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# Search Method Use by Unemployed Youth

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This article presents a search model which shows that search method choices should be related to their costs and expected productivities as well as to nonwage income and wage offer distributions. The empirical evidence then shows that the most frequently used search methods (i.e., friends and relatives and direct applications without referral) are also the most productive in generating offers and acceptances. The number of methods used is affected by factors that presumably reflect opportunities as well as income sources and needs. Specific methods are chosen in a manner that generates positive average effects on outcomes for those using them.

## I. Introduction

It is a fundamental fact, long known to labor economists and sociologists, as well as to the lay person, that many people hear about or obtain their

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jobs through friends and relatives.[1] This method is less costly in time and money than virtually any other and may be more productive than most in terms of generating job offers. This higher productivity derives from the fact that employers seem to regard referrals from their current employees as being more informative and reliable than direct applications from prospective employees (see Reynolds 1951; Heneman et al. 1980, pp. 215–16). Employees also regard their employed friends and relatives as reliable sources of information.[2] On the other hand, making contact with and applying to firms directly without such information may be costly and less effective in many places. The use of state employment agencies has also been known to be of very limited effectiveness in matching employers and workers (Rees 1966).

While these stylized facts have long been known to economists, there are few formal economic models that incorporate them. Saloner (1985) has modeled the "old boys' network" as a screening mechanism, while Pissarides (1979) and Barron and Mellow (1982) have focused on state employment agencies in their work. But more general search models in which individuals choose among a set of methods with different costs and expected productivities have been rare. Only Weitzman (1979) has modeled sequential search across outcomes from a variety of "sources," though not explicitly in an employment context.

This issue has particular relevance for models where search effort is analyzed since such effort is generally treated as a single uniform activity.[3] The low level of search intensity among the unemployed that has often been observed in survey data is therefore explained in these models by various factors such as unemployment insurance, the awaiting of recall from temporary layoff, or tastes for leisure. The notion that particular kinds of search, such as checking with friends and relatives, may be low in time intensity but high in productivity has not been emphasized in the search literature to date.

There has also been limited empirical work done on the choices and effects of specific methods of search. Summary evidence has frequently been provided on search method use and on methods by which recent jobs were obtained.[4] But there have been few attempts to systematically explore

[1] See Reynolds (1951), Rees and Schultz (1970), and Granovetter (1974). For more recent evidence, see Corcoran et al. (1980) and Winship (1982).

[2] See Rees (1966). The greater reliability of information so obtained and its implication for reducing employee turnover are stressed in Datcher (1983).

[3] For theoretical models of search effort choice, see Barron and McCafferty (1977), Barron and Mellow (1979), Seater (1979), and Burdett (1980). For empirical evidence on search effort choices or effects, see Rosenfeld (1977), Barron and Mellow (1979), Barron and Gilley (1981), Yoon (1981), and Chirinko (1982).

[4] See Bradshaw (1973) for summary evidence on search method use and Winship (1982) for evidence on methods by which recent jobs were obtained. Data on the former are regularly collected and published by the Bureau of Labor Statistics,

the determinants of search method choices or their different effects on employment outcomes of individuals.[5]

This article is an attempt to extend our understanding of these issues. I first present a job search model that relates search method choices to their expected costs and productivities, among other factors. I then provide some empirical evidence from a sample of unemployed youth.[6] There are two aims in the empirical analysis: (1) to explore the factors that cause young unemployed workers to choose search intensity through different methods of search, and (2) to analyze the effects of these search choices on certain outcomes for these job seekers. The use of various search methods is measured primarily by the number of search methods used that can be thought of as a proxy for overall search intensity. Some information is provided as well on the amount of time spent using each method. The employment outcomes considered are job offers and acceptances. The data used in the empirical work are taken from the Youth Cohort of the National Longitudinal Survey (NLS) for the year 1981.

The major empirical findings can be summarized as follows:

1. The methods of search used most frequently and most intensively by unemployed youth are checking with friends and relatives and direct application, respectively. These are also the most productive (per unit of time spent) in terms of generating job offers and acceptances, conditional on use. The acceptance rate for offers generated by friends and relatives is particularly high.

2. The number of search methods used by each individual is positively affected by one's expected offer probability and by being married and is negatively affected by being on layoff. These variables presumably reflect market opportunities as well as income sources and needs. The determinants of specific search method use are more varied.

3. Individuals choose search methods so that the number of search methods used has a positive effect on actual offers received (and accepted). Use of specific methods also has positive effects on offers in most cases.

Overall, search method choices appear to be based on relative productivities and costs, as the search model suggests they should be. These choices also affect employment outcomes in ways that are consistent with the model.

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whereas those on the latter were based on a special supplement to the January 1973 Current Population Survey (CPS).

[5] Barron and Gilley (1981) and Chirinko (1982) distinguish direct and indirect search, or "self-directed" and "intermediary" methods. Keeley and Robins (1985) distinguish "public" from other methods in their analysis of a number of search methods used on employment probabilities.

[6] This article focuses on job search among unemployed youth only. For empirical evidence comparing job search between employed and unemployed youth, see Holzer (1987*b*).

The rest of the article is organized into three sections. In the first of these I present a theoretical job search model that incorporates search methods that vary in cost and productivity for a particular individual and also across individuals. The implications of such a model for explaining search effort and employment probabilities of various groups are explained as well. The next section presents the empirical results, while the final section presents the conclusion.

## II. The Model

The theoretical model that is used here to motivate the empirical analysis is a direct extension of a particular model developed by Burdett (1980). The model posits that, in each period, unemployed individuals maximize the sum of current and expected future utility.[7] The latter is a weighted average of the utilities derived from working and not working, and the weights represent the probabilities of being in each of these states. Individuals maximize their utility by choosing a reservation wage and search intensity. Any search that is undertaken lowers current period utility of the unemployed because the costs of search in time and money must be deducted from the individuals' nonwage income and leisure time. However, search is productive in that it raises the probability of receiving an offer, which raises the expected future utility of being employed.

The major innovation in the version of the model presented here is that individuals choose from a set of search methods that vary in both cost and productivity for any given individual. For instance, checking with friends and relatives for information and "contacts" should be less costly and possibly more productive than other methods. The costs and productivities can also vary across individuals for any given search method, according to their skills, background, and place of residence. Thus individuals who have few employed friends and relatives or who live far from business areas may find direct contact with firms more costly and the use of friends and relatives less productive than will other individuals.

More formally, individuals perform the following maximization:

$$\max_{\substack{SM_1 \\ \vdots \\ SM_j \\ w^r}} U_t = v(Y - \sum_j c_j SM_j, L - \sum_j SM_j) + \pi(SM_1, \ldots, SM_j)[1 - F(w^r)] \times E[\psi(w)|w^r] + \{1 - \pi(SM_1, \ldots, SM_j)[1 - F(w^r)]\}U_{t+1}, \quad (1)$$

[7] The model is in the tradition of the "partial-partial" job search literature where individuals face exogenously determined offer probabilities and wage offer functions that reflect the demand side of the labor market. The model also focuses on unemployed search only, though it could be modified to include search among the

where $w^r$ is the reservation wage; $SM_1 \ldots, SM_j$ are the search intensities chosen for each of the $j$ methods; $U_t$ is total expected utility at period $t$; $v$ is current period utility, $Y$ is outside income, and $L$ is leisure; $c_j$ is the monetary cost per unit of $SM_j$; $\pi$ is the offer probability function; $f(w)$ is the wage offer distribution; and $\psi$ is the utility function for work in the next period. For the sake of simplicity, it is assumed here that $c_j$ is constant, though it will be assumed below that each method has diminishing effects on offer probabilities (i.e., $\pi_j > 0$ and $\pi_{jj} < 0$).[8] A zero discount rate is also assumed throughout for algebraic simplicity, though results are not affected by this.

The following first-order conditions determine choice of reservation wage and search method use:

$$\psi(w^r) = U_{t+1}, \tag{2}$$

$$v_1 c_j + v_2 \geq \pi_j \int_{w^r}^{\infty} [\psi(w) - U_{t+1}] f(w) dw \quad \text{for every } j. \tag{3}$$

Equation (2) states that the utility of employment must equal the expected utility of being unemployed in the next period. Equation (3) states that use of each search method is chosen to equate its marginal costs (in time and money) with its marginal benefit, where the latter is the expected gain in utility from being employed that each search method provides. Corner solutions in which search methods are not used because costs exceed benefits at any level of usage can also occur for any method; if true for all methods, no search is undertaken. Thus the model determines labor force participation as well as use of particular search methods. Total search intensity (SI) and search costs (SC) undertaken are also determined:

$$SI = \sum_j SM_j, \tag{4}$$

$$SC = \sum_j c_j SM_j. \tag{5}$$

The choices of search method use and reservation wage then determine the probability of an individual being employed during that period in the usual manner:

$$P_E = \pi(SM_1, \ldots, SM_j)[1 - F(w^r)], \tag{6}$$

with search methods determining offer probabilities and reservation wages determining probabilities of offer acceptance.

[8] Assuming increasing marginal costs rather than constant ones does not appear to change any of the results of the model.

Comparative statics are generated in this model by total differentiation of equations (2) and (3). For the sake of simplicity, I consider a two-factor case below where $j = 1, 2$. I also assume constant marginal utility of income and separability of income and leisure during the current period.

The effect of changes in the cost and the productivity, respectively, of search method on its own use are as follows:

$$\frac{d\mathrm{SM}_1}{dc_1} = \frac{\pi_{22}\left(v_1 - \pi_1 \frac{dT}{dc_1}\right) + \pi_2\pi_{12}\frac{dT}{dc_1}}{(\pi_{11}\pi_{22} - \pi_{12}^2)}, \tag{7}$$

$$\frac{d\mathrm{SM}_1}{d\pi_1} = \frac{\pi_{12}\left(T\pi_{12} + \pi_2 \frac{dT}{d\pi_1}\right) - \pi_{22}\left(T + \pi_1 \frac{dT}{d\pi_1}\right)}{(\pi_{11}\pi_{22} - \pi_{12}^2)}, \tag{8}$$

where $T = \int_{w^r}^{\infty} [\psi(w) - U_{t+1}]f(w)dw$. Assuming that the denominator in each case is positive (on the basis of second-order conditions), the signs of these derivatives depend on two terms: the cross-method effect on offer probabilities (i.e., $\pi_{12}$) and the effects of each change on the benefits of future employment (i.e., $dT/dc_1$ or $dT/d\pi_1$).

If the latter were zero, then the signs would be unambiguous: rising costs of methods would lower own use and rising productivity would raise use, as intuition suggests they would. However, this would require the strong assumption that changes in costs and productivities last only for the current period. While possibly true in some particular cases (e.g., cyclically induced changes in offer probabilities or temporarily available positions), the more relevant considerations involve permanent differences in costs and productivities across individuals with different backgrounds and characteristics.

Under this interpretation, rising costs of search methods will raise utility of employment (i.e., $dT/dc_1 > 0$), while rising productivities will have the opposite effects (i.e., $dT/d\pi_1 < 0$).[9] The effects of costs on use of own methods will then be positive if these methods are independent (or substitutes) in the production of offers and if the positive, partial effects of costs on the utility of future employment are smaller than their negative effects on current utility (i.e., $v_1 > \pi dT/dc_1$). Likewise, the effects of productivities on use of own methods will be positive if their positive partial

[9] The signs on these derivatives are obtained by substituting the first-order condition for reservation wages (eq. [2]) into $T$. It is then easy to show that $dT/dc_1 = -\psi'[1 - F(w^r)]dw^r/dc_j > 0$ if higher costs lower reservation wages. Equation (2) suggests that this latter condition should be met. Likewise, $dT/d\pi_1 = -\psi' dw^r/d\pi_1[1 - F(w^r)] < 0$ for the same reason.

effects on the utility of future employment are greater than their effects on costs, which are zero (i.e., $T + \pi_1 dT/d\pi_1 > 0$).

The effects of various other factors on search method use can be similarly determined. For instance, the effects of nonwage income and shifts in wage offer distributions on search method use are as follows:

$$\frac{d\mathrm{SM}_1}{dy} = \frac{\dfrac{dT}{dy}(\pi_2\pi_{12} - \pi_1\pi_{22})}{(\pi_{11}\pi_{22} + \pi_{12}^2)}, \tag{9}$$

$$\frac{d\mathrm{SM}_1}{df(w)} = \frac{\dfrac{dT}{df(w)}(\pi_2\pi_{12} - \pi_1\pi_{22})}{(\pi_{11}\pi_{22} + \pi_{12}^2)}. \tag{10}$$

Since the utility of employment is negatively affected by outside income (i.e., $dT/dy < 0$), we obtain unambiguously negative effects of such income on search method use if the two search methods are independent (or complements).[10] Likewise, we obtain positive effects of shifts in the wage distribution in search method use if the utility of future employment is positively affected by such shifts (i.e., $dT/df(w) > 0$) with the same cross-method effects.[11]

## III. Empirical Results

The empirical analysis described below is based on data from the Youth Cohort of the National Longitudinal Survey (NLS). This cohort has been surveyed each year since 1979, and data regarding search behavior are available in each panel. However, the 1981 panel contains an extensive set of questions on use of particular search methods as well as their effects. The analysis below is therefore limited to these data.

The NLS in 1981 contains a list of search methods that often appear in other surveys, such as the Current Population Survey (CPS). These include "formal" methods, such as the use of private or state employment agencies, Comprehensive Employment and Training Act (CETA) offices, labor

[10] It seems quite plausible that most search methods will be independent in the production of job offers, particularly for the various institutional methods. However, the use of friends and relatives might be complementary with other methods if references from the former were used in conjunction with those methods.

[11] While the sign on $dT/dy$ is unambiguously positive (since $dT/dy = -\psi' dw^r/dy > 0$), the one on $dT/df(w)$ is less clear: $dT/df(w) = \int_{w^r}^{\infty} [\psi(w) - \psi(w^r)]dw - \psi'[1 - F(w^r)]dw^r/df(w)$. The direct, positive effect of $f(w)$ on the utility of employment may be counteracted by a negative, indirect effect working through reservation wages. The signing of the derivative in eq. (8) thus depends on the direct effect being the larger one here.

unions, school placement programs, and so on, as well as "informal" methods, such as checking with friends and relatives, newspapers, or schoolteachers and professors. Applying directly to employers without referral is also listed as a method of search. Since there are too many methods listed here to be studied in detail, the analysis below focuses on the four methods most frequently used by youth: friends and relatives, newspapers, state employment agencies, and direct employer contact without referral. All other methods are combined below into an additional category.

For every individual who reports having searched for work in the previous month, the NLS asks whether each specific method has been used during that time. For those who answer affirmatively on any method, a set of questions is then asked about the effects of using those methods. In particular, users are asked whether or not each method resulted in job offers and job acceptances. Other questions are asked as well for users of each method, such as time spent using that method in the previous week.

The sample used below is limited to nonenrolled and nonenlisted young males (age 16–23) who were unemployed at the time of search. To obtain this last group, I include the currently unemployed as well as those among the employed who had searched in the previous month and whose employment durations were 30 days or less.[12]

Table 1 presents means on search method use by young blacks and whites. All means are weighted to account for NLS oversampling of low-income whites.

The first row shows that the average number of methods used by unemployed job seekers is a bit over three. Thus search does not appear to constitute a single, uniform activity for those seeking employment. The next five rows show the proportion of job seekers who used each method of search. These extensive measures indicate that the two most frequently used methods of search are friends and relatives and direct application, respectively. The higher frequency of use for these methods is consistent with previous evidence based on census data for youth and older groups (Bradshaw 1973).

The time spent using each method appears in the next five rows. These intensive measures of use include only those who used each method and for whom time spent was not missing. The results show that friends and relatives, as well as direct application, are used most intensively as well. Since this measure reflects time costs per unit of search method as well as frequency of use per person (eq. [4]), and since these time costs are likely to be relatively low for use of friends and relatives, we can infer that

[12] Those out of the labor force are excluded from the sample as well so as not to confound search method choices with more general labor force participation

**Table 1**
**Search Method Used and Time Spent by Unemployed Youth**

| | Mean |
|---|---|
| No. of methods used | 3.286 |
| | (1.261) |
| Percentage who used: | |
| Friends/relatives | .852 |
| Direct application | .796 |
| State agency | .538 |
| Newspaper | .578 |
| Other methods | .524 |
| Time spent by those who used: | |
| Friends/relatives | 295.97 |
| | (516.37) |
| Direct application | 363.28 |
| | (536.28) |
| Stage agency | 212.23 |
| | (298.09) |
| Newspaper | 237.74 |
| | (309.11) |
| Other methods | 218.65 |
| | (255.11) |

NOTE.—Standard deviations are in parentheses. These calculations are based on data from the 1981 panel of the NLS, Youth Cohort. All means are weighted. The sample size for number of methods used and percentage using each method is 608. For time spent, sample sizes are: 236 for friends and relatives, 182 for direct application, 102 for state agencies, 142 for newspapers, and 108 for other methods. The sample includes nonenrolled and nonenlisted males who were unemployed and searching in the previous month.

frequency of use for this method of search is substantially higher than that for any other method.

Table 2 presents summary measures of outcomes for the entire sample and for each search method. These measures include the fraction of users who obtained job offers and accepted job offers for the entire sample and for users of each method.

The results show that 34% of the unemployed have received at least one offer in the previous month, and that 12% report more than one. The latter figure may, however, be biased upward if some report a single offer twice for different methods of search. Almost 28% of the unemployed report accepting new employment in the previous month. This constitutes about 82% of all individuals with offers and about 70% of all offers made.

The results for each method show that the two methods most likely to result in job offers and job acceptances are friends and relatives and direct application. In fact, these two methods account for about 67% of all reported offers and 74% of all accepted offers. While it has long been known that a large fraction of jobs are obtained from "informal search" and especially from friends and relatives, the results of tables 1 and 2 establish

**Table 2**
**Outcomes of Search Methods Used by Unemployed Youth**

| Outcomes | % |
|---|---|
| Job seekers who reported offers: | |
| One | .220 |
| Two or more | .120 |
| Job seekers who reported offers from use of: | |
| Friends/relatives | .177 |
| Direct application | .186 |
| State agency | .089 |
| Newspaper | .099 |
| Other methods | .078 |
| Job seekers who reported job acceptance: | |
| One | .234 |
| Two or more | .043 |
| Job seekers who reported acceptance from use of: | |
| Friends/relatives | .143 |
| Direct applications | .121 |
| State agency | .048 |
| Newspaper | .040 |
| Other methods | .050 |

NOTE.—Samples for those reporting offers and acceptances for each method include only those who used each one. All means were weighted.

for the first time that these high fractions reflect both higher productivity in generating jobs and higher frequency of use among these methods.[13] In fact, the high frequency and intensity of use for friends and relatives and for direct application may be at least partly explained by the high productivity of these methods in producing offers and acceptances, as predicted by the theoretical model presented above.

It should be noted here that the measures listed in table 2 reflect ex post rather than the ex ante outcomes needed for testing the theory. However, ex post outcomes will be relatively lower for methods with high frequency of use if productivity diminishes as frequency rises. If this is the case for friends and relatives or direct application, the ex ante outcomes for these methods are presumably even higher, and the result of high use for high productivity methods continues to hold.

Furthermore, the offer and acceptance probabilities of table 2 can be compared with time spent per method in table 1 to obtain a rough idea

[13] The question, "How did you obtain your most recent job?" reflects both frequency of use and productivity in generating offers and acceptances. For any method $j$, the probability that a job was obtained through $j$ can be written as $P(E_j|E) = P(E_j)/P(E)$, where $P(E_j)$ is the probability of having obtained the job through $j$ and $P(E)$ is the probability of having obtained any job. The numerator is a product of the probability of using method $j$ and the conditional probabilities of obtaining offers and accepting them from using that method.

about productivity per unit of time spent on each method.[14] This comparison clearly shows that the differences in table 2 across the search methods are greater in percentage terms (especially for accepted jobs) than are the respective differences in time intensities in table 1. While productivity across methods may be equalized per unit of time at the margin, the *average* productivities continue to show differences across methods that presumably reflect differences in ex ante offer functions.

The results on friends and relatives are particularly striking in that 81% of all offers received through this method are accepted—a percentage well above that of any other method listed. Since acceptance or rejection of offers presumably is based on a comparison of offered wages with reservation wages, this finding implies that job offers obtained through friends and relatives generally have higher wages and/or more appealing nonwage characteristics than those otherwise obtained.[15] This result is consistent with evidence showing low rates of quits out of such jobs (Datcher 1983). Also, it further explains the high frequency of use for this method observed above, as would its apparently low cost of use (in both time and money).

Finally, it is worth noting that differences in search method use between groups of individuals may also be explained by differences in relative productivities for these groups across these methods. While black-white differences in search method use and outcomes are explored elsewhere at greater length (Holzer 1987*a*), it is worth noting here that time spent on friends and relatives and on direct application is higher for whites, while time spent on other methods is higher for blacks.[16] Likewise, the racial differences in job offers for users of each method are generally highest for the first two (i.e., informal) methods. Thus, the prediction of the search model above that productivity of search methods affect their use appears to be supported by evidence across groups as well as for the unemployed overall.

I now consider some econometric evidence on the determinants and outcomes of search method use among unemployed youth.[17] Tables 3–5

[14] The numbers in the two tables are not directly comparable since offer and acceptance probabilities reflect search in the previous month, while time spent reflects the previous week. Furthermore, the differences in sample composition between the two are not totally random since many of those who received and accepted offers have stopped searching before the previous week.

[15] This result suggests that search methods might have different effects on wage offers (or even nonwage job characteristics) as well as on offer probabilities. The model presented above could potentially be expanded to reflect this possibility.

[16] Time spent on friends and relatives by whites and blacks is 322.3 and 210.6 minutes, respectively. Comparable numbers for the other methods are: 397.3 and 252.2 for direct applications, 186.6 and 292.5 for state agencies, 223.6 and 292.2 for newspapers, and 205.4 and 266.0 for all other methods. Fractions using each method are quite comparable between the two groups.

[17] Reservation wage formation and effects among unemployed youth are considered in Holzer (1986*a*, 1986*b*).

**Table 3**
**Equations for Number of Search Methods Used by Unemployed Youth**

| | 1 | 2 |
|---|---|---|
| Constant | 3.031 | 3.203 |
| | (.170) | (.085) |
| Predicted offers | .714 | . . . |
| | (.511) | |
| On layoff | −.308 | −.288 |
| | (.249) | (.253) |
| Married | .296 | .321 |
| | (.185) | (.186) |
| Duration of jobless spell | . . . | .029 |
| | | (.037) |
| $\bar{R}^2$ | .005 | .003 |
| df | 605 | 605 |

NOTE.—Predicted offers are based on estimated coefficients that appear in the Appendix. Duration is measured in hundreds of days.

present estimated coefficients from equations of the following general form:

$$S_i = S(Z_i, \hat{O}_i) + \varepsilon_{si}, \tag{11}$$

$$O_i = O(X_i, S_i) + \varepsilon_{oi}, \tag{12}$$

where $S_i$ is some measure of search method use for the $i$th individual, $O_i$ represents an employment outcome that depends on search choices, the $X_i$ are a vector of personal characteristics that affect offer probabilities and/or wage offers, and $Z_i$ are other characteristics that affect search choices, based on equations (2) and (3) above. While expected outcomes enter the search choice equations, these choices themselves enter the ex post outcome equations and are considered exogenous.

In table 3 I consider estimates of equation (11) in which the dependent variables are the number of search methods used in the previous month, while in table 4 I consider estimates in which the dependent variables are dichotomous variables for the use of each of the five search methods.[18] In both cases, the $Z_i$ include a dichotomous variable for marital status, one for being on layoff, and the duration of the current spell of unemployment. The predicted outcome variable is the probability of obtaining an offer, estimated from a first-stage equation that included the $Z_i$ and $X_i$ as inde-

[18] A preferable specification of these equations might have included $\hat{O}_{ij}$ for all five methods simultaneously since the theory implies that relative productivities of all methods are considered when choosing use for each one. However, attempts to estimate such expected productivities were hampered by selection problems (since use of each is endogenous), small sample sizes, and multicollinearity in eq. (11). The effort was therefore abandoned.

**Table 4**
**Equations for Specific Search Methods Used by Unemployed Youth**

| | Friends/Relatives | | Direct Application | | State Agency | | Newspaper | | Other Methods | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 |
| Constant | 1.067 | .923 | .551 | .805 | .141 | .095 | −.103 | .115 | −.110 | .033 |
| | (.210) | (.102) | (.189) | (.096) | (.170) | (.085) | (.171) | (.085) | (.170) | (.085) |
| Predicted offers | −.136 | . . . | .808 | . . . | −.199 | . . . | .851 | . . . | .579 | . . . |
| | (.632) | | (.579) | | (.513) | | (.516) | | (.513) | |
| Married | .318 | .338 | .115 | .133 | .711 | .703 | −.160 | −.130 | .006 | .024 |
| | (.253) | (.254) | (.216) | (.216) | (.205) | (.205) | (.185) | (.185) | (.187) | (.187) |
| On layoff | −.327 | −.255 | −.052 | −.068 | .003 | −.004 | .027 | .043 | −.597 | −.583 |
| | (.279) | (.284) | (.277) | (.282) | (.253) | (.257) | (.251) | (.254) | (.261) | (.264) |
| Duration of jobless spell | . . . | .060 | . . . | −.001 | . . . | −.008 | . . . | .027 | . . . | .023 |
| | | (.046) | | (.042) | | (.037) | | (.037) | | (.037) |
| −2 Log $L$ | 514.06 | 572.74 | 620.80 | 623.22 | 822.00 | 824.36 | 830.52 | 834.40 | 836.36 | 837.52 |

NOTE.—Equations are estimated using probit. Predicted offers are based on estimated coefficients that appear in the Appendix, and duration is measured in hundreds of days.

pendent variables. The $X_i$ include age, education, race, urban residence, region (South vs. non-South), family income, and the local unemployment rate. The estimated equation upon which this variable is calculated appears in the Appendix.

The decision to focus on number of methods used rather than time spent rested on the large number of missing values and presumed measurement error (based on memory) of the latter.[19] The number of methods used can be interpreted here as a proxy for total search intensity since that measure is also determined in the search model prescribed above (eq. [11]).

Offer probabilities are used as the expected outcome because other possible measures (e.g., acceptance probabilities or offered wages) were less consistent with the theoretical model presented above or involved some econometric difficulties.[20] As for the $Z_i$, the variables included here in no way constitute a complete specification. Most clearly missing from this group is a variable for unemployment insurance (UI) (or other sources of outside income). However, the UI variables in the NLS Youth Cohort refer to the previous year rather than month. In these equations the layoff variable provides a rough proxy for receipt of such funds as well as for the probability of being recalled. In addition, the marital status variable should capture marginal value of income (as related to family responsibilities), while duration of unemployment should capture income stocks or flows (from UI), tastes for leisure, and other factors.[21] The duration variable is treated as exogenous here, though some possible biases are considered below. Because of its high correlation with the offer probability term (see the Appendix), duration and offer probabilities appear in separate specifications below. The equations for number of methods used are estimated using ordinary least squares, while those for specific methods are estimated using probit.

[19] Sample sizes for time spent on each method appear in the note for table 1. Missing values appear for half or more of the users of each method (see n. 14 above).

[20] Acceptance probabilities have the appealing feature of reflecting wage offers but the problem of reflecting reservation wages as well. First-stage equations also had much lower explanatory power for this variable, producing low variance among the predicted variables. Furthermore, the lower mean of this variable resulted in more predicted values outside of the 0–1 range, which occurred in very few cases for the offer probabilities. As for offered wages, these were hampered by small sample sizes for most of the search methods considered here.

[21] Another variable that might have been used to capture marginal value of income was whether or not an individual lives at home, which was recently shown to be related to youth employment status (McElroy 1985). This variable was highly correlated with marital status, and the latter was used instead (though results using the former variable were often quite similar). Other variables that are frequently used to reflect discount rates among job searchers (e.g., asset values) were not available in the NLS Youth Cohort.

The results of table 3 show that there are several factors that influence the number of search methods used. Expected offer probabilities and being married have positive effects, while being on layoff has a negative effect. The last result appears to reflect recall probabilities or receipt of UI while on layoff, and the first two appear to reflect expected returns to search (and perhaps a higher marginal value of income among the married). All of these findings are fairly consistent with those of Barron and Mellow (1979) on the determinants of search intensity.[22] However, the results presented here are all only marginally significant, and the explanatory power of the equation is quite weak. When duration of unemployment is included among the independent variables, it has a positive though insignificant effect on search method use. This, too, is consistent with declining income and marginal value of time as a spell progresses. It is also likely that this coefficient represents a lower bound to the true effect of duration, due to various heterogeneity or selection effects.[23]

When similar equations are estimated for individual search method use, the results are somewhat more varied. Table 4 presents these estimates. Offer probabilities have positive and marginally significant effects on three methods and insignificant negative effects on the other two. It is perhaps not surprising that the latter two effects occur for friends and relatives and state employment agencies. The low cost of the former enables it to be used even by those with low expected returns, and the latter is known to be used primarily by those with few other opportunities. Marital status has effects that are positive and at least marginally significant for two methods, while being on layoff has similarly negative effects for two methods. Duration effects are mildly positive or close to zero in each case.

These results therefore suggest that the use of specific search methods varies across individuals with different opportunities in the labor market and different sources or needs for income. They are at least broadly consistent with the model presented above in which search method use is chosen on the basis of relative productivities and costs which can vary across people.

[22] Barron and Mellow find negative effects of being on layoff and having other income while unemployed on search intensity (defined as total hours spent searching in the previous week). Their findings of positive effects of past wages and education are also consistent with the findings here on expected offers and marital status.

[23] Since duration is presumably negatively correlated with unobserved skill, and since skill appears to be positively correlated with search method use, the resulting bias is downward on duration. In particular, when predicted offers were included along with duration in these equations, the coefficients on both rose dramatically (though these results presumably reflect the high correlation between these variables that is apparent from the first-stage offer equation in the Appendix). Furthermore, if shorter spells (due to high search method use) are less likely to be observed at the time of the survey, this "length bias" will be downward as well.

**Table 5**
**Equations for Offers Received from Search Methods Used**

| | 1 | 2 |
|---|---|---|
| No. of methods used | .145 | . . . |
| | (.045) | |
| Methods used: | | |
| Friends/relatives | . . . | .314 |
| | | (.166) |
| Direct application | . . . | .038 |
| | | (.138) |
| State agency | . . . | .138 |
| | | (.120) |
| Newspaper | . . . | .242 |
| | | (.116) |
| Other | . . . | .037 |
| | | (.118) |
| $-2$ Log $L$ | 736.91 | 733.82 |

NOTE.—Equations are estimated using probit. Control variables include age, education, region (South vs. non-South), urban residence, race, family income, and local unemployment rate.

In table 5 I turn to the effects of search method use on the production of offers. These estimates are based on equation (12), and the dependent variable is a dichotomous one for whether an offer has been received in the previous month. Two equations are presented: one in which the number of methods is used to reflect choice of search intensity, and one in which separate variables appear for the use of each specific method. Both equations are estimated using probit.

The results show that the number of search methods used has a positive and significant effect on the probability of receiving an offer. Estimated equations in which the dependent variable was receipt of a job offer and acceptance showed similar effects.[24] The results thus stand in marked contrast to those reported recently by Keeley and Robins (1985), who found negative effects on number of methods used on the probability of gaining employment. While they attribute the negative effects that they found to the job search requirements of the UI system, it is very possible that their results reflect the particular empirical specification that they use to estimate these effects.[25] But the results here are generally consistent with those of

[24] The estimated coefficient and standard error on number of methods in this equation were .109 and .048, respectively.

[25] Since Keeley and Robins control for intermediate effects (e.g., employer contacts) or total search hours in their equations for new employment outcomes, these variables may be partially capturing the effects of number of methods. The fact that they also control for UI search requirements in their equations casts doubt on the claim that the negative effects of search methods can be explained by these requirements.

Barron and Gilley (1981), Yoon (1981), and Chirinko (1982), who find positive effects of search intensity on a variety of outcomes.[26]

As for the use of specific search methods, friends and relatives once again show the largest positive effect on receipt of offers, while state agencies and newspapers show effects that are also positive and at least marginally significant. The effect for state agencies is particularly noteworthy, given their reputation for low effectiveness. Furthermore, no method shows a negative effect on receipt of offers

These results thus show that, while different search methods may have different effects on employment outcomes, they appear to be chosen in a manner that generates positive effect on these outcomes. Total search intensity (as measured by the number of methods used) seems to be chosen in such a manner as well. Methods that generate fewer offers (such as state agencies) are chosen less frequently and mostly by those with fewer other opportunities, but even these methods show some effectiveness for those who use them. Given that there are presumably costs for the use of each method, the finding of positive average effects on outcomes is again consistent with a model in which individuals choose methods that balance the relative productivities and costs of each.

## IV. Conclusion

In this article I investigate the use of different search methods by unemployed youth. I present a job search model which shows that search method choices should be related to their costs and expected productivities, as well as to other factors such as nonwage income.

I then present empirical evidence on the use of these methods and their effects on employment outcomes. These results show that the most frequently used search methods, which are friends and relatives and direct application, are also the most productive in generating job offers and acceptances. The acceptance rate for offers generated by friends and relatives is particularly high.

Econometric evidence then shows that the number of methods used is affected by factors such as expected offers, marital status, and being on layoff, which presumably reflect market opportunities as well as income sources and needs. While the use of specific search methods responds differently to these factors, they are chosen in a manner that generates positive average effects on employment outcomes. The results thus suggest that overall search intensity, as well as its allocation across methods, is chosen

[26] Barron and Gilley find positive effects of search intensity on the probability of being employed and on the number of contacts made with employers, while Chirinko finds a similar positive effect (though with diminishing returns) on employer contacts. Yoon, using the number of contacts as a measure of intensity (rather than as an outcome variable), finds negative effects of this variable on weeks unemployed.

by individuals who balance relative productivities and costs, as the model suggests they should.

The fact that search methods are chosen more or less frequently by different individuals and that these methods have significant effects on outcomes suggests that they may be an important part of the labor market process by which individuals are matched with jobs. More research is needed to further our understanding of this process. In particular, we need to increase our understanding of why search methods vary in productivity across individuals who differ in personal characteristics such as race and family background. Furthermore, we need to understand why the hiring policies of firms vary in their reliance on employee referrals, direct applications, and outside institutions. These decisions by firms clearly affect the productivities of search methods that are exogenously determined for individuals in the model presented here. Therefore, the analysis of search

## Appendix

### Table A1
### First-Stage Equation for Offer Probabilities

| | Coefficients |
|---|---|
| Constant | .296 |
| | (.194) |
| Age | .007 |
| | (.010) |
| Education: | |
| High school | −.014 |
| | (.041) |
| College | .181 |
| | (.180) |
| Race | −.059 |
| | (.042) |
| South | −.018 |
| | (.043) |
| Urban residence | .002 |
| | (.048) |
| Family income | .003 |
| | (.002) |
| Family income missing | .015 |
| | (.050) |
| Local unemployment rate: | |
| <3% | −.026 |
| | (.056) |
| 3%–6% | −.012 |
| | (.043) |
| Duration of unemployment spell | −.056 |
| | (.014) |
| Married | −.026 |
| | (.070) |
| On layoff | −.108 |
| | (.093) |
| $\bar{R}^2$ | .025 |
| df | 595 |

NOTE.—Standard errors are in parentheses. Family-income variable includes zeroes for missing values and a dummy variable that equals one in these cases. Family income is measured in thousands of dollars, while duration is measured in hundreds of days.

method use in general equilibrium search models, as well as more empirical analysis of both employer and employee search behavior, are clearly warranted.

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