, if the individual does not search in the bad state, then the participation cost is avoided if a job is vacated in the bad state and hence we must entertain this possibility.

As before, it is easy to see that since the value of employment is increasing in the wage, both decisions will be characterized by reservation values. In particular, a worker in the good state who is searching will accept any job with \( E^g(w) \geq U^g \) and a worker with a job paying \( w \) in the bad state will retain the job as long as \( E^b(w) \geq N^b \). We will let \( w^a \) and \( w^r \) denote the reservation acceptance wage and the reservation retention wage, with the interpretation that \( w^a \) is the reservation wage for accepting offers in the good state, and \( w^r \) is the reservation wage for retaining offers in the bad state. It follows that these two wages satisfy \( E^g(w^a) = U^g \) and \( E^b(w^r) = N^b \).
It turns out that we can represent the optimal choices of $w^r$ and $w^a$ as the unique intersection of an upward sloping curve and a downward sloping curve in $w^a - w^r$ space. One of these curves can be thought of as expressing the optimal reservation wage for job acceptance given a value for the reservation wage for retention, and the other can be thought of as describing the optimal reservation wage for the retention decision given a reservation wage for the job acceptance decision. The first we will call the job acceptance (JA) curve and the second we will call the job retention (JR) curve.

The key to deriving these two curves is to express relevant value functions in terms of the two decision rules $w^a$ and $w^r$ and then to substitute for the value functions in the two equations that define the reservation values. Of particular interest is the value $E^g(w) - U^g$ since this value is critical in terms of deciding which wages to accept. A common property of worker search problems is that the value of employment is linear in the wage. This property was previously seen to hold in the always search case. This property does not hold here, however, because the separation rate is no longer independent of the wage—if the worker has a job paying $w$ and $w^a < w < w^r$ then the probability of a separation is $s + p^b$ whereas if $w^a < w^r < w$ then the separation hazard is only $s$. However, if $w^a < w^r$ it is easy to show that $E^g(w) - U^g$ is piecewise linear. In particular, one can show that for $w \geq w^r$

$$E^g(w) = \frac{1}{r + s}$$

while for $w^a \leq w \leq w^r$

$$E^g(w) = \frac{1}{r + s + p^b}$$

The difference in the two slopes stems from the fact that the separation rate for $w \geq w^r$ is $s$, whereas for $w^a \leq w \leq w^r$ it is $s + p^b$. Intuitively, the marginal value of a higher wage is smaller for $w^a \leq w \leq w^r$ because the job is not expected to last as long—these jobs will be terminated if the state changes to the bad one.

It follows that for $w^a \leq w \leq w^r$ we have

$$E^g(w) - U^g = \frac{1}{r + s + p^b}(w - w^a)$$

while for $w \geq w^r$ we have

$$E^g(w) - U^g = \frac{1}{r + s + p^b}(w^r - w^a) + \frac{1}{r + s}(w - w^r).$$
We are now in a position to derive the job acceptance curve from the equation that defines $w^a$: $E^g(w^a) = U^g$. Substituting (1) and (6) into this equation yields:

$$w^a = z^u - \beta \max\{E^b(w^a) - N^b, 0\} + \alpha E_\omega \max\{E^g(w) - U^g, 0\}$$  \hspace{1cm} (23)

In the region where $w^r \geq w^a$, we have that $E^b(w^a) \leq E^b(w^r) = N^b$ and equation (23) becomes

$$w^a = z^u + \alpha E_\omega \max\{E^g(w) - U^g, 0\}$$  \hspace{1cm} (24)

Using (22), equation (24) can be rewritten as

$$w^a = z^u + \alpha \left[ \int_{w^a}^{w^r} \frac{(w - w^a)}{r + s + \beta} dF(w) + \int_{w^r}^\infty \frac{(w^r - w^a)}{r + s + \beta} + \frac{(w - w^r)}{r + s} dF(w) \right]$$  \hspace{1cm} (25)

This is an equation in $w^a$, $w^r$, and primitives. The left hand side is trivially increasing in $w^a$, and it is easy to show that the right hand side is decreasing in $w^a$ and $w^r$. Thus, this equation describes a downward sloping curve in $w^a - w^r$ space. As expressed earlier, it is convenient to think of this curve as describing the optimal choice of $w^a$ given an optimal choice of $w^r$, though in fact all it really does is describe the locus of $(w^a, w^r)$ points that are consistent with the optimal job acceptance decision. Intuitively, in a standard search model if the separation probability goes up then the worker becomes more willing to accept lower paying jobs. In this model the effect is somewhat more subtle, but an increase in $w^r$ also implies that the jobs last less time on average and also leads to a lower value of $w^a$.

We can solve for one specific point on the JA curve by looking for a point on the curve that has $w^a = w^r$. In this case the individual never vacates a job once accepted and from (25) it is apparent that the value of $w^a$ satisfies:

$$w^a = z^u + \alpha \int_{w^a}^\infty \frac{(w - w^a)}{r + s} dF(w)$$

Note that the value of $w^a$ that solves this equation is exactly the same as the value of $w^a$ that was optimal in the case where the individual always searches, which we denoted by $\hat{w}^a$. That is, the JA curve intersects the 45-degree line at $\hat{w}^a$.

We can also solve for the asymptotic value of $w^a$ that this curve approaches as $w^r$ becomes arbitrarily large. This corresponds to the case where
all jobs are vacated if the bad state occurs. This value of $w^a$ satisfies:

$$w^a = z^u + \alpha \int_{w^a}^{\infty} \frac{(w - w^a)}{r + s + p_b} dF(w)$$

and is obviously smaller than $\hat{w}^a$.

Thus far we have only considered the region in which $w^r \geq w^a$. However, it is easy to extend the JA curve to other values as well. Suppose that we let $w^r$ take on a value below $\hat{w}^a$. How would this affect the optimal acceptance strategy? With $w^a = w^r = \hat{w}^a$ the individual is already not vacating any jobs when the state turns bad. If we consider even lower values of $w^r$ then this simply remains true, and hence the lowering of $w^r$ at this point has no impact on $w^a$. It follows that the JA curve is completed by adding a vertical section between the 45-degree line and the $w^a$ axis, as depicted in figure 1.

Next we derive the JR curve, which is derived from the condition $E^g(w^r) = N^b$. Using (2) and (5) to substitute into this condition, we get:

$$w^r = z^n + x^b - p^g \max\{E^g(w^r) - U^g, 0\}$$  \hspace{1cm} (26)

Once again we begin by considering the region in which $w^r \geq w^a$, which implies that $E^g(w^r) - U^g > E^g(w^a) - U^g = 0$. Together with (20), this

Figure 1: Determination of $w^a$ and $w^r$
implies
\[ E^g(w^r) - U^g = \frac{w^r - w^a}{r + s + p^b}. \] (27)
Substituting for \( E^g(w^r) - U^g \) using equation (26) gives
\[ \frac{w^r - w^a}{r + s + p^b} = \frac{w^r - z^n + x^b}{p^g} \]
which can be arranged to give
\[ w^r = \frac{r + s + p^b}{r + s + p^b + p^g} (z^n + x^b) + \frac{p^g}{r + s + p^b + p^g} w^a \] (28)

Thus the JR curve is an upward sloping line that intersects the \( w^r \) axis above the origin and that has slope less than one. It follows that it will necessarily intersect the 45-degree line. At this intersection we have \( w^a = w^r = z^n + x^b \). Again, it is convenient to think of this curve as describing the optimal choice of \( w^r \) given a value of \( w^a \) though in fact it really just gives pairs of points \((w^a, w^r)\) that are consistent with the optimal retention decision. Intuitively, the more attractive nonparticipation becomes in the bad state, the higher the reservation retention wage will become. From equation (5) the value of non-participation in the bad state is increasing in the value of \( U^g \) and it is easy to show similar to the previous subsection that \( U^g \) is increasing in the reservation acceptance wage \( w^a \).

Recall that the above derivation assumed that we were in the region \( w^r \geq w^a \). Once again, however, we can easily extend it beyond this region. In particular, consider the point where the JR curve intersects the 45-degree line. As we move below the 45-degree line, it is no longer true that \( E^g(w^r) - U^g > 0 \). Thus, from (26) it is easy to see that \( w^r = z^n + x^b \) in the region below the 45-degree line. The JR curve is thus as pictured in Figure 1.

It follows from Figure 1 that the JA and JR curves intersect at most once. We now consider the relationship between this intersection and the optimal solution to the worker’s search problem. Suppose we have an intersection that lies on or above the 45-degree line. It is easy to show that this solution provides higher utility than that generated by searching always. To see this note that if the intersection occurs above the 45-degree line, then the value of \( w^a \) at which the JA curve hits the 45-degree line, i.e. \( \hat{w}^a \), is less than the value at which the JR curve hits the 45-degree line, i.e. \( z^n + x^b \). Of course, as we showed before, \( \hat{w}^a < z^n + x^b \) implies that it is not optimal to search
in the bad state. If the intersection of the JR and JA curves occurs on the 45-degree line, then the individual is exactly indifferent between searching in the bad state and not searching in the bad state. Finally, if the intersection occurs below the 45-degree line then we know that the optimal strategy is to search in both states.

When is it preferable for the individual never to search rather than to search in the good state? We turn to this issue next. If an individual chooses never to search, then the problem becomes trivial. There are no additional decisions to make and as a result the flow utility will always be equal to $z^n$. It is then a simple matter to determine if it is better to search in the good state. We simply need to compare the flow value of searching in the good state, $rU^g$, with $z^n$. Proceeding as earlier it is possible to derive an expression for $U^g$ in terms of the decision rules. This expression is:

$$rU^g = \frac{r + p^g}{r + p^g + p^b} [w^a - x^g] + \frac{p^b}{r + p^g + p^b} z^n$$

As the expression shows, $U^g$ is dependent only on the primitives and $w^a$; the value of $w^r$ does not enter this expression. Also, the flow value of search is a convex combination of the reservation wage net of participation costs and leisure. This expression should remind the reader of the similar expression derived in the previous subsection. It is clear from this expression that $rU^g - z^n$ is positive (search in the good state is optimal) if and only if $w^a > z^n + x^g$. This expression is exactly analogous to the expression we derived for when search is optimal in the bad state.

It follows that the diagram with the JA and JR curves derived above can be used to completely determine the optimal decision rules. If the intersection is below the 45-degree line then the optimal behavior is to search always and use the (single) reservation wage derived in the previous subsection. If the intersection lies above the 45-degree line and has $w^a > z^n + x^g$ then the optimal solution is to search only in the good state and to use the reservation values corresponding to the intersection of the JA and JR curves. Otherwise, the optimal strategy is to never search.

4 Comparative Statics

Two types of comparative statics results are of interest. First, assuming no change in the decision regarding when to search, how do changes in the
Table 1: Impact of parameters on \( w^r \) and \( w^a \)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>( \alpha )</th>
<th>( p^b )</th>
<th>( p^g )</th>
<th>( s )</th>
<th>( r )</th>
<th>( z^u )</th>
<th>( z^n )</th>
<th>( x_b )</th>
<th>( x_g )</th>
</tr>
</thead>
<tbody>
<tr>
<td>( w^a )</td>
<td>+</td>
<td>-</td>
<td>+</td>
<td>-</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>( w^r )</td>
<td>+</td>
<td>+</td>
<td>-</td>
<td>?</td>
<td>?</td>
<td>+</td>
<td>+</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

The model’s parameters affect the optimal reservation values. Second, how do changes in the model’s parameters affect the optimal decision of when to search. To examine this we will consider an individual who is indifferent between searching and not searching in a given state and ask whether a change in a given parameter pushes them into the search or not search region.

The model allows us to analytically sign most of the comparative statics results. Table 1 summarizes the impact that the model’s parameters have on the two reservation wages, assuming that the parameters are in the interior of the set that assures that workers search only in the good state.\(^5\) Most of the results here can be determined by simply examining how the parameters shift the JA curve (represented by equation (25)) and the JR curve (represented by equation (28)), although some require a bit of algebra.

These results are largely intuitive. Because we will be concerned with the impact of frictions as captured by arrival rates, we begin with the effect of changes in \( \alpha \). Diagrammatically, an increase in \( \alpha \) does not affect the JR curve, while it shifts the JA curve to the right, leading to increases in the optimal values of both \( w^a \) and \( w^r \). Intuitively, when wage offers are easier to come by, workers can afford to be more selective in the wages they accept. Moreover, because wage offers are more plentiful, the value of being unemployed is higher, thereby raising the value of nonparticipation in the bad state and raising the reservation retention wage as well. Intuitively, when jobs are easier to come by, there is less reason to cling to a current job.

Next consider the parameters that characterize the stochastic nature of participation costs. An increase in \( p^b \) causes the upward sloping portion of the JR curve to become flatter, leaving the intersection with the 45-degree line unchanged, and causes the JA curve to shift to the left. Diagrammatically, the total effect is an unambiguous decrease in \( w^a \), while the change in \( w^r \)

\(^5\)If the worker searches in both states then the problem reduces to that of the standard worker search problem, so we do not report the comparative statics results for how various parameters affect \( \hat{w}^a \).
would appear to be ambiguous. However, one can show algebraically that the net effect on \( w^r \) is unambiguously positive. Intuitively, \( w^a \) is decreasing in \( p^b \) since workers have less reason to hold out for a high-paying job if they don’t expect to keep the job for long. Because there are opposing effects on \( w^r \), the intuition is not so clear. On the one hand, a higher value of \( p^b \) reduces the value of search lowers the value of nonparticipation, thereby leading to a lower value of \( w^r \). On the other hand, an increase in \( p^b \) means that a worker will spend more time in the bad state on average and hence conditional upon being in the bad state it takes a higher wage to make it worthwhile. What the algebra reveals is that this second effect dominates.

An increase in \( p^g \) causes the upward sloping portion of the JR curve to become steeper, while leaving the intersection with the 45-degree line unchanged. The JA curve is unaffected. Consequently, \( w^a \) increases and \( w^r \) decreases as \( p^g \) rises. Intuitively, workers are more likely to hang on to matches when the state turns bad (\( w^r \) lower) if on average spells of the bad state are shorter. The movement down the JA curve to a higher \( w^a \) reflects the fact that if matches are likely to last longer, then workers become more selective.

The impact of \( s \) is similar to the impact of \( p^b \): the JR curve flattens to the left of the 45-degree line and the JA curve shifts to the left. Thus, \( w^a \) unambiguously declines when \( s \) is increased. The overall impact on \( w^r \) is slightly different from the case of \( p^b \), since an increase in \( s \) affects the separation rate for all matches, whereas \( p^b \) affects the separation rate only for \( w < w^r \). As a result of this difference, it is not possible to sign the impact of \( s \) on \( w^r \). From equations (25) and (28), it is apparent that the impact of \( r \) on the JR and JA curves is identical to the impact of \( s \), which makes sense since both parameters affect the rate at which workers discount future payoffs.

Higher unemployment income (\( z^u \)) causes a rightward shift of the JA curve and no movement of the JR curve, resulting in a higher \( w^r \) and a higher \( w^a \). The rightward shift of the JA curve and the increase in \( w^a \) reflect the fact that unemployment becomes more attractive as \( z^u \) increases, allowing for more selective search. The increase in \( w^r \) reflects a movement along the JR curve.

An increase in \( z^n \) causes an increase in the vertical intercept of the JR curve, without altering its slope. The JA curve is unaffected. It follows that \( w^a \) falls and \( w^r \) increases when \( z^n \) rises. Intuitively, a higher \( z^n \) makes nonparticipation more attractive; consequently, workers are less likely to keep
a match when the state turns bad, thereby leading to a higher $w^r$. The lower value for $w^a$ results from the movement along the JA curve, representing the fact that workers are less selective when matches are not expected to last as long.

From equation (28), it is apparent that the impact from a change in $x^b$ is identical to the impact from $z^n$, which is intuitive since both parameters increase the cost of participation in the bad state ($z^n$ does not influence the cost of participation in the good state since workers here always participate in the good state). The fact that $x^g$ has no impact on the optimal reservation wages is also straightforward. Because $x^g$ affects the cost of participation in the good state, it is a critical parameter in determining whether workers participate in the good state, but conditional on participating, it has no impact on their reservation wages.

We now consider the second type of comparative static result—how do changes in parameters affect the decision of whether to search. Consider first the decision regarding whether to search in the bad state. The curve which describes the manifold of indifference in parameter space between searching always and searching only in the good state is $\hat{w}^a = z^n + x^g$. Recall that $\hat{w}^a$ is independent of the parameters describing the stochastic participation cost structure: $p^g$, $p^b$, $x^g$, and $x^b$, as well as the flow value of nonparticipation, $z^n$. And, as in a standard search model it is easy to show that $\hat{w}^a$ is increasing in $\alpha$ and $z^n$, and decreasing in $s$ and $r$. It follows that increases in $z^n$, $x^g$, $s$, or $r$ will make participation in the bad state less likely, and that increases in $\alpha$ and $z^n$ will make participation in the bad state more likely.

Next we consider the decision of whether to participate in the good state, which is the same as asking if the individual should ever participate. In this case the manifold of indifference in parameter space between searching and not searching in the good state is described by $w^a = z^n + x^b$, where $w^a$ is the reservation acceptance wage derived from the intersection of the JA and JR curves. The comparative statics exercise on $w^a$ is completely summarized by the results in table 1, thereby making it fairly easy to determine the effects on search in the good state. In particular, it follows that increases in $\alpha$, $p^g$, and $z^n$ increases the likelihood of participation in the good state, while increases in $p^b$, $s$, $r$, $z^n$, and $x^g$ all make participation in the good state less likely.

Because we will be particularly interested in the effect of increasing frictions on participation, it is of interest to summarize the comparative statics effects of a decrease in $\alpha$ on flows into and out of the labor force and on the
average time spent in the labor force. The first set of comparative statics results implied that \( w^a \) and \( w^r \) will decrease. The effect of these changes on flows into and out of the labor force are ambiguous. Holding individual characteristics fixed, a decrease in \( \alpha \) has several consequences. First, it influences the probability that an individual is employed, since both the arrival rate and the reservation wage change. In general this has an ambiguous effect on the probability of becoming employed, though it is known that log-concavity of the wage distribution guarantees that the probability of becoming employed will decrease. Holding all else constant, if the probability of being employed is lower, then the probability of leaving the labor market when the bad state occurs increases, since the worker always leaves when this state occurs if they are unemployed. Second, by influencing the reservation wage \( w^a \), the decrease in \( \alpha \) alters the distribution of accepted wages. Hence, even though \( w^r \) decreases, it does not follow that employed workers are less likely to transit to out of the labor force. Overall, the effect of the changes in reservation wages on flows into and out of the labor force are ambiguous. It also follows that the overall effect of the changes in the reservation wages on the average time spent in the labor force is also ambiguous.

Next we consider the implications of the changes on when an individual searches. Lower arrival rates unambiguously imply that search will at most stay the same–any worker who was initially indifferent about searching will now search less often. However, the implications for flows into and out of the labor force is ambiguous. Workers initially indifferent between searching all the time and searching only in the good state will now search less but will have more transitions into and out of the labor force. On the other hand, individuals initially indifferent between searching only in the good state and never searching will now search less and will have fewer transitions into and out of the labor force.

Combining the two sets of results, it is clear that we cannot say unambiguously what happens to the flows into and out of the labor force or the average amount of time spent in the labor force for a given individual when frictions increase. In the next section, we will carry out some simulations to further explore these effects. In our simulations we will consider the behavior of a population of individuals that are heterogeneous with regard to the expected duration of a spell of low participation costs. That is to say, we will assume that individuals differ with regard to the value of the parameter \( p^b \). Before moving to the simulations it is of interest to say something about how search behavior will vary across the population.
As already noted, $w^a - (z^n + x^g)$ is decreasing in $p^b$ and $\hat{w}^a - (z^n + x^b)$ is independent of $p^b$. It follows that there are two scenarios. In the first scenario, it is optimal for all workers to search always, independently of their value of $p^b$. In the second scenario it is not optimal for anyone to search in both states, and there is a threshold value $\bar{p}^b$ such that if $p^b > \bar{p}^b$ then the individual never searches, and if $p^b < \bar{p}^b$ then the individual searches only in the good state. 6 Basically, the higher the value of $p^b$, i.e., the lower the expected duration of a spell of low participation costs, the less likely is an unmatched worker to engage in search. The comparative statics results above tell us that if $\alpha$ decreases and we are in the second scenario, then $\bar{p}^b$ will decrease.

Lastly, we consider how search behavior would vary across individuals in a population if individuals were identical except for variation in the flow value of nonparticipation, $z^n$. This is of interest since in some contexts $z^n$ has been understood to be the primary determinant of whether individuals ever participate, with participation less likely among workers who place a higher value on leisure (see Pissarides (2000)). Analogous arguments to those just made will imply that there are two reservation values of $z^n$ with the property that for $z^n$ higher than the larger value individuals never search, for $z^n$ in between the two values individuals search only in the good state, and for $z^n$ less than the smaller value individuals always search. In this case as well, if frictions increase (i.e., $\alpha$ decreases) both cutoff values will decrease. Though this effect is present in our model, our quantitative analysis will focus on the new channel that we stress, between frictions and the stochastic nature of participation costs.

5 A Simulation

As discussed in the previous section, although it is possible to derive analytic results regarding how decision rules change in response to changes in model parameters, the consequences of these changes in decision rules on many statistics of interest is often ambiguous. Statistics of interest include average search duration, average match duration, unemployment rate, participation rate, and flows into and out of the labor force. Moreover, even if we knew the impact for a given type of individual, aggregate effects would depend upon

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6 We note that depending upon the parameters of the model it may be that the cutoff is infinite or zero.
Table 2: Parameter values for simulation

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>$r$</td>
<td>Interest rate</td>
<td>$1.04^{1/52} - 1$</td>
</tr>
<tr>
<td>$z^n$</td>
<td>Payoff from non-participation</td>
<td>0.68</td>
</tr>
<tr>
<td>$x_b$</td>
<td>Participation cost in bad state</td>
<td>0.8</td>
</tr>
<tr>
<td>$x_g$</td>
<td>Participation cost in good state</td>
<td>0</td>
</tr>
<tr>
<td>$z^u$</td>
<td>Payoff from unemployment</td>
<td>0.1</td>
</tr>
<tr>
<td>$s$</td>
<td>Exogenous separation rate</td>
<td>0.0025</td>
</tr>
<tr>
<td>$p^g$</td>
<td>Probability of switch to good state</td>
<td>0.05</td>
</tr>
<tr>
<td>$p^b$</td>
<td>Probability of switch to bad state</td>
<td>(various)</td>
</tr>
<tr>
<td>$\alpha$</td>
<td>Wage offer arrival rate</td>
<td>(various)</td>
</tr>
<tr>
<td>$F(w)$</td>
<td>Wage offer distribution</td>
<td>(see text)</td>
</tr>
</tbody>
</table>

the distribution of types. In order to explore the implications of the model for changes in these statistics, both at the individual and aggregate level, we turn to a simulation of the model. Our focus will be on assessing the effects of changes in $\alpha$ on various statistics.

We begin by examining the effects on individual outcomes. For this part of the analysis, we will consider individuals who differ in their value of $p^b$ but since we will not aggregate the decision rules we do not yet have to specify a distribution of individuals across values of $p^b$. Table 2 shows the parameter values used for the simulation. While these values were not carefully calibrated, they were chosen with an eye toward generating reasonable values for unemployment rates, search durations, and participation rates. The results focus on the impact that different levels of search frictions have on the behavior of individuals with different values of $p^b$.

We begin with the extreme case of no search frictions ($\alpha = \infty$). If job offers can be obtained immediately, workers will hold out for the highest wage. Thus, for the purposes of the simulation, the wage offer distribution is assumed to have an upper limit. Specifically, $F(w)$ is assumed to be uniform on the interval $[0,1]$.

7This does not otherwise change any of the qualitative features of the model relative to the analytic sections analyzed above.

8For the statistics that we look at the results were very similar when we assumed a truncated normal distribution rather than the uniform distribution.
is the highest possible wage, 1. Moreover, when participation costs switch to the higher value, \( x^b \), workers decide whether to continue participating on the basis of a static comparison of the payoff from non-participation, \( z^n \), and the payoff from participation, \( w - x^b \). The reservation retention wage equates these two payoffs: \( w^r = z^n + x^b = 0.68 + 0.8 = 1.48 \). Since this exceeds the highest possible wage, 1, it is clear that in the absence of search frictions, workers will always abandon their jobs when their participation costs switch to \( x^b \). Moreover, for the parameter values given and the range of values of \( \alpha \) considered, individuals will never choose to search in the bad state, regardless of their value of \( p^b \).

Figure 2 summarizes the results of the simulation, in terms of statistics for which analytic results are not possible, for each type of worker. We continue our focus on the results for the case with no search frictions. Note first that average unemployment and the average search duration are clearly zero when search frictions are absent, as the middle left and middle right panels show. Given that individuals participate when participation costs are low, and do not participate when they are high, the average participation rate of workers with a particular value of \( p^b \) will be given by the fraction of time that their participation costs are low: \( \frac{p^0}{p^b + p^b} \). Thus, the type-specific participation rate for the no-friction case is decreasing in \( p^b \), as shown in the upper left panel of the figure. Similarly, because employment spells end at rate \( s + p^b \), the average duration of an employment spell is given by \( \frac{1}{s + p^b} \), which is also clearly decreasing in \( p^b \) as indicated in the lower right panel of the figure. Finally, as the upper right panel shows, the flow rate out of participation, is given by \( p^b \) in the no-friction case.

The panels in figure 2 show results for three other levels of search frictions, allowing comparison with the no-friction baseline. One of the first things to notice in each of the panels is that results for the various values of \( \alpha \) are right-truncated at the value of \( p^b \) above which workers never participate. It is apparent that this threshold value of \( p^b \) is increasing in \( \alpha \), as the analytic results above showed.

The upper left panel shows that as frictions increase, participation rates for workers with a particular value of \( p^b \) rise (conditional on ever participating). This reflects the fact that when search frictions are greater, workers are more inclined to cling to an existing job when participation costs rise (as compared to the no-friction case in which workers never work when costs are high). Opposing this effect, in terms of the impact on the aggregate
Figure 2: Individual behavior conditional on $p^b$, for four values of $\alpha$. 
participation rate, is the fact that the set of workers who choose never to participate increases with search frictions.

For a given value of \( p^b \), the middle left panel of figure 2 shows that type-specific unemployment rates are increasing in search frictions. Of course, flows into unemployment from employment occur at rate \( s \), regardless of the value of \( \alpha \) or \( p^b \). However, flows into unemployment from non-participation occur at a lower rate when search frictions are higher, since many never leave the labor force when participation costs rise (meaning fewer re-entries from when participation costs fall). However, for this simulation the fact that the rate of flows into unemployment are lower when search frictions are higher is offset by the fact that unemployment durations are longer, as seen in the middle right panel. While average unemployment durations, given by \( \frac{1}{\alpha(1-F(w^a)) + p^b} \), are in this simulation lower when search frictions are greater, this result cannot analytically be proven generally. Lower \( \alpha \) means job offers occur less frequently, but lower \( w^a \) means that their acceptance rate \( 1-F(w^a) \) is higher.

We noted above that the impact of search frictions on the rate at which workers flow into and out of the labor force is ambiguous. The upper right panel of the figure shows that for this simulation search frictions do indeed lower the flow rate. That is, the fact that employed workers cling to jobs, which reduces flows, outweighs the fact that the composition of participants is shifted more toward the unemployed, who are more likely to transit to non-participation when the state turns bad.

As the lower right panel shows, employment durations, given by \( \frac{1}{s} \) for \( w \geq w^r \) and \( \frac{1}{s+p^b} \) for \( w < w^r \), are on average longer when search frictions are higher. This result reflects the fact that for this simulation, the composition of employment spells shifts toward workers with \( w \geq w^r \), meaning that fewer matches come to an end when participation costs increase (since fewer have \( w < w^r \)).

We now turn to calculating aggregate statistics, assuming that the only heterogeneity is in \( p^b \). Figure 3 displays the distribution used to generate the aggregate results shown below. There is a discrete set of values for \( p^b \), beginning with \( p^b = .0005 \) (expected participation duration of 2000 weeks, or approximately 40 years) and increasing in increments of 0.0025 to 0.033. The probability density is an exponentially declining function, with values of \( p^b \) higher than 0.033 assumed to account for the remaining probability mass. Other parameters remain the same as in table 2.

The figures in the far right column of table 3 represent average statistics
Figure 3: The fraction of individuals with transition probability $p^b$.

<table>
<thead>
<tr>
<th></th>
<th>$\lambda = 0.1$</th>
<th>$\lambda = 0.2$</th>
<th>$\lambda = 0.4$</th>
<th>U.S.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participation rate</td>
<td>0.5371</td>
<td>0.6200</td>
<td>0.6507</td>
<td>0.65</td>
</tr>
<tr>
<td>Unemployment rate</td>
<td>0.1109</td>
<td>0.0802</td>
<td>0.0605</td>
<td>0.06</td>
</tr>
</tbody>
</table>
| Average search duration (weeks) | 35.9 | 23.0 | 14.8 | 15?
| Monthly EU flow rate | 0.0095          | 0.0093          | 0.0094          | 0.0139 |
| Monthly UE flow rate | 0.0991          | 0.1871          | 0.2614          | 0.2141 |
| Monthly NU flow rate | 0.0054          | 0.0123          | 0.0167          | 0.0239 |
| Monthly UN flow rate | 0.0164          | 0.0230          | 0.0303          | 0.1344 |
| Monthly EN flow rate | 0.0036          | 0.0071          | 0.0103          | 0.0203 |
| Monthly NE flow rate | 0.0004          | 0.0019          | 0.0041          | 0.0287 |

Table 3: Various labor market statistics
for the US (the flow rates are taken from Abowd and Zellner (1985)). For \(\alpha = 0.4\), the model is able to match these various statistics rather well (indeed, the parameters were chosen with that goal in mind). A couple of exceptions stand out. First, the model is unable to match the large flows from non-participation directly to employment. Of course, given the definition of non-participation, one would expect that in the model and in the data these flows are near zero. In the model, there indeed are no true direct flows from non-participation to employment, but the flow reported here reflects the fact that some workers who re-enter the labor market may find a job before being interviewed and having their status re-classified as unemployed. Second, the model also is unable to match the high rate of flows from unemployment back into non-participation.

Several interesting findings emerge. First, as search frictions increase (\(\alpha\) declines), the participation rate declines. Given our parameterization, the reduced participation that results from people who leave the labor market permanently outweighs the increased participation among those that remain in the labor market (due to the fact that they cling to jobs even when participation costs are high). Second, greater search frictions also increase the unemployment rate and average search duration. In particular, the differences in the participation rate, unemployment rate, and average search duration for \(\alpha = 0.4\) and \(\alpha = 0.1\) are similar to the differences between values for the US and several European countries. The significance of this should not be overstated—the analysis here is strictly decision theoretic, aggregating decision rules across individuals holding the wage distribution constant. A complete analysis of cross-country patterns would require a general equilibrium treatment and force us to identify the cause of the lower job arrival rates in Europe. But, having made this qualification, we find the results suggestive of a potentially significant role for the effects captured in this model. Finally, the table also reveals that aggregate flows between labor market states are also decreased when job finding rates decrease. This is consistent with the findings by Blanchard and Portugal (2001) in their comparison of labor market dynamics in the US and Portugal.

6 Conclusion

We have introduced and analyzed a worker search model that highlights the interaction between search frictions and the participation decisions of workers
with stochastic participation costs. Higher search costs reduce flows into and out of participation. They can also lead to longer unemployment durations, longer employment durations, and higher unemployment rates. These results seem consistent with various observations that result from cross-country labor market comparisons. Countries like the US, with generally fewer labor market regulations and lower search frictions than in many Western European countries, tend to have greater flows into and out of participation, shorter employment and unemployment durations, and lower unemployment rates.

The results of this paper also raise interesting questions about the nature of search equilibrium and the job creation behavior of firms. One would expect that when there is heterogeneity in the expected participation duration of workers, firms would create different types of jobs in order to cater to different types of workers. More specifically, to cater to workers who do not anticipate participating for a long time, firms would have incentives to create low-wage, low-specific human capital jobs that can be quickly obtained. On the other hand, firms would also want to create higher-wage, high-specific capital jobs for workers who anticipate a more protracted employment duration. The model of this paper suggests that these workers would be willing to accept a longer search spell in order to obtain a higher wage. In an equilibrium model that accounts for firms’ job creation behavior, a natural question that arises is how different labor market policies—worker dismissal costs, unemployment insurance, minimum wages—affect the mix of jobs that firms choose to create. A natural hypothesis is that such policies discourage firms from creating easy-to-find, low-wage jobs, and consequently reduce the participation of people who desire such jobs. These broader questions that arise in the context of an equilibrium model seem like a promising area for future work.

References

