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ABSTRACT

The conventional economic model of labor supply is extended to include job-search activity of the worker. Off-the-job training may also be subsumed in the model. Search incentives are predicted for particular tax and transfer policies--proportional and progressive income taxes and income, wage, and earnings subsidies. For most policies, the slope of the labor-supply schedule affects whether positive or negative search incentives arise relative to laissez-faire. Only the income subsidy exerts unambiguously negative effects on search activity. A comparison of equal-revenue progressive and proportional income taxes reveals the latter to have greater search incentives. A comparison of equal-transfer subsidy plans shows the earnings subsidy to evoke more search than the other two subsidy forms, so long as we consider only the positive marginal subsidy range of the earnings subsidy. However, no general ranking of the three subsidy plans can be made on grounds of their search incentives.

Most policies affect the distribution of market wage rates in a determinate fashion. Whereas both tax forms induce greater inequality, the wage and earnings subsidies both promote equality. Work-effort and job-search considerations are combined in an analysis of the impact of each policy on the worker's gross market earnings. Deductibility of direct costs of search in tax and transfer policies is found to have an ambiguous effect on search undertaken and a disincentive to work effort. An extension of the model to include choice among jobs with different mixes of monetary (taxed) versus nonpecuniary (untaxed) rewards is sketched. The empirical evidence examined here is consistent with the predicted responses of the model. Finally, an application to the interpretation of income maintenance experiments is offered.

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I. Introduction

The effects of tax and transfer programs on work effort are well-developed extensions of static labor-supply analysis.[1] A much neglected range of tax effects lies in the dynamic aspects of worker behavior.[2] Job search activity, choice between jobs with more or less nonpecuniary rewards, and human-capital investment are the principal omitted responses. Owing to the prominence of income taxes in the existing fiscal structure, any induced effects on dynamic worker behavior will carry great import for policy. Implications for the wage structure and the efficiency of labor markets are clearly present. The prospect of major innovation at the transfer end of the fiscal structure further heightens our need to understand the dynamic effects of alternative policy proposals.

Our first goal will be to integrate job-search behavior into the conventional one-period model of labor supply. Human-capital investment which is time-intensive can be subsumed in the model; a minor addition permits the consideration of money costs in training, as well. We shall outline an extension of the model to include choice among jobs with different amounts of nonpecuniary rewards. Our second goal will be to predict the job-search incentive effects of specific tax and transfer policies. We shall include both positively-sloped and backward-bending labor-supply schedules in the analysis. The next goal will be to present empirical evidence bearing on the validity of the general model. Finally, the model will be applied to the interpretation of job-search findings from an experimental income transfer program.

II. Job Search in a Labor-Supply Model

A. Modelling Approaches

The simultaneous modelling of an individual's job-search and work-effort behavior requires a consumer-demand framework. In general, the worker's marginal rate of substitution between income and leisure will depend upon his income level. Any income effects from job-search decisions will impinge on labor-supply decisions. Consumption of leisure, which is subjectively evaluated by the worker, may be altered in the process. Consequently, a present-value choice framework is inappropriate here. The present-value approach has been utilized by Garfinkel (1973) in examining tax effects on human-capital investment and by McCall (1970) and Mortensen (1970) in job-search models. This approach treats the second activity in isolation from labor-supply activity.

The modelling could proceed along single-period or multi-period lines. Either of two conditions might justify the use of a multi-period model. One is where the worker faces different, but exogenously given, prices over time. Metcalf (1973) has exploited this approach in analyzing the incentive effects of temporary income transfer programs. The other condition for adopting a multi-period model arises where the worker faces a truly sequential decision problem. Then the prices faced by the worker in each period depend upon his actions in earlier periods.[3] This would be accurate in the portrayal of occupations with much on-the-job training and advancement hierarchies. For lower-echelon white-collar workers, many blue-collar workers, and most laborers and casual workers, the sequential aspects of job choice are relatively minor.

While restricting our range of occupational relevance, we shall opt for a single-period model. This facilitates integration of job search with the traditional labor-supply model. How can we interpret a one-period model of job search? The worker is seen as needing to undertake some level of search merely to maintain his job. For workers who experience frequent involuntary turnover, this is reasonable. For more stable workers who do not face sequential decisions, the model is reasonable if the period is taken as several years or even a working life.

We shall further opt for a certainty model, despite the strains this places on the notion of job search. This choice is a practical one. A general uncertainty model will not yield the determinate comparative static results which we seek in our analysis of tax effects. Our formulation will correspond in expected value to one class of stochastic search models, as explained below.

B. Assumptions of the Model

Job-search time readily enters the standard one-period labor-supply model. Total hours in the period, K, must now satisfy:[4]

$$K = L + H + S , \tag{1}$$

where L is leisure hours, H is work hours, and S is job-search hours. Let us specify a wage-rate function:

$$W = vW(S) + u , \tag{2}$$

where u and v are tax or subsidy parameters.[5] W is the worker's effective or net wage rate, while W(S) is his market or gross wage rate. Program parameter u makes the two wage rates diverge by an additive constant. Program parameter v makes the two rates diverge by a constant proportion.

In our micro view of the search process, $W(S)$ is the market-wage schedule faced by an individual worker.[6] We shall assume only that $W(S)$ is increasing in S:

$$W' \equiv dW(S)/dS > 0 , \qquad (3)$$

$$W'' \equiv d^2W(S)/dS^2 \gtreqless 0 . \qquad (4)$$

Note that market wage rates are used in these derivatives. The first functional property (3) reflects the productivity of search time in uncovering better offers for the worker. It is the outcome of a class of random search models in which the worker can "collect" job offers. The worker's expected highest wage-rate offer will be positively related to search time. Our model will later impose additional bounds on the values of W' and W''.

If offers generated are proportional to search time, a purely random search process yields a stronger result than property (4). In a result attributed to Robert Solow, Stigler (1961) notes that random search with collectible offers implies expected diminishing marginal returns to offers. This would render W'' negative. We wish to take a broader view allowing search to be nonrandom or offers to be not strictly proportional to search time. This process is recommended by the empirical work of Bluestone, Murphy, and Stevenson (1971) and theoretical work of Eaton and Neher (1973). These writers describe a world with high-wage and low-wage industries in which a worker with given skills can seek employment. By an extra expenditure of search time, a worker might break into the high wage industry. Thus W'' may be positive over some ranges of S in this circumstance. In the context of off-the-job training, locally increasing marginal returns to training time are a natural phenomenon. Time expended to complete the requirements for certification is an example.

The budget constraint facing the worker consists of lump-sum income (T) and work-conditioned components:

$$Y = T + (K-L-S)[vW(S)+u] . \tag{5}$$

After-tax income of the worker is Y. Work-conditioned income depends on search time as well as leisure time. Specification (5) holds for most linear tax and subsidy forms including the following:

$v = 1,$	$u = 0,$	$T = 0,$	laissez faire;
$0 < v < 1,$	$u = 0,$	$T = 0,$	proportional income tax;
$0 < v < 1,$	$u = 0,$	$T > 0,$	income subsidy, progressive income tax;
$0 < v < 1,$	$u > 0,$	$T = 0,$	wage subsidy;
$v > 1,$	$u = 0,$	$T = 0,$	earnings subsidy

For simplicity only we have assumed that T = 0 under laissez faire. Above its so-called break-even income level, the income subsidy can be regarded as a flat-rate progressive income tax. The earnings subsidy budget is described only below its recapture earnings level; about this level it is identical to an income subsidy. Other fiscal forms, such as a progressive income tax with more than one bracket, a categorical income subsidy, or overtime wage subsidy, require various departures from specification (5).

The worker's problem is to choose Y and L to maximize his utility function:

$$U = U(Y, L), \tag{6}$$

subject to the budget constraint (5). This formulation assumes that hours of search-time and work-time are perceived by the worker as equivalent in effort, distaste, or disutility. Without this strong assumption, the utility function would require a third argument.

C. Basic Properties of the Model

The assumed form of utility converts the problem to a two-stage maximization. For any given amount of leisure consumed, the worker wishes to choose the income-maximizing combination of search and work times. This determines his budget constraint in income-leisure space. Subject to this constraint, the worker chooses the utility-maximizing bundle of income and leisure.

The income-maximizing choice of search time for any given leisure time is determined:

$$\partial Y/\partial S \;=\; 0 \;\leftrightarrow\; HvW'-W = 0 \;. \tag{7}$$

We call this the optimality condition for job-search. Let us interpret this condition under laissez faire (or any program other than a wage subsidy):

$$W(S) \;=\; HW' \quad \text{with } u = 0 \quad . \tag{8}$$

A worker is spending the optimal time on search when a marginal hour will earn him the same amount at work, $W(S)$, as at search, HW'. Because v enters both sides of the equality, its value does not affect the result. Search optimality is not dependent on the marginal utilities, owing to the assumed utility form (6). The second-order condition for (7) to be a maximum rather than a minimum solution is:

$$\partial^2 Y/\partial S^2 < 0 \;\leftrightarrow\; HW'' - 2W' < 0 \;. \tag{9}$$

Before proceeding to the second stage of the maximization, we examine two properties of the income-maximizing budget constraint. The slope is readily established:

$$dY/dL \;=\; (\partial Y/\partial S)(dS/dL) + \partial Y/\partial L = \partial Y/\partial L = -W \tag{10}$$

by using condition (7). Search behavior makes the budget constraint nonlinear, but at any point its slope is minus the net wage rate. Because search time is assumed to be productive, the curvature depends uniquely on the sign of dS/dL. Using the implicit function theorem on (7), we obtain:

$$dS/dL = W'/(HW'' - 2W') \quad . \tag{11}$$

Result (9) ensures that dS/dL will be negative. The budget constraint in income-leisure space will be convex. Note that:

$$dS/dL < 0 \leftrightarrow W'' < 2W'/H \rightarrow W'' \gtrless 0 \;, \tag{12}$$

so that W'', while restricted in value, is not restricted in sign.

Let us conventionally assume the utility function to be twice differentiable and concave:

$$C \equiv W^2U_{YY} - 2WU_{YL} + U_{LL} < 0 \quad . \tag{13}$$

We shall later state the stronger second-order condition needed for an internal tangency in the presence of the convex budget constraint. Let us designate income the numeraire good. Then the first-order condition for the worker's utility-maximum will be:

$$U_Y = U_L/W \quad . \tag{14}$$

This is the familiar first-order condition of the standard labor-supply model.

Preliminary to a formal analysis of the response of search time to the program parameters, let us illustrate the response to a lump-sum transfer. This response will hinge on the convexity of the budget locus and the normality or inferiority of leisure. In Figure 1, a lump-sum transfer of

Insert Figure 1

size KK' simply raises the budget locus from KJ to K'J'. The initial equilibrium on KJ lies at point A. If leisure is a normal good, indifference curves lying directly above point A will be progressively steeper. Hence, at point A' above point A on K'J' the indifference curve will intersect the elevated budget locus from above. This implies a new worker equilibrium at point B, to the right of A, and at a lower wage rate. Since the relation between wage rates and search time is monotonic, we have established $dS/dT < 0$. It should be clear, without presenting a figure, that inferiority of leisure is necessary for the lump-sum transfer to raise search time.

III. Analysis of Tax Effects

A. Response to Program Parameters

To obtain the responses of search time to program parameters T, v, and u, the first-order conditions (7) and (14) are differentiated totally with respect to them. The resulting system is:

$$A \begin{bmatrix} dS/dT & dS/dv & dS/du \\ dL/dT & dL/dv & dL/du \end{bmatrix} = \begin{bmatrix} \left(WU_{YY} - U_{YL}\right) & W(S)\theta & \theta \\ 0 & u/v^2 & -1/v \end{bmatrix} \tag{15}$$

with the matrix:

$$A = \begin{bmatrix} -U_Y vW' & C \\ (2W' - HW'') & W' \end{bmatrix} \tag{16}$$

and its determinant:

$$|A| = -U_Y v(W')^2 - (2W' - HW'')\,C\,. \tag{17}$$

We find the relation:

$$-C/U_Y > v(W')^2/(2W' - HW'') \leftrightarrow |A| > 0\,. \tag{18}$$

The term $-C/U_Y$ can be confirmed by a result of Chiang (1974, p. 394) as the curvature of an indifference curve. The term $v(W')^2/(2W'-HW'')$ can be found as the curvature of the budget constraint by differentiation of result (10) for d^2Y/dL^2. Thus, the second-order condition on the utility maximization implies $|A|$ positive.[7]

A term appearing in (15) is:

$$\theta \equiv U_Y + H(WU_{YY} - U_{YL}). \tag{19}$$

This term is related to the elasticity of the marginal utility of income with respect to hours worked.[8] Cooper (1952, p. 65) proves that the sign of θ fixes the slope of the worker's ordinary labor-supply schedule. For θ positive, labor supply is positively sloped; for θ negative, backward-bending.

Response of search and leisure time to changes in the policy parameters can be found by Cramer's Rule. Henceforth, we shall omit the denominator $|A|$ on the right-hand-side of these response expressions. Since $|A|$ is positive, this will not affect our primary goal of determining <u>signs</u> of response. We begin with changes in the lump-sum income parameter:

$$dS/dT = (WU_{YY} - U_{YL})W' , \tag{20}$$

$$dL/dT = -(WU_{YY} - U_{YL})(2W' - HW'') . \tag{21}$$

For leisure to be a normal good we require $(WU_{YY} - U_{YL})$ negative, as in the standard two-good model without search time.[9] As demonstrated graphically before, search time responds inversely to changes in lump-sum income with leisure normal.

In our modification of the standard labor-supply model, normality of leisure is no longer sufficient to assure dH/dT negative. Let us take explicitly:

$$dH/dT = -dL/dT - dS/dT = (WU_{YY} - U_{YL})[(2W' - HW'') - W'] . \tag{22}$$

The sign of the response of hours worked to an increase in lump sum income depends on the sign of the bracketted expression in (22). Reference to result (11) in turn shows:

$$dS/dL \;=\; W'/(HW'' - 2W') \gtrless 1 \leftrightarrow dH/dT \lessgtr 0 \; . \tag{23}$$

Naturally, dH/dT negative requires that not all of increased leisure time come out of decreased search time. It is further observed that W" negative is sufficient (but not necessary) to yield dH/dT negative. This finding may have interest for empirical labor-supply estimates. Income coefficients in hours-worked regressions need not be negative to be theoretically justifiable. Positive income coefficients have in fact occasionally been estimated.

Responses of search time to parameters v and u can similarly be found:

$$dS/dv \;=\; W'W(S)\theta - Cu/v^2 \; , \tag{24}$$

$$dS/du \;=\; W'\theta + C/v \; . \tag{25}$$

Given that all tax and subsidy schemes considered in this paper have $u \geq 0$, we find dS/dv positive for $\theta > 0$. If we consider only $u=0$, we find dS/dv negative for $\theta < 0$. Responses to changes in u are rendered ambiguous by $\theta > 0$. Let us state the limiting case: $dS/du < 0$ for $\theta \leq 0$ and $d^2S/dud\theta > 0$. Another useful result derivable from (15) is:

$$dL/dv \;=\; - U_Y W'u/v - (2W' - HW'')W(S)\theta \; . \tag{26}$$

For programs with $u \geq 0$, or all programs considered here, the case of $\theta > 0$ carries dL/dv negative.

We have seen the sign of dS/du to be ambiguous when labor supply is positively sloped. The more plausible response would be dS/du negative. With u higher, the net returns to additional search are a smaller proportion of the worker's current net wage rate. Our empirical evidence presented later supports this intuition. We calculate the relation:

$$dS/dv = W(S)\ dS/du - CW/v^2 \tag{27}$$

irrespective of sign of θ, so that:

$$dS/du > 0 \rightarrow \frac{dS}{dv} > 0 \quad \text{but} \quad dS/du < 0 \rightarrow \frac{dS}{du} \gtrless 0 \tag{28}$$

This set of implications may prove useful in empirical tests, as dS/du is more readily measured than dS/dv.

B. Search Response to Specific Programs

We have demonstrated how job search can be treated as an integral part of the conventional labor-supply model. Our next goal is to predict the overall incentives for job search posed by several tax and subsidy programs. These incentives will be stated for each program relative to a laissez-faire setting. We shall also make comparisons between the two tax programs and among the three subsidy programs. As before, we simplify by assuming that workers have no lump-sum income in the absence of a program. Laissez faire is characterized by $T=0$, $v=1$, and $u=0$.

The simplest program is a proportional income tax with no exemptions. With $\Delta T=T=0$, $\Delta v=v-1<0$, and $\Delta u=u=0$, we calculate:

$$\Delta S = (dS/dv)\Delta v \ . \tag{29}$$

With $\theta>0$, the tax exerts a negative influence on search time; with $\theta<0$, more search time is induced. Relative to laissez-faire, the earnings subsidy offers $\Delta T=T=0$, $\Delta v=v-1>0$, and $\Delta u=u=0$. Result (29) applies again, but the results are reversed owing to the opposite sign for Δv. With $\theta>0$, the earnings subsidy induces additional job search; with $\theta<0$ it poses a disincentive to searching. Note that this treatment covers only the positive marginal subsidy range of the earnings subsidy.

The income subsidy and progressive income tax are merely different stretches of a common budget line.[10] Both offer $\Delta T=T>0$, $\Delta v=v-1<0$, and $\Delta u=u=0$. The impact on search time is:

$$\begin{aligned} \Delta S &= (dS/dT)\Delta T + (dS/dv)\Delta v \\ &= W'\left\{\left(WU_{YY} - U_{YL}\right)\Delta T + W(S)\theta\Delta v\right\} \qquad (30) \\ &= W'\left\{\left(WU_{YY} - U_{YL}\right)\left[\Delta T + W(S)\Delta vH\right] + W(S)\Delta vU_{Y}\right\} \ . \end{aligned}$$

The third line of result (30) utilizes definition (19). Recalling that $(WU_{YY} - U_{YL})$ is negative with leisure normal, the second line of (30) indicates a search disincentive under both programs with $\theta>0$. The third line of (30) indicates a disincentive irrespective of sign of θ if:

$$\Delta T + W(S)\Delta vH > 0 \leftrightarrow W(S)H < T/(1-v) \ . \qquad (31)$$

The right-hand inequality of (31) states that the worker has gross earnings less than the break-even income level in an income subsidy program. Income subsidy beneficiaries will reduce their search time regardless of the slope of their labor-supply curves. The progressive income tax has ambiguous search incentives if $\theta<0$.

To explore the incentives to search under a wage subsidy, where $\Delta T = 0$, $\Delta v = v-1 < 0$, and $\Delta u = u > 0$, we calculate:

$$\begin{aligned} \Delta S &= (dS/dv)\Delta v + (dS/du)\Delta u \\ &= W'\theta[(v-1)W(S) + u] + uC/v^2 \ . \end{aligned} \tag{32}$$

The market wage rate of a wage-subsidy beneficiary must lie beneath a break-even wage rate:

$$W(S) < u/(1-v) \quad \leftrightarrow \quad (v-1)W(s) + u > 0 \ . \tag{33}$$

This renders the sign of ΔS negative for $\theta < 0$ and ambiguous for $\theta > 0$. With $\theta > 0$ the search response is also negative for workers with market wage rates <u>just below</u> the break-even wage rate. Note that $d\Delta S/dW(S)$ is negative. This implies that a wage subsidy may increase the search time of workers with sufficiently low market wage rates.

All of the comparisons up to here have examined discrete changes from laissez-faire to a tax or transfer situation. Each has involved a gain or loss of revenue. We next examine the relative search effects of the two tax policies and of the three transfer policies. Each comparison will hold net revenue or net transfer constant between the two programs. All of these comparisons will include only marginal changes from one policy to another. As we shall see, this will make the results independent of the slope of the labor-supply curve. What happens to search incentives in moving from a proportional to a progressive income tax? Take a constant-revenue program:

$$\bar{R} = -T + (1-v)HW(S) \ . \tag{34}$$

For a small change in parameters, holding revenue constant, we have:

$$dv = -dT/(HW(S)) \quad (35)$$

We can think of a small increase in T from an initial value of zero. The impact on search is:

$$\Delta S = (dS/dT)dT + (dS/dv)\ [-dT/(HW(S))] = -W'U_Y dT/H \quad (36)$$

This result utilizes definition (19). The move toward progressivity in the income tax carries an unambiguous disincentive to job search.

Insert Table 1

With three different subsidy policies, we have three distinct two-way comparisons. Let us present the analysis only for the most complex of the three. Results for all as well as a summary of all previous results are presented in Table 1. What happens to search incentives in moving from an income subsidy to a wage subsidy? Take a constant transfer with all parameters of both programs:

$$-\bar{R} = T + [u + (v-1)W(S)]H \quad (37)$$

Holding net transfer constant, we have the following relations for small parameter changes:

$$dT = -Hdu , \quad (38)$$

$$dv = -du/W(S) .$$

We can think of a small increase in u from an initial value of zero, with T decreasing from a small positive value. The impact on search is:

$$\Delta S = (dS/dT)(-Hdu) + (dS/du)du + (dS/dv)(-du/W(S)) \tag{40}$$

$$= du\left[-H(WU_{YY} - U_{YL})W' + CW/(W(S)v^2)\right] .$$

The job search effects of this policy move are ambiguous irrespective of θ sign.

Table 1 reports two other subsidy comparisons. Movement from an income or wage subsidy to an equal-transfer earnings subsidy increases search activity. The earnings subsidy appears favorably on grounds of dynamic incentives. However, a full evaluation of the earnings subsidy must include the income-subsidy range of its schedule. To achieve an equal-transfer income and earnings subsidy may consequently require a more generous income transfer component in the latter. Recall the ambiguous ranking of the equal-transfer wage and income subsidies. Thus, the earnings subsidy will have overall search incentives which are a weighted combination of something superior to the wage subsidy and something which may be inferior to the wage subsidy. This leaves us without a determinate ranking of transfer programs on grounds of their search incentives.

C. Distributional and Earnings Effects

The distribution of wage rates is affected by the fiscal structure employed in the economy. This shows up in Table 1 by programs which, relative to laissez-faire, have one sign of effect for $\theta > 0$ and an opposite sign for $\theta < 0$. Most estimates of labor-supply behavior of married prime age males show a positive slope up to wage rates around

\$2.50-\$3.00, then a backward bend for higher wage rates.[11] Proportional and progressive income taxes discourage search activity for $\theta > 0$ (lower wage rates) and encourage search activity for $\theta < 0$ (higher wage rates). In this way, they create greater inequality of wage rates in the married male population. Wage and earnings subsidies can be seen to have the opposite effects at wages below and above the bend in the labor-supply curve. Either subsidy form will consequently bring greater equality in the distribution of market wage rates. This argument presumes that each program covers the full wage distribution, but partial arguments can be constructed.

It is possible to predict the net impact on a worker's market earnings from the combined dynamic and static effects. Market wage earnings of the worker are defined:

$$E \equiv W(S)H \, . \tag{41}$$

With the proportional income tax and earnings subsidy, the only parameter differing from its laissez-faire value is v. The impact on earnings will be:

$$\begin{aligned} \Delta E &= (dE/dv)\Delta v \qquad (42) \\ &= \{HW'(dS/dv) - W(S)[(dL/dv) + (dS/dv)]\}\Delta v \\ &= -W(S)(dL/dv)\Delta v \, . \end{aligned}$$

Via the search optimality condition (8) with u=0, terms in dS/dv drop out of the final result (42). With $\theta > 0$, the proportional income tax decreases and earnings subsidy increases the worker's market earnings. Backward-bending supply reverses these findings.

The impact of a progressive income tax or income subsidy on gross earnings of a worker will be:

$$\begin{aligned}\Delta E &= (dE/dT)\Delta T + (dE/dv)\Delta v \\ &= -W(S)[(dL/dT)\Delta T + (dL/dv)\Delta v] \qquad (43)\\ &= W(S)(2W' - HW'')[(WU_{YY} - U_{YL})\Delta T - W(S)\theta\Delta v] \\ &= W(S)(2W' - HW'')\{(WU_{YY} - U_{YL})[\Delta T + W(S)H\Delta v] + W(S)U_Y\Delta v\} \ .\end{aligned}$$

The third line of (43) shows that both programs reduce gross earnings if $\theta < 0$. The fourth line shows further that the income subsidy will reduce gross earnings for all recipients with $\theta > 0$ as well. This utilizes result (31) for gross earnings beneath the break-even income level. The effect of a progressive income tax on market earnings is ambiguous with $\theta > 0$. We do not present the details of our additional finding that a wage subsidy may cause market earnings to rise or fall. The conditions in this result are complex and not particularly illuminating.

3.4 Comparison with Other Findings

Other studies have analyzed some of the effects investigated here relating to transfer policies. Our results on job search are immediately applicable to off-the-job training, as the two activities have similar economic properties. One tradition of analysis is the present-value criterion for worker choice in a human-investment decision. Garfinkel (1973) calls this "the equilibrium condition for a utility maximizing individual." He restricts the problem by defining off-the-job training as an investment that entails a reduction of <u>work</u> hours. Our consumer-behavior model permits "investment" hours to come out of work or leisure hours. Garfinkel finds an unambiguous reduction in training under a wage subsidy; whereas we have found an ambiguous response in the case of positively-sloped labor supply schedules. He further finds the investment incentives of an income subsidy to dominate clearly those of a wage subsidy. We are unable to rank the two programs with either slope in the labor-supply schedule. Haveman, Lurie, and Mirer (1973) follow the same tradition of analysis for the earnings subsidy. They find that movement from laissez faire to an earnings subsidy carries no investment incentive effects. This contrasts with our finding of distinct positive and negative incentive effects depending on the slope of the labor-supply schedule. All of these authors also examine subcases where the investment act moves the worker from a subsidized to a nonsubsidized range of earnings or wage rate. We have not pursued the latter line of analysis.

Our consumer-behavior tradition of analysis has also been employed by Rae (1974a). As noted earlier, he employs a multi-period model primarily out of concern for the investment effects of temporary versus permanent programs. Otherwise, as we have seen, a one-period model is sufficient for analysis of the major comparative static results of interest. Rae posits a lifetime utility function which is separably additive in the individual years' utilities. Each year's utility follows our restrictive formulation (6). Investment time is productive, making W' positive, but W'' is restricted to be negative, with perfect certainty in returns assumed. Rae assumes that the worker undertakes all investment during the first year and begins working only after completing his training. He assumes the second-order conditions to hold without further analysis or recognition of the nonlinearity of the budget constraint. His predicted investment incentives in moving from laissez-faire to an income or wage subsidy are determinately negative. He finds the training incentives of an earnings subsidy to be ambiguous. This nonfinding probably results from a failure to distinguish between the two slope signs for the labor-supply schedule. Rae's triple pair-wise rankings of the incentives of the three transfer programs, holding constant the amount transferred, all agree with our findings.

IV. Extensions of the Model

A. Direct Costs of Search

Our first extension of the basic model will allow for direct money costs in job search. Thus far, we have considered only the worker's time input into search activity. A workable assumption is that direct costs are a linear function of search time. This also seems reasonable in the context of off-the-job training, where tuitions, textbooks, and practice materials are roughly proportional to time expended after some start-up costs. Since our model presumes that every worker will search some during the period, we can omit the constant term of the linear function.[12] The budget constraint is transformed to:

$$Y = T + (K-L-S)[vW(S) + u] - \alpha S \,, \tag{44}$$

where α is the marginal direct cost of a search hour.

Let us sketch the changes in analysis induced by the new budget constraint (44). The first-order condition of the income maximization becomes:

$$\partial Y/\partial S = -W + HvW' - \alpha = 0 \,. \tag{45}$$

The second-order condition of the income maximization and both conditions of the utility maximization remain as before. Calculation of the full displacement system yields the following differences from our earlier system (15):

$$A \begin{bmatrix} dS/dv & dS/d\alpha \\ dL/dv & dL/d\alpha \end{bmatrix} = \begin{bmatrix} W(S)\theta & -S(WU_{YY}-U_{YL}) \\ (\alpha+u)/v^2 & -1/v \end{bmatrix} . \tag{46}$$

Responses of S and L to parameters T and u are unaltered. We solve (46) for the new responses to v:

$$dS/dv = W(S)\theta W' - C\ (\alpha+u)/v^2 , \tag{47}$$

$$dL/dv = -U_Y W'(\alpha+u)/v - W(S)\theta(2W'-HW'') . \tag{48}$$

These are similar to the results without direct search costs, with α entering additively with u wherever it appears.

A general fiscal policy question is how the deductibility of search or training costs affects behavior. This question pertains to both tax and transfer policies. By varying parameter α, we can predict the effects of permitting larger deductions. Solution of (46) yields:

$$dS/d\alpha = -SW'(WU_{YY} - U_{YL}) + C/v , \tag{49}$$

$$dL/d\alpha = U_Y W' + S(WU_{YY} - U_{YL})(2W'-HW'') . \tag{50}$$

Inspection confirms the indeterminacy of sign of both responses if leisure is normal. Inferiority of leisure is sufficient but not necessary to determine the signs of both responses--making $dS/d\alpha$ negative and $dL/d\alpha$ positive. Why do we not find $dS/d\alpha$ negative in general, as if search time were an ordinary consumer good? A decrease in α exerts a positive income effect as well as a substitution effect. Recall that normality of leisure implies a rise in lump-sum income will decrease search time. In short, there is no general finding that an increase in permitted deductions ($d\alpha < 0$) will increase workers' incentives to search or train.

An increase in permissible deductions of search costs may affect labor supply. We calculate:

$$\begin{aligned} dH/d\alpha &= -dS/d\alpha - dL/d\alpha \\ &= -S(dH/dT) - C/v - U_Y W' . \end{aligned} \tag{51}$$

This derivation utilizes result (22) for dH/dT. The sign of $dH/d\alpha$ is determinate conditional on dH/dT being negative. Clearly, the first term in (51) will be positive. The second and third terms together can be found positive using result (22) along with the overall second-order condition (18). These yield $dH/d\alpha$ positive. Extending permissible deductions thus poses disincentives to work effort.

B. Heterogeneous Jobs

Tax and transfer treatment of earned incomes may induce workers to choose jobs of different quality. Quality of jobs encompasses many dimensions, but we shall focus on two of them. They are in-kind fringe benefits and on-the-job leisure. The job-search model of this paper can readily be extended to include either dimension of job quality. Both are germane considerations for incentive effects and occupational choice under tax and subsidy programs. The kind of jobs supplied by firms can itself be expected to change in the face of tax and subsidy programs.

Different jobs will offer varying amounts of fringe benefits not subject to taxation. Let q be the worker's money valuation on such benefits per work hour. We shall assume the flow of benefits to be proportional to work hours, though this is not always realistic. The worker's net effective wage rate will now be:

$$W^* = vW(S,q) + u + q \;, \tag{52}$$

where the wage-rate function includes job quality along with search time. Firm behavior suggests $W_q <$ and $W_{qq} < 0$. The worker's benefit income per period will be:

$$Q = (K-L-S)\,q \;, \tag{53}$$

and his net total income will be:

$$Y^* = Y + Q \;. \tag{54}$$

The two-argument utility function appears:

$$U = U(Y^*,L) \;. \tag{55}$$

Control variables for the worker include q(or Q) along with L and S. First-order conditions similar to (7) and (14) are augmented by:

$$vW_q + 1 = 0 \;, \tag{56}$$

an additional income-maximizing condition.

An alternative model is generated by the varying amounts of on-the-job leisure connected with various jobs. This leisure cannot be taxed any more feasibly than can off-the-job leisure. The worker's net wage rate will be:

$$W^* = vW(S,q) + u . \tag{57}$$

Up to some point, on-the-job leisure (rest breaks) contributes to the productivity of workers during the hours of actual work. Beyond this point, we would expect a supply of jobs with $W_q < 0$ and $W_{qq} < 0$. If on-the-job leisure is measured as a proportion of the work hour, the worker enjoys total leisure:

$$L^* = L + qH . \tag{58}$$

His utility function is:

$$U = U(Y,L^*) . \tag{59}$$

The additional first-order condition now becomes:

$$vW_q + W = 0 . \tag{60}$$

The comparative static analysis of these heterogeneous job models can be implemented on the lines of Section 3.1. When the effects of specific tax and subsidy programs on job quality are cranked out, the results are usually ambiguous in sign. With explicit forms for the wage-rate function, W(S,q), conclusive results might be obtained. Concavity of this function, for example, is useful in some cases. Conclusive results may await theoretical developments on firm behavior or empirical findings.

V. Evidence and Applications

A. Empirical Evidence

What empirical evidence bears on the validity of our job-search and labor-supply model? Static labor-supply behavior has received intensive empirical investigation in recent years.[13] Very little of this work has taken simultaneous account of job-search behavior. A notable exception is Hill (1973), who has estimated income and wage responses of unemployed time. Underlying these estimates are two separate estimating equations. One examines hours worked, H, while the other focuses on hours in the labor force, N (= H + S). Here we shall assume unemployed time to be equivalent to search time.[14] A linear specification is:

$$H = a_1\hat{W} + a_2T + x \ , \qquad (61)$$

$$N = b_1\hat{W} + b_2T + z \ , \qquad (62)$$

where $\hat{W}$ are predicted wage rates, and x and z are error terms.

Elasticities of search time with respect to wage rates and lump-sum income can be calculated from estimates (61-62). Unfortunately, the wage elasticity of search time will possess a negative bias. We can display this by taking the implicit equation for search time:

$$S = N - H = (b_1 - a_1)\hat{W} + (b_2 - a_2)T + (z - x) \ . \qquad (63)$$

The demand side of the labor market imposes more involuntary unemployment on lower wage workers than on higher wage workers. That is, we have $\text{cov}(\hat{W}, z - x)$ negative, a violation of the classical least squares assumption for unbiased estimation. Because T is lump-sum income, we have less presumption to expect cov(T, z - x) to be nonzero. For this reason, the income elasticity estimate may be relatively unbiased. Below we shall consider some features of unemployment insurance laws which could still bias these estimates. The second source of estimates of equations (61-62), Garfinkel and Masters (1974a, 1974b), recognizes the possibility of bias from demand-side factors.[15]

Whereas Hill has explicitly calculated the elasticities of search time implicit in (61-62), Garfinkel and Masters have not. We have performed the calculations for the latter and present all of the estimates in Tables 2 and 3.[16] These elasticity estimates reflect the (weighted) differences in wage-rate or lump-sum-income coefficients between two equations having similar dependent variables. Therefore, the confidence intervals for these figures are typically large and often include zero.

Table 2 around here

Let us first examine the income elasticities reported in Table 2. With three exceptions, all of the income elasticities are negative. These results corroborate the predicted direction of response for dS/dT in equation (20).[17] The three positive income elasticities reported are all for low-wage or poverty samples of male workers. We can offer a plausible argument that these estimates are biased positively by the operation of the unemployment insurance program. Within a poor or low-wage sample, the lowest earners will often be ineligible for unemployment benefits by virtue of their occupations, industries, or intermittent employment histories. The higher earners in this sample are more likely to qualify for benefits when they are unemployed. Thus, the lower earners will choose to spend less time between jobs than the higher earners during any spell of unemployment. We next note the positive correlation between past earnings or wage rates of workers and current nonemployment income receipts (T). The correlation occurs either through asset income from previous savings or through earnings-related pension entitlements. This could introduce a positive bias in the poverty and low-wage male samples.

We need to explain why income elasticities for the other samples do not have so large a positive bias as to make them positive. The income elasticity for the low-wage female head sample has the expected negative sign. The above argument for positive bias may not be applicable here on account of the lower wage-rate cut-off for the sample ($2.00 versus $3.00 for males). Alternatively, there may be less correlation between current T and recent earnings for female heads than for married men. The general samples of Garfinkel and Masters, which include the low-wage samples, have the predicted negative income elasticities. These general samples may possess a negative bias which counteracts any positive bias present in their low-wage portion. Unemployment insurance laws pose dollar-ceilings on benefits which make payments a lower proportion of the potential wage of an unemployed higher earner. Thus, the higher the worker's potential wage rate, the greater are his incentives to search and select a job quickly. Measured lump-sum income flows, T, are positively correlated with potential wage rates through past asset accumulation. Together these relations can negatively bias the income elasticity estimates.

Now we direct attention to the wage elasticities reported in Table 3. With only two exceptions, all of the elasticities are negative. The two exceptions both are associated with backward-bending labor-supply schedules ($\theta < 0$). The positive elasticity coincides with the only estimate which included over-time hours in the labor-supply measure.[18] The zero elasticity arises for a nonpoor sample in an estimate which suffers from truncation bias.[19]

Table 3 about here

Recall our strong presumption that all of the wage elasticities will have negative bias owing to demand-side factors. As we are unable to assess the magnitude of this bias, we cannot report even the signs of response with any confidence. Let us presume the biases to be sufficiently small that the true responses are negative. How does this compare with the model's predicted direction of response? The definition of net wage rate in equation (2) suggests that wage-rate changes are best parameterized by changes in u. Result (25), for dS/du, is ambiguous in sign for $\theta > 0$. Thus, negative wage-rate elasticities of search time are at least consistent with the model. A finding of dS/du negative does not help to confirm the sign of dS/dv through result (28). The response of search to changes in parameter v carries greater policy interest than the response to u, but we have no empirical evidence on the matter.

B. Income Subsidy Experiments

An application of our model appears in the New Jersey Graduated Work Incentives Experiment. This posed the first controlled test of an income subsidy program. Preliminary results reported by the Office of Economic Opportunity (1971) were that experimental families had a 9.8 percent rise in hourly market wage rates relative to control families. The O.E.O. ventured that transfers:

> . . . allow the prime worker the freedom not to accept the first job he can find, but rather to seek one more appropriate to his skills and interests and one which also pays a higher wage [rate].

The work hours of experimentals fell 11.8 percent relative to those of controls in the O.E.O. report. Together these changes yielded a relative decline in the gross market earnings of the transfer recipients. Our result (43) above predicts just such a decline in gross earnings under an income subsidy.

The final report of the New Jersey Experiment concluded with weaker and less clear static disincentives for primary workers in families. Hourly wage-rate increases by experimentals were visibly present, though diminishing as the experiment wore on. One theory posed by Watts and Mamer (1974) is that the apparent relative wage-rate gain by experimentals was an artifact of the interviewing procedure. We cannot resolve this issue here; indeed, the experimental data may not permit any resolution. We can only observe that our job search model is not consistent with the New Jersey finding of induced job-search activity under an income subsidy. An explanation might be that poor families lack the savings or access to loans which would enable them to search beyond the first job offer. An income transfer might enable them to undertake more extensive job search. Our model implicitly assumes that workers can borrow from themselves <u>within</u> the single time period.

One additional reservation about the dynamic incentives finding in New Jersey should be stated. Income transfers were available for only a small sample of the poor population in the affected communities. If an income subsidy were offered universally, all poor workers in a given community would have the enhanced search incentives. This would alter the schedule W(S) and probably lower the marginal returns to search time, W'. For this reason, it appears likely that the New Jersey results magnify any dynamic incentives beyond their value under a universal income subsidy. A definitive answer to this issue will be sought in a portion of the Manitoba income subsidy experiment. One small city will be the site of a "saturation" experiment, where all families below the income threshold receive transfers.[20]

How should policy-makers evaluate any induced search time under income maintenance programs? We have not explicitly described the process which makes $W' > 0$ in our model. If it is a pure "bumping" process, in which one worker merely displaces another potential worker equally suited for the job, then no real economic gains stem from augmented search incentives. We might call this a "good job - bad job" model. In this extreme case, there is a net economic loss in the additional time expended on search. At the other extreme we have a "good match - bad match" model. If the worker is induced to search for a job which would otherwise have gone vacant or been filled with a less qualified worker, then a real economic gain results. For a more realistic intermediate case, both efficiency gains and losses as well as interpersonal redistributions occur. The net efficiency outcome remains an open question. Analogous policy evaluation issues for job search arise under the existing personal income tax system.

FOOTNOTES

[1]The static model of a worker's income-leisure choice was expounded originally by Robbins (1930). Cooper (1952) applied the model to assess the static incentive effects of proportional and progressive income taxes. The model has also been utilized to study the static incentives of various income maintenance devices. Green (1968) examined an income subsidy ("negative income tax" or "guaranteed income"); Kesselman (1969) compared this with a wage subsidy; and Haveman (1973) compared both of the foregoing with an earnings subsidy. The current paper appraises the dynamic incentives of all of these tax and transfer policies.

[2]Boskin (1967) and Kesselman (1969) speculated about the dynamic incentives of transfer schemes. An early attempt at formal modeling of the problem was undertaken by Conlisk (1968), with a rather ad hoc approach.

[3]Rea (1974a) examines human-capital investment in a multi-period model which simultaneously determines labor supply. Investment is restricted to the first period, so that all other periods' prices are conditional solely upon period one's actions. Thus, the model does not exploit the full sequential logic of a multi-period model. Rea requires the multi-period framework to study the effects of temporary versus permanent programs, similar to Metcalf.

[4]Three implicit constraints in the following analysis are L, H, S $\geq$ 0. Corner solutions will be ignored in the analysis, because we shall be concerned only with the responses of labor-force participants. The analysis could be extended to include participation decisions.

[5]Alternatively, u could be a stochastic variable with expected value zero. This would depict random factors which affect a worker's wage rate for any given intensity of search effort. Or u could be a shift parameter to capture the skill level or employability traits of a given worker in a market for a given job type. Similarly, v could serve these roles as stochastic variable or personal shift parameter, this time in multiplicative form.

[6]Schedule W(S) may differ for each worker so long as it maintains property (3). We later touch on problems of aggregation and of interpreting empirical evidence which relate to W(S).

[7]The second-order condition restricts admissible values of W'. Consider $|A|$ a quadratic function of W', with the equation $|A| = 0$ yielding roots:

$r_1, r_2 = [-C \pm \sqrt{C^2 + U_Y vCHW''}\,]/U_Y v$. Since $|A|$ is concave in W', values of

W' lying between the two roots correspond to positive values of $|A|$. If we take $r_1 < r_2$, then the case $W'' \leq 0$ can be seen to imply $r_1 \leq 0$ and $r_2 \geq -2C/U_Y v > 0$. Thus for $W'' \leq 0$, all $W' > 0$ up to at least $-2C/U_Y v$ yield positive $|A|$. In the case $2W'/H > W'' > 0$, the range of admissible values for W' becomes smaller.

[8]If η is this elasticity, then the following relation holds: $\theta = U_Y(\eta+1)$. Also, see Musgrave (1959, pp. 232-238) on the relation between marginal utility of income and leisure and the work incentive effects of income taxes.

[9]The standard model has $dL/dT = (WU_{YY} - U_{YL})/C$, with the denominator negative for concavity of the utility function. Hence, normality of leisure requires that the numerator also be negative.

[10]We depict only a flat-rate progressive income tax, which is identical to a proportional tax with an exemption. Any progressive income tax can be linearized at the relevant equilibrium point for the worker. It then appears as a proportional income tax with an exemption reflecting the linearization. Consequently, we would predict the same effects on search time from any progressive income tax. For a similar approach with the conventional static model, see Hall (1973).

[11]See Figure 3.6 in Hall (1973, p. 155) for a graphical comparison of the ordinary labor-supply schedules estimated in several studies. Also note that three of the portrayed schedules have hours worked conditioned on labor-force participation.

[12]Omission of the constant term merely removes a negative component of lump-sum income. This does not affect the analysis of behavior induced by changes in T, u, or v. In examining the effects of tax deductibility, however, we need to insert an additional lump-sum income effect. Also, the presence of fixed costs in search will discourage some potential workers from entering the labor force. We are neglecting participation behavior in this paper.

[13]See the compendium by Cain and Watts (1973) for a selection of these studies.

[14]This assumption is probably incorrect for some groups of workers. Estimates of Gordon (1973) suggest that the unemployed individual searches only 8.4 hours per week. Rea (1974b) estimates that married women spend half of unemployed time in leisure but that married men spend virtually none in leisure. Regardless, we are here concerned only with elasticity estimates. The elasticity estimates of unemployed time can properly be identified as job-search elasticities under one assumption. We require that the proportion of unemployed time spent in job search be constant across the subsample of interest. The proof is straight-forward. Although Hill mistakenly identifies unemployed time of a worker with job-search time, he can be saved by the same device.

[15]Garfinkel and Masters specify the wage-rate variable, $\hat{W}$, in logarithmic form. Also, they avoid two methodological pitfalls of the Hill study--including income-conditioned components in the measure of T, and truncating the sample on the basis of one-year's observed income.

[16]I wish to thank Irv Garfinkel and Stanley Masters for supplying me with supplementary information on sample means needed to calculate the elasticities in a few of the cases.

[17]In order to interpret the regression wage and income coefficients as having behavioral properties, we need to assume each regression sample population to have similar tastes. This is a standard requirement in cross-sectional analysis. We further need to assume that schedule W(S) is similar for all workers in each regression sample. Note that our model analyzed the behavior of a single worker and thus did not require the latter assumption.

[18]Equation (25) unambiguously predicts dS/du negative with $\theta < 0$, and any estimation bias should only render the estimate more negative. The estimate might be dismissed in that it is the smallest in absolute value of all the reported wage elasticities (except zero) and statistically insignificant.

[19]See Cain and Watts (1973, chapter 9) for a treatment of this estimation problem arising from a faulty sample selection procedure.

[20]Kesselman (1973) has specified the job search and job mobility activities to be monitored in Manitoba.

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FIGURE 1: Effects of a Lump-Sum Transfer on Search and Work Time

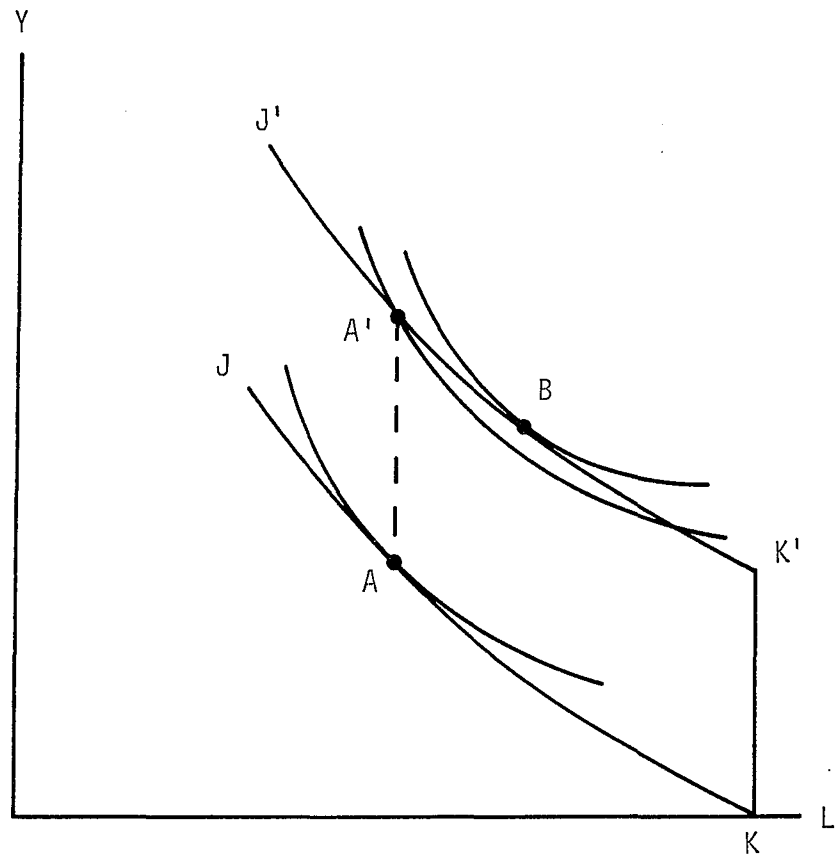

TABLE 1

Effects of Fiscal Policy Changes on Search Time

Policy change is from:	Labor-supply slope $\theta > 0$	Labor-supply slope $\theta < 0$
Laissez faire to proportional income tax	−	+
Laissez faire to progressive income tax	−	±
Laissez faire to income subsidy	−	−
Laissez faire to wage subsidy	±	−
Laissez faire to earnings subsidy[a]	+	−
Proportional income tax to progressive income tax[b]	−	−
Income subsidy to wage subsidy[c]	±	±
Income subsidy to earnings subsidy[a,c]	+	+
Wage subsidy to earnings subsidy[a,c]	+	+

Note: Effects of policy changes are denoted: + = increased search time; − = decreased search time; ± = indeterminate effect on search time.

[a]Considering only the positive marginal subsidy range of earnings subsidy; see text for fuller discussion.

[b]Holding net revenue constant; considers only marginal change in programs.

[c]Holding net transfer constant; considers only marginal change in programs.

TABLE 2

Income Elasticities of Job Search Time

Marital Status[a]/Age		Source[b]	ε_T	Notes[c]
Males	M25-54	ISR	-1.276	
	M25-54	ISR	-1.788	Hours include overtime; $\theta < 0$
	M25-54	SEO	- .201	
	M25-54	SEO	.211	Low wage sample (PW $\leq$ \$3.00)
	M25-54	SEO-H	.145	Poor black sample
	M25-54	SEO-H	.033	Poor white sample; $\theta < 0$
	S25-54	SEO	- .795	
	M55-61	SEO	- .401	
	S55-61	SEO	- .778	
Females	M25-54	SEO	- .843	
	M25-54	SEO	- .265	Income variables is husband's earnings
	S25-54	SEO	- .104	
	H25-54	SEO	- .554	
	H25-54	SEO	- .806	Low wage sample (PW $\leq$ \$2.00)

[a]M = married; S = single; H = head of household, unmarried or spouse absent.

[b]ISR = Institute for Social Research (Michigan) Income Dynamics Panel Study, and SEO = Survey of Economic Opportunity (self-weighting sample only), estimates of both reported by Garfinkel and Masters (1974a, 1974b); SEO-H = Survey of Economic Opportunity (subsample of families with 1966 income below Social Security Administration poverty threshold), estimates reported by Hill (1973).

[c]PW = potential wage rate of the worker; θ is defined in equation (19), corresponds to sign of labor-supply schedule's slope. Unless otherwise noted, each result has:

(i) omitted any over-time work hours in the observations;
(ii) positive slope in the estimated labor-supply schedule ($\theta > 0$);
(iii) utilized the full sex-mar al-status-age subsample described in the "source", with exclusions only for non-participants in the paid civilian labor force, for (Garfinkel-Masters) full-time students, and for (Hill) persons neither black nor white.
(iv) used as the income variable (T) some measure of the non-employment income of the unit.

TABLE 3

Wage Elasticities of Job Search Time

Marital Status[a]/Age		Source[b]	Wage Variable[d]	ε_W	Notes[c,e]
Males	M25-54	ISR	AVWR	-.166	
	M25-54	ISR	AVWR	.117	Hours include overtime; $\theta < 0$
	M25-54	SEO	PW	-1.214	
	M25-54	SEO	WR	-.678	
	M25-54	SEO	PW	-.988	Low wage sample ($PW \leq \$3.00$)
	M25-54	SEO	WR	-.428	Low wage sample ($PW \leq \$3.00$)
	M25-54	SEO-H	WR	-.583	Poor white sample; $\theta < 0$
	M25-54	SEO-H	WR	-3.180	Poor black sample at W = $.78
	M25-54	SEO-H	WR	-1.700	Poor black sample at W = $1.47 (mean value)
	M25-54	SEO-H	WR	-.209	Poor black sample at W = $2.16; $\theta < 0$
	M25-54	SEO-H	WR	0	Nonpoor sample, black or white; $\theta < 0$
	S25-54	SEO	PW	-1.398	
	S25-54	SEO	WR	-.610	
	M55-61	SEO	PW	-1.112	
	M55-61	SEO	WR	-.595	
	S55-61	SEO	PW	-.225	
	S55-61	SEO	WR	-.468	
Females	M25-54	SEO	PW	-.870	
	S25-54	SEO	PW	-.431	
	H25-54	SEO	PW	-.940	
	H25-54	SEO	PW	-1.400	Low wage sample ($PW \leq \$2.00$)

[a,b,c]Notes identical to Table 2.

[d]AVWR = average of the worker's wage rate over five years; PW = potential wage rate of the worker as imputed by a first-stage regression; WR = wage rate reported in survey; note that Garfinkel-Masters use wage variables in logarithmic form.

[e]Unless otherwise noted, each result has wage elasticity computed at sample mean wage rate.