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EDUCATION AND UNEMPLOYMENT: STATE DEPENDENCE IN UNEMPLOYMENT AMONG YOUNG PEOPLE IN THE 1990S*

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Tiivistelmä: Työssä tutkitaan nuorten, vuonna 1988 työmarkkinoille siirtyneiden henkilöiden työmarkkinakokemuksia aina vuoteen 1998 saakka. Erityisenä mielenkiinnon kohteena on työttömyyden kasautuminen, jota mitataan aiemman työttömyyden vaikutuksena tulevaan työttömyyteen. Tulokset osoittavat työttömyyskokemuksen vahingoittavan nuorten työmarkkinamahdollisuuksia. Keskimääräiseksi vaikutukseksi saadaan 20 prosenttiyksikön kasvu työttömyyden todennäköisyydessä. Koulutusasteittain eriteltynä havaitaan korkeakoulutuksen suorittaneiden selviävän hieman pienemmin pysyväis-vaikutuksin.

Asiasanat: Nuorten työmarkkinat, tilariippuvuus, työttömyys, paneeliaineisto

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Abstract: This study examines the labour market careers of young people who finished their studies or left compulsory schooling in 1988. The main issue of interest is the impact of past unemployment on current unemployment. The results strongly suggest a sizeable scarring effect of the incidence of unemployment on future labour market possibilities. The impact is estimated of being some 20 percentage points, on average, in terms of unemployment probability. When differentiated by the level of education, the results show that only university graduates were relatively immune to the damaging long-term effects of unemployment.

Key words: Youth labour markets, state dependence, unemployment, panel data

Contents

1 Introduction

Easing the problem of youth unemployment has long belonged to the government agenda in the OECD countries. There are several reasons for this. OECD (2002) reports that unemployment is more common among youth than among adults and there are severe difficulties among some groups of young people to find a permanent job. Blanchflower and Freeman (1996) show that youth employment prospects are particularly sensitive to changes in the economic situation and, accordingly, the effects of economic downturns are more severe in the youth labour market. In addition, many studies report that career interruptions have a downward impact on future labour market possibilities and this may be particularly severe at the early stages of a labour market career, see e.g. Albrecht et. al. (1999), Light et. al. (1998) and Waldfogel (1998).

The policy actions taken to ease youth unemployment have been numerous. These include training, employment subsidies, changes in the minimum wage legislation, measures to reduce labour costs, activation measures etc. (OECD, 2002). The success of these policy actions is largely conditional on to what extent the incidence of unemployment depends on unfavourable individual characteristics, and to what extent the incidence of unemployment in itself has a damaging impact on the future working career. In the former case, public policy should be aimed at improving the prospects of employment e.g. via further education. This leaves hardly any room for policy measures aimed at getting the unemployed back to work or preventing unemployment. The latter case, on the other hand, paves the way for the design of policies aimed at preventing unemployment and reducing the scarring effect of unemployment.

The long-term scarring effect of unemployment has direct policy implications but the separation of state dependence from individual heterogeneity is not an easy task. The same individuals may be observed constantly in unemployment merely because their propensity to become unemployed is high. This may arise from unfavourable individual characteristics and/or unobserved individual heterogeneity, such as lack of motivation or punctuality. If these factors are left uncontrolled, the magnitude of state dependence will be overestimated and the resulting policy implications will be misleading. The isolation of state dependence, or the scarring effect of unemployment, from unobserved heterogeneity is the main issue of interest in this paper.

Another issue of interest is the distribution of the scarring effect across different levels of education. To get a clearer picture of the role of education in labour markets, young persons who entered labour markets with a mere basic education are also included in the analysis. It is particularly interesting to examine whether these individuals had considerable problems in labour markets during the turbulent years of the 1990s. The impact of education on unemployment is

examined by two means, viz. the probability of unemployment and the magnitude of state dependence. Possible differences in the scarring effect point out that public interventions could be more effective if targeted to those levels of education that are harmed the most by the incidence of unemployment.

The rest of the paper is organised as follows. The next section introduces the empirical model for exploring the state dependence. The third section introduces the data and takes a first look at the persistence of unemployment. The results are discussed in the fourth section. A closer look at the state dependence across the levels of education is taken in the fifth section. The sixth section concludes.

2 Examining the state dependence in unemployment

On theoretical grounds the past unemployment experience may influence the future labour market career through several channels. It may be optimal for a firm to use different employment criteria for different groups of job seekers (Sattinger, 1998), and to rank job applications based on job seekers' duration of unemployment (Blanchard and Diamond, 1994). Gibbons and Katz (1991) show that owing to uncertainty firms try to infer the quality of workers from their employment history. Furthermore, the model by Eriksson (2002) implies that discrimination based on employment status is an equilibrium hiring strategy even when firms are allowed to set wages according to workers' expected productivity. As a result, the unemployed may be permanently scarred when applying for vacancies.

The experience of unemployment may also change the behaviour of the unemployed by changing preferences, prices and constraints (Heckman and Borjas, 1980). It is also commonly argued that interruptions in the working career reduce productivity both by preventing the accumulation of human capital and by deteriorating existing human capital, see e.g. Mincer and Polachek (1974) and Ruhm (1998). A reduction in productivity will then hinder the probability of getting a job in the future even if there are no informational asymmetries in labour markets.

Even though theoretical models suggest a causal link from past unemployment to future unemployment, it is not straightforward to establish this in empirical work. Some persons may be observed constantly in unemployment because their probabilities of getting a job are scant owing to observed characteristics (e.g. low education) and/or unobserved characteristics (e.g. lack of punctuality). If the unmeasured differences among cross-sectional units remain uncontrolled and they are correlated over time, previous unemployment may appear to determine further unemployment solely because it acts as a substitute for temporally persistent factors. This results in an overestimation in the magnitude of state dependence and, accordingly, in false policy recommendations.

The separation of state dependence from unobserved heterogeneity is possible only if one has access to panel data (see e.g. Baltagi, 1995). Let the underlying response variable be y_{it}^{*} which measures the ith individual's propensity to be unemployed in time period t. This latent variable is related to observed differences among cross-sectional units as

$$(1) \qquad y_{it}^{*} = a_0 + \gamma y_{it-1} + \lambda' z_i + \beta' x_{it} + u_{it}, \qquad i = 1, \ldots, N, \; t = 1, \ldots, T,$$

where the propensity variable is related to the previous labour market state, y_{it-1}, time-invariant variables, z_i, and time-varying variables, x_{it}. Time-invariant variables include the education variables that are fixed throughout the estimation period by the construction of the sample. Time-varying variables control for observable differences in individual and labour market characteristics that influence unemployment.

To incorporate unobserved heterogeneity into analyses, the composite error term, u_{it}, is separated into an individual-specific unobserved effect, α_i, and an iid random term, ε_{it}, as

(2) $$u_{it} = \alpha_i + \varepsilon_{it}.$$

This specification allows observationally identical individuals to have different probabilities of experiencing unemployment. Accordingly, the labour market career of a young person may differ systematically from the average behaviour of the similar youth owing to motivation or responsibility, for example. This intuitively appealing extension comes with the cost. Since the unobserved heterogeneity persists over time, the composite error term, u_{it}, is correlated across cross-section units in time even if the error terms ε_{it} are purely random.

Unlike in linear models, the estimation of unknown parameters presented in equation (1) and α_i is not asymptotically independent (Hsiao, 1991). Accordingly, there is no easy way to eliminate the individual-specific effect in the context of fixed-effects. An attractive alternative is to treat the individual heterogeneity effect, α_i, as randomly distributed in the population. The specification of distributions as $\alpha_i \sim IN(0, \sigma_\alpha^2)$ and $\varepsilon_{it} \sim IN(0, \sigma_\varepsilon^2)$, together with the assumptions that α_i and ε_{it} are independent of each other and of the explanatory variables, leads to the random effects probit model, first discussed in Heckman and Willis (1976) .

The parameter estimates of the random effects probit model are biased if unobserved heterogeneity is correlated with observed heterogeneity. Chamberlain (1984) suggested that a potential dependence can be allowed by specifying a distribution for α_i conditional on the leads and lags of time-varying explanatory variables. The drawback with this is, however, that the number of parameters to be estimated increases substantially. An alternative is provided by Mundlak (1978) who allowed unobserved and observed heterogeneity to be mutually dependent via the means of time-varying explanatory variables as

(3) $$\alpha_i = a_1 + b' \overline{x_i} + \xi_i ,$$

where $\xi_i \sim IN(0, \sigma_\xi^2)$ and is independent of the explanatory variables in (1).

An additional issue that arises in dynamic limited dependent variable models is that of initial conditions. The model requires an assumption concerning the initial observations, y_{i1}, and their relationship with the unobserved heterogeneity component, α_i. So far we have assumed that the initial observations are non-random constants for each cross-sectional unit that is, the initial conditions are assumed to be independent of unobserved heterogeneity. This assumption may be too strong even in the current case where we observe the entire history of the process. [1]

Typically the initial condition problem is dealt with by specifying a reduced form equation for the initial observation as discussed in Heckman (1981). This approximates the conditional distribution of the initial condition and results in a complete model for the unemployment process for periods t = 1, …, T. An attractive alternative is offered by Wooldridge (2000), who instead of finding the density of (y_{i1}, …,y_{iT}) given the explanatory variables, models the distribution of the unobserved effect conditional on the initial value and explanatory variables. This results in a joint distribution of outcomes for periods t = 2, ..., T conditional on the initial value and exogenous variables. The approach is close to the method in which the time-varying explanatory variables are allowed to correlate with unobserved heterogeneity. The only difference is that now the initial value of the process, y_{i1}, is also included in equation (3), i.e.

$$\alpha_i = a_1 + \phi y_{i1} + b'\overline{x_i} + \eta_i, \tag{4}$$

Since our information consists only of knowing whether or not some particular event occurred, we observe the mere sign of the latent variable via the indicator function $y_{it} = 1_{y_{it}^* > 0}$. To set up the scale, some normalisation is required. A typical normalisation is to set the error variance σ_u^2 equal to one. After this normalisation the equations (1) – (4) set up the transition probability for an individual i at time t and conditional on η_i as

$$\Pr[y_{it} \mid y_{it-1}, z_i, x_{it}, y_{i0}, \bar{x}_i, \eta_i] = \Phi[(\gamma y_{it-1} + \lambda' z_i + \beta' x_{it} + \phi y_{i1} + b'\bar{x}_i + \eta_i)(2y_{it} - 1)],$$

where Φ denotes the cumulative distribution function of the standard normal distribution. The joint probability of the observed run of different labour market states, conditional on the unobserved heterogeneity, is obtained from equation (4) by multiplying the transition probabilities of different time periods with each other. When the probability function for y_{it} conditional on η_i is replaced by the probability function that is marginal on η_i, the unconditional log-likelihood

[1] Another issue that may affect the magnitude of the state dependence is serial correlation in the error term. If the AR(1) term in the error term is positive (negative) the state dependence parameter is upward (downward) biased. This issue, while being potentially important, is left for further study.

function for a random sample of N cross-section units over T time periods becomes (see e.g. Hsiao, 1986 and Arulampalam, 1999)

$$\log L = \sum_{i=1}^{N} \log \int_{-\infty}^{\infty} \left\{ \prod_{t=2}^{T} \Phi\left[\left(\gamma y_{it-1} + \lambda' z_i + \beta' x_{it} + \phi y_{i1} + b' \bar{x}_i + \sigma_\eta \eta^*\right)\left(2y_{it} - 1\right)\right] \right\} \phi(\eta^*) d\eta^*$$

where $\eta^* = \eta/\sigma_\eta$ and ϕ denotes the probability distribution function of the univariate normal distribution. Wooldridge (2000) shows this integral can be approximated by a Gaussian-Hermite Quadrature as described in Butler and Moffitt (1982) so that the initial values in each time period are included among the other explanatory variables (see also Wooldridge, 2002).

3 Data

The data for this study are drawn from the population census data. The original data consists of a random sample of 350 000 individuals (around 10 per cent of the working age population) who were 12-75 years of age in 1997. Statistics Finland has expanded the census data by collecting information on these individuals from a number of different registers, including the population central register, tax register, pension register, student register and the register maintained by the labour administration. The resulting data set is rich in information covering the years 1987-1998.

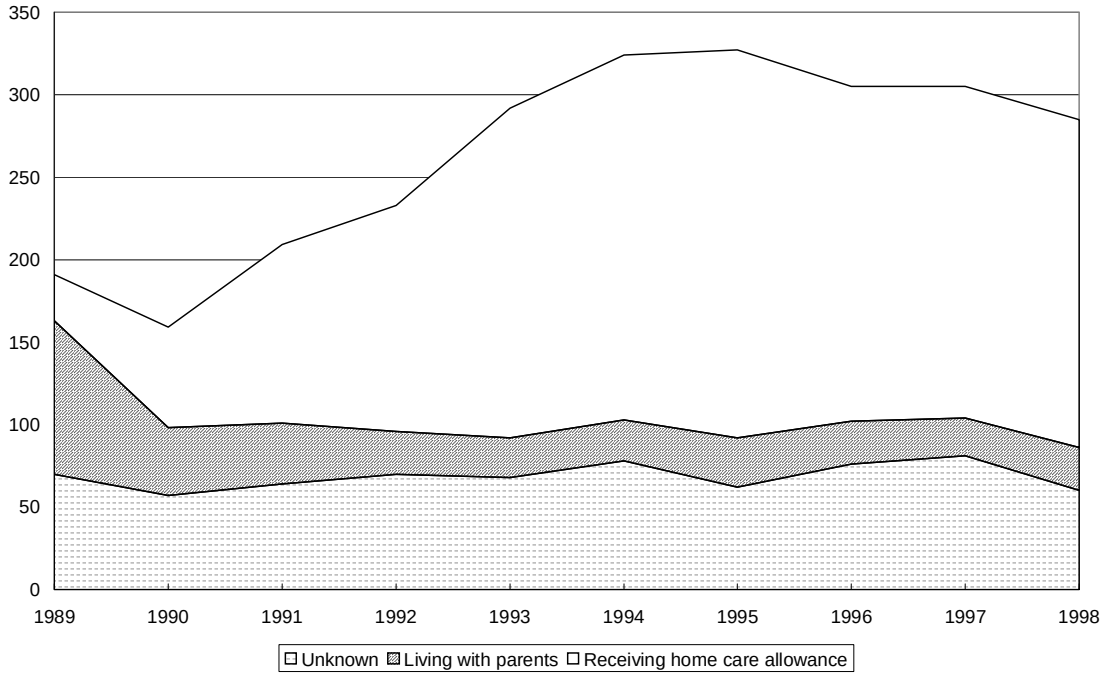
To focus on young people at their early stages of their labour market career, all individuals who either graduated or left compulsory education in 1988 were selected. The sample was then restricted by two conditions: individuals were under 30 years of age in 1988 and they had not received any further educational qualifications by the end of the year 1997[2]. Since the average graduating age from a university is around 27-28, the sample selection criteria ensure that we are able to analyse the labour market history of young labour market entrants graduating from different levels of education. After dropping individuals who retired during the observation period or had missing values (109 cases), the final sample consists of 5095 individuals.

Transitions between labour market states are frequent among young people. As a result, altogether 1522 individuals had at least one unknown labour market state at the end of a year during the 1988-98 period, corresponding to 250-400 observations a year. Some of these individuals can be assigned to a known labour market state by the use of the main economic status during a year and information provided by the registers of labour administration. These modifications alter the labour market state of 50–100 individuals a year, leaving 200-300 individuals a year whose labour market state remains unknown.

Figure 1 shows that the vast majority of these 200-300 individuals belong to one of two groups. At the beginning of their labour market career the largest group consists of young people who live with their parents. This is a temporary situation for many as implied by a sharp decline during the second year. In their later working career the main reason for having an unknown labour market state is childbearing. The number of young people receiving home care allowance taking care of their children at home starts to increase rapidly after the second year after graduation, settling to some 200 persons a year (70 per cent of all individuals whose labour market status is unknown). The final group whose labour market state is truly unknown remains at around 60 persons per year.

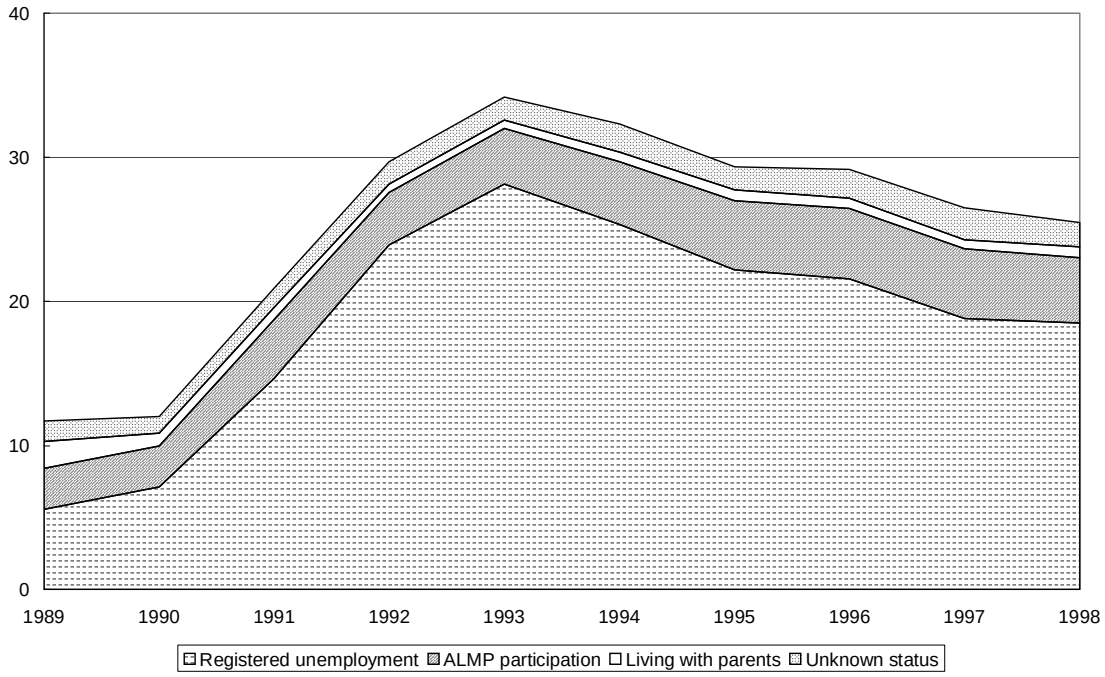
[2] Even though the data cover the years 1988-1998, the year 1997 is employed here owing to the change in the educational coding system that took place in 1998.

Figure 1. The number of young people whose labour market state is unknown



The next question is how to define unemployment. In this study the following procedure is adopted. The dependent variable obtains the value of one at the end of the year if (i) an individual is registered as an unemployed job seeker, (ii) an individual is participating in an active labour market programme, (iii) an individual has an unknown labour market state and he/she is living with parents, and (iv) the labour market state of an individual is truly unknown. This definition corresponds to the total unemployment (registered unemployed and programme participants) added to young persons whose labour market career can otherwise be characterised as an unfortunate one. Figure 2 shows that the contribution of cases (iii) and (iv) to the share of unemployment is rather modest compared with registered unemployment and participation in an active programme. For this reason, the inclusion of these individuals among the unemployed has only a modest impact on the results to be presented below.

Figure 2. The impact of modifications on the dependent variable; % of the population



After defining unemployment, there still remains the question of what to do with groups of individuals who are out of the labour force in some of the years owing to military service, a participation in education without obtaining further qualifications, or home care allowance. A typical solution is to focus on individuals who are constantly in the labour force (see e.g. Arulampalam et. al., 2000 and Stewart, 2002). We partially follow their example and keep individuals in the sample until they participate in education or start a spell of receiving home care allowance. It has to be noted, however, that a young person is likely to return to the labour markets after a break. Since the lagged labour market state requires one to have consecutive information on their labour market career, we lose the entire labour market history of young people after they return to the labour markets. To see whether this has any effects on the estimation results, we also report the results of estimations in which different sample selection criteria are employed. Finally, the dependent variable obtains the value of zero if a person is doing military service at the end of the year, i.e. military service is considered as a spell of employment.

An alternative for allocating individuals to two labour market states would be to specify the model as consisting of several states, and possibly of durations spent in different states. This approach would have several drawbacks. First, the discussion above shows that in the youth labour market the group of individuals who are out of the labour force is extremely heterogeneous. For this reason, some of the cell sizes become so small that some grouping had to be done in any case.

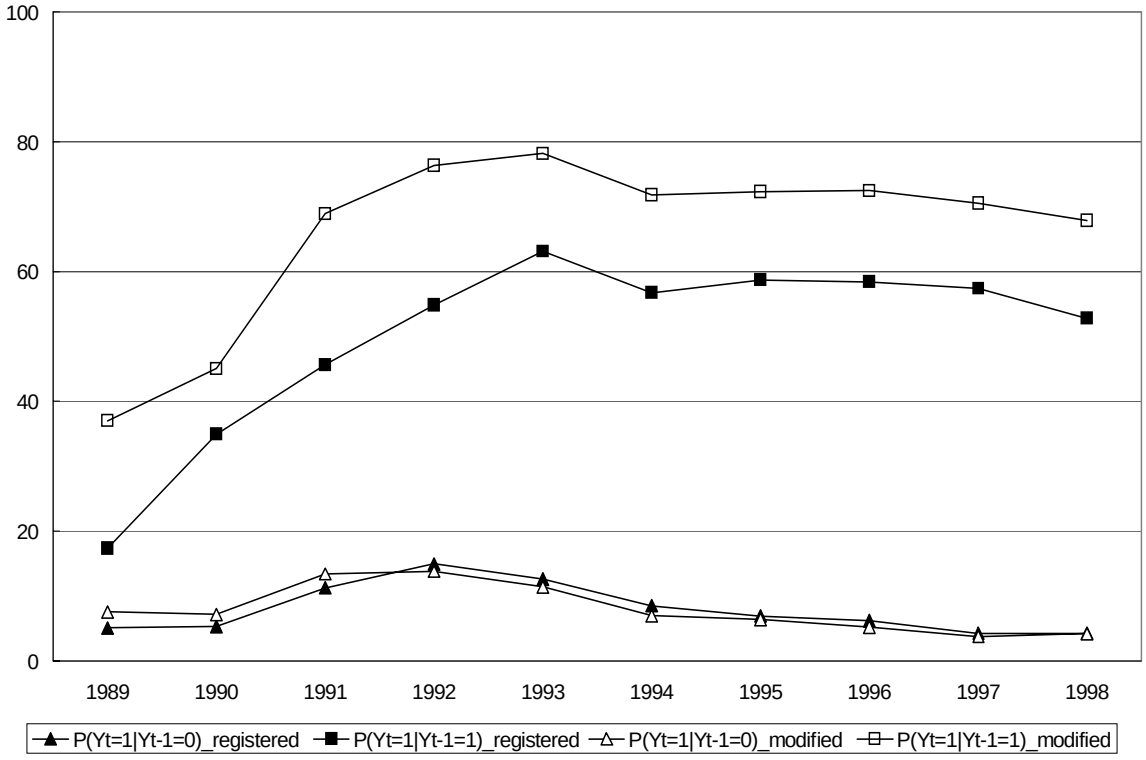
Second, the data is fairly detailed in determining the time an individual has spent as an unemployed job seeker in an employment office or as a participant in an active programme, but information concerning the time spent in employment is less reliable and the exact time spent out of the labour force is almost non-existent. Since the movements of young people between different labour market states are frequent and these movements include transitions out of the labour force, the analyses of state durations could be carried out only for a smallish group of all labour market entrants. This would wipe out much of the effects that young persons with atypical labour market careers have on the persistence of unemployment. This would be unfortunate since these youngsters are the most challenging cases for public policy. Third, the specification of several labour market states would complicate the already complicated model even further. For these reasons, we believe that the approach adopted in this study is relevant for exploring the state dependence in unemployment among the young labour market entrants.

Next, we take the first look at the state dependence in unemployment among the young labour market entrants. Figure 3 reports the raw conditional probabilities of unemployment for individuals who were employed in the previous period, $P(Y_t=1|Y_{t-1}=0)$, and for the individuals who were unemployed in the previous period, $P(Y_t=1|Y_{t-1}=1)$. These are reported for two different definitions. The first definition (registered) corresponds to the original labour market state as reported by Statistics Finland. The second definition (modified) refers to our modified labour market state. To recall, these definitions are very different. In the original definition all other states than registered unemployment are defined as zero cases. These include both participants in active labour market programmes and all individuals whose labour market state is originally reported as unknown. The modified definition, on the other hand, refers to the large unemployment discussed above.

The striking feature in Figure 3 is the persistence of unemployment. At the end of the 1990s well over half of young individuals who were unemployed in the previous period were also unemployed in the current period. Equally evident is the impact of the recession on the persistence of unemployment. The persistence in unemployment increased by 40 percentage points and it has remained at a high level throughout the period of economic growth in the latter part of the 1990s. The incidence of unemployment also increased among the employed during the recession but the effect was far from that of the unemployed. During the observation period the difference in the incidence of unemployment between these two groups rose from 15-25 percentage points to 50-60 percentage points depending on the exact definition of unemployment. Finally, it is worth noticing that the difference in the persistence of unemployment between the two definitions of unemployment has remained fairly constant at some 15 percentage points. Owing to a considerably larger number of zero cases, the modification of

the dependent variable does not have any significant impact on the conditional current unemployment of the employed at t-1.

Figure 3. The raw conditional probabilities at t distinguished by the labour market state at t-1



It is worth noticing that the observed difference in raw conditional probabilities does not necessarily imply that the actual incidence of unemployment is somehow harmful. As the data appendix reports, the observed characteristics of young people differ vastly between mutually exclusive groups of individuals. In addition to the non-random selection based on observed heterogeneity, the propensity of being unemployed is likely to be determined by unobserved individual factors. Below, we aim at separating observed and unobserved heterogeneity from the scarring effect of unemployment.

4 The results

The estimation results are shown in Table 1. To explore the sensitivity of the results on different assumptions, the table reports the results of several different specifications. The first column (Linear) refers to the linear probability model that is estimated as a random effects model to get parameter estimates of time-invariant education variables. This model is poorly specified both because the probability is not constrained between zero and one and because the lagged dependent variable is correlated with the composite error term (Baltagi, 1995). However, it is a useful starting point since the parameter estimates are readily interpretable as marginal effects. The second column (Pooled Probit) reports the results of the pooled probit model that would be correctly specified in the absence of unobserved heterogeneity. The third column (RE probit) corresponds to the usual random effect probit models. The fourth column (CRE probit) differs from the third one by allowing the unobserved heterogeneity term to be correlated with the explanatory variables. The final column (Wooldridge's CRE probit) reports the results of the Wooldridge (2000) specification that allows the dependence between the unobserved heterogeneity and the initial conditions.

Encouragingly, all models paint a fairly similar picture of the determinants of unemployment. The results concerning individual characteristics reveal that married men have a smaller probability of becoming unemployed than single men. Marital status has an opposite impact on women. Gender does not influence the propensity of unemployment, per se, but after interacting it with the marital status the results show that the unemployment probability of married women is much larger than that of men or single women. Young persons who live with their parents and lone parents are also found to have a high risk of unemployment.

There are interesting differences in the parameter estimates of individual characteristics between the results reported in the third and the fourth/the fifth column. To recall, the specification of the fourth column allows the unobserved heterogeneity term to be correlated with the explanatory variables and the specification of the fifth column takes account of potential dependence between the initial values and unobserved heterogeneity. After these extensions the impact of children, lone parenthood and home ownership turns out to be statistically insignificant. This is not totally unexpected since all of these factors are likely to be correlated with some unobserved characteristics. For instance, an individual needs a rather stable work career before selecting owner-occupied housing. It is likely that behind a stable work career hinges some unobserved factors, such as commitment to labour markets, that increase the probability of owning a house while reducing the probability of becoming unemployed. If this correlation is not taken into account, the parameter estimates of owner-occupied housing are downward biased.

Table 1. The parameter estimates

	Linear	Pooled Probit	RE probit	CRE probit	Wooldridge's CRE probit
Un_{t-1}	0.32***	1.62***	1.02***	1.02***	0.97***
Individual characteristics					
Gender	-0.01	-0.05*	-0.05	-0.10*	-0.12**
Age	0.00	-0.08***	-0.06**	-0.05	-0.05
Age^2/100	0.00	0.14***	0.11*	0.11*	0.10*
Married	-0.05***	-0.30***	-0.41***	-0.26***	-0.26***
Gender *Married	0.07***	0.42***	0.59***	0.47***	0.48***
Number of children under 7	0.00	0.07***	0.07**	0.04	0.04
Lives with parents	0.03***	0.09***	0.16***	0.16***	0.16***
Lone parent	0.04*	0.18*	0.28**	0.15	0.15
Owner-occupied housing	-0.03***	-0.21***	-0.20***	-0.02	-0.03
The level of education					
A-level	-0.15***	-0.37***	-0.69***	-0.72***	-0.65***
Upper secondary	-0.15***	-0.39***	-0.70***	-0.65***	-0.61***
Tertiary	-0.22***	-0.91***	-1.49***	-1.40***	-1.34***
The field of education					
Arts	0.04*	0.22***	0.34**	0.30**	0.33**
Teaching	-0.05***	-0.33***	-0.57***	-0.60***	-0.54***
Social/commercial science	-0.02	-0.06	-0.13*	-0.10	-0.09
Technology	0.01	0.05	0.09	0.08	0.09
Transport	-0.03	-0.10	-0.21	-0.21	-0.19
Health care	-0.05***	-0.25***	-0.48***	-0.48***	-0.43***
Agriculture and forestry	-0.02	-0.07	-0.10	-0.13	-0.10
Labour market characteristics					
Lives in Uusimaa	-0.02***	-0.11***	-0.25***	-0.19**	-0.21**
Semi-urban	0.00	-0.03	-0.02	0.06	0.06
Rural	0.00	-0.03	0.00	0.03	0.03
Migrated	0.03***	0.14***	0.19***	0.18***	0.18***
Entrepreneur	-0.14***	-1.09***	-1.44***	-1.54***	-1.55***
Unemployment rate	0.01***	0.04***	0.05***	0.06***	0.06***
Initial labour market state	-	-	-	-	0.42***
σ_u	0.14***		0.87***	0.85***	0.87***
ρ	0.21***		0.43***	0.42***	0.43***
Log-L	7855.17	10699.33	10231.49	10169.34	10134.88
N	33065	33065	33065	33065	33065

Note: All estimations include a constant term and year dummies (results not shown). *** (**,*) indicates that a parameter estimate is significant at the significance level of 1 (5,10) per cent.

The parameter estimates of the education variables show that both the level and the field of education influence the probability of unemployment. The general finding is that the higher the level of education is the lower the incidence of unemployment is[3]. Interestingly, a-level education is found to have a similar impact on the labour market career of young people as upper secondary education. This finding is likely to reflect the selectivity of a-level graduates. These individuals have established their working career during the 10-year period without the necessity to acquire further education. The results also show that the boosting of their employment record would require tertiary education that may be out of reach for many whose highest educational attainment is the a-level they received as early as the 1980s.

When it comes to the field of education, labour market careers are found to differ significantly in the case of three subjects, viz. arts, teaching and healthcare. Young people who have acquired an arts education have a significantly higher probability of experiencing unemployment than others, all other things being equal. This finding implies that labour markets reward specific skills more than general skills provided by an arts education. Teachers and healthcare workers, on the other hand, have a lower probability of experiencing unemployment than others. This is an interesting finding, given the difficulties in the financial situation of the public sector in the 1990s. There are, at least, two explanations for this. First, teachers and healthcare workers had perhaps established their working career in permanent employment contracts before the economic downturn. Second, despite a reduction in job security, they had had better opportunities to work with temporary contracts than, for example, manufacturing workers.

The results related to labour market characteristics show no particular surprises compared with previous cross-section estimates. An increase in labour demand captured by a drop in the travel-to-work unemployment rate and the dummy variable for the capital region of Uusimaa lowers the probability of unemployment. Similarly, the incidence of unemployment is lower among entrepreneurs. One should not put too much confidence in the exact magnitude of this effect, since the variable is included merely to control for observable differences in the entrepreneur status during a year. If this effect was left uncontrolled, it could have biased the state dependence parameter upwards, owing to the greater persistence of employment among entrepreneurs[4]. Finally,

[3] The finding is consistent with previous Finnish cross-section studies according to which education is negatively related to the unemployment incidence among manufacturing workers (Asplund, 2000), unemployment duration (e.g. Kyyrä, 1999) and repeat unemployment (Hämäläinen, 1998).

[4] It has to be noted that the inclusion of entrepreneurship might violate the assumption of strong exogeneity (conditional on the individual effect). However, since the results remain practically the same if this variable is excluded from estimations, we decided to leave it among the independent variables. The same argument applies to the variable indicating home ownership. These unreported results are available from the author on request.

migration during a previous year is found to increase the probability of unemployment, being in line with the results reported in Pekkala and Tervo (2002). This result holds even after allowing correlation with unobserved heterogeneity, implying that the migrants had, at least temporary, difficulties in establishing their employment position during the 1990s.

When it comes to the main issue of interest, namely to the state dependence in unemployment, past unemployment is found to have a positive and well determined impact on current unemployment, regardless of the exact specification of the model. This finding strongly suggests that unemployment has long-term negative effects on future employment possibilities. Individuals who have experienced unemployment in the past are more likely to become unemployed in the future than similar individuals without unemployment experience.

The parameter estimates of state dependence are not directly comparable between different specifications. Arulampalam (1999) shows that to compare the parameter estimates of the random effects (RE) probit model with the parameter estimates of the pooled probit model, one needs to multiply the RE probit estimates by the factor $\sqrt{1-\hat{\rho}}$. This adjustment more than halves the parameter estimate of state dependence from 1.62 to 0.77. The magnitude of the scarring effect reduces further if the assumption of non-stochastic initial conditions is relaxed. The decline is, however, relatively minor, since we observe the process from the beginning and the time period under examination is rather long.

These findings cast serious doubts on the cross-section estimates of state dependence. One will massively overestimate the magnitude of true state dependence if unobserved heterogeneity is not controlled in estimations. This is not unexpected, given that the proportion of total error variance attributed to individual heterogeneity is estimated as being statistically significant and around 40 per cent of magnitude (see the correlation coefficients ρ).

The parameter estimates of the linear probability model (column 1) are readily interpretable as marginal effects. These results imply that the incidence of unemployment in the previous period increases the probability of current unemployment by 32 percentage points. The parameter estimates of non-linear probability models do not lend themselves directly to marginal effect examinations. For this reason, it is worth taking a closer look at the incidence of state dependence in unemployment.

5 Taking a closer look at state dependence

In calculating the marginal effects one has to take into account the fact that observably identical individuals may have different propensities of unemployment owing to unobserved heterogeneity, η. If the calculations are carried out by employing the average value of η, the resulting marginal effects may be relevant only for a small fraction of the population. Chamberlain (1984) argued that an attractive alternative is to calculate the marginal effects as mean effects for a randomly drawn individual. He shows that a consistent estimator for a change in the state dependence parameter from y_{t-1}^{a} to y_{t-1}^{b} is provided by

$$\frac{1}{N}\sum_{i=1}^{N}\left\{\Phi\left[\frac{\gamma y_{it-1}^{b}+\lambda' z_i+\beta' x_{it}+\phi y_{i1}+b'\bar{x}_i}{\sqrt{\sigma_\varepsilon^2+\sigma_\eta^2}}\right]-\Phi\left[\frac{\gamma y_{it-1}^{a}+\lambda' z_i+\beta' x_{it}+\phi y_{i1}+b'\bar{x}_i}{\sqrt{\sigma_\varepsilon^2+\sigma_\eta^2}}\right]\right\}$$

where the denominator relates to the square root of total error variance and the parameters are replaced by their estimates (see also Arulampalam and Booth, 2000).

Table 2 reports the marginal effects of state dependence distinguished by the level of education. The first column (observed difference) shows the difference in the raw probabilities of unemployment that prevail between young people who were unemployed at t-1, $\Pr[y_t=1 \mid y_{t-1}=1]$, and those who were not, $\Pr[y_t=1 \mid y_{t-1}=0]$. The next two columns give the calculated marginal effects for the random effects probit model (state dependence) and the proportion of the raw difference that the model allocates to the state dependence (%). The next two columns report the corresponding figures for the correlated random effects model and the final two columns report the results of the Wooldridge (2000) conditional random effects probit model. All of these figures are averages over the observation period of 1989-1998.[5]

[5] The results reported in Table 2 are based on estimations in which the lagged dependent variable is interacted with dummy variables related to the level of education The results of other determinants of unemployment remain unchanged, so they are not reproduced here.

Table 2. State dependence in unemployment distinguished by the level of education; percentage points

		RE probit		CRE probit		Wooldridge's CRE probit	
	Observed difference	State depend	%	State depend	%	State depend	%
Basic	56.24	25.52	45	25.54	45	23.62	42
A-level	57.43	22.39	39	21.19	37	19.66	34
Upper	55.43	21.46	39	20.95	38	19.62	35
Tertiary	38.72	9.96	26	9.40	24	8.94	23

Sensitivity analyses

		RE probit		CRE probit		Wooldridge's CRE probit	
	Observed difference	State depend	%	State depend	%	State depend	%
All cases							
Basic	49.44	26.14	53	26.00	53	25.12	51
A-level	47.66	21.46	45	21.25	45	20.80	44
Upper	50.80	23.52	46	22.09	43	21.44	42
Tertiary	40.64	14.45	36	14.05	35	13.73	34
Students excluded							
Basic	55.02	27.38	50	25.33	46	25.81	47
A-level	55.26	23.64	43	22.44	41	21.21	38
Upper	52.38	21.95	42	21.60	41	20.69	39
Tertiary	37.49	11.70	31	14.08	38	10.85	29
Two year interval							
Basic	48.86	25.01	51	23.45	48	21.02	43
A-level	49.85	22.30	45	20.03	40	19.09	38
Upper	47.66	18.75	39	17.20	36	15.84	33
Tertiary	20.08	3.82	19	3.18	16	3.00	15

Let us first concentrate on the upper panel of Table 2 that corresponds to the specifications presented in Table 1. The difference between the observed raw conditional probabilities varies from 38 to 57 percentage points depending on the level of education. Accordingly, an unemployed person may be over 50 percentage points more likely to be unemployed in the next period than an

individual who is currently employed. Interestingly, there is almost no variation in the observed raw difference across the first three levels of education, viz. basic, a-level and upper secondary education, regardless of differences in the unemployment rates across education levels. Only tertiary education stands out as having a considerably smaller persistence in unemployment in terms of the raw data.

Subsequent columns reveal that observed and unobserved heterogeneity helps to explain more than half of the raw persistence in unemployment. However, the estimated scarring effect of unemployment remains sizeable. The results indicate that a young person who has been unemployed at t-1 is 9-25 percentage points more likely to experience unemployment at t than someone with the same set of characteristics, but employed at t-1. In general, this scarring effect is negatively related to the level of education, being highest for young people with a basic education and the lowest for university graduates. An interesting finding is that state dependence reduces noticeably only after crossing the threshold of tertiary education. This implies that young people need a substantial amount of education in modern labour markets if they want to insure themselves against the scars of unemployment.

The estimated models paint a fairly similar picture of the persistence of unemployment in youth labour markets. The results of RE and CRE models are almost identical. Only after allowing for the dependence between the initial values and unobserved heterogeneity do some drops in the magnitude of the scarring effect occur. These are fairly small, the largest reductions being around two percentage points. Accordingly, the results imply that the initial condition problem is not very severe if the process is observed from the beginning and the time period of the panel data is long.

All in all, the estimation results imply a substantial price for entering the state of unemployment. Around 35 per cent of the difference in the raw conditional probabilities of being currently unemployed, which prevail between the employed and the unemployed distinguished by the labour market state at t-1, can be allocated to the incidence of unemployment. On average, this corresponds to an increase of almost 20 percentage points in the probability of being unemployed. Interestingly, the estimate is of the same magnitude as the corresponding figure reported in Arulampalam et al. (2000) for young people under 25 years of age in the UK.

The lower part of Table 2 puts these results under scrutiny by various means. The first two sets of results correspond to different sample selection criteria. To recall, individuals were kept in the sample until they either had a student status or started to care for their children at home. It is likely that these individuals are not randomly distributed across different levels of education. To explore whether this has any impact on the results, we re-estimated the models both for the full sample

and for the sample in which the students were excluded. These experiments generally produce figures for higher state dependence. Accordingly, the sample selection does not affect the finding according to which unemployment significantly harms the future labour market careers of the unemployed.

The results reported at the bottom of Table 2 refer to a specification in which the time interval between observations is widened to two years, i.e. the years 1989, 1991, 1993, 1995, 1997 are employed in estimations. By this means it is possible to test whether the state dependence becomes overestimated owing to long unemployment spells overlapping several years. It has to be noted, however, that long unemployment spells are rather rare among young persons, as implied by the average length of an unemployment spell that was around 20 weeks in the mid 1990s. This is reflected in the results, the widening of the time interval producing only 1-5 percentage points lower scarring effects. The finding implies that the incidence of unemployment harms further labour market prospects and this effect will remain for a long time. An incidence of unemployment that happened two years ago increases the current unemployment probability of a randomly selected individual by some 15-20 percentage points. The result indicates that only university graduates are immune to the scarring effect of unemployment over a span of two years.

6 Conclusions

This study explores the persistence of unemployment among young people who graduated or finished compulsory schooling in 1988. Their labour market careers are followed through the turbulent years of the 1990s. The results strongly suggest a sizeable scarring effect of unemployment on future labour market possibilities. Even after controlling for observable and unobservable heterogeneity, past unemployment is found to increase the probability of current unemployment by almost 20 percentage points, on average.

The stigmatising effect of unemployment is not randomly distributed across different levels of education. It is found to vary from 9 to 25 percentage points in terms of unemployment probability. Surprisingly, a drop in the scarring effect takes place only after graduation from tertiary education. This indicates that the majority of young people who became unemployed in the early 1990s had serious difficulties in labour markets throughout the decade. Unemployment is also found to be especially common among young persons with an arts education. These two findings show that modern labour markets reward specific skills and young people need to acquire these skills from the highest possible level. General skills, even an upper secondary education, do not help to insure young people against the scars of unemployment.

The results have direct policy implications. The finding according to which the incidence of unemployment affects long-term labour market possibilities paves the way for public interventions in the youth labour market. Moreover, these interventions should be targeted to young persons who have not acquired tertiary education. The study also carries less optimistic messages. On the one hand, the observation according to which only university graduates are relatively immune to the scarring effects of unemployment is alarming, since university studies are out of reach for many young people. On the other hand, the results highlight the need for public interventions but they do not give any direct guidance for the proper selection of public measures.

Having said that, the study has two kinds of messages for policy makers. First, an increase in the scarring effect of unemployment casts serious doubts on the effectiveness of public measures employed in the 1990s. Second, the results emphasise the importance of macroeconomic stability. Once overall unemployment increases, young people who are affected by this bear the scars for several years.

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Data appendix. Variable means by sub-samples

	Full	Unt 0 years	Unt 11 years	Single transition from unt	Single transition to unt	Multiple transitions
	38130	17846	333	2004	1737	16210
Individual characteristics						
Gender	0.40	0.42	0.25	0.45	0.45	0.37
Age	25.77	26.97	23.97	25.81	24.84	24.58
Married	0.25	0.32	0.08	0.17	0.18	0.19
Number of children under 7	0.26	0.32	0.09	0.22	0.21	0.21
Lives with parents	0.27	0.19	0.53	0.31	0.31	0.35
Lone parent	0.01	0.01	0.01	0.01	0.02	0.01
Owner-occupied housing	0.36	0.46	0.13	0.32	0.28	0.26
The level of education						
Basic	0.12	0.04	0.56	0.13	0.19	0.18
A-level	0.06	0.07	0.00	0.08	0.07	0.06
Upper level education	0.71	0.71	0.44	0.71	0.69	0.72
Higher education	0.11	0.18	0.00	0.09	0.05	0.04
The field of education						
Arts	0.02	0.02	0.00	0.03	0.03	0.03
Teaching	0.03	0.06	0.00	0.01	0.01	0.01
Social/ commercial science	0.22	0.25	0.06	0.25	0.20	0.18
Technology	0.32	0.31	0.29	0.29	0.30	0.35
Transport	0.02	0.02	0.00	0.03	0.02	0.01
Health care	0.07	0.10	0.00	0.03	0.05	0.04
Agriculture and forestry	0.06	0.05	0.07	0.09	0.03	0.06
Labour market characteristics						
Lives in Uusimaa	0.31	0.39	0.10	0.21	0.34	0.24
Semi-urban	0.15	0.14	0.11	0.16	0.13	0.16
Rural	0.20	0.16	0.32	0.23	0.16	0.23
Migrated	0.11	0.11	0.06	0.10	0.10	0.11
Entrepreneur	0.03	0.04	0.00	0.04	0.01	0.02
Unemployment rate	13.31	12.91	16.50	14.08	13.19	13.61

Notes: The figures below the titles refer to the number of observations (individuals times time periods). The sub-samples are mutually exclusive. Unt refers to unemployment.

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