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Can Work Disincentives Shorten the Duration of Job Search?

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Can Work Disincentives Shorten the Duration of Job Search?

This study develops a framework for analyzing the impact of taxes and transfers on the length of time a person waits to accept a job while receiving transfer payments. By introducing guarantees and tax rates into a search model we supplement the traditional work-leisure choice models, which can only answer comparative static questions. Since the public may care more about shortening spells of unemployment for transfer recipients than in increasing the labor supply of those who work, this paper has direct public policy implications.

While there is still controversy over the magnitude of labor supply responses to changes in guarantees and tax rates, there is a consensus about the appropriate framework for analyzing these issues--empirical studies are uniformly based on the standard comparative static analysis of a utility-maximizing recipient choosing the optimal work-leisure combination.[1]

The empirical duration models, made possible by the introduction of longitudinal data and survival (or hazard) models into economics, have not shared a common theoretical base. Blau and Robins (1986) offer a purely statistical description of a stochastic process generating transitions off of welfare. Plotnick (1983) describes transitions in a static work-leisure framework, while Plant (1984) introduces stochastic shocks into a similar model. Only studies of unemployment insurance (UI) have used an explicit search framework to explain dynamics. I will show, however, that the analytical conclusion they reach--that higher benefits increase search duration--is not necessarily generalizable.

This paper explores the impact of changes in the parameters of a transfer system on the costs and benefits of search. Rather than focusing on a specific program, I consider a generic tax-transfer system characterized by a guarantee (the benefit to someone not working) and a tax rate (the rate at which benefits are reduced or taxes increased as earnings rise). Our analytical results indicate that increases in guarantees need not increase duration--the UI result is a special case of the more general formulation. In fact, increases in guarantees and increases in tax rates may shorten duration even as they decrease the labor supply of persons staying on the program.

The first section of this paper introduces guarantees and tax rates into a standard search model in which hours are fixed. I show that program parameters affect duration even when labor supply is assumed to be perfectly inelastic with respect to guarantees and tax rates. In this way I show that the impact of taxes and transfers on duration is conceptually distinct from their effect on labor supply. The second section integrates the duration and labor supply decisions. The third section presents a simulation of the effect of changes in guarantees and tax rates on AFDC duration, and the final section summarizes the findings.

Before delving into the formal model it is useful to give an intuitive explanation of how taxes and transfers can affect duration. In the comparative static framework changes in program parameters can end spells of unemployment. However, a large amount of the turnover occurs during periods in which programs do not change. Previous studies have had to rely on unexplained stochastic changes in earnings or changes in other circumstances, such as remarriage or a child moving out of the household, to explain welfare duration. The analytical problem is to show how the levels of guarantees and tax rates affect the probability that recipients will leave the program through work.

The insight of search theory is that most people looking for work, including welfare recipients, do not face a single wage offer. They face an array of jobs, some of which may yield higher utility than staying on the transfer program. If a recipient waits long enough, he or she may be offered a job with a high enough wage, or good enough working conditions, to induce him or her to stop searching. This job may or may not take the person off the welfare program.

The decision of whether or not to hold out for a better wage offer depends on the benefits and costs of search. If tax or transfer programs affect the net value of wage offers or the costs of search, they will affect the reservation wage and, hence, duration.

FIXED HOURS

To develop basic concepts in this section, we consider the case of a person with institutionally fixed hours of work.[2] The assumption of fixed hours allows us temporarily to abstract from the impact of taxes and transfers on labor supply decisions. In this way we show that guarantees and tax rates have conceptually distinct roles in comparative static and search models.

The analysis in this section is divided into two parts. The first lays out our model and introduces taxes and transfers into a standard search model. The second derives the relationship between the parameters of the transfer system, the reservation wage, and the duration of search.

Costs and Benefits of Search

Suppose a person faces a transfer program with a guarantee, G, and a benefit-reduction rate, 1-k (where k is the "keep rate"). The person must decide on the basis of the offered wage whether or not to accept a job offer. For simplicity we assume that one wage offer is received at the end of each period from a distribution with density function f(W).[3] The cost of a wage offer, C, is paid at the end of the period.

The standard result for an infinite-horizon search model is that the reservation wage, W*, should be set to equate the discounted benefit of search with the cost of search.[4] For a model with no tax and transfer system, the reservation wage is the solution to the implicit equation

$$(1) \qquad \left\{\int_{W^*} (W - W^*)dF\right\}/r = W^* + C,$$

where r is the appropriate discount rate.[5] The left-hand side of equation (1) gives the benefit of search, while the right-hand side shows that, in a model with discounting, the cost of search includes the opportunity cost of forgoing W*, plus the out-of-pocket costs, C.

In a model with taxes and transfers, the benefit of a wage offer depends on whether the wage is sufficiently high to make the person ineligible for the transfer program. Given fixed hours, the wage uniquely determines program eligibility. Let the fixed number of hours be normalized to one, so $W_b = G/(1-k)$ is the break-even wage--all wages below W_b are sufficiently low to maintain eligibility in the transfer program. Since the transfer program makes the person eligible for a guarantee of G, but taxes earnings at the rate (1-k), the value of a wage less than W_b is kW + G.

The benefit of search, $H(W^*,k,G)$, can be written in two parts, depending on whether or not the wage offer is sufficiently high to take the person off the program. For $W^* < W_b$:

$$(2a) \quad H(W^*,k,G) = \left\{\int_{W^*}^{W_b} [(kW + G) - (kW^* + G)]\, dF \right.$$

$$\left. + \int_{W_b} [W - (kW^* + G)]dF\right\}/r$$

$$= \left\{k\int_{W^*}^{W_b} (W - W^*)dF + \int_{W_b} W - (kW^* + G)dF\right\}/r,$$

and for $W^* > W_b$:

$$(2b) \quad H(W^*,k,G) = [\int_{W^*} (W - W^*)dF]/r.$$

The marginal benefit schedule is drawn as the downward-sloping schedule in Figure 1. It is kinked at the break-even wage, W_b, since

$$(3) \quad \frac{\partial H}{\partial W^*} = - k\ [1 - F(W^*)]/r < 0 \qquad \text{when } W^* < W_b,$$

$$= - [1 - F(W^*)]/r < 0 \qquad \text{when } W^* > W_b.$$

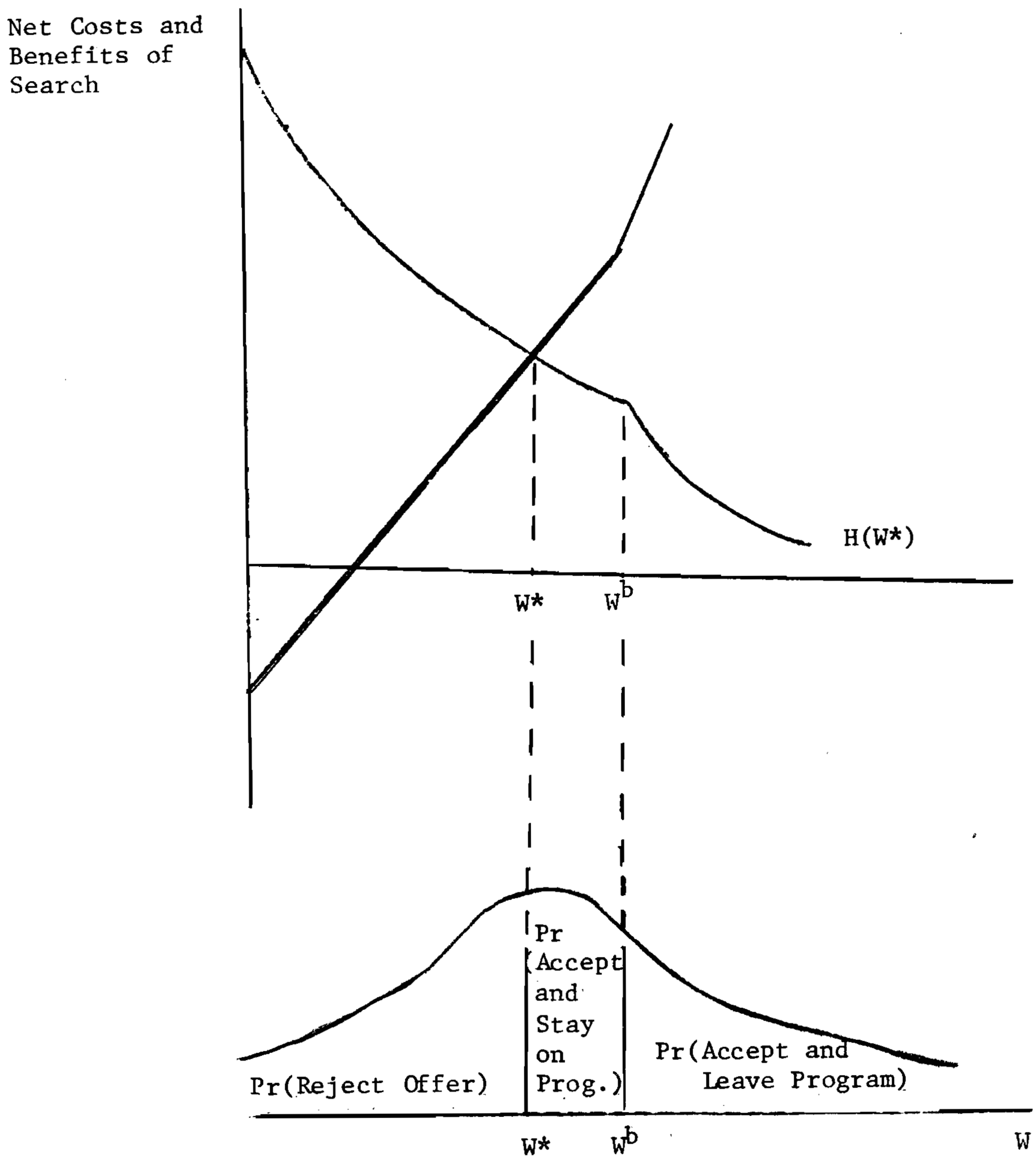
The net cost of an offer, $N(W^*,k,G)$ is equal to the out-of-pocket costs, C, plus forgone earnings, minus the guarantee. Since forgone earnings depend on whether or not the reservation wage is above the break-even wage, we have for $W^* < W_b$:

$$(4a) \quad N(W^*,k,G) = C + (kW^* + G) - G,$$

$$= C + kW^*,$$

Figure 1

Relationship between Benefit of Search (H), Net Costs of Search (N), Probability of Accepting a Wage Offer, and Probability of Leaving the Program



and for $W^* > W_b$:

(4b) $N(W^*,k,G) = C + W^* - G.$

The net cost of search is shown as the upward-sloping line in Figure 1.

Note that the guarantee cancels out when $W^* < W_b$. The intuition is that the guarantee offsets part of the costs of search but also raises the opportunity cost of search, since the guarantee is received as long as $W^* < W_b$.

Equilibrium is attained where

(5) $N(W^*,k,G) = H(W^*,k,G).$

For a person with $W^* < W_b$, the probability of rejecting a job offer is $F(W^*)$, the probability of accepting a job that keeps the person on the program through low wages is $F(W_b) - F(W^*)$, and the probability of leaving the program through work is $[1 - F(W_b)]$. These are shown in the bottom panel of Figure 1.

Since the levels of G and k affect the costs and benefits of search, this simple framework establishes the relationship between the level of G and k and the rate at which nonworking recipients exit that state. We now derive the relationship between these program parameters and the reservation wage.

Impact of G and k on W*

Since the probability of leaving the initial state (receiving a transfer and not working) depends on the reservation wage, we derive an expression for the impact of G and k on W*. To obtain this relationship, take the total differential of both sides of equation (5),

$$(6) \qquad \frac{\partial N}{\partial W^*} dW^* + \frac{\partial N}{\partial k} dk + \frac{\partial N}{\partial G} dG = \frac{\partial H}{\partial W^*} dW^* + \frac{\partial H}{\partial k} dk + \frac{\partial H}{\partial G} dG,$$

and rearrange terms:

$$(7) \qquad dW^* = \frac{[\frac{\partial N}{\partial G} - \frac{\partial H}{\partial G}]\, dG + [\frac{\partial N}{\partial k} - \frac{\partial H}{\partial k}] dk}{\frac{\partial H}{\partial W^*} - \frac{\partial N}{\partial W^*}}.$$

This yields the basic relationship between changes in program parameters and changes in the reservation wage, which directly affects the probability of starting to work. The partial derivatives in equation (7) can be obtained by differentiating equations (2) and (4).

Impact of Changes in the Guarantee

The impact of changes in G, holding k constant, can be obtained by setting dk equal to zero in equation (7) and dividing by dG:

$$(8) \qquad \frac{dW^*}{dG} = \frac{\frac{\partial N}{\partial G} - \frac{\partial H}{\partial G}}{\frac{\partial H}{\partial W^*} - \frac{\partial N}{\partial W^*}} .$$

Evaluating the appropriate partial derivatives and simplifying yields

$$(9a) \qquad \frac{dW^*}{dG} = \frac{[1 - F(W_b)]/r}{-k\{1 + [1 - F(W^*)]/r\}} < 0 \qquad \text{for } W^* < W_b,$$

and

$$(9b) \quad \frac{\partial W^*}{\partial G} = \frac{1}{1 + [1 - F(W^*)]/r} > 0 \qquad \text{for } W^* > W_b.$$

Therefore, increases in the guarantee lower the reservation wage and shorten the expected duration for people with $W^* < W_b$. Increasing the guarantee has the opposite effect, lengthening expected duration, for people with $W^* > W_b$.

Figures 2 and 3 can be used to give the intuition of these results. The higher guarantee has no impact on costs for people with $W^* < W_b$--recall that the higher guarantee raises the opportunity cost by the same amount that it offsets the costs of search. The benefit of search, however, declines as low wages, which keep the person eligible for benefits, are made more attractive by the higher guarantee, but higher wages are not affected. The result is a reduction in the reservation wage, shown in Figure 2.

For people with $W^* > W_b$ (shown in Figure 3), the cost of search decreases, since the increase in G is not offset by an increase in the opportunity cost of search. The benefits of search are not affected--since all acceptable wages would get the person off the program, the level of G does not affect the benefits of search. The result is an increase in the reservation wage.

It should now be clear why UI is a special case. Under UI programs in most states, any recipient accepting a job becomes ineligible for UI.[6] Therefore, it is impossible to have $W^* < W_b$--all accepted wage offers make the person ineligible for UI. The result is that all recipients experience a decrease in the costs of search and no change in the benefits of search. Hence, their reservation wages increase and duration

Figure 2

Impact of an Increase in the Guarantee
for a Person with $W^* < W_b$

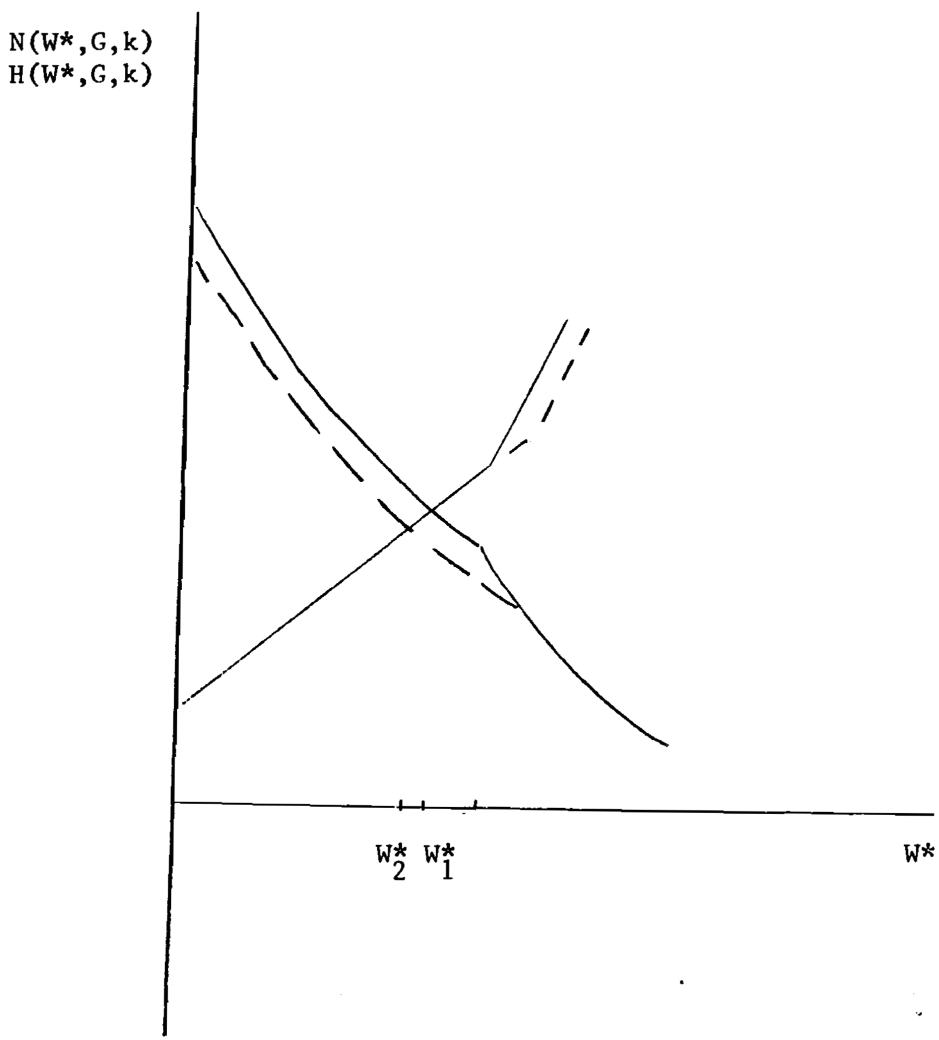
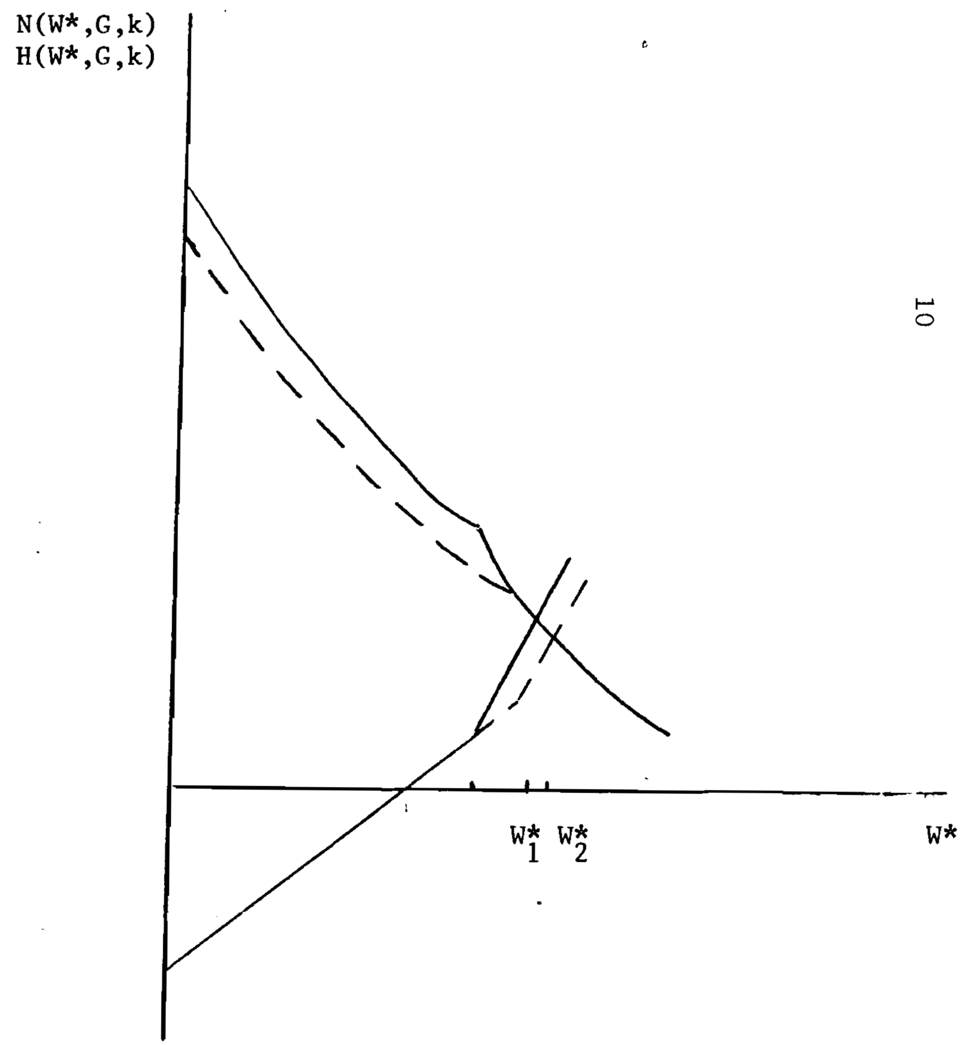


Figure 3

Impact of an Increase in the Guarantee
for a Person with $W^* > W_b$



lengthens. This is not the case under most transfer programs, which at least phase out benefits over some income range.

Impact of Changes in the Benefit-Reduction Rate

The impact of a change in the benefit-reduction rate on the reservation wage can be obtained similarly, by setting dG equal to zero in equation (7) and dividing by dk:

$$(10) \quad \frac{dW^*}{dk} = \frac{\dfrac{\partial N}{\partial k} - \dfrac{\partial H}{\partial k}}{\dfrac{\partial H}{\partial W^*} - \dfrac{\partial N}{\partial W^*}} .$$

The denominator is always negative (see equations 3 and 4). Since $\partial N/\partial k$ is always nonnegative, the sign on the numerator depends on $\partial H/\partial k$. $\partial H/\partial k$ is obtained from equation (2):

$$(11) \quad \frac{\partial H}{\partial k} = \{\int_{W^*}^{W_b} (W - W^*)dF - W^* [1 - F(W_b)\}/r \qquad W^* < W_b,$$

$$= 0 \qquad W^* > W_b.$$

Hence, changes in k have no impact on the benefit of search for persons with low enough search costs to place their reservation wages above the break-even.

For persons with reservation wages below W_b, the sign on equation (11) depends on W^*. This can be seen by recognizing that $\partial H/\partial k$ is strictly decreasing in W^*, since

$$(12) \quad \frac{\partial^2 H}{\partial k \partial W^*} = - [1 - F(W^*)]/r < 0,$$

and that $\partial H/\partial k$ is positive when W* is equal to zero and negative when W* equals W_b:

$$(13) \quad \frac{\partial H}{\partial k} = [\int^{W_b} WdF]/r > 0 \qquad \text{for } W^* = 0,$$

$$= -W_b[1 - F(W_b)]/r < 0 \qquad \text{for } W^* = W_b.$$

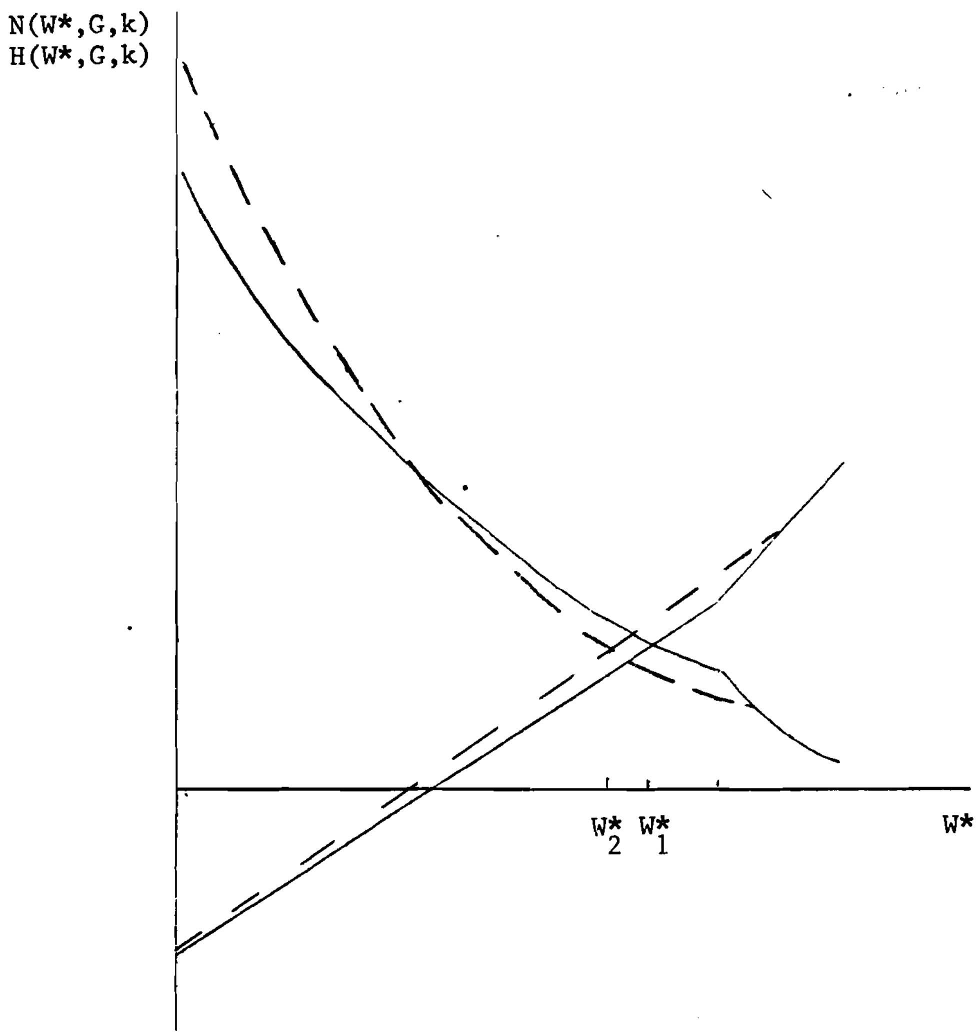
Thus, raising k increases the benefit of search for persons with reservation wages near zero and decreases the benefits for persons with reservation wages near W_b.

Intuitively, letting recipients keep a higher proportion of their earned income has two offsetting effects. The benefit of draws below the break-even increases, since the proportion of the wage a person can keep increases. However, the benefit of draws above W_b decreases--since the benefit of draws over the break-even is the difference between the taxed reservation wage and the untaxed draw, the benefit decreases when the tax is lowered. The expected benefit of an additional draw is a weighted average of potential draws whose values have increased (those below W_b) and those whose values have decreased (those above W_b). The higher a person's reservation wage, the higher the weight given to wages above W_b and, hence, the lower the benefits of search.

This twisting of the benefit schedule and the increase in the cost of search is illustrated in Figure 4.[7] The figure is drawn for a person who has a sufficiently high W* to experience a decrease in the benefit of

Figure 4

Impact of an Increase in the Keep Rate



search as a result of the increase in k. For such a person the increase in k will yield a lower reservation wage and, hence, a shorter duration of search. The opposite result could emerge for people with sufficiently low initial reservation wages. For them the increase in k could raise the benefits of search more than the costs. The result would be a higher reservation wage and longer duration.

In summary, we have shown that changes in the guarantee and in the benefit-reduction rate have impacts on duration, even if they do not affect the number of hours a recipient would work if he remained on the program. In the following section we allow both labor supply and duration to be affected by G and k.

LABOR SUPPLY DECISION IN A SEARCH MODEL

To incorporate labor supply decisions we turn to a utility-maximizing model in which hours of work and the reservation wage are both choice variables. We start by developing the necessary additional notation and then proceed to derive dW^*/dG and dW^*/dk, much as we did in the previous section.

To focus attention on the essential elements of the argument we use a model with no savings and no intertemporal substitution. Utility, $U(Y,L)$, is a function of income, Y, and leisure, L (which includes all time not allocated to market production). The total amount of time to be allocated to market and nonmarket activity is T. Total labor income is W multiplied by $h(W)$, where $h(W)$ is desired labor supply if the wage offer, W, is accepted.

In a model without taxes and transfers, utility while searching is given by

$$(14) \quad U_s \equiv U(-C,T).$$

Utility while employed for one period at wage W is

$$(15) \quad U_e(W) \equiv U(W \cdot h(W),\ T - h(W)),$$

and the present discounted value of this flow is $U_e(W)/r$.

The Appendix shows that the optimal reservation wage is obtained by setting the benefits of search,

$$(16) \quad H(W^*) = [\int_{W^*} U_e(W) - U_e(W^*)dW]/r,$$

equal to the costs of search,

$$(17) \quad N(W^*) = U_e(W^*) - U_S.$$

The cost of search again reflects the opportunity cost of search, $U_e(W^*)$, which is offset by the utility obtained while searching, U_S.

As before, we modify the basic relationships shown in equations (16) and (17) to incorporate G and k. The utility of searching while receiving the guarantee is

$$(18) \quad U_s(G) \equiv U(G - C,L).$$

The utility of being employed while remaining on the transfer program is

$$(19a) \quad U_e(W,k,G) \equiv U[G + k \cdot W \cdot h(kW,G),\ T - h(KW,G)],$$

where $h(kW,G)$ indicates that labor supply is both a function of the net wage and the guarantee. The utility of being employed while off the program is

$$(19b) \quad U_e(W) \equiv U[W \cdot h(W),\ T - h(W)].$$

Again the costs and benefits of search depend on whether W^* is sufficiently low to keep the person eligible for transfers at the reservation wage. Since hours are now variable, we can no longer use a single break-even wage to distinguish between transfer recipients and non-recipients. In its place we introduce the exit wage, $W_x(G,k)$, which is defined as the wage which would make the person indifferent to being on or off the program. It is the solution to the implicit equation

$$(20) \quad U_e[G + kW_x h(kW_x,G),\ T - h(kW_x,G)] = U_e[W_x h(W_x),\ T - h(W_x)].$$

The exit wage plays the same role in the utility-maximizing model as the break-even wage plays in the model with fixed hours. It can be shown that

$$(21) \quad \frac{\partial W_x}{\partial k} = \frac{W_x}{(1-k)} > 0,$$

and

$$(22) \quad \frac{\partial W_x}{\partial G} = \frac{1}{(1-k) \cdot h(K,W_x,G)} > 0.$$

Therefore, increases in k or in G will increase the wage at which a person would choose not to participate in the program. This is symmetrical to the mechanical relationship between W_b, k, and G in the fixed-hours model.

The expected benefit of search can be written in two parts. For $W^* < W_x$:

$$(23a)\quad H(G,k,W^*) = \{\int_{W^*}^{W_x} [U_e(k,W,G) - U_e(k,W^*,G)]dF + \int_{W_x} [U_e(W) - U_e(k,W^*,G)]dF\}/r,$$

and for $W^* > W_x$,

$$(23b)\quad H(G,k,W^*) = \{\int_{W_x} [U_e(W) - U_e(k, W^*)]dF\}/r.$$

Since the opportunity cost of search depends on the utility of income received if W* is accepted, G and k also affect the costs of search. Thus, for $W^* < W_x$ the cost of search is

$$(24a)\quad N(W^*,k,G) = U[kW^*h(kW^*,G) + G,T - h(kW^*,G) - U(G - C,T),$$

and for $W^* > W_x$,

$$(24b)\quad N(W^*,k,G) = U[W^*h(W^*), T - h(W^*)] - U(G - C,T).$$

With this notation we derive the impact of k and G on W* by differentiating equations (23) and (24). Letting $\partial U(W^*)/\partial Y$ and $\partial U(W)/\partial Y$ indicate the marginal utility of income, evaluated at W* and W respectively, we have[8]

$$(25)\quad \frac{\partial H}{\partial k} = \{\int_{W^*}^{W_x} [\frac{\partial U(W)}{\partial Y} \cdot W \cdot h(kW,G) - \frac{\partial U(W^*)}{\partial Y} \cdot W^* \cdot h(kW^*,G)]dF$$

$$- \frac{\partial U(W^*)}{\partial Y} \cdot W^* \cdot h(kW^*,G) \cdot [1 - F(W_x)]\}/r \qquad \text{for } W^* < W_x,$$

$$= 0 \qquad \text{for } W^* > W_x.$$

Again, changes in the keep rate twist the benefit schedule. the change from an income-maximizing model to a utility-maximizing model complicates but does not change the interpretation. Comparing the first bracketed term in equation (25) with the corresponding term in equation (11) shows that (for wages below W_x), the impact on the benefits of search no longer depends on the difference between W* and W, but rather on the difference in utilities of the earnings generated by each of these wages. Likewise, the second term is replaced by an expression for the marginal value of the earnings generated by W*. By an argument similar to that used in the previous section, it is straightforward to show that the result of increasing k is to twist the benefit schedule, raising the benefits for persons with low W*'s and lowering the benefits for those with high values.

The impact of G on the benefits of search is also altered, but not in a fundamental way, by going from an income- to a utility-maximizing model.

$$(26) \quad \frac{\partial H}{\partial G} = \{\int_{W*}^{W_x} [\frac{\partial U(W)}{\partial Y} - \frac{\partial U(W*)}{\partial Y}] dF$$

$$- \frac{\partial U(W*)}{\partial Y} [1 - F(W_x)]\}/r < 0 \qquad \text{for } W* < W_x,$$

$$= 0 \qquad \text{for } W* > W_x.$$

Since concavity implies that $\partial U(W)/\partial Y < \partial U(W*)/\partial Y$ when $W > W*$, both terms in equation (26) are negative. Therefore, increases in G decrease benefits for persons with $W* < W_x$ and have no impact on persons with $W* > W_x$. Therefore, the conclusions of the preceding section are not altered by the introduction of labor supply responses to wages.

In summary, allowing labor supply to be responsive to taxes and transfers does not alter the basic conclusion of the earlier analysis, in which hours are fixed. While increases in the benefit-reduction rate and the guarantee will decrease the number of hours a recipient would want to work at any given wage, they will not necessarily increase the duration of search for an acceptable offer.

SIMULATED IMPACT ON DURATION

To gauge the potential quantitative impact of k and G on duration, we perform some simulations of the search model presented thus far. These simulations do not test the model; instead they show what the probability of starting to work would be if recipients behaved in a manner consistent with the model. To test the model would require the estimation of complex structural hazard models, such as those developed in Flinn and

Heckman (1982), which would take us well beyond the scope of this paper. The simulations are offered to see whether the potential effects of G and k on search duration are large enough to warrant future empirical work.

Since the reservation wage is determined uniquely by k, G, C, and the distribution of W, we can simulate the probability that a welfare recipient will take a job by making appropriate assumptions about these parameters.

The wage-offer distribution was estimated by fitting a censored log-normal distribution to the wages of a sample of nonworking AFDC recipients who started jobs during 1972. The data are from the control group of the Denver Income Maintenance Experiment (DIME). In order to be included in the sample a person had to be a female household head receiving AFDC and not working in January 1972.

MLE was used to estimate the two paramters of the log-normal distribution. There were 382 household heads who accepted jobs paying at least the minimum wage during 1972. The remaining 7,600 cases that did not accept a job or accepted a job paying less than the minimum wage were treated as censored. The mean and variance of the uncensored distribution of log wages were estimated to be -.995 and .872, with standard errors of .383 and .230 respectively.

The guarantee of $222 per month and the effective tax rate of .35 represent the average of the 1971 and 1973 AFDC values for Colorado, as estimated in Fraker, Moffitt, and Wolf (1985). We assumed that the discount rate was .1, there were no out-of-pocked costs of search, and all jobs were full time (172 hours per month). Our results are not very sensitive to these assumptions.

Row 1 of Table 1 shows that a person facing the estimated wage-offer distribution and the assumed program parameters would have a reservation wage of $2.38. She would have a .0163 probability of accepting a wage offer in any month. This overall probability of accepting a job is the sum of the .0121 probability of accepting a wage below the break-even income and the .0043 probability of accepting a job which will take her off the program (shown in column 3). The latter is the probability of leaving welfare through work.

Rows 2 and 3 show the impact of raising G by 10 percent and lowering k by 10 percent. Both of these changes would create static work disincentives (if the person were free to choose hours). However, the two parameter changes have opposite impacts on search duration. Column 2 shows that increasing the guarantee by 10 percent increases the probability that a wage offer will be accepted by 3.7 percent (from .0163 to .0169), implying an arc elasticity of .38. Lowering k by 10 percent decreases the probability of accepting a wage offer from .0163 to .0139, implying an elasticity of 1.51. Focusing on the subset of wage offers which would take the person off of the program (column 3) indicates arc elasticities of -3.74 and 4.91 for changes in G and k respectively.[9] The lesson from these simulations is that while only a small proportion of AFDC recipients start working in any month, and an even smaller proportion leave welfare through work, these proportions are potentially sensitive to G and k.

Table 1

Impact of G and k on Probability of Accepting a Wage Offer

	Reservation Wage	Probability of Accepting an Offer	Probability of Accepting an Offer Above Break-Even Wage
Base Simulation[a]	\$2.38	.0163	.0043
Alternative Simulations			
G 10% higher	2.35	.0169	.0030
k 10% lower	2.52	.0139	.0073

[a]The base simulation assumes that the recipient faces a transfer program with a guarantee of \$222 per month and a keep rate of .65, yielding a break-even wage of \$3.69. All values are 1972 dollars. Offers are for full-time jobs of 172 hours per month. There are no out-of-pocket search costs and the discount rate is .1 per year.

SUMMARY

The impact of income transfers on the probability of accepting a job has been shown to be conceptually different from their impact on labor supply. While transfers alter the number of hours worked by affecting the income-leisure opportunity set, they affect the duration of search by altering the costs and benefits of search.

Increases in the guarantee (or reductions in any lump-sum tax) shift both the costs and benefits of search. We have shown that for persons who would accept some jobs with wages low enough to keep them on the program, the benefits of search decline, but the costs do not change. The result is that higher guarantees lead to lower reservation wages, and hence shorter durations. It is only for people who will not accept a job that will keep them eligible (or for programs which rule out receiving benefits while working) that increases in guarantees necessarily increase search duration.

A change in the benefit-reduction rate (or any other proportional tax) affects both the benefits and costs of search. Since the benefit of search depends on the difference between the net value (or utility) of the offered wage and the expected value of further wage offers, anything that diminishes the difference reduces the benefits of search. We have shown that the effect of decreases in the tax rate is to twist the benefit schedule in such a way as to increase the benefits of search for recipients with low reservation wages while decreasing benefits for others. The net impacts of decreases in the tax is to raise the cost of search and lower the benefits for persons with high reservation wages. For them, the net effect is unambiguously to decrease the reservation wage. For individuals with reservation wages sufficiently low to lead to an increase in benefits, it is impossible to sign the impact on the reservation wage.

The result of our simulations suggests that, if this model appropriately mirrors behavior, then changes in G and k can have quantitatively large impacts on search duration. Our estimates are that the elasticity of duration with respect to G and k are roughly .4 and 2.0 respectively.

While this paper has developed a theoretical framework for understanding the relationship between program parameters and duration, it represents only a first step. There are at least two potentially useful tasks remaining on our agenda. First, the predictions could be tested using a structural hazard model. As we have seen, the relationships are sufficiently complex to be likely to be inappropriately modeled using simple reduced-form approximations. Estimating a structural hazard model would, however, be a major task, since one would ideally need simultaneously to model both the labor supply decisions, which are also affected by the parameters, and the hazard of making a transition.

Second, alternative theoretical approaches should be explored. The job search model is not the only method of modeling transitions--it is only the most obvious to those trained in traditional economics. The challenge should be to find alternative theories which also provide a coherent explanation of why recipients find and accept jobs even when their static constraints do not change.

In conclusion, this paper has offered one framework for thinking about welfare dynamics. This framework, which focuses on the impact of guarantees and tax rates on the costs and benefits of search, offers a theoretical foundation for further work in this area.

Notes

[1]See Danziger, Haveman, and Plotnick (1981) for a review of the empirical literature.

[2]Since hours are fixed, income maximization is equivalent to utility maximization.

[3]Allowing the number of wage offers to be stochastic would not affect the results, since the benefits of search would just have to be adjusted for the probability of not receiving an offer.

[4]Note that the term reservation wage has been used in two different senses in the literature. In the job search literature the term indicates the lowest wage a person would accept if the person had to pay a positive sum to gain another offer from a nondegenerate wage distribution. This is the sense in which we use the term. In the labor supply literature the term indicates the lowest wage at which a person will work (Killingsworth, 1983, p. 8)--the slope of the indifference curve at zero hours of work. The static analysis assumes that the wage offer distribution collapses on a single value and that job offers at that wage can be obtained costlessly. Hence, the search "reservation wage" will always be greater than the static "reservation wage."

[5]Equation (1) is identical to the flow version of equation (13) in Lippman and McCall (1976), when the flow of benefits from the stock is received at the end of the period. Letting $B(\xi)$ be the benefit of the stock ξ in their notation and $H(W^*)$ be the benefit of the flow W^* in our notation, we have $\xi = W^*/r$ and $B(\xi) = H(W^*)/r$. Substituting this into their equation (13) yields our equation (1).

[6]Only 5 percent of recipients received partial benefits as a result of part-time work. See Hamermesh (1977, p. 57).

[7]The same twisting can be deduced geometrically. An increase in k steepens the function and increases W_b. Since the new steeper profile must join the old profile at the higher W_b, the new profile must cut through the old profile.

[8]Equations (25) and (26) reduce to their counterparts in the previous section if h(kW,G) and $\frac{\partial U}{\partial Y}$ are both equal to one, implying that utility maximization is equivalent to income maximization.

[9]Note that changes in the probabilities in column 3 reflect changes in W_b as well as simulated behavioral changes.

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Appendix

This Appendix derives the optimal stopping rule when individuals are allowed to accept or reject wage offers and are allowed to choose the number of hours to work at the offered wage. We assume that the same number of hours must be worked in each period, so intertemporal substitution is ruled out. Hours are, therefore, chosen to maximize the utility of any given wage offer.

Every wage offer maps into the number of desired hours, so we can work directly with the utility of this wage-hours pair. Using the notation and assumptions in the text, the value function becomes

$$\text{(A1)} \qquad V = \max[U_e(W)/r,\ \beta U_s + \beta\mu],$$

where $\beta = 1/(1 + r)$ and

$$\mu = \int^{W^*} (\beta U_s + \beta\mu)dF + (1/r)\int_{W^*} U_e(W)dF;$$

$$\text{(A2)} \qquad = \frac{\beta U_s\ F(W^*) + (1/r)\int_{W^*} U_e(W)dF}{1 - \beta\ F(W^*)}.$$

Maximization requires that

$$\text{(A3)} \qquad U_e(W^*)/r = \beta U_s + \beta\mu.$$

Substituting (A2) into (A3) and simplifying yields

$$\text{(A4)} \qquad U_e(W^*) - U_s = H(W^*),$$

where $H(W^*) = (1/r)\int_{W^*} [U_e(W) - U_e(W^*)]dF.$

Equation (A4) yields the utility-maximizing counterpart to the better-known income-maximizing result shown in equation (1) in the text.