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## Hidden unemployment A search-theoretic interpretation

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### Abstract

Labor force surveys show that in the United States a significant fraction of the jobless who do not search for work, and who are therefore not classified as unemployed by official statistics, state that they 'want a job now'. A model of job search is used to interpret this phenomenon.

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### 1. Introduction

Official labor force statistics define an unemployed worker as one who does not have a job and who searches for a job. The labor force consists of all persons who are employed or unemployed. Labor force surveys show that a sizable number of jobless who are not classified as unemployed by official statistics because they are not actively looking for work (and who are thus not counted as part of the labor force – 'non-participants', henceforth), do declare that they want a job. For example, the U.S. Current Population Survey shows that on average during the period 1971–92 the number of non-participants who stated that they 'want a job now' amounted to 77% of the number of workers classified as unemployed according to the official definition.<sup>1</sup>

Several studies have analyzed these 'hidden' unemployed who are excluded from official unemployment figures,<sup>2</sup> but this earlier work has been mainly descriptive and has lacked a clear theoretical framework.

<sup>1</sup> Based on quarterly figures from Employment and Earnings (Bureau of Labor Statistics). See OECD (1987, 1993) for evidence concerning other industrialized countries.

<sup>2</sup> See, for example, Stein (1967), Flaim (1969), Rosen (1973), Gellner (1975), Challier (1987), OECD (1987). For discussions on whether these workers should be included in official unemployment statistics, see, for example, NCEUS (1979, ch. 2 and ch. 4). Much attention has been devoted to 'discouraged' workers, i.e. to jobless wanting

As jobless workers who do not search for work are rather unlikely to obtain job offers, the fact that a large number of jobless who are not searching for jobs state that they 'want a job now' is conceptually quite puzzling. The aim of the present paper is to provide a theoretical analysis of this intriguing phenomenon.

The key idea of the paper is that a person declares that he/she wants a job if the value of that person's non-market time is smaller than the expected wage which that person would obtain by conducting an optimal job search. Based on this interpretation, we predict that, *ceteris paribus*, the number of non-participants who want jobs is larger when the cost of job search is high, when few jobs are available (i.e. when the arrival rate of job offers is low) and when the mean wage offer is large. Furthermore, this interpretation implies that non-participants who want a job are more likely to enter the labor force at some future time than those who do not want a job, as is consistent with the data (see, for example, Job, 1979; OECD, 1987).

## 2. An illustrative model

For illustrative purposes, a standard search model with infinitely lived workers is considered (see, for example, Devine and Kiefer, 1991, ch. 2; Flinn and Heckman, 1983). The model assumes continuous time. Job offers arrive by a Poisson process with parameter  $a$ . Wage offers are independent draws from a time-invariant wage distribution  $F(w - \mu)$ , where  $w$  is the wage (an increase in the parameter  $\mu$  translates the distribution of wage offers to the right). Offers that are rejected cannot be recalled later.  $F(\cdot)$  is strictly increasing and differentiable. Once a worker is hired, he stays with his employer forever. Workers have a constant rate of time preference  $i > 0$ . Their instantaneous utility while working equals their salary  $w$ . Jobless workers who do not search for work have instantaneous utility  $\omega$ , while those who search have instantaneous utility  $k$  ( $\omega$  represents the value of the worker's non-market time;  $k$  equals  $\omega$  minus the cost of job search).

Under these assumptions, a rational jobless person searches for work if  $\omega < \rho^*$  holds, where  $\rho^*$  is defined by

$$\rho^* = k + (a/i) \int_{\rho^*}^{\infty} (w - \rho) F'(w - \mu) dw.^3 \quad (1)$$

Hence

$$\omega < \rho^* \Rightarrow \text{worker searches for work.} \quad (2)$$

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a job who are not actively searching for work because they view search as futile (see, for example, Flaim, 1973, 1984; Gastwirth, 1973; Mincer, 1973; Rosenblum, 1974; Finegan, 1978, 1979, 1981; Ondeck, 1978; Job, 1979; OECD, 1993). The present analysis does not distinguish between 'discouraged' workers and other non-participants who want a job (recent work suggests that these two sets of workers are behaviorally rather similar, in particular when compared with the unemployed and with those jobless who do not want jobs; see OECD (1987)).

<sup>3</sup>It can be shown that  $\rho^*/i$  is the expected lifetime utility of a jobless individual conducting an optimal job search.

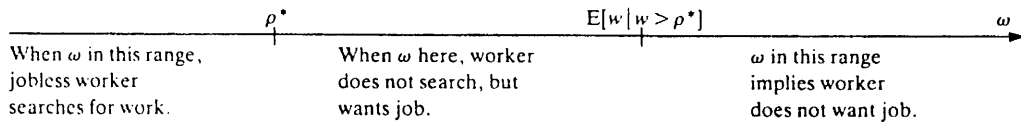


Fig. 1

$\rho^*$  is also the optimal reservation wage adopted by a worker who does search, i.e. such a worker should reject all wage offers smaller than  $\rho^*$  (see Devine and Kiefer, 1991).

*When does a worker want a job?*

Job search is an unavoidable precondition for finding work. If a worker states that he wants a job, I interpret this as meaning that the expected wage that he would obtain by conducting an optimal job search (i.e. using the reservation wage  $\rho^*$ ) exceeds his instantaneous utility while not searching ( $\omega$ ):

$$\omega < E[w | w > \rho^*] \Rightarrow \text{worker wants a job.} \tag{3}$$

Note that  $\rho^* < E[w | w > \rho^*]$ . Hence

$$\rho^* < \omega < E[w | w > \rho^*] \Rightarrow \text{worker is non-participant, but wants job.} \tag{4}$$

Fig. 1 illustrates this interpretation.

### 3. Implications of the proposed interpretation

Fig. 1 suggests that non-participants who want a job are more likely to join the labor force at some future date than other non-participants (note, for example, that a small reduction in the value of non-market time  $\omega$  is more likely to induce a non-participant who wants a job to start searching for work than one who does not want a job). This is consistent with empirical evidence according to which non-participants who state that they desire work are more likely to be classified as unemployed and to find employment at future dates than non-participants who do not want a job (see OECD, 1987; Job, 1979).

We see from (1) that when  $k$  equals  $\omega$  (i.e. when job search is costless), then  $\rho^* > \omega$ . Hence the phenomenon that non-participants declare that they want a job only arises when searching for work is costly (i.e. when  $k$  is smaller than  $\omega$ ).

Additional predictions can be obtained if one assumes that the logged density of wage offers is strictly concave.<sup>4</sup> As shown in the appendix, this assumption guarantees that

$$\begin{aligned} d(E[w | w > \rho^*] - \rho^*)/da < 0, \quad d^*(E[w | w > \rho^*] - \rho^*)/dk < 0 \\ \text{and } d(E[w | w > \rho^*] - \rho^*)/d\mu > 0. \end{aligned} \tag{5}$$

Hence we see that, under this distributional assumption, a reduction in the arrival rate of job

<sup>4</sup> The normal density, for example, meets this criterion.

offers, an increase in the cost of job search or a translation of the distribution of wage offers to the right (i.e. an increase in  $\mu$ ) widens the interval ( $\rho^*$ ,  $E[w | w > \rho^*]$ ); hence these parameter changes can be expected to increase the proportion of jobless who are not searching for work but who want jobs.<sup>5</sup> Empirically, wages tend to be somewhat procyclical (Mankiw, 1991, p. 294); the arrival rate of job offers is likely to be procyclical and search costs are probably countercyclical (job openings are scarce during recessions). On the basis of the last expression in (5), we thus expect that the proportion of jobless wanting a job is procyclical, whereas the first two expressions would imply that it is countercyclical.<sup>6</sup> The latter implication is consistent with data from the U.S. Current Population Survey.<sup>7</sup>

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### Appendix: Proof of (5)

Totally differentiating (1), we obtain

$$\begin{aligned} d\rho^*/da &= [(1 - F(\rho^* - \mu))(E[w | w > \rho^*] - \rho^*)]/[i + a(1 - F(\rho^* - \mu))] > 0, \\ d\rho^*/dk &= i/[i + a(1 - F(\rho^* - \mu))] > 0 \end{aligned}$$

and

$$d\rho^*/d\mu = a(1 - F(\rho^* - \mu))/[i + a(1 - F(\rho^* - \mu))] > 0.$$

Note that  $\partial E[w | w > z]/\partial z > 0$  for all  $z$ . Strict log-concavity of the density of  $w$  (i.e. strict concavity of  $\ln(F'(w - \mu))$ ) implies  $\partial E[w | w > z]/\partial z < 1$  for all  $z$  (see Proposition 1 in Burdett and Ondrich, 1985). Assuming strict log-concavity, we therefore have<sup>8</sup>

<sup>5</sup> At least under the assumption that the value on non-market time,  $\omega$ , is (approximately) uniformly distributed among the jobless.

<sup>6</sup> But note that this argument is merely suggestive, because the model used in Section 2 is not designed for the analysis of business cycles, as it assumes that the parameters of the decision problem faced by a worker who searches for work do not change over time.

<sup>7</sup> The correlation between quarterly real GDP (detrended using the Hodrick and Prescott, 1980, filter) and the ratio of the number of non-participants who want a job to the total number of jobless is  $-0.41$ ; for the ratio of the number of non-participants who want a job to the total number of non-participants, the correlation with detrended real GDP is  $-0.29$ .

<sup>8</sup> Note that  $\partial E[w | w > z]/\partial z + \partial E[w | w > z]/\partial \mu = 1$  for all  $z$  (see Burdett and Ondrich, 1985).

$$d\{E[w|w > \rho^*] - \rho^*\}/da = [\partial E[w|w > \rho^*]/\partial \rho^* - 1][d\rho^*/da] < 0,$$

$$d\{E[w|w > \rho^*] - \rho^*\}/dk = [\partial E[w|w > \rho^*]/\partial \rho^* - 1][d\rho^*/dk] < 0,$$

$$d\{E[w|w > \rho^*] - \rho^*\}/d\mu = [\partial E[w|w > \rho^*]/\partial \rho^* - 1][d\rho^*/d\mu - 1] > 0.$$

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