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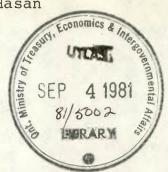
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DISCUSSION PAPER NO. 202

Job Search, Duration of Unemployment and Subsequent Wage Gain

by

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Résumé

Les plus récents ouvrages économiques se rattachant à ce qu'on appelle parfois la révolution post-keynésienne ont mis l'accent sur le fait que les marchés ne restent pas longtemps congestionnés. Les niveaux observés du chômage positif ne sont pas considérés comme une faiblesse des marchés du travail, mais plutôt comme un résultat productif et rationnel du manque d'information sur certains aspects importants de ces marchés. L'opinion selon laquelle le chômage peut être considéré comme une activité productive repose sur la théorie de la recherche d'un emploi. Ce paradigme se fonde sur le fait observé que les marchés du travail souffrent de certaines imperfections concernant la diffusion de l'information. Cette situation engendre des salaires différents pour un genre de travailleurs donnés, de sorte qu'une personne en quête d'un emploi pourrait avoir avantage à ne pas accepter automatiquement la première offre qu'elle recoit, et à investir son temps et d'autres ressources dans la recherche d'une offre plus appropriée. temps consacré à la recherche serait considéré comme une période de chômage dans les statistiques officielles. En conséquence, la théorie voulant que les marchés du travail se maintiennent le plus souvent au point d'équilibre est compatible avec les taux positifs de chômage.

Le comportement de plus grande valorisation que reflète la théorie de la recherche d'un emploi se fonde sur l'équilibre marginal à établir entre les avantages et les coûts prévus d'une période de recherche additionnelle. Toutefois, les politiques gouvernementales influent tant sur les bénéfices que sur les coûts prévus. Par exemple, le programme d'assurance-chômage accorde aux chômeurs un important pourcentage de ce qu'ils gagnaient, notamment dans le cas des personnes se situant au bas de l'échelle des salaires. Ce subventionnement de la recherche d'un emploi encourage normalement les travailleurs à devenir chômeurs et à prolonger leur période de chômage. Certains soutiennent que les périodes de recherche plus longues dont jouissent les prestataires d'assurance-chômage leur permettent d'obtenir un emploi plus satisfaisant ou plus rémunérateur.

Dans le présent document, nous étudions la question de la productivité du chômage consacré à la recherche d'un emploi. Les écrits sur cette recherche mettent l'accent sur l'évolution des taux de salaire au cours de la période de recherche comme étant le principal indicateur de la productivité de cette activité. Pour que la recherche s'avère productive, il faut que le salaire qu'obtient un travailleur après une période de chômage soit plus élevé qu'avant cette période. Nous utilisons ce changement de salaire comme mesure de la productivité de la recherche d'un emploi.

Nos résultats indiquent que cette productivité varie avec le temps. Dans le cas des <u>femmes</u>, chercher un emploi pendant plus de 15 semaines entraîne, en moyenne, une baisse évidente de la productivité de cette recherche; la diminution du salaire hebdomadaire après la période de chômage dépasse à peine 0,5 % (aux prix de 1971). Par contre, dans le cas des <u>hommes</u>, la productivité de cette recherche est positive; la valeur d'une semaine supplémentaire de recherche se situe entre 0,5 et 2 % en salaire hebdomadaire additionnel. Ces résultats montrent que le fait de prolonger la période de recherche réduit la productivité de cette période dans le cas des femmes, mais a un effet contraire dans le cas des hommes.

Il semble que les travailleurs féminins et masculins de notre échantillon participent à différents marchés et que la productivité du temps consacré à la recherche soit considérablement influencée par la nature des marchés du travail. Bien que ces résultats ne soient pas absolument concluants, ils laissent néanmoins entendre que les modèles de comportement relatifs à la recherche d'un emploi sont soumis aux contraintes imposées par les marchés segmentés.

Abstract

Recent developments in economic literature, sometimes labelled as post-Keynesian revolution, have emphasized that markets clear rapidly. Observed levels of positive unemployment are seen not as a failure of labour market but as productive and rational response to the lack of information about key aspects of labour markets. The view that unemployment can be described as a productive activity rests on the theory of jobsearch. This paradigm builds upon the observation that labour markets are beset with imperfections of information. This situation generates dispersion in wages for a given jobseeker. Faced with this dispersion of wage offers, it may pay a jobseeker not to automatically accept the first wage offer he/she encounters but to invest time and other resources in finding an appropriate offer. This type of investment in search time would be counted as unemployment in official statistics. Hence, the equilibrium view of labour markets is consistent with positive rates of unemployment.

The optimizing behaviour portrayed by search theory is based on the equality, at the margin, of expected returns and expected costs of additional search. However, both the expected returns and the cost of search are influenced by government policy. The unemployment insurance (UI) program, for instance, replaces a large fraction of wages for the unemployed, especially at the lower end of the wage spectrum. This subsidization of search

costs is expected to induce individuals into unemployment as well as lengthen their duration of unemployment. It has been argued that the longer periods of search enjoyed by UI beneficiaries permits them to obtain a more satisfactory or better paying job.

In this paper, we examine the question of productivity of search unemployment. Search literature has emphasized the movement of wage rates over the spell of search as a prime indicator of search productivity. If search is productive we would find post unemployment wages to be higher than preunemployment wages. We use this wage change as a measure of search productivity.

Our results suggests that the productivity of the search process is segmented over time. For <u>females</u>, searching for more than 15 weeks leads, on average, to a definite lowering of search productivity; percentage decline in post-unemployment weekly wages just over .5 per cent per week (in 1971 prices). For males, in contrast, the productivity of search time is positive; the value of an additional week of search is in the range of .5 to 2 per cent in weekly wages. These results mean that increasing the time spent in searching reduces the productivity of search time for females while the impact is precisely opposite for males.

It appears that male and female jobseekers in our sample are participating in different markets and that the productivity of search time is significantly affected by the nature of labour markets. Although these results are not conclusive our findings do suggest that models of job search behaviour operate within the constraints imposed by segmented markets.

I Introduction

The prevalence, in recent years, of high unemployment rates coexisting with high rates of inflation — the so-called stagflation phenomenon — has confounded economists, policy—makers and the general public alike. One explanation of the stagflation phenomenon has been in terms of the natural rate or non-accelerating inflationary rate of unemployment (NAIRU). The microfoundations of this aggregative analysis rest on the search paradigm which originated with the seminal articles of G. Stigler (1961, 1962).

According to the search paradigm, the labour market is beset with imperfections of information. Participants in this market can reap economic benefits by improving the information they possess. However, this information is costly to obtain. Under these conditions, the familiar economic calculus of equating the marginal cost of gathering information with its marginal benefits yields an optimum degree of investment in search time. Far from being a waste of resources, unemployment, in this view, appears as a necessary and rational response to market imperfections. 1

The optimizing behaviour portrayed by search theory is based on the equality at the margin of expected returns and expected costs of additional search. However, both the expected returns and the cost of search are influenced by government policy. The unemployment insurance (UI) program, for instance, replaces a large fraction of wages for the unemployed, especially at the lower end of the wage spectrum. This heavy subsidization of search costs is expected to induce individuals into unemployment as well as lengthen their duration of unemployment.² It has been argued that the longer periods of search enjoyed by UI beneficiaries permits them to obtain a more satisfactory or better paying job. It is this debate with which we are concerned.

The objective of the present paper, is to examine the issue of productivity of search time. Search literature has emphasized the movement of wage rates over the spell of search as a prime indicator of search productivity, which is measured, ceteris paribus, in terms of the change between the pre- and post-unemployment wages. If search is productive i.e., an investment in order to find higher post unemployment wages relative to previous wages, we would expect wage gains over search duration. Accordingly, our analysis focuses on the behaviour of relative wage change experienced by unemployed job searchers over the search spell and we treat this relative wage change as an indicator of productivity of search.

Given the importance of the policy issues involved empirical analysis of productivity of search time has been limited, in general, and practically non-existent for Canada. 4 This paper uses Canadian data to examine the relative wage change

experienced by workers over the search duration. The regression specification is developed in the framework of job search theory. Data are drawn from the Labour Force Tracking Survey (1978) conducted by the Department of Industry Trade and Commerce, which provides a longitudinal profile covering a five year period. The characteristics of the data are discussed in Section III. In Section II, we outline the conceptual framework underlying our analysis. In Section IV, we present the empirical results and investigate their implications for a broader perspective on the productivity of search time. The conclusions are summarized in Section V.

II The Conceptual Framework

It has long been recognized that workers with any given skill command a spectrum of wages rather than a single wage rate in the labour market. To secure the maximum return for his labour, the worker must search for an appropriate wage offer. This concept was first formalized by Stigler (1961, 1962) who reasoned that labour market information is not a free good. Rather, it involves jobseeking activity which is costly but can also yield positive returns. The notion of costly search but with a positive expected return led to the development of sophisticated and formal search models. They all highlight the productive nature of search unemployment and identify the source of returns to costly job search in the existence of wage dispersion.

The thrust of this thesis is the examination of microeconomic aspects of unemployment associated with job search. 5

The key question addressed by early search models related to the optimal stopping time. In these non-sequential search models 6 it is assumed that information does not depreciate over the duration of search and that a wealth-maximizing jobseeker conducts a search of predetermined length based on the criterion of equality of marginal returns to the marginal cost of search. The searcher then accepts the highest paying job encountered during the search.

Further theoretical developments that ensued from the works of Mortensen (1970) and McCall (1970) have been categorized as sequential search models. These models view non-depreciation of information as neglecting the stochastic nature of the search process. In these models, job search is conceptualized as a random process, and a jobseeker must accept or reject each offer as he finds it, if he is not allowed to cumulate job offers. A wealth maximizing individual undertakes search up to the point where the marginal cost of additional search just equals the marginal expected return. The solution to the search problem — optimal expected search — is obtained by setting up a reservation wage (RW), the minimum wage below which an offer will not be accepted. A wage offer (W) is accepted if W>RW and search ceases; otherwise the wage offer (W) is rejected and search continues.

Standard search theory models suggest that reservation wage (RW) in the functional form can be specified as:

$$RW = f_1(R, C) \tag{1}$$

where R represents expected returns from search and C denotes cost of search. The underlying search theoretic hypotheses are that R is positively related to RW while C is negatively related. In turn, the expected returns from search depend upon the mean and the standard deviation of the distribution of possible wage offers facing the individual. The expected duration of search (D) is given by:

$$D = f_2(RW, R) \tag{2}$$

According to equation (2), given the expected returns from search, an increase in RW will increase the expected duration of search (as the probability of receiving an acceptable offer decreases). Similarly, holding the RW constant, an increase in the mean of the wage offer distribution will reduce D by increasing the probability of an acceptable offer in any period of search.

In this paper, our objective is to estimate returns to job search and not the reservation wage. As argued earlier, we treat the relative wage change (between the pre- and post-unemployment wages) over the search duration as a measure of productivity of search. The following two-equation (recursive) model is drawn from underlying search theory. In our estimation equation, returns to search depend upon duration of search (D) and the moments of the wage offer distribution captured by the set of

variables denoted by X_j . This relationship is portrayed by equation (3) where the wage change serves as the dependent variable. Equation (4) gives the determinants of the duration of search and is based on equation (2) described above.

$$\log (W_{t}/W_{t-1}) = \beta_{0} + \beta_{1}D + \sum_{j=2}^{m} \beta_{j}X_{j} + u$$
 (3)

$$D = \alpha_0 + \alpha_1 RW + \sum_{j=2}^{m} \alpha_j X_j + e$$
 (4)

where log W_t = logarithm of real (in 1971 dollars) weekly post-unemployment wages log W_{t-1} = logarithm of real (in 1971 dollars) weekly pre-unemployment wages D = duration of search in weeks $X_j = \text{the 'j'th variable}$ $\alpha, \beta = \text{the coefficients, and}$ e, u = the disturbance terms.

III The Data and Empirical Procedures

The Labour Force Tracking Survey (1978) covers individuals from selected communities who were laid off or who voluntarily left their jobs as a result of a plant shutdown or a cutback in production. Survey teams gathered the list of such individuals from specific employers within designated localities and an attempt was made to contact each individual on the list. From the individuals contacted information was sought concerning their employment-unemployment records for the last five years, from 1973 to the cutoff date in summer 1978. The data used here

relate to all completed unemployment episodes, single or multiple, as the case may be. Each episode contains information on pre- and post-unemployment wages, reason for job separation, selected personal and human capital characteristics, and motivational and financial attributes of the individual and selected characteristics of the household to which he/she belongs. When the data for all the years are pooled together, the total sample consists of 12,020 observations out of which 1,931 relate to male quits, 860 to female quits, 7,619 to male layoffs and 1,610 to female layoffs. Our data set consists of those individuals who had experienced some unemployment during the period 1973-78. The records have been arranged so that, for every person, each spell of unemployment is identified and can be classified as the result of a quit or a layoff.

Clearly these data are not representative of the Canadian labour force or even of the unemployed population. This limitation is mitigated somewhat by inclusion in the sample of unemployment/employment history of the past five years. A second limitation of the sample is that it is also potentially affected by the contacted rate. Highly mobile individuals, especially those who move out of the communities surveyed could not be contacted and as such they may be underrepresented in the sample.

Consider now equation (3) which estimates returns from search. The dependent variable is W_t/W_{t-1} in logarithmic form where W_t is the actual post-unemployment wage obtained by the

jobseeker and is treated as a proxy for the best offer that await the searcher. Three sets of variables are used to explain the behaviour of relative wage change. First, the set of variables which determine the mean and the standard deviation of the wage offer distribution facing an individual. A second set consists of control variables. Finally, the most important variable from our point of view, in equation (3) is the duration of search (D) and the focus of our attention is on the sign of its coefficient. If search time is indeed productive we would $\exp \text{ct} \beta_1 > 0$.

The wage offer distribution facing an individual depends on (a) market productivity characteristics of the individual, and (b) local labour market conditions. To capture an individual's market productivity characteristics we use such variables as AGE, EDUC and TRAINING. Variable (AGE2) is used to allow for possible non-linearities in AGE. Job tenure with previous employer (DUREMP) is used as a measure of experience. We use two variables to represent labour market conditions: (i) URATE, and (ii) a set of dummies representing regions, LOCPRE1 to LOCPRE5. Among the set of control variables, occupation (OCCUP) and unionization (UNIONIZE) at the previous job are used to represent both the labour market characteristics as well as the productivity characteristics of an individual. On-the-job search (LOOKBLLJ) is another variable of interest which represents jobseeker's knowledge of employment opportunities that could affect the probability of receipt of a job offer. Finally, willingness to move (FLXMOVE) opens up broader avenues for

employment opportunities and other things equal, may also affect the mean of the wage offer distribution.

Consider now equation (4) which includes the determinants of the (expected) duration of search. The expected duration of search depends on the reservation wage as well as the wage distribution. The market productivity characteristics variables and the labour market variables again measure the distribution of offers. Other things equal, anything that raises the expected wage increases the length of search, but anything that increases actual offers (given expectations) reduces search duration. The cost of search, the resources available to finance search activities and the financial responsibilities each affect one's reservation wage. The cost of search includes the opportunity cost of unemployment which is represented by the jobseeker's preunemployment wages ($\log W_{t-1}$) and by the jobseeker's unemployment insurance benefit (UIB) status. Other things being equal, the greater the cost of search, the lower the RW and the shorter the duration of search. To depict the resources available to finance search activities, we use such variables as spouse's income (SPOUSEY), other sources of income (OTHERY), and the availability of past savings (SAVINGS). It is hypothesized that availability of non- wage income (SPOUSEY, SAVINGS, and OTHERY) induces a jobseeker to set up a higher RW as it provides a cushion against his depleting the household's asset portfolio or the need to borrow. Consequently, the duration of search is prolonged. The primary earner status in the family (PRIMEARN), number of dependents (DEPENDENT), and the marital status

(MARITAL) are variables which measures financial responsibilities of the jobseeker. This would tend to lower the RW and all else equal, reduce expected duration of search. Finally, three variables are introduced as controls which may affect RW. These variables represent, respectively, an individual searches over different industries, FLXINDUS, or different occupations, FLXOCCUP, and is willing to accept a wage cut (FLXWAGE). The precise definition of the afore-mentioned variables is included in an Appendix.

Equations (3) and (4) are estimated separately by sex for those who quit their jobs voluntarily and those who were laid off. The rationale for incorporating the causes of job separation is that individuals initiating a spell of unemployment voluntarily (quits) may be motivated differently as compared with layoffs who are, by definition, forced into job search involuntarily. In addition, layoff status of a jobseeker may serve as a negative signal to prospective employers that the productivity of the worker in question was judged by the previous employer to be below the wages paid to him or her.8

Equations (3) and (4) are estimated by ordinary least squares (OLS) and two stage least squares (TSLS). However, more confidence should be attached to TSLS estimates due to the following reasons. First, if we used a single equation framework the coefficient on D_t may be interpreted as the determinant of the reservation wage rather than the returns to search and it is the latter which we wish to estimate. Second, the fact

that the duration of searh itself is endogenous in the search process violates the OLS assumption that the variables on the right-hand side of equation (3) are exogenous. Therefore, TSLS is used to avoid the simultaneous equation bias that might otherwise result.

Two possible biases in our estimates may be noted. First, the fact that those persons who moved out of the communities surveyed were not in the sample might mean that some of the more productive searchers are not reported in the data. In such an event, the coefficient of D in equation (3) may be biased downward. Second, to the extent that the omitted variables such as ability etc., are contained in the error terms of both equations (3) and (4) and are correlated with the right-hand variables of these equations, there may be an asymptotic bias to a TSLS estimation of equation (3). However, the direction of such a bias is not obvious because the variables correlated with ability (EDUC, DUREMP, Wt-1, etc.) may have different effects on D.

IV Results and their Interpretation

-- Productivity of Search Time (Equation 3)

Before we present the regression results a preliminary look at the data is instructive. From the summary statistics presented in Table 1 we observe that guits, whether they are

Table 1 Mean Values of the Wage Change (W_t/W_{t-1})

	Quit	Layoff		
Male	1.06	0.986		
Female	1.035	0.965		

males or females, make a wage gain while layoffs suffer a loss in either category. Since our wage data are adjusted for price changes (1971 base), these results should be viewed as a change in real wages. Among quits, the increase was larger for males — 6 per cent compared with 3.5 per cent for females. Among layoffs, females lost about 3.5 per cent, on average, while for males, the wage loss was slightly more than 1 per cent.

These data are consistent with the hypothesis that voluntary turnover (quits) leads to improved post-unemployment wages while involuntary turnover (layoff) results in reduced wages. This may be due to the fact that individuals taking quit decisions are likely to have better information about the job opportunities and prospective wage offers. Involuntary layoffs, on the other hand, may experience a decline in relative wage since (a) the decision to leave the job is not their own, (b) lay-off status may signal to firms that the worker is less desirable than otherwise, (c) permanent layoffs are a function of unfavourable market conditions, which restrict reemployment opportunities. 10

Not only did quits, on average, experience a wage gain, the proportion of cases experiencing a wage gain was higher among

quits than among lay-offs. This observation is brought out in Table 2. Conversely, the proportion experiencing a wage loss is higher among the layoffs, whether males or females.

Table 2

Percentage of Workers Whose Post-Unemployment Wages Were Less
Than (Greater Than) Pre-unemployment Wages*

	(W _t /W _{&} t-1)>1	(W _t /W _{gt-1})<1	Total No. of Workers
Males Quit Layoff	46.5 41.7	53.5 58.2	100 100
Females			
Quit Layoff	48.0	51.9 59.7	100 100

^{*}Only a few workers had identical pre- and post-unemployment wages. We ignore such cases in this table.

We now turn to the question of whether there is a systematic relation between the duration of search and relative post-unemployment wages. In Tables 3 and 4 we present estimated parameters for equation (3) -- the relative wage change equation -- by sex for those who quit their previous jobs and those who were laid-off. Results are also presented for all-males and all-females categories regardless of quit/layoff distinction. Our focus is on the coefficient of duration of search (D) variable.

A major result in Tables 3 and 4 is that, except for TSLS estimation for male quits, the coefficient of D is negative and is statistically significant, mostly at the 1 per cent level. This provides strong evidence to the effect that an additional week of search causes a reduction in post-unemployment wages relative to pre-unemployment wages. The productivity of additional search time, therefore, is negative. However, percentage change in post-unemployment wage per week is very small relative to wages at the previous job.

It is interesting to note the difference between male and female samples. While the coefficient of D is statistically significant for each of the six estimates (OLS and TSLS) for females, only three cases are significant for males. Moreover, each of the three TSLS estimates for males is insignificant and is, in fact, positive in one case. In consequence, the conclusion that the contribution of search time is negative for males needs to be qualified.

The difference in results for males and females prompted a more in depth look at the pattern of wage gains over search duration. As shown in Table 5, a large proportion of jobseekers in our sample are concentrated in long spells of unemployment. Hence, it would seem appropriate to separate the long-term unemployed from those who experience short spells on the assumption that long-term unemployment may be due to structural factors. Critics of search theory have argued that the theory cannot explain total

unemployment since much of observed unemployment is concentrated in long spells exceeding six months. This type of hard core unemployment can hardly be termed as arising from frictions in the labour market and can be better explained by absence of jobs. 12 To take this view into account, we use fifteen weeks as the dividing line, which approximates the average duration of unemployment for the Canadian labour force (the average duration was close to 15 weeks during the period 1973-77). 13 Using this criterion, wage change equations are separately estimated for the two groups of data and the magnitude of the D coefficients is presented in Table 6.14

These results provide a much richer description of the pattern of search productivity. It appears that search productivity is segmented over the duration of search. For spells lasting 15-weeks or less, an additional week of search contributes positively to wage improvement. This is true for males as well as females and regardless of how the unemployment spell is initiated. The value of the coefficient for D is larger for for those individuals who were laid off than those who quit their job and larger for females than for males.

For spells lasting more than fifteen-weeks, the contrast between the OLS and TSLS results for the male sample may be noted. While the OLS results indicate that the productivity of an additional week of search is negative the TSLS estimates suggest a positive effect. As pointed out by Kahn (1978), one

Table 3 Estimates of the Productivity of Search Time Equation (3): Male Sample Dependent Variable log (W_t/W_{t-1}) (t-values (asymptotic for 2SLS) in parentheses)

Explanatory	Q	uit	La	ayoff	All Males		
variables	OLS	2SLS	OLS	2SLS	OLS	2SLS	
AGE	.0013	.001			.001***		
AGESQRE	000007 (.30)	00001 (.42)	00002** (2.25)		00001*** (1.75)	00001*** (1.69)	
EDUC	.004		.00002	.00005	.0002	.0001	
AGEDUC	0002 (1.22)	0001 (1.01)		.000001		000002 (.15)	
TRAINING	.004	.004 (1.46)	00 (.002)	.00001	.00008	.00008	
DUREMP	00003** (1.92)		00003* (4.79)		00003* (5.10)	00003* (4.87)	
OCCUP	.012 (1.34)	.012 (1.29)	.010** (1.92)	.010**	.012*	.011*	
UNIONIZE	040* (5.20)		021* (6.11)	021* (6.08)	025* (8.01)	025* (8.02)	
FLXMOVE	.002	.002	.004 (1.30)	.004	.003	.004	
QL	•••	• • •		•••	003 (.64)	004 (.36)	
D X QL	•••		• • •	•••	.0004*	.0005	
LOOKBLLJ	.033*	.031*	.009*	.009*	.014*	.014* (4.52)	
URATE	014* (5.24)	013* (4.74)	005* (4.57)	005* (3.92)	007* (6.85)	007* (6.28)	
LOCPRE1	.054**		029* (2.67)	033* (2.65)	014 (1.40)	013 (1.11)	
LOCPRE2	.0008		005 (.58)	008 (.84)	0007 (.10)	0002 (.02)	
LOCPRE 3	.005	006 (.31)	.010**	.008	.009*** (1.84)	.009 (1.56)	
LOCPRE 4	052* (2.96)		040* (6.13)	041* (6.10)	043* (7.07)	043* (6.73)	
LOCPRE5	049** (1.90)	043*** (1.65)	047* (4.09)	044* (3.77)	047* (4.57)	048* (4.47)	
D	0003*** (1.76)	.0004	0006* (8.27)	0004 (.93)	0006* (8.08)	0007 (1.43)	
CONSTANT	.098***	.094 (1.57)	.035**	.027 (1.30)	.062* (4.01)	.064* - (3.00)	
R ²	0.06		0.04	gap may	0.04		
F-Ratio	6.91	W 40	18.6		22.33		
Number of Observa- tions	1931	1931	7619	7619	9550	9550	

^{*} Significant at the 1% level ** Significant at the 5% level *** Significant at the 10% level.

Table 4 Estimates of the Productivity of Search Time Equation (3): Female Sample Dependent Variable $\log{(W_t/W_{t-1})}$ (t-values (asymptotic for 2SLS) in parentheses)

Explanato Variables		Quit	0.10	Layoff	All Fe	
variables	OLS	2SLS	OLS	2SLS	OLS	2SLS
AGE	.004	.005	.001	.002 (1.03)	.002	.001
AGESQRE	-:00005 (.92)	00003 (.47)	00002 (1.31)	00002 (1.07)	00003*** (1.67)	00002 (.88)
EDUC	.003	.002	0008 (.73)	002 (1.62)	001 (.90)	004 (2.13)
AGEDUC	00009 (.37)	0001 (.42)	.00002		** .00002 (.77)	.00009*
TRAINING	003 (.39)	.012 (1.09)	0005 (.72)	0008 (.88)	0006 (.92)	001 (1.14)
DUREMP	00008** (2.27)	000005 (.11)	00003* (2.21)	.00001	00004* (2.95)	.000
OCCUP	.026**	.010	.016***	.006	.022*	.016 (1.56)
UNIONIZE	046* (3.60)	015 (.84)	036* (4.65)	028* (2.65)	040* (5.97)	033* (3.50)
FLXMOVE	.020***	.021 (1.25)	007 (.86)	.009	.003	.002
QL	• • •				.013	166* (3.96)
D X QL	•••		•••	• • •	00009 (.52)	.006*
LOOKBLLJ	.015 (1.21)	.021 (1.30)	.005	.0005	.008	.003
URATE	002 (.54)	015** (2.20)	009* (3.14)	024 (4.68)	005** (2.01)	017* (3.96)
LOCPRE1	004 (.02)	.063	.077 (1.49)	.11*** (1.63)	.042	.038
LOCPRE2	.051 (1.29)	.200*	.025 (1.27)	.119*	.021 (1.22)	.115*
LOCPRE3	.018	.066 (1.58)	.026***	.048**	.019 (1.40)	.041**
LOCPRE 4	.049 (1.48)		033** (2.09)	046** (2.11)	009 (.62)	018 (.87)
LOCPRE5	.005	100 (1.37)	023 (.82)	123* (2.87)	014 (.57)	.112*
D	0006* (4.20)	004* (5.15)	0006* (5.31)	0046* (5.06)	0006* (4.84)	0064* (4.85)
CONSTANT	096 (.95)	.057	.066***	.281*	.020	.292*
R ²	0.10		0.07		0.08	
F-Ratio	5.55		7.53		10.48	
Number of Observa		860	1610	1610	2470	2470

^{*} Significant at the 1% level ** Significant at the 5% level *** Significant at the 10% level.

Table 5 Percentage of Workers Experiencing Longer Duration of Search by Sex

Duration of Search Category	Male Quit % of workers	Male Layoff % of workers	All Males % of workers	Female Quit % of workers	Female Layoff % of workers	All Females % of workers
D ≤ 15 weeks	46	37	39	38	32	34
D > 15 weeks	54	63	61	62	68	66

Table 6 Percentage Change in Returns to Search with an Additional Week of Job Search (t-values (assymptotic for 2SLS) in parentheses)

			Duration of	Search Grou	ıp	P. Carlotte	
	Tota	1 D	D ≤ 15	weeks	D >	D > 15 weeks	
	OLS	2SLS	OLS	2SLS	OLS	2 SLS	
Males							
Layoffs	06* (8.27)	04 (.93)	+.06***	+.40** (2.39)	07* (6.85)	+.42* (5.33)	
Quit	03*** (1.76)	+.04	+.01 (.30)	+.22 (1.03)	04 (1.59)	+1.9* (2.48)	
All Males	06* (8.08)	07 (1.43)	+.06** (2.12)	+.51** (2.41)	07* (6.88)	+.64*	
Females							
Layoffs	06* (5.31)	06* (4.84)	+.08**	+.42***	09* (5.47)	67* (3.85)	
Quit	06* (4.20)	40* (5.15)	+.013 (.30)	+.18 (1.01)	08* (3.43)	63* (4.41)	
All Females		64* (4.85)	+.085** (2.29)		08* (4.93)	57* (3.11)	

^{*} Significant at the 1% level
** Significant at the 5% level
*** Significant at the 10% level.

might interpret the OLS findings as measuring a declining relative reservation wage. From our present perspective then, greater confidence should be attached to TSLS estimates because we are measuring returns to search. The simultaneous equations (recursive) framework makes one more confident that the determinants of returns to search rather than of relative reservation wage are being estimated in equation (3). The TSLS results indicate that for spells lasting more than fifteen-weeks leads to a definite lowering of search productivity for females, with percentage change in post-unemployment weekly wages just over .5 per cent per week or about 2 per cent per month (in 1971 dollars) relative to previous wages. For males, in contrast, the productivity of search time is positive; the value of an additional week of search is in the range of .5 to 2 per cent in relative weekly wages.

Two major conclusions emerge very clearly from the above discussion: (i) Search is productive for all those jobseekers in our sample who were able to generate an acceptable wage offer within the first fifteen weeks of their search. (ii) For females, searching more than fifteen weeks on an average leads to a definite lowering of search productivity. For the males, in contrast, longer spells are as productive as the short spells.

Why does productivity of search time behave differently for male and female jobseekers whose search spell lasted more than fifteen weeks. The answer, we think, lies in the differing

nature of labour markets in which the two groups conduct their search. 15

It appears that female workers in our sample are conducting their job search in secondary markets where relatively limited number of good job opportunities exist. As we know, secondary markets are characterized by production processes involving simple repetitive tasks which many of the virtually infinite supply of untrained people can often learn quickly and easily. Anyone may enter this segment of the labour market, but the absence of internal job ladders prevents much upward mobility. Secondary markets may also be more localized, the few employers offering better than average wages may be widely known. At any rate, the wage offer distribution for individuals searching in the secondary markets may be highly concentrated around the mean i.e., may have very small variance. 16 Given these circumstances, the female jobseekers who are able to exploit the few good opportunities are also able to terminate their search early. This may explain the positive coefficient for additional search for the D < 15 week category. Beyond this search period, additional search yields negative results because of small variance in the wage offer distribution. If the limited number of job opportunities are exploited early in the search period, as we argue, then waiting longer would generate a negative relationship between D and relative wage change. On average, the UI program replaces a relatively larger fraction of wages for females than for males which may explain why the duration of

search is actually longer for females than for males. Empirical evidence on this issue is discussed in some detail in the section that follows.

For <u>males</u>, the productivity of search time is positive for those who search in either of the two duration categories but more so for longer spells. We suggest that male jobseekers in the sample are searching in the primary labour market. This market is characterized by higher wage levels, greater degrees of specific human capital, greater stability of job attachment and the existence of internal job ladders. These circumstances provide considerable opportunities to jobseekers to improve upon their past wages. An early acceptance of a wage offer may in fact jeopardize a better opportunity that can only arise from a more extensive search.

While it is difficult to document conclusively that all the stylized characteristics of a dual labour market fit our sample for men and women, there is some evidence to suggest that the two groups do participate in different types of labour market. 17

The weekly wage rates for males in our sample are significantly higher than for females. The sample consists mainly of low-wage manufacturing industries where skilled and semi-skilled blue collar trades are traditionally paid more than lower level white collar jobs. The proportion of males in the white collar occupations is smaller than that for females. Men are more unionized than are females. Their duration of previous job is

also higher. While there is little difference in completed education, men do have higher levels of training.

Before concluding the discussion of productivity of search time a number of ancillary results emerging from Tables 3 and 4 may be noted parenthetically. First, job tenure with previous employer (DUREMP) is used instead of the conventional age-minus-educationminus-five as a measure of experience. We expected a positive sign on the coefficient of this variable. This variable can also be viewed as measuring stability in employment (i.e., ability to stay on one job for a period of time), which is relevant for prospective employers. As such, one will also expect it to have a positive effect. As it turns out, this variable has a significant negative impact in most of the cases studied. This suggests a very strong role for job-specific human capital. 18 Second, aggregate economic conditions have an important bearing on the productivity of search time. This is borne out by the coefficient of URATE, which is found to be negative in all the cases and statistically significant in most of the cases examined. An increase in the unemployment rate by 1 per cent is associated with a 1 to 2 per cent decline in relative wage gain. Third, the coefficient of search-on-the-job (LOOKBLLJ) is positive in all wage change equations, and is significant for males. This variable contributes about 3 per cent wage gain for male guits and about 1 per cent for male layoffs, suggesting that pre-meditated guitting has relatively higher positive payoffs. Fourth, the significant and positive impact of OCCUP variable

means that jobseekers with white collar occupations prior to unemployment obtained higher relative wage gains than blue-collar jobseekers, holding previous job tenure, education and age constant. Finally, the significant negative effect of UNIONIZE variable suggests that the jobseekers whose previous jobs were unionized registered lower relative wage gains than the non-unionized searchers. This may be due to the reason that the former category of workers have relatively higher wages in our sample and therefore are likely to experience lower relative wage gains.

-- The Duration of Search (Equation 4)

We now turn our focus to the determinants of the duration of job search. The estimates of the parameters of the duration of search equation for quits and layoffs are given in Table 7. The mean values of duration of search (D) suggest that those who lost their jobs experience, on average, longer search (unemployment) spells than those who left their jobs voluntarily. For the sake of brevity, we shall confine our discussion to only a few variables.

Consider first the cost of search variables. The coefficient on UIB has the most unambiguous message for each of the four categories examined. Being a UI beneficiary increases weeks of search from a low of 8 to a high of 11 weeks. The impact is larger for quits. The impact of UI compensation on duration of

unemployment and on the unemployment rate generally has been investigated by a number of other researchers. Ehrenberg and Oaxaca (1976), Felder (1977) each find a strong positive relationship between the <u>rate</u> of unemployment insurance benefits and the duration of unemployment. Although they are not inconsistent with such results, our findings are not comparable since our specification does not refer to the rate of UI benefit. The results of Schmidt (1974), however, suggest that UI beneficiaries search for two months longer than those who do not receive compensation — a figure not too different from our estimates. 19

The opportunity cost of search time is measured by previous wage (log W_{t-1}). An asymmetry between the results for males and females should be noted. As argued earlier, we expected negative sign for this variable. For the males the sign of W_{t-1} is negative (significant for layoffs), but for females it is positive (significant for quits). A possible rationalization for this discrepency may be as follows. Earlier in this section we noted that extended search in the secondary labour markets yields negative returns. We rationalized this by postulating that good job opportunities are few in this sector and exhausted early. The wage offer distribution that exists in this sector is highly concentrated and exhibits smaller variance than in the case of men. That is, a job offer can be easily generated for a market wage which is not very attractive. Under these circumstances waiting for a more lucrative wage is unlikely

to be very fruitful. If persons with higher previous wages also happen to search longer, the negative productivity of search reported earlier would follow. The coefficient of $\log W_{t-1}$ in Table 7 does suggest that females with higher previous wages search for longer periods of time.

Although the predicted response of workers' search duration varies with the source of non-wage income (SPOUSEY, SAVINGS, and OTHERY), the observation worth mentioning is that females are more responsive than males to the spouse's income. This result is not surprising since male earners' income is generally larger and more stable. Contrariwise, the SAVINGS variable is significant in male equations but insignificant for females. The proxies for the discount rate (PRIMEARN, DEPENDENT, and MARITAL) are generally not significant.

The impact of aggregate economic conditions is captured by introducing provincial unemployment rates. In addition, a set of dummies representing each of the provinces in the data is also included. These dummy variables are, by and large, statistically significant, suggesting the important influence of labour market conditions. The unemployment rate by itself is highly significant for each of the cases studied. The negative sign for URATE suggests a decrease in search time associated with higher rates of unemployment. This stands in contrast to the theoretical expectation of a positive coefficient on the unemployment rate. It is widely assumed that long term

Table 7 Ordinary Least Square (OLS) Estimates of Determinants of Search Duration Dependent Variable: D (t-statistics)

Explanatory	Males			Females		
Variables	Quit	Layoff	All Males	Quit	Layoff	All Females
AGE	112 (.25)	.004	042 (.39)	-1.47 (1.38)	148 (.53)	110 (.41)
AGESQRE	.007	.001	.002 (1.51)	.022*** (1.82)	.002 (.59)	.003
EDUC	1.28** (2.04)	106 (1.18)	050 (.54)	96 (.62)	360 (1.36)	281 (1.03)
AGEDUC	03 (1.54)	.001	00006 (.03)	.021	.010 (1.52)	.007
TRAINING	937** (2.09)	03 (.54)	048	3.21*** (1.73)	097 (.70)	067 (.46)
DUREMP	0009 (.38)	.003*	.003* (3.39)	.015***	.009*	.010*
Log W _{t-1}	-3.54 (.89)	-3.43*** (1.90)	-4.07* (2.47)	27.54* (2.62)	6.72 (1.01)	18.14* (3.25)
OCCUP	291 (.20)	-1.62** (2.10)	909 (1.35)	-3.20 (1.07)	-2.10 (1.12)	-2.47 (1.55)
UNIONIZE	.503	278 (.53)	194 (.40)	5.15*** (1.73)	.325	1.88
FLXINDUS	.560 (.25)	-1.53*** (1.80)	-1.24 (1.53)	5.66 (1.17)	.259	1.52
FLXOCCUP	1.75	4.19* (5.07)	3.79* (4.79)	2.44	2.95 (1.09)	1.49
LXWAGE	858 (.70)	.126	049 (.11)	-1.65 (.59)	4.80* (2.87)	2.24 (1.54)
LOOKBLLJ	2.75**	.142	.797***	2.34 (.83)	-1.46 (.88)	138 (.10)
SPOUSEY	717 (.35)	.591	(.52)	10.80* (2.84)	5.15** (2.24)	6.52* (3.32)
THERY	.757	3.05*	2.39*	-2.65 (.61)	2.53	.018
SAVINGS	4.03*	2.19*	2.47*	1.99	2.42 (1.49)	2.13 (1.51)
JIB	10.97*	10.22* (13.21)	10.98*	11.10*	8.18* (3.95)	10.01* (6.10)
JRATE	-1.17* (2.81)	-1.24* (7.10)	-1.21* (7.43)	-4.21* (4.42)	-3.89* (6.18)	-4.34* (8.31)
LOCPRE1	22.26* (4.75)	16.28*	16.71*	25.02 (.70)	14.44 (1.26)	20.06***
LOCPRE2	12.93*	10.39*	10.70* (8.30)	40.33* (4.25)	25.54* (5.88)	31.27* (7.77)
LOCPRE3	12.59*	7.17*	7.86*	16.11**	9.36*	11.47*
LOCPRE4	5.13*** (1.84)	4.18*	3.84* (4.05)	4.99	-2.33 (.65)	336 (.10)
LOCPRE5	-7.61*** (1.87)	-8.49* (4.95)	-8.82* (5.58)	-20.38*** (1.67)	-22.00* (3.67)	-23.63* (4.28)
FLXMOVE	.652 (.55)	.716 (1.49)	.655 (1.45)	4.27 (1.41)	341 (.18)	.764
PRIMEARN	336 (.23)	112 (.18)	179 (.31)	.525 (.17)	2.16 (1.15)	1.96 (1.22)
DEPENDENT	324 (.53)	.179 (1.23)	.146	.425	.180	.206 (.80)
MARITAL	635 (.40)	-3.95* (6.31)	-3.46* (5.86)	.810	.174	.613) (.30)
)L		• • •	-1.88* (3.33)			.374
CONSTANT	.631	17.24* (6.52)	15.75* (6.28)	53.10** (2.24)	42.73* (5.16)	40.12* (5.32)
R ²	.11	.07	.08	.17	0.09	.11
F-statistics	8.71	22.25	29.76	6.24	5.70	10.81
Number of observations	1931	7619	9550	860	1610	2470
Mean D (in week (in weeks)	20.71	23.65	23,06	30,90	31.48	31.28

^{*} Significant at the 1% level ** Significant at the 5% level *** Significant at the 10% level.

unemployment becomes proportionately greater in a recession. However, as Kiefer and Neumann (1979) suggest, if cyclical conditions, proxied by the unemployment rate, are anticipated then there need not be any association, positive or negative, between duration of search and the unemployment rate. In this light, the negative coefficient for the unemployment rate in Table 7 may be interpreted as follows. Statistics on the URATE in our sample refers to the rate at the start of a search spell. It is possible that wage offer expectations may be geared to this rate as search begins: the higher the URATE the lower the expected value of the mean of the wage offer. Note also that the higher the unemployment rate at the start of the spell the more likely a subsequent improvement in the economic climate. If the unemployment picture improves as search proceeds the jobseeker would be pleasantly surprised by actual wage offers exceeding the expected distribution. A lower duration of search unemployment may in this way be related to high levels of the initial URATE.

V Summary and Conclusions

Theoretical models of job search view unemployment as productive search activity. Central to the search paradigm is the notion that search is an investment of time and resources in order to secure an acceptable offer. Unemployed searchers acquire labour market information that helps them to maximize their lifetime income (utility). This paper has examined the issue of productivity of search time as measured by changes in

the post-unemployment wage relative to the wage rate received before the spell of unemployment began. Several important findings emerge from our analysis.

First, the fact that a large proportion of jobseekers manage to secure a wage gain as a result of job search provides a broad support for the search paradigm. Individuals who guit obtain a larger gain than individuals who are forced into search involuntarily. Second, perhaps the most significant finding is that the productivity of the search process is segmented over time. Search is productive for all those jobseekers who were able to terminate their unemployment within the first fifteen weeks of the search. Searching for more than 15 weeks leads, on average, to a definite lowering of search productivity for females; with a change in post-unemployment weekly wages just over .5 per cent per week or about 2 per cent per month (in 1971 dollars) relative to previous wages. For males, in contrast, the productivity of search time increases with duration of search even for long spells of unemployment, the relative wage gain varies between .5 to 2 per cent per week. These results mean that increasing the time spent in searching reduces the productivity of search for females while the impact is precisely opposite for males.

It appears male and female job seekers in our sample are participating in different markets and that the productivity of search time is significantly affected by the nature of labour

markets. Although these results are not conclusive our findings suggest that models of job search behaviour operate within the constraints imposed by segmented markets.

Third, productivity of search is a function of the relative looseness or tightness of the labour market. Specifically, an increase in the unemployment rate by one per cent leads to a reduction of 1 to 2 per cent in the post-unemployment weekly wages relative to wages at the previous job. This may happen either because employers lower their wage offers thus shifting the distribution of wage offers downward or because jobseekers lower their wage expectations and accept a low paying job or, perhaps, both of these processes occur simultaneously.

Fourth, additional support for the search paradigm comes from the fact that a part of the duration of search can be explained by the cost and expected returns to search. In particular our study shows that UI beneficiary status increases the duration of search by about two to three months. This estimate is in line with estimates from other sources and suggests a substantial role for UI in determining the aggregate level of unemployment. Whether increases in UI benefits would induce additional productive job search or induce leisure can not be ascertained from these data and certainly this is a subject for further study in the Canadian context.

These results should not be automatically generalized for the Canadian labour markets as a whole. It should be remembered that our data are drawn from the Labour Force Tracking Survey which focuses on communities where massive layoffs had occurred and in this sense our results do not necessarily represent the behaviour of the entire labour force. Also, to the extent that non-pecuniary returns to searh activity, i.e., better job-worker matching, are important, the change in relative wage is an incomplete indicator of the success of search. A more comprehensive approach should attempt to take such considerations into account since they affect search productivity in a broader sense.

Notes

- Although economists of all persuasions have always recognized that a certain degree of unemployment arising from frictions in the labour market is necessary for the smooth functioning of the real world labour market there is considerable debate about the validity and significance of the search-theoretic explanation of unemployment. Tobin (1972) in particular has minimized its significance as a major explanatory factor of the high rates of unemployment experienced over the past decade by the U.S. and other western economies. Gordon (1973), Feldstein (1975) and Clark and Summers (1979) also provide evidence which questions the empirical significance of search unemployment.
- See, for example, Ehrenberg and Oaxaca (1976) Classen (1977); Siedule, Skoulas and Newton (1976); Grubel, Maki and Sax (1975); and Green and Cousineau (1976).
- 3 Admittedly this is a somewhat restricted definition as non-wage elements of a job (including long run impact of job search) are not covered.
- Previous empirical research in the United States such as Barnes (1975), Kasper (1967), and Stephenson (1976) have also examined the wage changes but the focus was on the time path of the reservation or asking wage of the unemployed job seeker. Some other studies, for example, Ehrenberg and Oaxaca (1976) examined the effect of unemployment insurance benefits on the relative wage change and on the duration of unemployment. Their results indicate that an increase in U.I. benefits would induce additional productive job search for both the older males and females, with the magnitudes of the impacts on both relative post-unemployment wages and duration of unemployment being larger for males.
- 5 See Phelps ed. (1970).
- 6 See Stigler (1962); and Alchian (1969).
- 7 For an excellent survey of the literature, see Lippman and McCall (1976).
- 8 See, for example, Welch (1977).
- 9 See, for example, Kahn (1978).
- 10 See, for example, Cook (1979).
- 11 A Chow test on the independence of sample of quits and layoffs resulted in a statistically significant F of 1.41 for males and 1.83 for females, indicating that the underlying productivity of search process is not the same for quits and layoffs. Consequently, it is appropriate to estimate separate

equations for quits and layoffs. The reader may notice that in the regression for all males (and all females), we introduce a dummy variable QL (if quit = 1, 0 otherwise) as well as an interaction variable D X QL.

- 12 See, for example, Clark and Summers (1979).
- 13 This duration of unemployment (search) can be considered frictional in nature. A Rees (1957), for example, uses a tenweek cutoff as a "possible device for distinguishing frictional unemployment from other types". However, many governmental publications often make an important distinction between unemployment that is 15 or fewer weeks in duration and that which has greater duration. See Fleisher (1970), p. 263.
- 14 The complete results are available upon request.
- 15 Much has been written on segmented labour markets in recent years. Although there is continuing debate on the merits of theories of labour market segmentation, there is wide agreement on the stylized elements that distinguish the primary sector from the secondary. See, for example, Doeringer and Piore (1971); Loveridge and Mok (1978); and Wachter (1974).
- 16 In our sample, female workers have much smaller variance in the wage distribution as compared to male workers.
- 17 Segmented labour markets are also characterized by the presence of wage discrimination. Following the methodology used by Gunderson (1979), our estimates indicate that close to 63 per cent of wage differentials between males and females in our example can be attributed to wage discrimination against females. These estimates are quite close to those found by Gunderson (1979); and Robb (1978) in Canadian context.
- 18 See, for example, Kiefer and Neumann (1979).
- 19 Other studies of UI, for instance Mortensen (1977) and Canadian studies such as Grubel, Maki and Sax (1975), Green and Cousineau (1976), Siedule, Skoulas and Newton (1976) also provide evidence of the impact of UI. However, while they each suggest a positive impact, their results are in terms of the impact on the rate of unemployment and not on the duration of (search) unemployment per se.

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Appendix

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19/1 dollars)	(when job was		
(in	wage		
= the logarithm of the real	weekly post-unemployment wage (when job was	accepted) in period t;	= actual age in years;
log W)		AGE

AGESQRE = actual age in years squared;

EDUC - years of schooling;

FLXMOVE = 1 if willing to move to a new location, 0 otherwise

TRAINING = years of formal training;

OCCUP = 1 if white collar occupation, 0 otherwise;

UNIONIZE = 1 if union member, 0 otherwise;
FLXWAGE = 1 if willing to accept wages lower than at previous job, 0 otherwise;

FLXOCCUP = 1 if also searched for a job in occupations in addition to the previous, 0 otherwise;

AGEDUC = interaction variable (AGE X EDUC)

LOOKBLLJ * 1 if looked for alternative job while still employed, 0 otherwise;

URATE = provincial unemployment rate at the start of the search period; LOCATION = a set of six provincial dummy variables; British Columbia is the category omitted from regressions;

LOCPRE1 = Newfoundland;

LOCPRE2 = New Brunswick;

LOCPRE3 = Que bec;

LOCPRE4 = Ontario;

LOCPRE5 = Manitoba;

SPOUSEY = 1 if spouse had an employment income, 0 otherwise;

OTHERY = 1 if had other sources of income during unemployment, 0 otherwise;

SAVINGS = 1 if used savings during unemployment, 0 otherwise; UIB = 1 if received unemployment compensation while unemployed, 0 otherwise;

O otherwise;

DEPENDENT = number of dependents divided by the

= 1 if prime earner of the family,

PRIMEARN

the

DEPENDENT = number of dependests divided by the number of earners in the family;

MARITAL = 1 if married, 0 otherwise;

log W = logarithm of real (in 1971 dollars)
pre-unemployment weekly wages;

D = duration of search in period t in weeks (total weeks between jobs (completed spell) minus weeks not searching for a job).

= 1 if quit, 0 if layoff

OL

D X QL = interaction variable (duration of search X quit (layoff)).

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Hasan, Abrar
Job search, duration
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