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An Analysis of the Processes of Labour Market Exclusion and (Re-) Inclusion

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ABSTRACT

An Analysis of the Processes of Labour Market Exclusion and (Re-) Inclusion*

In this paper we analyze the processes of labour market exclusion and (re-) inclusion, using a Danish register-based data set covering the period 1981-1990. The analysis is performed by estimation of reduced form transition models, the parameters of which are interpreted within the framework of search theory mixed with social psychological theories regarding unemployment and labour market exclusion. The main findings of the study are that low levels of education and working experience are associated with an increased risk of labour market exclusion. However, for the labour market (re-) inclusion process, human capital variables are not important. There is indirect evidence of psychological damaging and/or stigma effects of unemployment and nonparticipation. There is also evidence of budget constraints that eventually lead to decreasing reservation wages or increasing search intensity, as unemployment spells become very long. We discuss some policy implications of our findings.

JEL Classification: C41, J21, J60, J64

Keywords: Labour market exclusion and inclusion, multiple state duration model, left-censoring, unobserved heterogeneity

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1. Introduction

Throughout the Western hemisphere, unemployment has been unusually high since the mid 1970s. The increase in unemployment, and in particular the presence of severe long-term unemployment accentuates analyses of the consequences of long-term unemployment for future labour market outcomes, see for instance Machin and Manning (1999). Machin and Manning conclude that the fraction of long-term unemployed falls as unemployment goes down. However, they also note that this does not necessarily imply that the long-term unemployed find jobs. Instead, they may become nonparticipants. For instance, it may be the case that - as an unemployment spell lengthens - the likelihood of re-entering employment falls while at the same time the risk of leaving the labour force temporarily or permanently increases, at least relatively, which fits the description of the discouraged workers phenomenon. This process is stressed by Goldschmidt, Veum and Darity (1995) and Darity Jr and goldsmith (1996), who survey empirical evidence from the psychological literature on the psychological effects of unemployment and find strong indications that individuals are adversely affected by unemployment. It may thus be the case that long-term unemployment is the beginning of a process which, for some individuals, leads to complete exclusion from the labour market.

The situation outlined above may have serious consequences, and many OECD countries have fought to alleviate those problems for centuries. In the presence of an ageing population, the consequences are potentially much more severe, and may in the end lead to the disruption of the welfare state as we know it. In the OECD Economic Outlook for 1998, it is stated that *"... unless there are major changes in policy, the increase in the number of retirees relative to persons active in the labour force will reduce growth in material living standards and put public budgets under mounting pressure."*[1] Not surprinsingly, policies aiming at increasing the effective retirement age are strongly advocated. However, it is also important to acquire an understanding of the processes that lead to exclusion from the labour market. With such knowledge, we may pursue a complementary strategy, namely one of increasing the fraction of employed workers in future labour market cohorts, and perhaps even in age cohorts already on the labour market. The latter would entail the design and implementation of policies aimed at social re-inclusion.

The purpose of this paper is to provide some empirical evidence regarding the consequences of long-term unemployment by estimating a multiple state competing risks transition model for different age cohorts, men and women. We analyse the transition patterns on and off the labour market between three mutually excluding and exhaustive states, employment, unemployment, and nonparticipation. This enables us to identify factors that are associated with processes that lead

[1] P.179

not only to labour market exclusion but also factors that lead to (re-) inclusion. The analysis is performed by estimation of reduced form transition models, the parameters of which are interpreted within the framework of search theory mixed with social psychological theories regarding unemployment and labour market exclusion.

More specifically, we specify particularly convenient functional forms for the multivariate mixed proportional hazard model (the MMPH model, see Van den Berg, 2001), which produce an analytical expression for the likelihood function, even in the presence of left-censored observations and unobserved heterogeneity. The sampling scheme leads to an initial conditions problem. Although the sample drawn is random, the state occupied by an individual at the beginning of the observation period is not random. This problem is solved by deriving analytically the likelihood of the first (left-censored) observation. The econometric model also allows for correlation between destination specific hazard rates out of a given state and for correlation between hazard rates out of different states. It is thus a convenient and highly flexible econometric specification.

The model is estimated on samples of three age cohorts of Danish men and women. These cohorts are followed through a ten year period, during which the entire labour market history of each individual is known. The master sample originates from registers maintained by Statistics Denmark. These include registers on mandatory labour market pension contributions, registers on UI benefit eligibility, taxable income, all of which are used by the administration for the payment of UI-benefits, pensions, etc. Hence, the data is considered very reliable.

The main findings of the study are that low levels of education and working experience are associated with an increased risk of labour market exclusion, that is, with the transition from employment to unemployment to nonparticipation. However, for the labour market (re-) inclusion process, that is, the transition from nonparticipation to unemployment to employment, human capital variables are not important. There is indirect evidence of psychologically damaging and/or stigma effects of unemployment and nonparticipation. There is also evidence of budget constraints that eventually lead to decreasing reservation wages or increasing search intensity, as unemplyment spells become very long. We discuss some policy implications of our findings.

In order to set the stage, we will briefly summarize a few characteristics of the Danish labour market to place it in an international context. The male participation rate is fairly normal; 81.7% among those aged 16-66 in 1997, whereas the female participation rate is remarkably high; 72.9% for the same age group in 1997. The degree of unionisation is high; around 75% of the workforce are union members, and almost 80% are members of unemployment insurance funds, which are heavily subsidised by the state. In particular, the state finances marginal additions to the pool of unemployed, which may have caused some incentive problems in wage negotiations (Jensen, 1996). Before and during the 1980s, wage negotiations were heavily centralised, but since 1989 there has been a movement towards more decentralised bargaining. Unemployment is widespread in Denmark, in the sense that about a quarter of the labour force experiences some unemployment in a given year, but on the other hand unemployment is also heavily concentrated among certain groups, in particular the least skilled. Unemployment insurance benefits are quite generous, especially with respect to the maximum benefit period, which currently is 4 years. Those who are not eligible for UI-benefits can obtain social assistance, which is also relatively generous. Unemployment in Denmark is characterised by high inflow and low average duration (in an international context), thus resembling the labour markets of the U.S. and Canada. As in the U.S., temporary layoffs are common in Denmark, accounting for 40 % of all unemployment spells and 16 percent of total unemployment time. Concerning expenditures on active and passive labour market policies measured as a percentage of GDP, Denmark ranks very high among OECD-countries.

The next section contains a discussion of the theoretical framework of search models and some useful extensions. In Section 3, the econometric specification is laid out, while the data is presented briefly in Section 4. The main estimation results are presented along with additional analyses in Section 5, and the main conclusions are stated and some policy implications discussed in Section 6.

2. The theoretical framework

In this Section, we briefly outline the prototypical search model in continuous time and discuss some extensions that may be relevant in the present case. Consider an unemployed worker who maximizes the expected present discounted value of future income flows. The income flow during unemployment is denoted b. He is faced with a constant potential arrival rate of job offers, λ, and wage offer distribution $F(w)$. In order to actually receive offers, he must decide to search actively. Search intensity is given by s, and $c(s)$ is search costs, assumed increasing and convex. The value function of an unemployed worker is

$$rV = \max_{s\geq 0}\left[b - c(s) + \lambda s \cdot \int_0^\infty \max\left(V, W(x) - V\right) dF(x)\right]$$

where $W(x)$ is the value of accepting a job at wage x.[2] It is easily shown to lead to an optimal search intensity while unemployed, $s^*(b)$, and a reservation wage, w^*, both of which are constant during the entire unemployment spell. The reservation

[2] See e.g. Mortensen (1986).

wage, w^*, is such that a wage offer above w^* is accepted by an uneployed worker, while offers at or below the reservation wage are rejected. The model also allows for search while employed, and the reservation wage of an employed worker is the current wage earned by that worker. It is also straightforward to show the existence of a search reservation wage, that is, a wage above which search is no longer optimal. If the search reservation wage is less than or equal to the reservation wage, the individual is a nonparticipant. By allowing for a finite planning horizon or a time limit for unemployment insurance benefit receipt (or another binding budget constraint), the model may explain positive duration dependence, due to declining reservation wages. Negative duration dependence have been justified with reference to stigmatization, see for instance the ranking model, Blanchard and Diamond (1994).

The prototypical model has been extended in many ways. The general pattern is that extensions along one dimension involves simplifications along other dimensions. Otherwise the model becomes very complicated. In this paper, we want to estimate a three state transition model of the labour market. Such models have been specified and/or estimated by for instance Flinn and Heckman (1982), Burdett et al. (1984), Olsen et al. (1985), and Magnac et al (1995). However, these theoretical models are all highly stylized; they do not allow for duration dependence, there is no allowance for reservation wages or other threshold values to change over time.[3] Particularly, many of the features of interest in this paper would be lost in a structural estimation. Instead, we will estimate reduced form models and interpret the estimation results within the framework of search theory.

We will proceed by discussing a few aspects of search models that are relevant to the topics of labour market exclusion and (re-) inclusion. Van den Berg (1990b) extends the prototypical search model by allowing for transitions from unemployment into employment *and* non-participation. The transitions into non-participation occur at *exogenous rate*, though. Hence, they are not modeled in a behavioural sense. In addition, a utility function is specified which allows for different utility in employment and unemployment. He notes the possibility that workers may become discouraged and hence they may leave unemployment for nonparticipation at an increasing rate as duration increases, but he does not allow for it in the specified model.

McFadyen and Thomas (1997) argue that standard search theory is not wrong in its assumptions about individual rational behavior, but that the model merely is too simplistic. The authors then describe some insights and theories from social psychology. Of particular interest here is the relationship between unemployment, psychological well being, and job search. Motivation and problem solving abilities

[3] Van den Berg (1990a) discusses varous ways in which non-stationarities may be introduced into the search model.

are disrupted during periods of unemployment, especially among the long term unemployed. The implication is that job search will be adversely affected. This behaviour is actually rational; a rational strategy for coping with rejection is to avoid them (by not searching), thus avoiding further emotional disruption. It is even argued that psychological well-being may be partially restored by distancing oneself from work related matters. They report evidence that psychological well-being declines during the first 2-3 years of unemployment, whereafter it stabilizes, and perhaps even increases slightly. Not only search intensity but also search channels may be affected. The authors survey evidence that long term unemployed use more formal channels of job search than newly unemployed, who to a larger extent rely on direct contacts to employers, and on networks.

They also report evidence that young unemployed workers - and particularly the long term unemployed - value employment more than young employed workers, and therefore they are willing to take any job after a while. Van den Berg (1990b) finds in his empirical section that there is disutility associated with being unemployed compared to employment, *ceteris paribus*. However, in the structural framework, he does not capture the extent to which the disutility changes during an unemployment spell.

The observation that people value employment higher than unemployment, *ceteris paribus*, may be explained with reference to Warr's (1987) vitamin model - about what makes a job important. These factors are 1) secure income, 2) experience of control, 3) a defined goal structure, 4) contacts with other people, and 5) opportunities for skill utilization etc. Another useful reference is the functional model of Jahoda (1981,1988), which identifies 5 positive aspects of employment not obtained by leisure. Employment 1) imposes a time structure on the day, 2) provides contacts to people outside the family, 3) links individuals to goals and purposes that transcend their own, 4) provides status and identity, and 5) enforces activity. See also Goldsmith, Veum and Darity Jr (1995).

Darity Jr and Goldsmith (1993, 1996) report evidence that individual unemployment leads to psychological impairment and thus has persistent effects on the individuals labour market history. There is a recovery period, which increases with elapsed unemployment duration. Unemployment leads to helplessness which lead to detrimental cognitive effects that hamper learning. As a consequence, search intensity declines as unemployment duration lengthens, and in addition, productivity is adversely affected - something economists have depreciation of human capital.

The upshot of this evidence - as we see it - is that the search model may be able to capture all these features, but that the resulting formal specification of that model will be prohibitively complex for estimation purposes. We will nevertheless state some main lessons from this literature. First, there are non-monetary aspects of employment and unemployment that are important for the choice between the two.[4] More importantly, the valuations of these aspects may change during an unemployment spell. In terms of our model above, this would imply that the parameter b is a utility function, and that some of its arguments and/or parameters may be a function of unemployment duration. Second, the optimal search intensity and the effectiveness of search may be a function of unemployment duration. Finally, the productivity of the worker may change during a spell of unemployment. This could lower the (mean of) wage offer distribution faced by the individual.

In conclusion, transitions into non-participation may be explained by a discouraged worker type argument: Long term unemployment affects utility, search, and productivity in a way such that a transition into nonparticipation may become relatively more likely as unemployment proceeds. It is thus of prime interest to investigate patterns of duration dependence in the transitions from unemployment into employment and nonparticipation for different cohorts.

Transitions from nonparticipation back into the labour force can be rationalised in a similar fashion: By distancing herself from the labour market, an individual may gradually regain some of the self-esteem and well-being which was lost during unemployment. hence, search may once again be optimal, in the sense that the search reservation wage may increase above the reservation wage. In addition, we know that empirically, we observe transitions directly between nonparticipation and employment, suggesting that the distinction between unemployment and nonparticipation in the data is not the same as in the search model.

Transitions out of employment have been justified by 'learning about the job match' search theory (Jovanovic, 1979), according to which some workers a badly matched with a firm, and hence it is optimal for them to leave the firm (quit) and continue searching. These types of job separations are also optimal for the employers. In addition, employment separations may be involuntary, when a worker is laid off due to lack of demand. To model changes in the demand, we would need to introduce non-stationarities into the search model. This problem is often overcome by specifying an exogenously given job destruction rate, as it is done, for example, in equilibrium search theory, see e.g. Burdett and Mortensen (1989, 1998). Normally, we would expect transitions from employment to unemployment, but we also observe a few transitions directly from employment to nonparticipation, even if we exclude retirees. This may be women taking a maternity or child-rearing leave, persons with temporary disabilities etc., and persons laid off

[4] Van den Berg (1990b) finds that the disutility of unemployment is large. In fact, it is so large that the reservation wage is so small that nearly all wage offers are accepted by unemployed workers.

for whom the shock of layoff is so traumatic that they become nonparticipants immediately.

In sum, there are many factors which may lead to non-stationarities in the search model, and it would be difficult to incorporate even a few of these into an estimable model. Therefore, we choose to estimate a reduced form transition model. Note, however, that it is only in rare cases that a mixed proportional hazard specification (which we specify) follows directly from search theory, see Van den Berg (2001). Therefore, some caution is relevant in the interpretation of the results.

3. Econometric Specification

Since we are interested in the entire processes that lead to social exclusion and (re-) inclusion, we want to analyse individuals' transitions between the three states employment, unemployment, and nonparticipation. Let the time spent in employment, unemployment, and nonparticipation be random variables, T_e ,T_u, and T_n, respectively. Conditional on observed characteristics (x_e, x_u, x_n) and unobserved characteristics (v_e, v_u, v_n), T_e, T_u, and T_n are assumed to be independent. It is common in duration models to specify the econometric model in terms of the hazard rate, see e.g. Lancaster (1990) and Van den Berg (2001). In a three-state model, it is possible to exit a state into either one of the two other states, so the hazard rate is the sum of two destination specific hazard rates. Each of the destination specific hazard rates are assumed to be mixed proportional hazards (MPH). This implies that the destination specific hazard rate is the product of a function of time (the baseline hazard), a function of observed characteristics, and a function of the unobserved characteristics,

$$h_{ij}\left(t \mid x_i, v_{ij}\right) = \lambda_{ij}\left(t\right) \varphi_{ij}\left(x_i\right) \psi_{ij}\left(v_{ij}\right), \qquad i,j = e,u,n, \qquad i \neq j \tag{3.1}$$

The hazard rate from state i, $h_i(\cdot)$ is thus

$$h_i\left(t \mid x_i, v_i\right) = h_{ij}\left(t \mid x_i, v_{ij}\right) + h_{ik}\left(t \mid x_i, v_{ik}\right), \quad i \neq j,k, \quad j \neq k \tag{3.2}$$

where $v_i = (v_{ij}, v_{ik})$.

Let each of the destination specific hazard rates be constant on each of N intervals with splitting times $\tau_0, \tau_1, .., \tau_N$, with the conventions $\tau_0 = 0$, $\tau_N = +\infty$. This specification is also known as the piecewise constant hazard, which can attain arbitrary flexibility by increasing the number of intervals. The overall hazard rate from state i is obviously also piecewise constant on the same intervals. Let the hazard rate in state i in interval m be h_i^m. Let $m(t)$ be a function that maps a duration t into an interval m. Suppressing the dependence on observed and unobserved variables, the integrated hazard is

$$H_i(t) = \int_0^t h_i^{m(s)} ds \tag{3.3}$$

Defining a destination indicator for the transition $i \rightarrow j$ as d_{ij}, the contribution to the likelihood function of a single spell in state i is, exploiting that the contribution of a right-censored observation is the survivor function $1 - F_i(t) = \exp[-H_i(t)]$,

$$\mathcal{L}_i = \left(h_{ij}^{m(t)}\right)^{d_{ij}} \cdot \left(h_{ik}^{m(t)}\right)^{d_{ik}} \cdot \exp[-H_i(t)] \tag{3.4}$$

Our event history for an individual may not be complete. In particular, we observe a person from the beginning of 1981. Given the samples selected (see the next section), a person will already be in one of the state E, U, N. We know for how long the individual remains in that state, but not for how long the individual has already been there. This leads to an initial conditions problem, because although the samples are random, the state first occupied by an individual is not. The contribution to the likelihood function of this first (left-censored) spell is complicated. It equals the probability of being observed in the initial state, multiplied by the density or probability of the observed remaining duration of the spell. We can derive the probability of being observed in state i at the time of entry into the sample by first noting that the process described above is a continuous time semi-Markov chain. Define the transition matrix

$$\Pi = \{\pi_{ij}\}$$

where

$$\pi_{ij} = \begin{cases} \int h_{ij}(t)\,(1 - F_i(t))\,dt & \text{if} \quad i \neq j \\ 0 & \text{if} \quad i = j \end{cases}$$

is the marginal probability of entering state j from state i. Π defines a discrete time Markov chain with transition intensities π_{ij}. Associated with this Markov chain is a set of equilibrium probabilities defined as the solution to

$$\pi' = \pi' \cdot \Pi \tag{3.5}$$

The elements of $\pi = (\pi_e, \pi_u, \pi_n)$ are the (equilibrium or long-run) probabilities of entering a state. It is easily seen that the elements of π may be obtained by solving

$$\pi' Q = 0$$

where $Q = \Pi - I_3$ where I_3 is a 3x3 identity matrix with rank 2. Adding the restriction $\sum_{i=e,u,n} \pi_i = 1$, this yields a homogenous equation system with exactly one solution.

The probability of being observed in state i at the time of entry into the sample is then, under appropriate assumptions concerning the starting time of the labour market process

$$P_{1i} = \frac{\pi_i \cdot E\left[T_i | x_i, v_i\right]}{\pi_e \cdot E\left[T_e | x_e, v_e\right] + \pi_u \cdot E\left[T_u | x_u, v_u\right] + \pi_n \cdot E\left[T_n | x_n, v_n\right]} \tag{3.6}$$

This expression is also given in Lancaster (1990). The expected value of the duration of time spent in a given state is given by

$$E\left[T_i | x_i, v_i\right] = \sum_{n=1}^{N} \frac{1}{h_i^n} \cdot \Pr\left(\tau_{n-1} < T_i \leq \tau_n | x_i, v_i\right) \tag{3.7}$$

which is derived in Rosholm (1998a). Intuitively, it makes sense that the expected value of a piecewise constant distributed variable is a probability-weighted average of expected values of exponentially distributed variables with hazard rates equal to each of the values on the baseline segments. The contribution of a left-censored time t in state i is

$$\mathcal{L}_{left,i} = \frac{1}{E\left[T_i | x_i, v_i\right]} \cdot \left(\begin{array}{c} \frac{\left(h_{ij}^{m(t)}\right)^{d_{ij}} \cdot \left(h_{ik}^{m(t)}\right)^{d_{ik}}}{h_i^{m(t)}} \cdot \Pr\left(t < T_i \leq \tau_{m(t)} | x_i, v_i\right) \\ + \sum_{n=m(t)+1}^{N} \frac{\left(h_{ij}^{n}\right)^{d_{ij}} \cdot \left(h_{ik}^{n}\right)^{d_{ik}}}{h_i^{n}} \cdot \Pr\left(\tau_{n-1} < T_i \leq \tau_n | x_i, v_i\right) \end{array} \right) \tag{3.8}$$

which is also derived in Rosholm (1998a). It follows that the likelihood contribution of the first spell (of type i) is

$$\mathcal{L}_{1i} = P_{1i} \cdot \mathcal{L}_{left,i} \tag{3.9}$$

Let a sampled person have m_e, m_u, and m_n employment, unemployment, and nonparticipation spells, respectively, and initially be in state i. The contribution of such a person to the likelihood function is

$$\mathcal{L}(\gamma) = \iiint \mathcal{L}_{1i} \cdot \prod_{k=1}^{m_e} \mathcal{L}_{e,k} \cdot \prod_{l=1}^{m_u} \mathcal{L}_{u,l} \cdot \prod_{m=1}^{m_n} \mathcal{L}_{n,m} \cdot g\left(v_e, v_u, v_n\right) dv_e dv_u dv_n \tag{3.10}$$

where $g(\cdot, \cdot, \cdot)$ is the joint probability density function of the unobserved characteristics. The joint log-likelihood function for a sample of N individuals is then the sum over these N person of the natural logarithm of terms like 3.10.

Van den Berg (2001) states the conditions necessary for nonparametric identification of the MPH model. The presence of multiple spells of the same type and of different types of spells for some individuals in the sample substantially weaken the conditions necessary for identification.[5]

4. Data

The data set used in this study is a register based representative 1% master sample of the Danish population aged 16-75, covering the period 1981-1990. The sample is updated in such a way that it is representative in each of the years. For this period, it is possible to construct an entire labour market history, on a weekly basis, for each individual in the sample. The labour market history consists of a sequence of spells of the following type: Employment (E), unemployment (U), and nonparticipation (N).[6] In this paper, we have chosen to ignore unemployeemnt spells of the 'temporary layoff' type, that is, unemployment spells ending with re-employment with the previous employer before three months of unemployment. These spells are not interesting for the purposes of the present study. Hence, temporary layoff is categorized as part of the employment spells in the sense that the sequence employment - temporary layoff - employment is treated as one employment spell.

The sample selected consists of all individuals aged 13-42 in 1981, since the main focus of this paper is nonemployment which is not caused by retirement due to old age. The sample is split according to gender, and age in 1981, in such a way that there are three age cohorts, $[13; 22]$, $[23; 32]$, and $[33; 42]$ years old in 1981. Each person is followed from max(*1981, year of sample entry, year of highest graduation+1*) and until min(*year of attrition, 1990*). The reason for using only information from the first year after graduation and onwards is that the only information available on the graduation date is year of graduation. Therefore, in order to avoid accidentally including persons in education in the sample, individuals are only included from Jan. 1 of the year following graduation.

A random subset of 20% of the master sample has been selected for each age group.[7] The youngest female cohort has been labled **W1**, the middle female cohort **W2**, and the oldest female cohort **W3**. For male cohorts the corresponding lables are **M1**, **M2**, and **M3**.

[5] See also Heckman and Honoré (1989), Honoré (1993), and Abbring and Van den Berg (2000) for more identification results.

[6] The state *missing information* is ignored, as these spells are not interesting. The type of attrition is non-informative by construction of the sample, and transitions into this state are therefore treated as right censored observations.

[7] The reason for using only a sub sample is computational speed

Table 1. Summary statistics.

	W1	W2	W3	M1	M2	M3
Employment spells						
# E-spells	**1725**	**2018**	**1471**	**1928**	**2144**	**1637**
# E-U transitions	1257	1408	792	1427	1493	909
# E-N transitions	37	51	79	35	45	46
Experience, mean (years)	2.84	5.96	9.53	3.58	6.39	13.30
Education, mean (years)	11.01	10.51	9.97	10.66	10.66	10.60
% living in provinces	73.57	70.32	67.64	74.79	67.40	69.70
Wage, mean (DKK)	55.80	61.00	59.82	61.67	72.86	81.06
% missing wage obs.	18.49	18.83	18.01	12.24	11.99	17.53
Avg. duration E (weeks)	42.55	51.27	78.36	44.99	49.71	61.38
Unemployment spells						
# U-spells	**1784**	**1605**	**901**	**1971**	**1825**	**1050**
# U-E transitions	1384	1446	788	1540	1558	925
# U-N transitions	276	83	62	306	208	79
Experience, mean (years)	2.67	5.90	9.59	3.50	6.04	13.32
Education, mean (years)	10.87	10.27	9.41	10.53	10.41	9.98
% living in provinces	74.72	73.02	73.14	72.91	66.63	69.24
Avg. duration U (weeks)	18.04	19.82	21.80	14.39	14.78	15.36
Nonparticipation spells						
# N-spells	**448**	**231**	**252**	**436**	**327**	**162**
# N-E transitions	45	78	79	49	35	27
# N-U transitions	306	81	67	308	210	79
Experience, mean (years)	0.79	3.58	6.21	1.26	2.76	7.94
Education, mean (years)	10.25	9.10	8.75	9.99	9.84	9.85
% living in provinces	60.27	60.61	60.71	61.47	48.93	40.74
Avg. duration N (weeks)	41.10	100.4	101.5	31.35	32.38	42.76
# spells in total	**3957**	**3854**	**2624**	**4335**	**4296**	**2849**
# persons	**652**	**707**	**757**	**670**	**747**	**784**

We use only a few explanatory variables.[8] They are assumed to be constant during a given spell, and they measure the value of the variable at the starting time of the spell. **Exper** measures *actual* accumulated working experience, and **Exper**^{2} is its square.[9] **Educ** is the length of formal education, and **Prov** is an

[8] In future work, when larger computers become available, we will include more explanatory variables.

[9] Actual working experience is computed by combining information on past mandatory pension contributions paid by employers. These contributions are proportional to hours worked,

indicator for living in the provinces. **Wage** is the hourly wage of an employed person at the beginning of his or her employment spell, and **WageMiss** is an indicator of missing wage information. For observations with **WageMiss**=1, **Wage** is set to 0. The last two variables are only used in the transitions out of employment.[10] Summary information concerning sub-sample size, number of spells, number of transitions, average durations of uncensored spells, and the means of the covariates is given in Table 1.

There are approximately 700 individuals in each cohort. The average duration of employment is increasing with age, and it is roughly equal for men and women. Almost all employment spells end in a transition into unemployment. Women have fewer unemployment spells than men, but on average they stay unemployed for a longer time. The average duration of unemployment is slightly increasing with the cohort age. Most unemployment spells end with a transition into employment, but a non-negligible fraction ends with a nonparticipation spells. In general, women have more nonparticipation spells than men. For the second cohort, however, the situation is reversed. Men tend to stay nonparticipants for a shorter period of time than women. Most nonparticipation spells end with a transition into unemployment, but for the second and third cohort of women, a large fraction move directly into employment (possibly due to ending a maternity leave period). For the second cohort, there is a much higher fraction of male than female U-N transitions, and a correspondingly larger fraction of N-U transitions. Thus, there is an indication in the descriptive sample statistics that the men and/or women in the middle cohort differ from the other cohorts, at least in the way they move between unemployment and nonparticipation.

In terms of means of the characteristics used as covariates, there are some systematic differences across age, cohort, and across the types of spells. Actual working experience at the beginning of a spell is increasing with cohort age for men and women for all spell types. Experience is in general highest in E-spells, followed by U-spells, and it is always lowest in N-spells. For nearly all cohorts and all spell types men have more experience than women. The only exception is men in the second cohort beginning an N-spell. Looking more closely at the numbers, it is seen that the difference between male and female experience levels is always smaller for the second cohort than for the surrounding cohorts. Education is mostly non-increasing with cohort age. Cohort differences in education are highest for women. For the youngest cohort, women have more education than

hence they allow for computation of accumulated hours (we report working experience in years).

[10] Information on income during unemployment and nonparticipation is not included. Unemployment insurance benefits are almost identical for all unemployed workers, since there is a (very low) ceiling on the benefits level. Information on social assistance to nonparticipants is not available.

men across all spell types. The opposite is true for the two older cohorts. Across spell types, those starting an E-spell have more education than those starting a U-spell, who in turn have more education than those who start an N-spell.

Another interesting feature is that the fraction living in the capital is much larger among those who commence an N-spell, especially for men in the two older cohorts.

To sum up, the cohort and spell type decomposition of various individual characteristics brings out a number of interesting observations. First, the main transition patterns of interest are the main path to labour market exclusion, namely E-U-N, and the main pattern leading to (re-) inclusion, namely N-U-E. Second, there is an indication that men in the second cohort differ from the surrounding cohorts in their transition patterns and accumulated working experience, particularly regarding the group of nonparticipants in that cohort, who appear to be extraordinarily 'weak'.

5. Estimation and Results

5.1. Parametrization

The model is estimated for each of the six subsamples described in Section 4. The baseline hazard rates are piecewise constant, and the splitting times have been determined by looking at plots of Kaplan-Meyer estimates of the destination specific hazard rates for the entire sample. Seven intervals are used, and Table A1 in the appendix shows the constants used in each interval for the 6 different baseline hazards. Due to the limited number of transitions between some states, we have decided to trade flexibility in some of the baseline hazards for some added efficiency (due to the fewer parameters).

The $\varphi_{ij}(\cdot)$-functions are specified as $\exp(x_i\beta_{ij})$. The baseline hazard of each of the destination specific hazard rates is specified as follows.

$$\lambda_{ij}(t) = \exp\left(\gamma_{ij}^{m(t)} - \gamma_{ij}^{1}\right) \tag{5.1}$$

where $m(t)$ is defined in the top row of Table A1.[11] The baseline parameter vector is thus specified in deviations from its value in the first interval.

The function of the unobserved variable v_{ij} is parameterized as $\exp(v_{ij})$ and v_{ij} is assumed to follow a discrete distribution with two points of support. The usual normalization $\mathbf{E}[v_{ij}] = 0$ is not very practical here, but given the normalization of

[11] Note that with this formulation, there is only one $m(\cdot)$-function, but for a given destination specific hazard, two or more intervals may have the same constant term associated with it. This specification is convenient when programming the likelihood function in Gauss.

the baseline above, no additional restriction is needed on v_{ij}. Its mean is simply the level of the destination specific hazard rate during the first interval.

With respect to the distribution of unobservables we make the following assumptions:

A1: Each of the v_{ij} follow a discrete distribution with two points of support, v_{ij}^1 and v_{ij}^2.

A2: v_{ij} and v_{ik} are perfectly correlated.

The second assumption is equivalent to the one-factor loading specification, see Van den Berg (2001). This specification implies that $v_{ik} = a + bv_{ij}$. Hence, there is only one unobserved variable per state e, u, and n.[12] Denoting $v_i^s = (v_{ij}^s, v_{ik}^s)$, the probability associated with (v_e^s, v_u^s, v_n^s) is denoted $\mathbf{Pr}(v_e^s, v_u^s, v_n^s)$, $s = 1, 2$.

For the third cohort of men, two of the location points approached minus infinity, so for this group we conditioned on these two values and maximized the log-likelihood with respect to the remaining parameters of the model. Also, in the estimations some of the probabilities approached zero. Whenever this happened, that probability was set to zero (conditioned on). If, subsequently, another probability went to zero, it was conditioned on, but at the same time the previous conditioning was cancelled - the first probability was estimated again. If it then approached zero again, we conditioned on a value of zero for both probabilities. If a third probability then went to zero, the procedure was repeated (inclusion of both probabilities previously set to zero). Furthermore, for each estimation we tried different starting values in order to ensure convergence to a global maximum of the likelihood function.

5.2. Results

Rosholm (1998a) contains a detailed description of all estimated parameters. Here, only a brief summary concerning the distribution of unobserved variables is included. The estimated parameters of the distributions of unobserved variables are shown in Appendix Tables A2-A3. For transitions out of unemployment, the unobservables are negatively correlated between transitions, so a high value of the unobserved variable in the U-E hazard is associated with a low value of the unobservable in the U-N hazard.[13] This holds for all cohorts. The interpretation is straightforward; those with 'good' unobseved characteristics are more likely to

[12] Even with only two points of support in each of the marginal distributions, to specify a six-dimensional distribution of unobservables would require estimation of 63 probabilities and 12 locations, which is a computationally intensive task, especially when applying the estimation strategy outlined in the main text.

[13] In Rosholm (1998a) all correlations between all unobserved variables are calculated and reported. In addition, the implied correlations between durations in diffferent states are reported. The associated tables are available on request.

find employment and simultaneously less likely to become nonparticipants. For transitions out of employment it holds that for all the female cohorts, the unobserved variable in the E-U hazard is negatively correlated with the unobserved variable in the E-N hazard. For the first and third male cohorts the correlation is positive, while it is negative for the second male cohort. However, the difference between v_1 and v_2 in the E-N hazard is insignificant for all groups. For transitions from nonparticipation there is negative correlation between unobservables in the N-E hazard and the N-U hazard for all cohorts. It is not straightforward how to interpret the signs on the correlations in the latter cases, because we do not have strong a priori expectations, because individuals may leave and enter the labour force for reasons other than labour market exclusion, such as child birth, temporary sickness, etc.

In Tables 2-4 baselines and covariate effects are shown for the transitions out of employment, unemployment, and nonparticipation, respectively. In the following we will briefly summiarize the main results, particularly those of interest for our study. First, we focus on the transitions leading towards labour market exclusion, E-U-N.

5.2.1. The labour market exclusion process

There is strong negative duration dependence for all cohorts in the E-U transition. However, for all groups we observe an increase in the hazard rate (relative to the previous period) in the interval 26-52 weeks. This shape of the E-U baseline hazard is predicted by Jovanovic's (1979) model for learning about the job match; as more information about the job match is revealed, the separation rate will increase. Eventually, only good job-worker matches are left, and the separation rate becomes very small. More education reduces the E-U hazard rate for the two older male cohorts and the second female cohort. For the youngest male and female cohort, the experience profile is positive in the linear term and negative in the quadratic term, indicating that when an individual from, say, the M1-cohort enters the labour market, the probability of an E-U transition is increasing with working experience up to 3.75 years, whereafter it starts decreasing. For the second male cohort, experience reduces the risk of unemployment at an increasing rate. For the oldest cohort (both male and female), the experience profile does not seem to affect transitions from E to U. Living in the provinces increases the E-U hazard for all cohorts. A higher wage increases the E-U hazard for all cohorts, indicating that workers with a high wage (relative to their productivity in terms of education and experience) become unemployed more often. The search theoretic interpretation would be that those individuals are the ones who are badly matched with their job, in the sense that their productivity does not justify the wage paid to them, hence they are laid off.[14]

The U-N hazard rate falls drastically after the first year of unemployment for all groups. It is smallest for the men in the second cohort. If we compare the fall in the U-N hazard with the change in the U-E hazard after a year, then we find that for all groups except one, the U-N hazard falls relatively more than the U-E hazard, an observation which is in conflict with a general discouraged worker phenomenon. However, for the men in the second cohort, the estimated parameters are such that after a year, the probability of a transition into nonparticipation is relatively more likely than it was at the beginning of the unemployment spell. This is more in line with the discouraged worker hypothesis. More education reduces the probability of a transition into nonparticipation from unemployment, but the effect is insignificant for all except the youngest female cohort. The experience profiles are such that for all groups, more working experience decreases the U-N hazard. Those living in the provinces are less likely to make a U-N transition, irrespective of age and gender. Those workers who are most likely to leave the labour force are thus workers without much working experience, and young workers with little education.

In summary, we can say that the best way of avoiding labour market exclusion is to find the right job and keep it for some time. While this is a tautology, it does carry the message that employment stability is important, because of negative duration dependence in employment and the associated accumulation of working experience. In addition, more education is associated with staying employed, and those workers who are most likely to leave the labour force are workers without much working experience and young workers with little education. In a search theoretic perspective, we would say that the inclination to become discouraged and search less (or not at all) is associated with being uneducated and inexperienced. These individuals are likely on average to be those whose self-esteem is already low and/or who have not yet obtained job related status to hang on to. Of course, there is also the possibility that the problems these persons face are caused by labour market rigidities such as high minimum wages, generous UI-benefits and social assistance programs. The analysis conducted in this paper is obviously conditional on these programs, which are quite generous in denmark (cf. the brief summary in the introduction), and since the analysis is of the reduced form, we can say nothing about the effects of loosening such rigidities.[15]

[14]Search theory does predict that high wage individuals have a low *quit* rate, but this relates to on-the job search for 'better' employment, and has nothing to do with the E-U transition rate.

[15]Even structurally specified and estimated models need to make (untestable) identifying assumptions to say something about the effects of lowering minimum wages, see e.g. Koning et al. (1995).

Table 2. Baseline and covariate effects for transitions out of employment.

	W1	W2	W3	M1	M2	M3
E-U hazard:						
c_2 (weeks 4-13)	-1.3561	-1.6241	-1.3890	-0.7278	-1.0171	-1.3588
	0.1027	*0.0901*	*0.1346*	*0.0850*	*0.0790*	*0.1505*
c_3 (weeks 13-26)	-1.5024	-2.0039	-2.0174	-1.1515	-1.6448	-1.7462
	0.1116	*0.1073*	*0.1669*	*0.0930*	*0.0962*	*0.1316*
c_4 (weeks 26-52)	-1.1263	-1.5957	-1.7211	-1.0186	-1.4732	-1.6227
	0.0802	*0.0748*	*0.1071*	*0.0916*	*0.0836*	*0.1144*
c_5 (weeks 52-104)	-1.9668	-2.5034	-2.8690	-1.7474	-2.1793	-2.3486
	0.1158	*0.1283*	*0.1770*	*0.1103*	*0.1003*	*0.1334*
c_6 (weeks 104-156)	-2.3639	-3.2035	-3.1389	-2.0641	-2.8564	-3.4073
	0.1663	*0.1874*	*0.2443*	*0.1525*	*0.1732*	*0.2709*
c_7 (weeks 156-∞)	-3.1014	-3.8071	-3.6268	-2.5050	-3.7405	-3.9057
	0.1157	*0.1272*	*0.1658*	*0.1222*	*0.1022*	*0.1793*
Education	0.0355	-0.0267	-0.0226	-0.0141	-0.0604	-0.0621
	0.0212	*0.0093*	*0.0147*	*0.0234*	*0.0125*	*0.0126*
Experience	0.1799	-0.0645	-0.0057	0.1419	-0.0717	-0.0153
	0.0451	*0.0280*	*0.0361*	*0.0400*	*0.0284*	*0.0211*
Experience^2	-0.0210	-0.0015	0.0005	-0.0189	-0.0015	-0.0006
	0.0057	*0.0019*	*0.0014*	*0.0041*	*0.0019*	*0.0008*
Provinces	0.3959	0.1356	0.3031	0.1513	0.1420	0.0147
	0.0685	*0.0539*	*0.1057*	*0.0746*	*0.0727*	*0.0717*
Wage	0.0031	0.0025	0.0017	0.0016	0.0039	0.0024
	0.0013	*0.0010*	*0.0020*	*0.0012*	*0.0009*	*0.0009*
Wagemiss	0.5253	0.8043	0.5364	0.3698	0.3983	0.3609
	0.1030	*0.0846*	*0.1580*	*0.1107*	0.0977	*0.1285*
E-N hazard:						
Education	0.1268	-0.1660	-0.1058	0.1096	-0.0854	-0.0807
	0.0968	*0.0540*	*0.0390*	*0.0804*	*0.0593*	*0.0601*
Experience	-1.2805	-0.3179	-0.0408	-0.3256	-0.2783	0.0352
	0.2129	*0.1179*	*0.0726*	*0.2163*	*0.1679*	*0.1126*
Experience^2	0.1097	0.0175	-0.0008	0.0176	0.0118	-0.0047
	0.0356	*0.0106*	*0.0039*	*0.0312*	*0.0149*	*0.0054*
Provinces	-0.2231	-0.6294	-0.3221	-0.0067	-0.4144	-0.6146
	0.2233	*0.2311*	*0.2234*	*0.2466*	*0.2976*	*0.3466*
Wage	-0.0659	-0.0762	-0.0592	-0.0726	-0.0694	-0.0502
	0.0040	*0.0048*	*0.0036*	*0.0066*	*0.0067*	*0.0054*
Wagemiss	-3.7321	-2.7826	-2.6994	-3.4700	-3.8267	-3.2272
	0.4230	*0.3527*	*0.3151*	*0.4402*	*0.5552*	*0.4978*

Note: Standard errors in italics.

Table 3. Baseline and covariate effects for transitions out of unemployment.

	W1	W2	W3	M1	M2	M3
U-E hazard:						
c_2 (weeks 4-13)	-0.1342	-0.6137	-0.5491	-0.1098	-0.4495	-0.2882
	0.0866	*0.0704*	*0.1104*	*0.0639*	*0.0677*	*0.1002*
c_3 (weeks 13-26)	-0.1729	-0.5067	-0.4658	-0.1416	-0.5576	-0.0407
	0.0893	*0.0817*	*0.1270*	*0.0763*	*0.0781*	*0.1188*
c_4 (weeks 26-52)	0.0196	-0.4927	-0.6363	-0.2647	-0.8684	-0.0765
	0.1036	*0.0761*	*0.1305*	*0.0953*	*0.0984*	*0.1382*
c_5 (weeks 52-104)	0.1624	-0.3717	-0.4155	-0.2518	-0.8326	0.0572
	0.1684	*0.1314*	*0.1729*	*0.1661*	*0.1335*	*0.1936*
c_6 (weeks 104-∞)	0.1766	-0.3253	-0.2450	0.1892	-0.5536	0.9207
	0.2851	*0.3813*	*0.7105*	*1.3673*	*0.4273*	*0.6808*
Education	0.1210	0.0518	0.0366	0.0063	-0.0005	-0.0146
	0.0183	*0.0090*	*0.0137*	*0.0195*	*0.0074*	*0.0151*
Experience	0.2822	0.1034	0.0409	0.0381	0.1079	0.1497
	0.0425	*0.0282*	*0.0325*	*0.0398*	*0.0221*	*0.0270*
Experience^2	-0.0316	-0.0052	-0.0009	0.0016	-0.0044	-0.0051
	0.0053	*0.0018*	*0.0015*	*0.0039*	*0.0014*	*0.0010*
Provinces	-0.0096	0.0080	0.4049	0.1749	0.2284	0.2985
	0.0737	*0.0485*	*0.1074*	*0.0670*	*0.0459*	*0.1097*
U-N hazard:						
c_2 (weeks 52-∞)	-0.9587	-1.1754	-0.9127	-0.5727	-0.4472	-1.9274
	0.2990	*0.5679*	*0.8311*	*0.4086*	*0.3767*	*1.3327*
Education	-0.1309	-0.0736	-0.0827	-0.0383	-0.0337	-0.0451
	0.0539	*0.0647*	*0.0978*	*0.0549*	*0.0373*	*0.0554*
Experience	-1.3139	-0.2738	-0.1759	-0.3248	0.0705	-0.3675
	0.1038	*0.1133*	*0.1333*	*0.1101*	*0.1185*	*0.1062*
Experience^2	0.1281	0.0076	0.0037	0.0004	-0.0313	0.0074
	0.0138	*0.0107*	*0.0049*	*0.0169*	*0.0137*	*0.0053*
Provinces	-0.6122	-0.9339	-1.1459	-0.5705	-0.6782	-1.3717
	0.1121	*0.3259*	*0.4291*	*0.1041*	*0.1629*	*0.3567*

Note: Standard errors in italics.

Table 4. Baseline and covariate effects for transitions out of nonparticipation.

	W1	W2	W3	M1	M2	M3
N-E hazard:						
c_2 (weeks 52-104)	1.4396	-0.6001	0.2601	0.8969	0.2244	0.8513
	0.5118	*0.7511*	*0.5257*	*0.4623*	*0.6516*	*0.6282*
c_3 (weeks 104-∞)	0.8021	-0.2625	-0.1217	-0.0365	-0.8687	-0.8317
	0.4887	*0.4057*	*0.3726*	*0.4654*	*0.4737*	*0.7143*
Education	0.2250	-0.0222	0.0801	0.0223	-0.0255	0.1717
	0.0900	*0.0458*	*0.0332*	*0.0855*	*0.0743*	*0.0803*
Experience	0.4470	0.1675	0.1615	0.1282	0.3096	0.0236
	0.2204	*0.0907*	*0.0588*	*0.2479*	*0.1563*	*0.1034*
Experience^2	-0.0481	-0.0073	-0.0048	-0.0064	-0.0191	0.0003
	0.0358	*0.0085*	*0.0030*	*0.0331*	*0.0128*	*0.0047*
Provinces	-0.0016	-0.1556	0.1127	0.2296	0.3855	0.2175
	0.2888	*0.2199*	*0.2328*	*0.2769*	*0.3325*	*0.3791*
N-U hazard:						
c_2 (weeks 4-13)	-1.2229	-1.4946	-1.0511	-0.8363	-1.2055	-1.7374
	0.1838	*0.6722*	*0.7701*	*0.1711*	*0.2530*	*0.9810*
c_3 (weeks 13-26)	-1.4467	-2.3881	-2.2439	-1.4037	-2.0369	-1.8008
	0.1962	*0.5662*	*1.2548*	*0.2534*	*0.3142*	*0.5021*
c_4 (weeks 26-52)	-1.8547	-2.2728	-2.1704	-1.6896	-2.2143	-3.1926
	0.2042	*0.5159*	*0.8466*	*0.2719*	*0.3730*	*1.2198*
c_5 (weeks 52-∞)	-2.7335	-3.3220	-3.3173	-2.1738	-2.9974	-2.2730
	0.1839	*0.4055*	*0.6240*	*0.2210*	*0.3105*	*0.4075*
Education	0.1081	0.0209	0.0962	0.0348	-0.0026	-0.0025
	0.0484	*0.0765*	*0.1188*	*0.0647*	*0.0337*	*0.0772*
Experience	-0.5405	0.2494	0.0707	0.1361	0.3193	-0.0686
	0.1240	*0.2677*	*0.1792*	*0.1112*	*0.1182*	*0.0828*
Experience^2	0.0538	-0.0254	-0.0068	-0.0243	-0.0319	0.0017
	0.0174	*0.0301*	*0.0102*	*0.0198*	*0.0141*	*0.0045*
Provinces	-0.0497	-0.2451	-0.2290	-0.1087	-0.2446	-1.0311
	0.1019	*0.6148*	*0.4438*	*0.1258*	*0.1931*	*0.5466*

Note: Standard errors in italics.

5.2.2. The labour market (re-) inclusion process

There is very strong negative duration dependence in the transition rate from nonparticipation to unemployment. This holds for all cohorts. The search interpretation given to this finding is that distancing oneself from work by becoming a nonparticipant (not searching) leads further away from the labour market in the sense that a re-entry into active search becomes increasingly unlikely, a finding that is in contrast to some of the evidence found by social psychologists.

More education increases the probability of moving from N to U for the youngest women, but does not have a significant effect for other groups. For the youngest women, more experience reduces the N-U hazard up to around 5 years of experience, whereafter it increases the hazard (but women in this age cohort are likely to have less than 5 years of working experience, see Table 1). For men in the second cohort, the effect of experience is to increase the hazard at low level of experience, but at five years of experience and more, it reduces the hazard rate from N to U. However, the men in this cohort who enter non-participation do not have much experience, so in most cases more experience will increase the probability of re-entering the labour market. The experience profile is not significant for the other groups. This evidence suggests that once a person has become excluded from the labour market, human capital variables are not very important for their re-inclusion. However, unobserved factors are highly important, see Tables A2-3. There are thus some unmeasured individual specific components for all groups, which matter for the process of reinclusion, but these are not measured in this study. It is of primary importance to identify these components in the attempt to design policies aimed at reinclusion of these individuals. These could be components of psychological well-being, or they could be related to the reasons for becoming excluded in the first place (e.g. health related factors), or they could be unmeasured components of the individuals' productivities and/or preferences for work. Future work should explore this issue in more detail, but it requires access to more detailed information than that available to us.

The transition from unemployment to employment generally exhibits negative duration dependence, in the beginning of an unemployment spell. However, for most groups, the hazard rate flattens out after 13-26 weeks of unemployment, and for most groups it then starts to increase again. The exception is men in the second age cohort, for whom duration dependence is negative until 1 year of unemployment and thereafter the hazard rate stays low. From a search theoretic perspective, this suggests that, initially, stigma and/or social psychological detrimental effects dominate the development in the hazard rate. After some time, however, the budget constraint becomes binding, and individuals lower their reservation wages or increase their search intensity in order to re-enter employment.[16]

For women, more education has a positive effect on the probability of going from U to E, and the effect is strongest for the youngest cohort and weakest for the oldest cohort. For men, education does not appear to affect this transition probability. The experience profile is increasing over most of the support that a given cohort is likely to occupy. For instance, for women more working experience increases the hazard rate up to around 4.5 years for the youngest cohort, 10 years for the middle cohort, and up to 23 years for the oldest cohort. These cohorts will be younger than 31, 41, and 51 in 1990, respectively, so more experience is

[16]It may be the case that the shape of the baseline is affected by the state last occupied. Since most individuals entering unemployment were previously employed, we can thus imagine that the baseline looks different for those who were previously nonparticipants. However, to identify this pattern, we would need an interaction between the baseline parameters and an indicator for the previously occupied state. This would not only increase the number of parameters of the model, but also change the econometric specification itself, since the process no longer will be semi-Markov. Hence, we have chosen to ignore this possibility.

not likely to reduce the U-E hazard for many persons in any of the cohorts. For all except the youngest female cohort, living in the provinces increases the U-E hazard rate. To the extent that education and working experience are measures of productivity, we can thus say that more productive individuals are also more likely to return to employment, at least among the women. For the men, this interpretation holds only for working experience.

5.2.3. Discussion

The evidence presented above suggests that lack of human capital in the form of education and working experience are are associated with a higher risk of embarking on a path which leads to labour market exclusion. However, once a person has become excluded from the labour market, there is no indication that human capital variables have nearly as much of a role to play for the (re-) inclusion process. Once you are outside the labour market, what matters is not to stay out for too long (there is strong negative duration dependence). There is indirect evidence that there are stigma effects or social psychological factors which lead to a reduction in the probability of finding jobs among the unemployed. These effects are important in the early phases of an unemployment spell. We are not able to distinguish between the two with the available data, since they both lead to negative duration dependence, but for different reasons. However, there is also evidence that there are budget constraints of some kind, since the hazard rate from unemployment to employment is U-shaped. This could also be due to improved psychological well-being (and an associated resurgence of search activity) sometimes seen as individuals adapt to their new 'status'. The stigma or social psychological effect appears much stronger for those individuals who actually end up leaving the labour market. Since these individuals in most cases still receive some social assistance even as nonparticipants, it is likely that they are perceived as 'lower grade' unemployed persons. This is not only stigmatizing, but may also be very bad for the individuals self-esteem, perception of own status, well-being etc. Although we do not have direct evidence on this issue, there are indications that the labour market exclusion process has consequences beyond those traditionally considered by economists, namely the monetary loss the individual and to society. To the extent that these additional emotional and psychological consequences have lasting effects (something we have not investigated in this paper), the process of re-inclusion may be very difficult. Therefore, there is a strong case for carefully designed labour market and social policies, which take into account the situation and needs of the individual.

The labour market policies should be designed so as to keep individuals attached to the labour market, in contact with potential employers, etc. One way to do this would be to subsidize the employment of long term unemployed individuals, for instance through the use of subsidized trial periods of employment. This policy is different from employment subsidies in general, since these are inherently temporary, while trial periods are associated with the initial phases of 'real' jobs.

The social policies should be designed so as to reestablish a sense of well-being and self-esteem in the individual. This may be obtained in various ways. One of the ways is through the creation of subsidized jobs. However, it is important to note that employment subsidies in this case do not work because they provide working experience, since working experience is not important for the re-inclusion process. Rather, employment in some sense carries positive externalities to the individual (see Warr, 1987, Jahoda, 1981, 1988, and Section 2 in this paper), such as status, self esteem etc., which facilitate re-inclusion into the labour market. Of course, it may be the case that these factors may be brought forth in a cheaper fashion by other types of policies, but that is not the point here. The point is that education and classroom training programs will probably not have any effect, since they do not provide the status and other positive aspects associated with employment. On the contrary, it has been documented by the social psychological literature that learning abilities are hampered in the exclusion process. Hence, education and classroom training may lead to further experiences of failure on the part of the individual. The other good feature with employment subsidies is that they generate networks that may be exploited by the individual to obtain 'real' jobs.

6. Conclusion

We have analyzed factors associated with the processes of labour market exclusion and (re-) inclusion in a search theoretic and social psychological framework, although the estimations performed have been of the reduced form.

First, we have discussed the appropriate search theoretic framework within which to interpret the parameter estimates. This theoretical framework is then widened to admit factors known from social psychology to affect (and be affected by) unemployment duration and labour market exclusion adn inclusion processes. These factors include the psychological well-being of the individual, status, self-esteem, and even individual productivity.

To perform the empirical analysis, we have derived the likelihood for a three state competing risks duration model with unobserved heterogeneity, flexible baseline hazards, and explixit solutions to the problem of initial conditions. This model is used to estimate labour market transition intensities for various cohorts of men adn women on the Danish labour market, followed during the period 1981-1990. The main findings regarding labour market exclusion and (re-) inclusion were the following:

Low levels of education and working experience are associated with an increased risk of labour market exclusion, that is, with the transition from employment to unemployment to nonparticipation. There is indirect evidence of psychologically damaging and/or stigma effects of unemployment and nonparticipation. Hence, there is a strong case for labour market policies designed to keep individuals in contact with the labour market and to build networks with potentiall employers. This could be achieved through subsidization of trial periods of employment for long-term unemployed workers.

When it comes to the re-inclusion process, that is the transition from nonparticipation to unemployment to employment, human capital variables are far less important. The important factor here is time. The longer the individual stays a nonparticipant, the lower is the probility of ever returning to employment again. Hence, there is a strong case for a comprehensive system of active social policies aimed at establishing individual well-being, status, and self-esteem. One way to do this is to give excluded individuals jobs. This may be achieved by the use of ordinary empoyment subsidies. There does not appear to be a role for educational or classroom training programs, in the sense that such policies can not provide what these individuals miss.

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Table A1. Intervals (weeks) on which the baseline hazards are constant.

Type	(0;4]	(4;13]	(13;26]	(26;52]	(52;104]	(104;156]	(156;∞]
E-U	λ_{eu}^1	λ_{eu}^2	λ_{eu}^3	λ_{eu}^4	λ_{eu}^5	λ_{eu}^6	λ_{eu}^7
E-N	λ_{en}^1						
U-E	λ_{ue}^1	λ_{ue}^2	λ_{ue}^3	λ_{ue}^4	λ_{ue}^5	λ_{ue}^6	
U-N	λ_{un}^1				λ_{un}^2		
N-E	λ_{ne}^1				λ_{ne}^2	λ_{ne}^3	
N-U	λ_{nu}^1	λ_{nu}^2	λ_{nu}^3	λ_{nu}^4	λ_{nu}^5		

Table A2. Estimated values of the unobserved variables v_{ij}

	W1	W2	W3	M1	M2	M3
U-E:						
v_{ue}^1	-2.7010	-2.6196	-2.8901	-2.8556	-2.4668	-1.8759
	0.0873	*0.0534*	*0.1229*	*0.0769*	*0.0483*	*0.1250*
v_{ue}^2	-3.6672	-3.2582	-3.89054	-3.7615	-3.5712	-3.4035
	0.1087	*0.1315*	*0.2158*	*0.1287*	*0.1368*	*0.1339*
U-N:						
v_{un}^1	-7.0666	-9.5445	-7.8425	-6.3953	-7.9122	$-\infty$
	0.4396	*0.9216*	*0.7220*	*0.2825*	*0.3702*	.
v_{un}^2	-4.6984	-3.9912	-3.9677	-3.4917	-3.7853	-5.2232
	0.1365	*0.2042*	*0.3455*	*0.1051*	*0.2084*	*0.2980*
E-U:						
v_{eu}^1	-2.7003	-2.4383	-2.6849	-2.8865	-2.3014	-2.4064
	0.1203	*0.0559*	*0.1152*	*0.0987*	*0.0750*	*0.0928*
v_{eu}^2	-3.3955	-4.5641	-5.6894	-3.8111	-3.4077	-4.8086
	0.1274	*0.2245*	*0.3854*	*0.1747*	*0.1101*	*0.3131*
E-N:						
v_{en}^1	-7.3104	-8.6183	-8.2103	-7.5936	-9.0548	-7.7486
	0.6459	*0.3485*	*0.2968*	*0.3651*	*0.6822*	*0.4855*
v_{en}^2	-7.1686	-7.5084	-7.7390	-7.8322	-8.2243	-8.9633
	0.3007	*0.2326*	*0.1984*	*0.3778*	*0.2769*	*0.4421*
N-E:						
v_{ne}^1	-5.9404	-5.1380	-5.7477	-5.4038	-5.3755	-5.3526
	0.5113	*0.3938*	*0.3678*	*0.4254*	*0.3986*	*0.5194*
v_{ne}^2	-7.0252	-6.7217	-6.9688	-7.1720	-6.6042	-6.3143
	0.5096	*1.0921*	*0.8007*	*0.8463*	*0.9152*	*0.7190*
N-U:						
v_{nu}^1	-4.0810	-5.0856	-5.7516	-4.0210	-3.8155	$-\infty$
	0.3052	*0.6837*	*1.0168*	*0.3694*	*0.4405*	.
v_{nu}^2	-2.6709	-1.8793	-2.3381	-1.9919	-1.7655	-2.0376
	0.1568	*0.5242*	*0.6460*	*0.1737*	*0.3430*	*0.4151*

Table A3. Parameter estimates for the unobservables' distribution.

	W1	W2	W3	M1	M2	M3
$\mathbf{P}(v_u^1, v_e^1, v_n^1)$	0.1759	0.4963	0.2906	0.3331	0.2281	0.1103
	0.0553	*0.0398*	*0.0371*	*0.0887*	*0.0328*	*0.0225*
$\mathbf{P}(v_u^1, v_e^1, v_n^2)$	0	0	0	0.0765	0	0
	.	.	.	*0.0608*	.	.
$\mathbf{P}(v_u^1, v_e^2, v_n^1)$	0.2874	0.3160	0.5539	0.0336	0.6148	0.4249
	0.0756	*0.0708*	*0.0609*	*0.1069*	*0.0408*	*0.1307*
$\mathbf{P}(v_u^1, v_e^2, v_n^2)$	0	0	0	0.3786	0	0
	.	.	.	*0.1208*	.	.
$\mathbf{P}(v_u^2, v_e^1, v_n^1)$	0	0	0	0.0983	0	0
	.	.	.	*0.0310*	.	.
$\mathbf{P}(v_u^2, v_e^1, v_n^2)$	0.0330	0.0727	0.0560	0.0030	0.0241	0.2156
	0.0392	*0.0231*	*0.0184*	*0.0457*	*0.0155*	*0.0311*
$\mathbf{P}(v_u^2, v_e^2, v_n^1)$	0	0.0536	0	0.0641	0	0.1228
	.	*0.0601*	.	*0.0391*	.	*0.1580*
$\mathbf{P}(v_u^2, v_e^2, v_n^2)$	0.5037	0.0614	0.0994	0.0127	0.1331	0.1264
	0.0557	*0.0422*	*0.0589*	*0.0419*	*0.0335*	*0.1000*

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