Estimating the Parameters of Interest in a Job Search Model

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No.259

WARWICK ECONOMIC RESEARCH PAPERS

DEPARTMENT OF ECONOMICS

UNIVERSITY OF WARWICK
COVENTRY

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March

1. Introduction

A lot of attention has been focussed on the issue of the effects of the level of benefits on the duration of unemployment in the last decade. These analyses have been carried out either in a reduced form framework or an approximate structural form framework allowing for some dynamics, or in a proper structural form static framework.

The reduced form approach is mainly concerned with the specification and estimation of the conditional probability of leaving an unemployment spell - see for example, Lancaster (1979), Nickell (1979), Lancaster and Nickell (1980). Search theory is then made use of, to interpret the estimated coefficients in the model. Within the search theory framework, this conditional probability can be interpreted as a product of (a) the probability of coming across a vacancy and being offered the job when applied for, and (b) the probability of accepting this offer. The latter probability, being a function of a minimum acceptable wage (reservation wage) to the individual would therefore depend on various variables like for example, personal characteristics, environmental influences etc. Hence, if one is interested in distinguishing various effects, one needs a structure for the problem.

The papers by Kiefer and Neumann (1979a, 1979b, 1981) on the other hand, consider the problem within a structural form framework.

Two linear functions, one for the wage offers and another for the reservation wages are specified and estimated and the search theory is then made use of in interpreting the results. These two functions can be thought of as first order approximations to a complicated wage offer distribution and a reservation wage equation. These approximations also allow one to model some simple dynamics.

The paper by Narendranathan and Nickell (1984) also follows a structural form approach but makes use of higher order approximations to model the wage distribution and the reservation wage equation. The main advantage of this approach being able to estimate a reservation wage for each individual even though the model has to be estimated within a static framework to avoid complicated analyses and estimation. These estimated reservation wages helps one to check the validity of the imposed structure.

There is also a novel approach taken by Lancaster and Chesher (1983), where they also take a structural form approach but the parameters of interest are calculated as sample averages rather than estimated.

In this paper we just concentrate on the methodological issues of these models that have made use of 'job search theory', without reporting or analysing any results of these investigations.

The simple 'search theory' model, as any empirical investigator would agree, is not very realistic and is also far too simple to enable any serious conclusions to be drawn. Therefore, we present a modified search theory model in Section 2 which we subsequently make use of to analyse the existing empirical literature. In Sections 3 to 5 we look at these models in greater detail and summarise and conclude the paper with Section 6.

2. Theoretical Model

'Job Search' theory is basically concerned with the optimal behaviour of an unemployed individual who is engaged in a sequential random search for a suitable job in the segment of the labour market in which he is interested. The environment in which the individual is searching plays a crucial role in the interpretation of the results. Therefore, we begin by attempting to describe, with some degree of realism, the environment facing the unemployed individual.

As time passes, new vacancies come to this individual's notice. For example, through friends, newspapers or Employment Agency advertisements, etc. Let w be the wage associated with each new vacancy and this is assumed to be a random drawing from a known density $f(w)$.

Let $q^1(z^1)$ be the probability per period that a vacancy comes to this individual's notice. z^1 here, is a set of variables which include the degree of labour market tightness and may also include some personal characteristics.[1/]

Let $q^2(z^2)$ be the known objective probability that the individual would actually be offered the job associated with the vacancy were he to make himself available. This for example would depend on variables (z^2) that would affect his desirability as an employee. Thus, $q^1q^2f(w)dw$ can be thought of as the 'probability' of being offered a job with a wage w in any period. The time interval is assumed to be small enough to ensure that there is a zero probability of being offered two or more jobs within that interval.

Suppose the individual has a utility function associated with his income (y_t) of the form

$$E \sum_{t=1}^{\infty} \frac{u(y_t)}{(1+\rho')^t} \tag{1}$$

ρ' is his rate of utility discount.

The individual is expected to hold the accepted job for T periods. T is not a choice variable in this model.

Under the above assumptions and given a stationary environment, the individual's optimal strategy is to follow a reservation wage policy. I.e. He accepts the job if the associated wage w exceeds the optimal reservation wage ξ and otherwise he continues with his search. Given the stationary nature of the problem, the reservation wage is a constant in this model and may be derived as follows:

Let V be the expected net reward from searching as viewed from the beginning of the period t. Assuming that he is free to start within an interval and all payments are made at the end of the interval, we have,

$$V = \frac{(1-\Theta)}{(1+\rho')} u(b) + \frac{(1-\Theta)}{(1+\rho')} V +$$

$$\left\{ \frac{1}{(1+\rho')} + \frac{1}{(1+\rho')^2} + \ldots + \frac{1}{(1+\rho')^T} \right\} \int_{\hat{\xi}}^{\infty} u(w)\; q(z) f(w) dw$$

$$+ \frac{\Theta}{(1+\rho')^T} V \qquad (2)$$

where,

b is the net income received when unemployed and

$q(z) = q^1(z^1).q^2(z^2)$.

Equation (2) says that the expected net reward at the beginning of the period is equal to the sum of the expected net reward for the interval and that at the end of the period.

Maximising V in (2) with respect to $\hat{\xi}$ gives us the expression for the optimal reservation wage ξ, which is

$$u(\xi) = u(b) + \frac{q(z)}{\rho} \int_{\xi}^{\infty} [u(w) - u(\xi)] f(w) dw$$

$$\rho = \frac{\rho'(1+\rho')^{T-1}}{(1+\rho')^{T-1} - 1} \qquad (3)$$

The conditional probability of leaving the unemployment spell (i.e. the hazard function) is

$$\theta = q(z) \int_{\xi}^{\infty} f(w)\,dw$$

$$= q(z)\ \bar{F}(\xi) \qquad (4)$$

where $\bar{F}(\xi) = 1-F(\xi) = 1-\int_{\xi}^{\infty} f(w)\,dw$

Some points to note:

i) If all one is concerned to do is to consider the impact of Key exogeneous variables, such as say unemployment benefits, on the duration of unemployment or on the re-employment probabilities, then one could follow a 'reduced form' approach. 'Search Theory' is then used as a framework for the interpretation of the results. In this approach, few priors about the detailed structure of the search process need be imposed on the data and this reduces the risk of corrupting the parameters of interest via the imposition of inappropriate restrictions. We look at the ways in which these models are formulated and estimated in more detail in Section 3.

ii) The other approach that has been followed in the literature could be termed the 'Structural form' approach. This typically involves the imposition of the basic structure of Search theory at varying degrees on the data. In

Section 4 we look at the ways in which the basic model presented here has been generalised or simplified in the empirical literature.

3. The Reduced Form Approach

This approach is essentially concerned with the formulation and estimation of the hazard function directly (see equation 4), making use of the information on the duration of the unemployment spell.

3.1. The Hazard Function Approach

The earlier papers that made use of this approach were Lancaster (1979), Nickell (1979) and Lancaster and Nickell (1980). They were concerned with the estimation of the hazard function for unemployed adults. More recent studies are Atkinson, Gromulka, Micklewright and Rau (1982), Narendranarthan, Nickell and Stern (1984) concerned with an unemployed adult and Lynch (1984) with an unemployed youth.

This approach essentially requires some data on individual unemployment durations (completed or uncompleted) and a functional form for the hazard. One could then write down the likelihood function for the sample and estimate the unknown parameters of the hazard function θ using maximum likelihood methods.

Let θ be a function of set of variables x as well as t, the length of time the individual has already been unemployed. Even though the model set out in Section 2 is static, one might wish to allow the hazard to be a function of t for various reasons. In the United States there is evidence that the reservation wage declines over the spell - see Kasper (1967) or Kiefer and Newman (1979) for example. In theory this could be for a variety of reasons.

For example (1) working lives are not finite. But, except for older workers, the implications of this turn out to be negligible (see Mortenson (1983)). (2) In the United States, the unemployment Benefits do not continue indefinitely and this will lead to a declining reservation wage. This obvious factor is not present in Britain as benefits do continue indefinitely. (3) There is a possibility that the 'offer' probability is directly dependent on spell duration. For example an individual who has been unemployed for some time may become discouraged or be labelled as unrealiable or feckless and thus be less attractive to employers.

Suppose, the unemployment spell duration is a random variable s with density g(s) and distribution G(s). Then,

$$\Theta(x,t)dt = \frac{P(t < s < t + dt)}{P(s > t)} \tag{5}$$

$$= \frac{g(x,t)dt}{1-G\ (x,t)}$$

which on integration gives,

$$1 - G(x,t) = \exp\left\{ - \int_0^t \Theta(x,\tau)d\tau \right\} \tag{6}$$

and from (5),

$$g(x,t) = \Theta(x,t)\ \exp\left\{ - \int_0^t \Theta(x,\tau)d\tau \right\} \tag{7}$$

Now, suppose, for example, that we have a random sample of individuals who entered unemployment at a given date and were interviewed after t_0 periods. Suppose, individuals $i = 1,\ldots I$ had already returned to work and individuals $j=1,\ldots J$ are still unemployed at date t_1, then the likelihood for the sample[2/] is

$$L = \prod_{i=1}^{I} g(x_i,t_i) \prod_{j=1}^{J} \left\{ 1 - G(x_j,t_1) \right\} \qquad (8)$$

which in turn can be expressed in terms of θ using (6) and (7). Even more limited information can be analysed along these lines. See Lancaster and Nickell (1980) for various examples of sample likelihoods.

Given (8), we now need a functional form for θ. There are two functional forms that have been used in the literature with one being more popular than the other (see Table 1). The set of variables that are typically included in x are constant, age, education, unemployment benefit or unemployment income, expected wage or expected income in employment, unemployment history variables, marital status, ethnicity, local labour market variables to capture any demand side effects etc.

One final point worth noting is that, if θ is expressed as

$$\theta = \alpha t^{\alpha-1} \exp \left\{ x\beta \right\} \qquad (9)$$

where α is the measure of duration dependence (if $\alpha = 1$ then θ

is constant over the length of the spell) then, the elasticity of the hazard with respect to a variable that enters (9) in log form is β/α and the elasticity of the expected duration with respect to the same variable is $-\dot{\beta}/\alpha$.

Authors	Data	Specification of θ
1) Atkinson et al (1982)	U.K. Family Expenditure Survey 1972-1977	$\alpha t^{\alpha-1} \exp\{x\beta\}, \alpha > 0$
2) Lancaster (1979)	U.K. Political and Economic Planning Survey. 1973.	$\alpha t^{\alpha-1} \exp\{x\beta\}, \alpha > 0$
3) Lynch (1984)	Longitudinal Survey of young people living in London. 1980.	$\alpha t^{\alpha-1} \exp\{x\beta\}, \alpha > 0$
4) Narendranathan et al (1984)	U.K. Department of Health & Social Security Cohort Study of the unemployed. 1978-79.	$\alpha t^{\alpha-1} \exp\{x\beta\}, \alpha > 0$
5) Nickell (1979)	U.K.General Household Survey. 1972.	$\simeq \exp\{x\beta\} \exp\{\alpha_1 t + \alpha_2 t^2\}$

4. The Structural Form Approach

The research under this category falls mainly into two types. One which uses the maximum likelihood methods to estimate the parameters of interest and the other which uses sample averages to calculate (rather than estimate) the elasticities of interest. We first look at the latter.

4.1 Inference without Estimation

In their paper, Lancaster and Chesher (1984), make use of the optimal reservation wage equation (3), the equation for the hazard (4) and the information supplied by the answers to two questions from the survey, they calculate some elasticities as follows:

From (4) we have

$$\theta = q\,\bar{F}(\xi) \tag{4}$$

From (3) with a linear utility function, we have

$$\xi = b + \frac{q}{\rho}\int_{\xi}^{\infty} (w-\xi)\,f(w)\,dw \tag{10}$$

The expected wage w^e in employment is given by

$$w^e = E[w | w > \xi]$$

$$= \int_{\xi}^{\infty} wf(w)dw/\bar{F}(\xi)$$

$$= \xi + \int_{\xi}^{\infty} \bar{F}(w)dw/\bar{F}(\xi) \quad \text{(using integration by parts)} \tag{11}$$

Using (3), (10) and (11) we can derive various elasticities. For example:

$$\text{ELAST1} = \frac{\partial \ell n \xi}{\partial \ell n b} = \frac{b}{\xi}\left(\frac{w^e - \xi}{w^e - b}\right) \tag{12}$$

$$\text{ELAST2} = \frac{\partial \ell n \xi}{\partial \ell n q} = \left(\frac{\xi - b}{\xi}\right)\left(\frac{w^e - \xi}{w^e - b}\right) \tag{13}$$

$$\text{ELAST3} = \frac{\partial \ell n \Theta}{\partial \ell n b} = -\frac{f(\xi)}{\bar{F}(\xi)}\left(\frac{b}{1+\Theta/\rho}\right) \tag{14}$$

$$\text{ELAST4} = \frac{\partial \ell n \Theta}{\partial \ell n q} = 1 - \frac{f(\xi)}{\bar{F}(\xi)}\left(\frac{\xi - b}{1+\Theta/\rho}\right) \tag{15}$$

To evaluate ELAST1 and ELAST2 for each individual we only need data on the reservation wage ξ i.e. the minimum acceptable wage for each individual and the wage the individual expects to get on leaving unemployment, w^e. By interpreting certain answers to questions from a survey as representing ξ and w^e, they calculate ELAST1 and ELAST2 for each individual and then average over the individuals and obtain a unique elasticity. They essentially concentrate on individuals with longer durations where the constancy of ξ is less unreasonable.

Now, to evaluate ELAST3 and ELAST4 we need to make some assumptions regarding the shape of f. They first make the assumption of a Pareto distribution to evaluate these elasticities but later check for the sensitivity of these results under a log Normal distribution.

Pareto distribution assumption gives,

$$w^e = \frac{\xi}{1-\sigma} \tag{16}$$

where, $\text{Variance}(\ell nw) = \sigma^2$

and,

$$\frac{f(\xi)}{\bar{F}(\xi)} = \frac{1}{\sigma\xi} \tag{17}$$

Using (16) and (17), we can rewrite (14) and (15) as

$$\text{ELAST3} = -\frac{b}{\sigma\xi}\left(\frac{w^e-\xi}{w^e-b}\right) \tag{18}$$

$$\text{ELAST4} = 1 - \frac{1}{\sigma}\left(\frac{\xi-b}{\xi}\right)\left(\frac{w^e-\xi}{w^e-b}\right) \tag{19}$$

Making use of the reported w^e and ξ and expression (16), they calculate σ for various duration groups and then evaluate ELAST3 and ELAST4 using (18) and (19).

Even though this is a novel way of calculating the required elasticities, one essential drawback with this approach is that it requires the accurate measurement of individuals' reservation wage ξ and the expected wage w^e.[3/] In the following sections we review some other approaches that do not make use of the reported ξ but either estimate the ξ within the model for each individual or make use of methods that do not require ξ.

4.2.1. Estimation without the reservation wage

In this section we look at ways in which the parameters of interest may be estimated without requiring knowledge of reservation wages. But, this method does require information on the post unemployment wages of those people who left unemployment within a certain time period. See for example Kiefer and Newman (1979(a), 1979(b), 1981). We first look at the static version of the model.

We start off with the specification of a functional form for $f(w)$. Let $\ell n(w)$ be distributed as Normal with mean $x\beta$ and variance σ_ε^2.

$$\text{i.e.} \quad \ell n(w_i) = x_i\beta + \varepsilon_i \tag{20}$$

$$\varepsilon_i \sim N(0,\sigma_\varepsilon^2)$$

where i refers to individual i and x is the set of variables that affect $\ell n(w)$. Next suppose the reservation wage ξ_i which is assumed to be a constant for each individual is generated by:[4/]

$$\ln(\xi_i) = z_i\gamma + u_i$$
$$u_i \sim N(0, \sigma_u^2) \qquad (21)$$

and assume that the two error terms ε_i and u_i are jointly distributed as bivariate Normal with covariance $\sigma_{u\varepsilon}$.

An individual accepts a job if and only if $s_i = \ln(w_i) - \ln(\xi_i)$ is greater than zero: which from (20) and (21) is:

$$s_i = x_i\beta - z_i\gamma + \varepsilon_i - u_i > 0$$
$$= x_i\beta - z_i\gamma + v_i > 0 \qquad (22)$$

with $v_i \sim N(0, \sigma_\varepsilon^2 - 2\sigma_{u\varepsilon} + \sigma_u^2)$

Since the condition for observing an individual's post unemployment wage is that (22) holds - wages below ξ_i are not accepted and therefore not observed. If w_i^* is the observed wage then it is distributed with:

$$E(\ln w_i^*) = x_i\beta + \rho\sigma\lambda_i \qquad (23)$$

$$\text{Var}(\ln w_i^*) = \sigma_\varepsilon^2(1 + \rho^2 r_i\lambda_i - \rho^2\lambda_i^2) \qquad (24)$$

where:

(a) $$\lambda_i = \frac{\phi(-r_i)}{1-\Phi(-r_i)} \tag{25}$$

(b) $$r_i = \frac{x_i\beta - z_i\gamma}{\sigma}$$

(c) $$\rho = \frac{\sigma_\varepsilon^2 - \sigma_{u\varepsilon}}{\sigma_\varepsilon \sigma}$$

(d) $$\sigma^2 = \sigma_\varepsilon^2 + \sigma_u^2 - 2\sigma_{u\varepsilon}$$

Here, ϕ and Φ are the standard Normal density and distribution functions respectively. If λ_i were known, the regression:

$$\ell n\ w_i^* = x_i\beta + \rho\sigma_\varepsilon\lambda_i + v_i \tag{26}$$

could be run and β and $\rho\sigma_\varepsilon$ estimated. Heckman (1979) shows that the probit estimates of the normalised version of (22), that is

$$s_i^* = \frac{s_i}{\sigma} = \frac{x_i\beta - z_i\gamma}{\sigma} + \frac{v_i}{\sigma} \tag{27}$$

can be used to estimate λ_i consistently, which in turn provides consistent estimates of $\rho\sigma_\varepsilon$. Generalised least squares can be used to improve efficiency. Note that the probit probabilities obtained from (27) are the re-employment probabilities - the hazard rates of equation (4).

The above method allows us to identify the wage distribution parameters. The identification of the reservation wage equation parameters (see equation (21)) are achieved by making use of a restriction implied by the optimal reservation wage equation (3), duration data and also assuming that some elements of x_i affect reservation wages solely through their effects on the wage distribution - see Kiefer and Neumann (1979(a) for further details.

Kiefer and Neumann (1979(b)) allow for time variation in the reservation wages by respecifying equation (21) as:

$$\ell n(\xi_i) = z_i\gamma + g\cdot t + u_i \tag{28}$$

By making use of information on the exact duration and the post unemployment wages of those people who become unemployed and also the information that the others are still unemployed at the particular time period, they set up the relevant likelihood function and estimate the parameters by maximum likelihood methods. They then follow the same procedures as discussed above for the identification of the reservation wage equation parameters.

4.2.2. Estimation of the reservation wage

There are well known problems with interpreting the answers to questions like, "what is your minimum acceptable wage" as the individual's reservation wage. The answers generally tend to be a fixed proportion or difference from the individual's pre-unemployment wages. In section 4.2.1 we considered a method that does not require observations on the actual reservation wage of the individuals but requires full information on the post-unemployment wages of those who left unemployment. In this section, we look at another approach that estimates a reservation wage within the model without requiring information on post-unemployment wages. See Narendranathan and Nickell (1984). The identification of the parameters of interest is achieved in this approach, by the a priori specification and estimation of the distribution of wages associated with the flow of vacancies faced by the individual, i.e. $f(w)$.

Suppose, we assume that $\ell n(w)$ is Normally distributed with mean μ and variance σ^2. In the absence of detailed information on the wages associated with the vacancy flow, we could use the pre-unemployment wages as a proxy. Then, the predicted values from a regression of say ℓn (pre-unemployment wage) on various variables would be an estimate of μ and the estimated regression error variance would be an estimate of σ^2. Next, we have to specify various functional forms to be able to make use of equation (3). We assume the following:

i) $$u(y_t) = \ell n(y_t).v(\ell_t)$$

where, ℓ_t is leisure in period t and takes the value 1 if the individual is unemployed and $\bar{\ell}$ if he is employed. y_t is the <u>total</u> income receipts in period t.

(ii) $$q(z,\tilde{w}) = \exp\left\{z\gamma + \phi\tilde{w}\right\}, \quad \tilde{w} = \frac{\ell n(w)-\mu}{\sigma}$$

The dependence of q on w is allowed to take account of the fact that there is more competition for higher wage posts and thus a lower chance of an offer.

iii) b is the total income receipts while unemployed and w_e is the income receipts other than wages while in employment. We can now write equation (3) as:

$$\ell n(\xi + w_e) = \exp\left\{x\beta\right\} \ell n(b) + \exp\left\{z\gamma + \pi\right\}$$

$$\int_{\xi}^{\infty} \left[\ell n\left(\frac{w+w_e}{\xi+w_e}\right)\right] e^{\phi\tilde{w}} \, f(w)\,dw \qquad (29)$$

where

$$\frac{v(1)}{v(\ell)} = \exp\left\{x\beta\right\} \quad \text{and} \quad \rho = \exp\left\{-\pi\right\} .$$

From (4) we have that,

$$\theta = \int_{\xi}^{\infty} \exp\left\{z\gamma + \phi\tilde{w}\right\} f(w)\,dw \qquad (30)$$

Therefore, if we have a sample of individuals who entered unemployment at the same time and if say $i=1,\ldots I$ individuals become re-employed after t_i periods and $j=1,\ldots J$ are still unemployed after t_0 periods, then, we can construct the relevant likelihoods as in (8). Hence, given μ and σ^2 we can maximise the likelihood subject to the restriction implied by (29). Equation (29) allows us to evaluate ξ as a function of data and the parameters of interest. For further details see Narendranathan and Nickell (1984). The estimated reservation wage along with the reported post unemployment wage can then be used as a first check on the validity of the model as the theory predicts that the post unemployment wage is greater than the reservation wage.

5. Extensions

The models presented in the previous sections have been extended in the following ways:

i) Within the reduced form approach, the hazard function θ has been re-specified to take into account any unobservable heterogeneity in the sample.

For example θ in equation (9) can be modified as:

$$\theta = \alpha t^{\alpha-1} \exp\left\{x\beta\right\}.\nu \tag{31}$$

where the distribution of ν is typically assumed to belong to the Gamma family and one could integrate out the ν from the relevant densities. See Lancaster (1979) and Lancaster and Nickell (1980) for further details.

ii) The model presented in Section 4.2.1 may also be modified to take into effect the unobservable heterogeneity in the sample. Kiefer and Neumann (1981) respecify equation (20) as:

$$\ell n(w_i) = (x_i\beta + f_i) + \varepsilon_i \tag{32}$$

where the f_i's are assumed to be individual effects which are distributed Normally and are integrated out from the relevant densities before estimation.

iii) The model presented in Section 4.2.2 could be modified to allow for the individuals to have different utility discount rates. Narendranathan and Nickell (1984) respecify ρ as:

$$\rho = \exp\left\{-x_1 \pi\right\} \tag{33}$$

The reservation wage equation (29) thus becomes

$$\ell n(\xi + w_e) = \exp\left\{x\beta\right\}\ell n(b) + \exp\left\{z\gamma + x_1 \Pi\right\}$$

$$\int_{\xi}^{\infty} \left[\ell n\left(\frac{w+w_e}{\xi+w_e}\right)\right] e^{\phi \tilde{w}} f(w)\, dw \tag{34}$$

6. Summary and Conclusions

We have, in this paper, looked at various models that have been estimated in the empirical literature which have made use of 'Job Search' Theory. The approaches used can broadly be divided into two categories. First there is the Reduced form approach, which specifies and estimates the conditional probability of leaving an unemployment spell. Alternatively, there is the structural form approach which makes use of the restrictions implied by the optimal reservation wage equation in one form or other.

The model discussed in Section 4.1, that of Lancaster and Chesher (1984), makes use of the survey information on the reported reservation wages and the expected wages along with the optimal reservation wage equation and calculates rather than estimates the relevant elasticities of interest.

The model discussed in Section 4.2.1, that of Kiefer and Neumann (1979a, 1979b, 1981) makes use of the first order approximation to the optimal reservation wage equation, a restriction implied by this equation and the information on the post unemployment wages to identify and estimate the parameters of interest. In contrast, the model discussed in Section 4.2.2, that of Narendranathan and Nickell (1984) makes use of a higher order approximation to the optimal reservation wage equation and estimates the wage distribution associated with the flow of vacancies to identify the parameters of interest. This model also obtains an estimate of the optimal reservation wage for each individual without making use of post unemployment wages. The estimated reservation wage can then be used as a check on the model as the reported post unemployment wage should be above the estimated reservation wage as a first check.

We have also mentioned in Section 5 a few extensions to the models we have looked at. In practice, of course, the approach one takes would depend on the available data set and also on the extent to which the investigator is willing to impose any structure on the data. In practice, the models that have had time variations in the hazard function have worked rather better than the ones without. As the model discussed in Section 4.2.2 allows us to check the validity of the imposed structure, we intend generalising the model to allow for a variable reservation wage in later work.

FOOTNOTES

1/ These may, for example, relate to search intensity. In the model discussed here, we assume this to be exogeneous and not a matter of optimal choice.

2. The DHSS Cohort Study of the unemployed data set, made use of by Narendranathan, Nickell and Stern (1984) is of this firm.

3/ See also Lynch (1983) for a study on Youth labour market that makes use of the same model.

4/ Equation (11) may be thought of as an approximation to the non-linear equation (3).

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