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EMPLOYMENT STABILITY FOLLOWING UNEMPLOYMENT  
AND MANPOWER PROGRAMS

by

Tomas Korpi  
Max-Planck-Institut für Bildungsforschung  
Lentzeallee 94  
D-1000 Berlin 33

Stockholms Universitet  
Demografiska avdelningen  
S-106 91 Stockholm

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## **Abstract**

Although important for our understanding of the dynamics of both unemployment and manpower program participation, the question of employment stability subsequent to unemployment has received relatively little attention to date. Here, the determinants of the duration of single and concatenated employment spells that follow upon unemployment or manpower programs are analyzed, using hazard models and data pertaining to Swedish youth. The analyses include a comparatively detailed specification of the individuals' previous labor market history, in particular as regards unemployment and program participation.

The results indicate that the main determinants of employment stability are education and labor market history variables. Particularly interesting is the increased employment duration associated with coming directly from manpower programs. This results appears to be a product of a positive occurrence effect and a positive duration effect of program participation. Finally, while there in general are negative effects of previous unemployment, no effect of the length of the latest unemployment spell is found.

Keywords: unemployment, employment duration, manpower programs, hazard models.

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## 1. Introduction

Most recent research on the problems confronted by the unemployed has focused on the duration of their unemployment spells and their (re)employment probabilities. These studies have provided important insights into the processes leading to renewed employment.<sup>1</sup> Nevertheless, the story does not end once a job has been found. As soon as this is recognized, questions about the characteristics and determinants of subsequent events pose themselves. For example, will the job turn out to be a long term one? If not, will it be a stepping stone into stable employment, or only a reprieve from unemployment? And are there individual differences as regards subsequent events? Answering these questions concerning future employment outcomes, questions sparingly analyzed to date, is imperative for a comprehensive understanding of the individual aspects of unemployment.

Interest in these questions is enhanced since not only the unemployed themselves have an interest in their successful labor market reintegration, this is also an area of public policy. Typically, this public interest is expressed in the provision of various forms of programs aimed at easing the transition into stable employment. Identifying the determinants of employment stability is therefore also of importance (a) for the implementation of the programs, by providing guidance for targeting of programs at groups having trouble finding stable employment, and (b) for the evaluation of programs, by furnishing evidence on the relationship between program participation and subsequent employment stability. Even though this latter issue, program participation and stable employment, is an important one when judging the success of the programs, it is one that has received relatively little

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<sup>1</sup> A recent review can be found in Devine and Kiefer (1991).

attention in evaluation studies. As Layard et al. (1991, 481) note, "it is surprising how little work has been done comparing the employment records of otherwise similar people exposed (and not exposed) to programmes."<sup>2</sup>

The purpose of this paper is therefore twofold; to analyze determinants of subsequent employment stability among previously unemployed, and to study the relationship between employment stability and manpower program participation. The paper thus presents results from empirical analyses of the duration of employment spells that follow upon unemployment or manpower programs. The study focuses on Sweden, using survival models to analyze data on the labor market outcomes for a group of initially unemployed youth.

Section 2 of this paper contains a review of relevant empirical literature, while Section 3 presents data and empirical models. Section 4 contains the results, starting with analyses of total duration of employment following unemployment ("long term" employment stability). These are the papers' basic results regarding determinants of employment stability as well as effects of program participation. These analyses are supplemented by investigations of employment spells that initially follow upon unemployment ("short term" stability). The latter results focus on the mobility processes underlying long term stability. In Section 5, finally, I formulate some conclusions and note some policy implications.

## **2. Earlier research**

The number of studies dealing with the stability of employment following unemployment is surprisingly limited.

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<sup>2</sup> Instead, the evaluation literature has tended to focus on the effect of participation on subsequent wages and earnings, or alternatively on the probability of being employed at a (specific) later date (see Björklund (1990) for a survey of Swedish studies).

Previous studies of employment durations have mainly used samples where those coming directly out of unemployment only make up a (often unknown) fraction of the employed (cf. Devine and Kiefer (1991)). However, using US data and focusing on the evaluation of training programs, Ham and LaLonde (1991) analyzed the subsequent labor market careers of unemployed women. They reported, *inter alia*, that lack of a high school diploma increased the rate of transition out of employment, but that the rate was unaffected by the amount of additional education and prior employment experience. Training decreased the transition rate, and they also found some indications of a similar effect of age.

Some other evaluation studies are also of interest. Thus, Gritz (1988) found that among youth in the US previous participation in public training programs increased the rate of transition from employment to non-employment, and indications that the effect of private training programs were the reverse. He also found indications that training decreased the rate of transition from employment to non-employment among women while it increased it among minorities. In addition, Ridder (1986) studied the duration of employment following program participation on data from the Netherlands. He concluded that employment program participation decreased the rate of transition out of employment for women, youth, and minorities. Further, recruitment programs decreased the transition rate for women and youth, and training programs decreased it for women and minorities.

Of direct relevance for this analysis is also the study on Swedish data by Sehlstedt and Schröder (1989). As will be seen below, the data they used are very similar to the data I have used and their results are therefore of immediate interest. Sehlstedt and Schröder found that among youth unemployed at the initiation of their study, time spent in relief work and recruitment programs in the

private sector in the following year was positively related to the time spent in employment and education in the second and third year. On the other hand, relief work in the public sector and public training programs appeared to have no effect. They also found that the relation between program participation and time in employment and education appeared to be more positive for women than for men. In addition, previous education had a positive, previous unemployment a negative, and previous employment experience no effect on the time in employment and education in the second and third year following unemployment.<sup>3</sup>

In sum, despite its obvious importance, there are only a few studies of the determinants of the total employment duration subsequent to unemployment. The studies reviewed here indicate basically no influence of employment experience on employment stability, a negative effect of previous unemployment, and positive effects of increased education. The effects of education seem stronger among youth than among adult women, where instead a negative effect of not having completed compulsory education was found. Program participation appear to have a positive effect on employment stability, although the relationship between participation and stability appears to differ between demographic groups. There are also indications that different programs have different effects.

There are, however, some other aspects of these studies that also should be noted. While analyzing individuals in precarious positions, not all studies focus on post-unemployment developments specifically. Furthermore, some studies do not analyze employment durations *per se*, nor do they all distinguish between

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<sup>3</sup> The most interesting part of their study, however, regarded the content of the programs and the jobs. Thus, their results suggest that to improve the labor market prospects of the unemployed, the activities should be in line with their interests as well as previous experience and training and not lie within a completely unrelated field.



subsequent events of different type. Regarding policy issues, discussions of policy targeting are hampered by the limited controls for previous labor market experience that have been included, and evaluations of program effects are sometimes difficult because the lack a natural comparison group.<sup>4</sup> These problems have been taken into consideration in the construction of the models presented in this paper.

### 3. Empirical model

The data that I have analyzed come from the Survey of Unemployed Youth in Stockholm, a longitudinal survey covering the period 1981 to 1985 (Holmlund and Kashefi (1987)). It contains continuous labor market histories pertaining to a random sample of those between ages 16 and 24 registered as unemployed at the employment agencies in the County of Stockholm in the end of January 1981. The 830 respondents (93 % of the original sample) were interviewed in the spring and in the fall of 1981, in the spring of 1982, and finally in 1985. They were then asked to distinguish between ten different labor market states; permanent employment, temporary employment, relief work, labor market training, youth teams, unemployment, military or civil service, regular education, on leave, or the status other activities. In addition to these histories a large amount of background data was collected, as well as information relating to the spells underway at the time of the different interviews.

The focus here is on the situation following unemployment and on the influence of program participation.

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<sup>4</sup> As for the study by Sehlstedt and Schröder, it can also be noted that as they looked at the total time and not at the distinct episodes, they were not able to analyze the transition processes underlying total employment and education time. Furthermore, the method they used did not account for the fact that the full length of the employment and education episodes underway at the end of the survey could not be observed (right censoring), something which may have biased the results.

The inclusion of individual  $i$ 's  $j$ 'th spell, given that it was an employment spell, has thus been conditioned on (a) the previous spell (spell  $j-1$ ) being an unemployment spell, or on (b) spell  $j-1$  being either a relief job or labor market training spell and spell  $j-2$  an unemployment spell.<sup>5</sup> This is illustrated by the three boxes to the left in Figure 1. Two points relating to this specification are of importance for the subsequent policy discussion. First, as the employed all were unemployed initially, these analyses of employment stability pertain to a group that normally is a beneficiary of targeted labor market programs. Second, this specification allows a comparison of the subsequent employment durations of the unemployed who did not take the program route with those of the unemployed who did. For the purpose of program evaluation, the present specification thus generates a natural comparison group.

From an individual as well as from a policy perspective, both long and short term aspects of employment stability are of relevance. The interest could thus be directed at how long one remains employed following a spell of unemployment, abstracting from the time in any particular employment spell. This is here referred to as long term stability, and indicates how successful the labor market reintegration of an individual has been. I have operationalized this into estimates of (i) the duration of concatenated employment spells, i.e. one or more employment spells following immediately upon one another. More precisely, the duration of a concatenated spell, measured in weeks, has been from the beginning of a spell of permanent or temporary employment and until the time of the first subsequent transition into any state other than permanent or temporary employment.

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<sup>5</sup> Note that the spell of unemployment need not be the first unemployment spell observed for the respondent. Note also that the specification does not allow for an unemployment spell between a program spell and employment.

In these analyses of concatenated employment, I have estimated a general model of exit out of employment and into any other state (total attrition). This model is illustrated in Figure 1, where the large box on the right hand side of the figure indicates that the various destinations have been treated as one. While the attrition model provides a baseline for the discussion of employment stability, interest is often connected to the risk of returning to unemployment specifically. This is in particular so in discussions of program effects. In terms of the figure, estimates of the model of recurrent unemployment involves studying the transitions into unemployment separately. In the latter case, transition into any other state (see also the complete enumeration above) has been treated as censoring.

Alternatively, interest can focus on the employment spell initially following unemployment, here referred to as short term stability. Analyses of such spells provide evidence on the transition dynamics underlying long term employment stability. I have therefore supplemented the concatenated spell estimates with estimates of (ii) the duration of the employment spells initiating these series. In these analyses, the duration of a spell has been counted from the time of entry into a spell of permanent or temporary employment until the time of exit from the same spell.<sup>6</sup> To illustrate the difference, if unemployment is followed by, in turn, temporary employment, permanent employment, and relief work, the concatenated spell stretches from the beginning of the temporary employment spell to the end of the permanent employment spell. In the analysis of initial (temporary) employment spells, duration is equal to the duration of the temporary employment spell alone.

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<sup>6</sup> Regrettably, the structure of the data is such that a single spell of permanent employment can be made up of a number of permanent jobs following upon one another, and likewise for temporary employment.

As noted earlier, the data contains a distinction between spells of permanent and temporary employment. The two employment types differ in that temporary jobs have a termination date fixed prior to the beginning of the spell, which permanent jobs do not. A temporary job need not necessarily be shorter than a permanent one, but in practice the duration of the temporary employment spells are markedly shorter. In addition, temporary employment often lacks the employment protection connected with a permanent job. For these reasons, in the analyses of the initial employment spells the two employment types have been treated separately.

As in the concatenated case, I have in the analysis of both permanent and temporary employment estimated an attrition model, and also looked at what follows the initial spell. In the latter destination specific models, I have in the permanent employment case distinguished between transitions into temporary employment and into unemployment. In the temporary employment case, a distinction has been made between spells that end with a transition into permanent employment and those that end with a return to unemployment. In the competing risk (i.e. destination specific) models, transition into any other state than the state of interest has again been treated as censoring.

To summarize, the following models have been specified; attrition and repeated unemployment models of concatenated employment, as well as attrition, other employment, and recurrent unemployment models of both permanent and temporary employment. To lay the ground for further modelling, I have computed the occurrence-exposure rates for these different models (not shown).<sup>7</sup> As is often the case, the number of observations and transitions at

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<sup>7</sup> The occurrence-exposure rates are here defined as  $\lambda_e = d_k / (n_k - w_k/2)$ , where  $n_k$  is the number of individuals entering period  $k$ ,  $w_k$  the number of individuals censored in  $k$ , and  $d_k$  the number of individuals experiencing an event in  $k$ .

longer durations is small, generating very imprecise estimates of the hazard.<sup>8</sup> In the case of the attrition model for concatenated employment I have therefore censored the durations at two and a half years of employment (130 weeks), and in all other models after a year and a half of employment (78 weeks).

The occurrence-exposure rates have then been reestimated with these additional censorings, and these estimates display either a monotonously decreasing hazard or an initially increasing and subsequently decreasing hazard (shown in Figures A1 to A3 in the Appendix). Based on these observations, I have chosen to estimate log-logistic hazard models, as this parameterization allows for both the observed patterns. Such a model can be written as a location-scale model

$$\log(T) = \mu + \sigma\epsilon, \quad (1)$$

with the duration of a spell  $T$ , a location parameter  $\mu$ , a scale parameter  $\sigma > 0$ , and an error term  $\epsilon$  with a logistic distribution. The hazard rate and the survivor function for  $T$  can in turn be written

$$\lambda(t) = \lambda\alpha(\lambda t)^{\alpha-1}/(1+(\lambda t)^\alpha), \quad (2)$$

$$\text{and } S(t) = 1/(1+(\lambda t)^\alpha), \quad (3)$$

respectively. Here  $\lambda = \exp(-\mu)$  and  $\alpha = 1/\sigma$ . Duration dependence in the hazard rate is indicated by  $\alpha$ . Thus, with  $\alpha < 1$  the hazard is monotone decreasing from infinity, and with  $\alpha = 1$  it is monotone decreasing from  $\lambda$ . An  $\alpha > 1$ ,

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<sup>8</sup> A further point that can be noted is that there are peaks in the hazard at weeks 4, 9, 13, 17 etc., i.e. a marked tendency for the durations to be an integer number of months. The main reason for this is probably the transformation of the durations, from months to weeks, that in some cases have taken place. Other possible causes for such a pattern are administrative practices, such as the tendency for jobs to begin and end at the beginning of a month, and so-called digital preference on the part of the respondents.

finally, indicates that the hazard increases from zero to a maximum at  $t = (\alpha-1)^{1/\alpha}/\lambda$ , and subsequently declines towards zero.<sup>9</sup>

Observed individual heterogeneity can be modeled by setting  $\mu(x) = x\beta$ , giving

$$\log(T|x) = x\beta + \sigma\epsilon, \quad (4)$$

where  $x$  is a vector of covariates and  $\beta$  a corresponding vector of parameters. However, in the discussion of competing risk models it may seem awkward to interpret the results in terms of the duration until a specific event which may not take place. In such cases, it is often more natural to discuss in terms of the alternative hazard rates formulation (a.k.a. transition rates, or risks). With individual heterogeneity modelled as above,

$$\lambda = \exp(-x\beta). \quad (5)$$

Note that the alternative formulation implies the reverse interpretation of the sign of an estimated parameter. For example, a positive parameter implies both longer duration (Eq. 4) and lower hazard (Eq. 5).

Demographic, educational, labor market history, and labor demand variables have been included in the analyses. The variables, together with definitions and some descriptive statistics, are listed in Table A1 in the Appendix. The demographic covariates have been "Female", "Immigrant background", and "Age"<sup>10</sup>, while education has

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<sup>9</sup> For  $\sigma < 1$  ( $\alpha > 1$ ), the expected duration can be shown to be  $E(T) =$

$\int_0^{\infty} tS(t)dt = \sigma\lambda^{-1}\Gamma(\sigma)\Gamma(1-\sigma)$ , where  $\Gamma$  is the Gamma function.

<sup>10</sup> In order to catch possible non-linearities in age due to educational structures, legislation regulating work for certain age groups, as well as the military service of young men, the age variable has been partitioned into four categories in the analyses. The base category has been 18-19 years of age.

been captured by the dummies "Less than compulsory school", "Vocational gymnasium", "Theoretical gymnasium", and "University".<sup>11</sup> Variations in labor demand has in turn been measured by "Vacancies/unemployment".

These variables have been complemented by variables capturing the labor market history of the respondent, and these are worth additional comment. Previous employment and unemployment have been measured by "Employment experience", "Unemployment experience", and "Unemployment spells", and it should be noted that both unemployment measures encompass the unemployment spell preceding employment. However, as the duration of the latest unemployment spell often is suggested as a criterion for program administrators when selecting among potential participants<sup>12</sup>, the above measure of unemployment experience has in some models been partitioned into two. "Recent unemployment experience" has then measured the length of the latest unemployment spell, the spell on which selection has been conditioned, while "Earlier unemployment experience" has captured the total duration of earlier unemployment spells.

Further, the dummy "Program participant" has indicated that employment followed directly upon a program spell<sup>13</sup>, i.e. that the program route was taken. "Program spells", in turn, has measured instances of program

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<sup>11</sup> The base category has been "Compulsory school".

<sup>12</sup> Specifically, it has been suggested that priority be given to long term unemployed.

<sup>13</sup> Temporary relief work and labor market training were the main programs supported by the Swedish government in the period studied here. While the main purpose of the training programs is to increase the human capital of the participants by teaching them specific skills, the relief jobs have traditionally been seen mainly as a counter cyclical labor demand measure. Nevertheless, they also contain aspects of human capital improvement, as they explicitly aim at providing the participants with employment experience. Both programs have a normal duration of around six months. While being dictated by data availability, an aggregation of the two programs would seem to be substantively upheld by these similarities.

participation prior to the latest unemployment spell, and "Program experience" the time spent in programs up to the employment spell.<sup>14</sup> Note here that while the definition of "Program spells" has excluded the spell indicated by the variable "Program participant", the duration of this program spell has been included in "Program experience".

However, the effect of the duration of the latest program spell is also of interest in itself, and this for two reasons. It is thus an open question if there are differences in the occurrence effect and the duration effect of program participation.<sup>15</sup> It is furthermore an open issue if the effect of length of the program spells differs from the effect of the length of the unemployment spell, i.e. time spent in programs is more "productive", in the sense of generating longer subsequent employment, than time spent in unemployment. The above measure of program experience has thus been split such that "Recent program experience" has measured the duration of the spell indicated by the variable "Program participant", and "Earlier program experience" the total length of any other spells.

Although they are all measures of the respondent's previous participation in labor market programs, there is an important distinction between the variables "Program participant" and "Recent program experience" on the one hand, and "Program experience", "Earlier program experience", and "Program spells" on the other. Thus, the latter three are to be regarded purely as additional controls for heterogeneity, and not as involving an evaluation of the effect of program participation. To see

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<sup>14</sup> No information was collected on participation in training programs prior to 1980.

<sup>15</sup> In a policy context, the importance of the distinction can be exemplified by a situation in which only occurrence is found to matter. This might mean that it is of relatively little importance whether the program is completed or not, a result of obvious relevance for program evaluation.



this, note that in order to be included in the analyses one has to become unemployed again, i.e. subsequent to the participation captured by these covariates. That is, participants for which the previous programs had an immediate positive effect have been less likely to be included in the samples. As a result, only the effects of the former two variables should be viewed as reflecting effects of program participation.

An additional remark relating to the variables in the analyses is that the modified set of variables is the inherently more interesting of the two, as it implies a closer modelling of previous labor market history. However, as will be seen below, because of missing values the modified set of variables can only be estimated on a much smaller sample. The resulting difference in the precision of the estimates has prompted me to work with both the basic and the modified specification. The problem of missing values has also prohibited the use of these variables in the models of permanent and temporary employment duration, where the sample sizes are smaller to start with. Thus, in the analyses of concatenated employment the two basic models of attrition and recurrent unemployment have been complemented with two analyses in which the modified specifications of unemployment and program experience have been used.

As can be seen from the Table A1, while there are no major differences between individuals with permanent jobs and those with temporary jobs as far as the demographic and educational indicators are concerned, there are systematic differences in their labor market histories. Thus, temporary job holders have "worse" histories with regard to employment, unemployment, and manpower programs. Another difference, not shown in Table A1 but interesting as a preliminary indicator of the relationship between program participation and employment stability, is that while those entering employment directly from unemployment have a mean

censored concatenated employment duration of 48 weeks, the ones entering by way of a program have one of 65 weeks, 35 percent longer.

#### 4. Results

The estimates on long term employment stability (the duration of concatenated employment spells) are shown in Table 1. A natural starting point for a discussion of these results is the basic model of exits into any other state, that is the attrition model in Column 1. Regarding the demographic variables, there does not appear to be any major differences among the categories defined by the variables female, immigrant background, and age. The different schooling variables, on the other hand, have a pronounced but somewhat mixed effect. In comparison to those with a completed compulsory education, those with less than that thus stay employed longer while those with a theoretical upper secondary education do not. Both results are perplexing, but a possible explanation of the former could be the legislated responsibilities of the schools vis-a-vis youth under the age of 18, basically a guarantee of employment, training, or education (Wadensjö 1987). As those that have dropped out of compulsory school often are regarded as a group with particular problems, it may be that schools concentrate their efforts on this group rather than the age group as a whole. The latter result could reflect transitions into further education or military service. Surprising is also the result that an increased vacancy-unemployment ratio shortens durations. This could perhaps reflect an increase in quits as labor market conditions improve.

As for the labor market history variables, in the model of Column 1 both employment experience and previous unemployment spells affect the duration of employment, the former positively and the latter negatively. Furthermore,

all the program variables have low p-values, below the 10 percent level. Employment duration increases with the total time spent in manpower programs, but decreases with the number of times an individual has participated in such programs. There is also a strong relationship between having left unemployment by way of a program and longer employment durations, with the parameterization of the model implying that the expected duration for someone entering employment by way of a program is 76 percent longer than the duration of those coming directly from unemployment.<sup>16</sup>

In Column 2 the previous model has been modified to take into account specific policy related aspects of unemployment and program participation, viz. the most recent unemployment and program spell durations. Regarding the results for having come directly from a program and the time spent in this program, both results show a positive but imprecisely estimated effect.<sup>17</sup> The provisional conclusion would therefore seem to be that the strong positive effect of participation reported in Column 1 is a combination of occurrence and duration effects of program participation.<sup>18</sup> The non-effect on subsequent employment stability of the length of the previous unemployment spell,

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<sup>16</sup> This is the so-called odds-ratio, which in the case of a zero-one variable is calculated as  $\exp[\text{coefficient}]$  (cf. Eq. 6).

<sup>17</sup> Once again, because of missing values in the latest unemployment spell duration variable, this involves a decrease in the number of observations and in turn a general decrease in the precision of the estimates. The missing values are due to the fact that the starting date of some unemployment spells initiated in 1980 cannot be determined unequivocally.

<sup>18</sup> This conclusion is further supported by results from models (not shown) which are variations of the model of Column 2. In a model with the dummy "Program participant" excluded, but otherwise similar to the one of Column 2, the estimated coefficient for the variable "Recent program experience" increases to 0.0823 and its standard error decreases to 0.0406. The p-value for the hypothesis that the parameter is equal to zero is then below the 5 percent level. In a model identical to the one of Column 1, but estimated on the data of Column 2, the parameter for the dummy "Program participant" is estimated as 0.7608 with a standard error of 0.3497.

in contrast, is based on a much larger number of observations and should therefore be more reliable. As for the question of if time spent in programs differs in effect from time spent unemployed, these results do not support this hypothesis. With the two estimates having estimated variances of 0.0010 (latest unemployment experience) and 0.0050 (latest program experience) and an estimated covariance of 0.0001, the test statistic of a two-sided t-test is 0.17, far from any interesting p-level.

Regarding the risk of recurrent unemployment (Column 3 of Table 1), only the estimates of the effects of education, unemployment experience, and program spells display substantive differences from those in Column 1. There is thus a gradient in educational level indicating that more schooling (above the mandatory level) decreases the unemployment risk, and the transition rate is affected by the time spent unemployed as well as by the number of occasions.<sup>19</sup> The program variables appear to show the same pattern as in the model of Column 1, although the effect of previous program spells is less precisely estimated. Moving to the modified model in Column 4, there are only five cases in which the individual came from a program and was observed to reenter unemployment. It is therefore not possible to base any definite conclusions on the results for the variables "Program participant" and "Recent program experience". Given this, the estimated variances 0.0019 ("Recent unemployment experience") and 0.0271 ("Recent program experience") and covariance 0.0004 produce a t-test test statistic of 1.16 for the hypothesis that they are unequal, implying a p-level of around 25 percent with a two-sided test.<sup>20</sup>

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<sup>19</sup> As discussed above, when the results are interpreted in terms of hazard rates (transition rates, risks) instead of durations, the meaning of the sign of a parameter is reversed.

<sup>20</sup> Specification tests of the models of Table 1 are reported in the Appendix.

As argued above, analyses of initial employment spells may provide an enhanced understanding of the long run results. Beginning with permanent employment, first note that transitions out of this type of employment are a fairly rare occurrence. Only 50 percent of the spells are non-censored, that is a transition is observed. This observation is supplemented by the results presented in Table 2. Regarding the attrition model of permanent employment duration (Column 1),<sup>21</sup> the most interesting individual differences relate to previous program participation and previous unemployment. In both cases, an increase in the number of previous spells tends to decrease subsequent employment duration while an increase in the total previous duration increases subsequent employment duration. Before looking at the destination specific transition rates, note that the number of observed events is small in both cases. The estimates should therefore be interpreted with caution. Given this, age (note the gradient) seems to be the only factor affecting transitions from permanent to temporary jobs (Column 2) while unemployment risks (Column 3) show signs of being related to sex and previous unemployment spells.

Regarding temporary employment, as can be seen from the empirical hazard estimates (Figures 3 and 4) the rate of exit out of temporary employment is much higher than that out of permanent employment. Looking then at the attrition model in Table 3 (Column 1), it is apparent that, similar to the permanent employment case, there are only small individual differences in the transition rate. The only clear result is the increase in stability with age (note gradient). Greater individual differences are found in the competing risk models. The rate of transition into permanent employment (Column 2), displays a slight tendency

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<sup>21</sup> The category "University degree" has here been subsumed into the category "Theoretical secondary education" as there were so few observed transitions for the former category. For the same reason, the indicator for program participation immediately prior to employment has been left out completely.

to increase with educational level. (The estimate for university degree should be viewed skeptically, there are only two transitions observed for this category.) It also looks like it decreases with age and with time spent unemployed. Regarding the program variables, the transition rate increases with total program experience but no clear effect can be registered from the number of previous spells and coming off a program. As for the risk of returning to unemployment (Column 3), it appears as if there are gradients in age and in education above compulsory level, and also a relation between previous unemployment experience and unemployment risk.

To conclude the discussion of Tables 1 to 3, it can be observed that in all models there is a tendency for women to have lower recurrent unemployment risks, and those with an immigrant background to have shorter employment durations and higher risks of recurrent unemployment, although these effects normally are imprecisely estimated. (Some specification tests can be found in the Appendix.)

As noted in Section 2, earlier research has indicated that there are differences among the programs in their effects, and that program effects could differ between demographic groups. Some further modifications of the basic attrition model of concatenated employment have therefore been made, and the results are reported in Table A2 of the Appendix. A general problem encountered when pursuing these more detailed hypotheses is the limited number of observations in the different categories, and these analyses are therefore exploratory in character.

Regarding program differences, analyses with the effects of relief work and labor market training separated out do not suggest any major differences in the effects related to the two program types (Column 1). (The differences in p-values probably only reflect differences in the number of observations.) To examine the possibility of different effects among different demographic groups,

the program variables have been interacted with the indicators for sex and immigrant background. Of these results, the only interesting difference is that the effect of coming from a program could differ between immigrants and non-immigrants, possibly implying that only non-immigrants benefit from program participation.

### 5. Conclusions and some policy implications

These analyses of the determinants of the rate of transition out of concatenated and initial employment spells have shed light on the processes generating employment stability following unemployment, an issue that has only received scant attention to date. Regarding long run stability, here operationalized as continuous employment, the main individual determinants are education and labor market history variables, with demographic characteristics having little effect. An increase in educational level seems to increase stability in general, and decrease the risk of recurrent unemployment in particular. An increase in stability is also the effect of longer employment experience. While the duration of the most recent unemployment spell appears to have no effect on the duration of subsequent employment, a history of frequent and/or prolonged unemployment tends to decrease overall stability and increase the risk of further unemployment. Frequent program participation has a similar effect, while an increase in the time spent in programs increases stability. Finally, coming directly from a labor market program increases stability and decreases unemployment risks.

The analysis of overall stability is supplemented by separate estimates of the duration of permanent and temporary employment, sketching a picture of the transition processes underlying long run stability. These results indicate that after a permanent job has been found, there is only a relatively low overall probability that a

transition out of this type of employment will occur and that there is little individual difference in this probability. If instead the first job is a temporary one, the analyses again indicate that the duration of the spell largely is determined independently of individual characteristics. However, individual characteristics influence what follows upon the initial spell. Thus, the likelihood of moving on to permanent employment appears to be related to age, education, and unemployment and program history. Of the latter two, the likelihood of a transition to a permanent job decreases with the time spent unemployed but increases with the time spent in programs. The risk of recurrent unemployment seem related to the same characteristics, but with the variables education, unemployment experience, and program experience having the reverse effects.

In relation to earlier research, the analyses presented here have also included a more detailed description of the previous labor market history of the individual in the models. The potential importance of a closer modelling of labor market history, in particular recent events, can be illustrated in the context of manpower program implementation. In their treatise on unemployment, Layard et al. (1991, 473-474) conclude that the expected remaining duration of unemployment is longer among the long-term unemployed than among the newly unemployed, and propose that resources should be targeted at the long-term unemployed as long as they are not "disproportionately likely to return [to unemployment]". The results reported here indicate that the length of the preceding unemployment spell has no effect on the risk of



recurrent unemployment, a result which would seem to be strengthen the argument for such targeting.<sup>22</sup>

Regarding program evaluation, this study has documented positive program effects on subsequent employment durations as well as decreased unemployment risks, issues previously analyzed in only a limited number of studies. It is, however, obvious that more research is needed on the effects of program participation on subsequent employment stability. In particular, additional attempts to distinguish between participation and duration effects are needed. My seminal results suggest that program participation alone is not enough, the positive effects of participation on employment stability are also related to the time spent in the programs. Furthermore, these results show leaving unemployment by way of a manpower program to have a positive effect on subsequent employment duration. It is interesting to relate this to the results found by Edin and Holmlund (1991); namely that while in the programs, participants have a lower probability of becoming employed than those unemployed. This suggests a "trade-off" between a lower employment probability while in a program and a longer employment duration once the program is completed. Thus, the potential existence of negative initial effects and positive subsequent ones is another issues which would seem to require further investigation.

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<sup>22</sup> However, these results have been obtained in the presence of labor market programs, and one should therefore be wary of using them as an argument for the introduction of such programs. Furthermore, Layard et al. make their recommendation under conditions relating to both program costs and risks of recurrent unemployment, and it should perhaps be pointed out that my results only relate to the latter.

of the European Association of Labour Economists. I am also grateful for the financial support provided by the Nordic Council of Ministers. Any remaining errors and misunderstandings are my own.

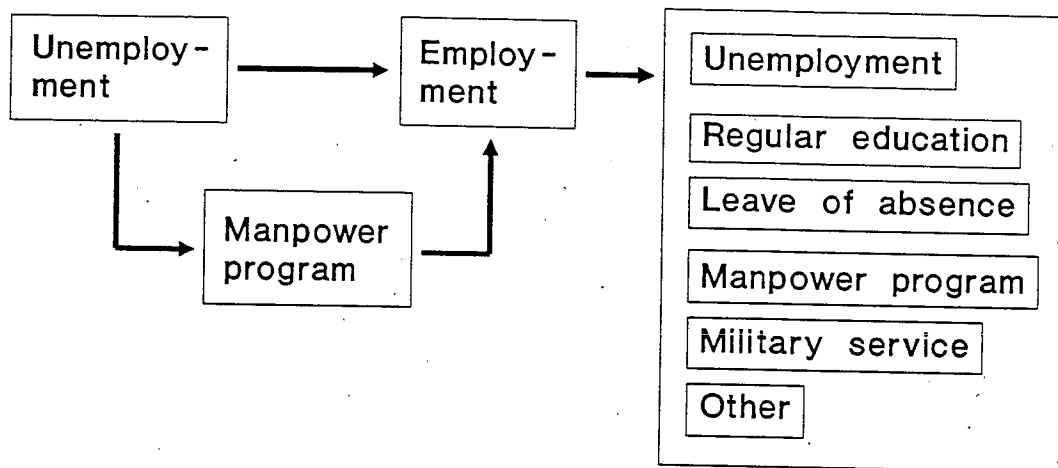
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Figures

Figure 1. Illustration of attrition model of employment duration



Tables**Table 1. Log-logistic model estimates of the duration of concatenated employment. Standard errors in parentheses.<sup>a</sup>**

| Variable                   | Attrition             | Attrition            | Unemployment          | Unemployment         |
|----------------------------|-----------------------|----------------------|-----------------------|----------------------|
| Intercept                  | 3.9459**<br>(0.2109)  | 3.9772**<br>(0.2813) | 5.0651**<br>(0.3323)  | 5.0960**<br>(0.4428) |
| Female                     | -0.0079<br>(0.1213)   | -0.0469<br>(0.1557)  | 0.3607**<br>(0.1857)  | 0.2255<br>(0.2348)   |
| Immigrant<br>background    | -0.2162<br>(0.1763)   | -0.2480<br>(0.2371)  | -0.3771<br>(0.2525)   | -0.4879<br>(0.3311)  |
| Age 16-17                  | -0.0011<br>(0.2008)   | -0.1478<br>(0.2621)  | -0.4835*<br>(0.2976)  | -0.6511*<br>(0.3807) |
| Age 20-22                  | 0.0789<br>(0.1698)    | 0.1263<br>(0.2141)   | 0.0728<br>(0.2620)    | 0.0191<br>(0.3285)   |
| Age 23-                    | -0.1221<br>(0.2183)   | -0.1248<br>(0.2765)  | -0.1099<br>(0.3300)   | -0.0817<br>(0.4169)  |
| Less than<br>comp. school  | 0.5894**<br>(0.2246)  | 0.5782**<br>(0.2889) | 0.6112*<br>(0.3288)   | 0.6336<br>(0.4092)   |
| Vocational<br>sec. school  | 0.4983**<br>(0.1740)  | 0.5319**<br>(0.2325) | 0.4152<br>(0.2640)    | 0.7588**<br>(0.3578) |
| Theoretical<br>sec. school | -0.0019<br>(0.2114)   | 0.0347<br>(0.2658)   | 0.5098<br>(0.3507)    | 0.6506<br>(0.4409)   |
| University                 | 0.6237**<br>(0.3191)  | 0.4603<br>(0.4220)   | 0.8034<br>(0.5191)    | 1.0041<br>(0.7052)   |
| Employment<br>experience   | 0.2040**<br>(0.0425)  | 0.2242**<br>(0.0561) | 0.2076**<br>(0.0645)  | 0.2028**<br>(0.0836) |
| Unemployment<br>spells     | -0.0480**<br>(0.0234) | -0.0311<br>(0.0287)  | -0.0424<br>(0.0327)   | -0.0093<br>(0.0392)  |
| Unemployment<br>experience | -0.0337<br>(0.0913)   | -0.0802<br>(0.1169)  | -0.2735**<br>(0.1260) | -0.2551<br>(0.1609)  |

continued

Table 1 cont.

|                               |                       |                       |                       |                       |
|-------------------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| Program spells                | -0.1088*<br>(0.0620)  | -0.1099<br>(0.0763)   | -0.0963<br>(0.0923)   | -0.1052<br>(0.1078)   |
| Program experience            | 0.4830**<br>(0.1988)  | 0.4092*<br>(0.2487)   | 0.4780<br>(0.3077)    | 0.3610<br>(0.3658)    |
| Following program             | 0.5572**<br>(0.2873)  | 0.5047<br>(0.6015)    | 1.0534**<br>(0.4958)  | 0.2893<br>(1.0979)    |
| Latest unempl. spell duration |                       | 0.0104<br>(0.0298)    |                       | -0.0266<br>(0.0414)   |
| Latest program spell duration |                       | 0.0345<br>(0.0669)    |                       | 0.1759<br>(0.1590)    |
| Temporary employment          | -1.1104**<br>(0.1290) | -1.2356**<br>(0.1668) | -1.4188**<br>(0.2084) | -1.4939**<br>(0.2635) |
| Vacancies/unemployment        | -0.0386**<br>(0.0116) | -0.0508**<br>(0.0154) | -0.0350**<br>(0.0175) | -0.0501**<br>(0.0228) |
| Scale                         | 0.9319<br>(0.0325)    | 0.9693<br>(0.0410)    | 1.1939<br>(0.0593)    | 1.2407<br>(0.0739)    |
| Log L                         | -1285.7               | - 888.2               | - 903.6               | - 634.4               |
| Noncens. spells               | 568                   | 384                   | 294                   | 204                   |
| Right cens. spells            | 291                   | 206                   | 565                   | 386                   |

## Note:

a Spells censored at 130 weeks in the attrition models, and at 78 weeks in the unemployment models. For additional censoring, see text. \*\* and \* indicates significantly different from 0 at the 5 and 10 % level, respectively. All tests based on  $\chi^2$ -statistics.

**Table 2. Log-logistic model estimates of the duration of permanent employment. Standard errors in parentheses.<sup>a</sup>**

| Variable                | Attrition             | Temporary employment | Unemployment          |
|-------------------------|-----------------------|----------------------|-----------------------|
| Intercept               | 4.1050**<br>(0.3125)  | 5.8191**<br>(0.6868) | 5.8101**<br>(0.6373)  |
| Female                  | -0.1170<br>(0.1890)   | -0.2250<br>(0.3809)  | 0.5047<br>(0.3829)    |
| Immigrant background    | -0.2467<br>(0.2825)   | 0.2233<br>(0.6581)   | -0.3658<br>(0.5198)   |
| Age 16-17               | 0.1412<br>(0.2953)    | -0.0483<br>(0.5581)  | -0.6862<br>(0.5566)   |
| Age 20-22               | 0.2135<br>(0.2732)    | 0.2737<br>(0.5137)   | 0.8711<br>(0.6134)    |
| Age 23-                 | 0.1143<br>(0.3689)    | 1.3341<br>(0.8828)   | 0.3556<br>(0.7867)    |
| Less than comp. school  | 0.3616<br>(0.3457)    | -0.7579<br>(0.5733)  | 1.1094<br>(0.7908)    |
| Vocational sec. school  | 0.5800**<br>(0.2823)  | 0.0101<br>(0.5139)   | 0.5320<br>(0.5946)    |
| Theoretical sec. school | -0.0827<br>(0.3068)   | -0.4273<br>(0.6236)  | -0.0617<br>(0.6650)   |
| Employment experience   | 0.0330<br>(0.0669)    | -0.1660<br>(0.1362)  | 0.0065<br>(0.1390)    |
| Unemployment spells     | -0.1341**<br>(0.0452) | -0.0423<br>(0.1143)  | -0.1607**<br>(0.0771) |
| Unemployment experience | 0.2775<br>(0.1828)    | 0.6623<br>(0.6075)   | -0.2905<br>(0.3034)   |

continued



Table 2 cont.

|                            |                       |                     |                      |
|----------------------------|-----------------------|---------------------|----------------------|
| Program spells             | -0.1860<br>(0.1481)   | -0.0726<br>(0.2880) | -0.1311<br>(0.2214)  |
| Program experience         | 0.6170*<br>(0.3584)   | 1.1055<br>(0.9442)  | 0.2316<br>(0.5998)   |
| Vacancies/<br>unemployment | -0.0587**<br>(0.0186) | -0.0089<br>(0.0362) | -0.0687*<br>(0.0358) |
| Scale                      | 0.8123<br>(0.0564)    | 0.8842<br>(0.1350)  | 1.1598<br>(0.1322)   |
| Log L                      | - 363.5               | - 118.1             | - 209.6              |
| Noncens spells             | 152                   | 32                  | 60                   |
| Right cens spells          | 149                   | 269                 | 241                  |

## Note:

a Spells censored at 78 weeks. For additional censoring, see text.

\*\* and \* indicates significantly different from 0 at the 5 and 10 % level, respectively. All tests based on  $\chi^2$ -statistics.

Table 3. Log-logistic model estimates of the duration of temporary employment. Standard errors in parentheses.<sup>a</sup>

| Variable                   | Attrition             | Permanent<br>employment | Unemployment          |
|----------------------------|-----------------------|-------------------------|-----------------------|
| Intercept                  | 2.7847**<br>(0.1794)  | 4.1485**<br>(0.2638)    | 3.5791**<br>(0.3110)  |
| Female                     | -0.0226<br>(0.1143)   | -0.0332<br>(0.1618)     | 0.2778<br>(0.1999)    |
| Immigrant<br>background    | -0.2034<br>(0.1600)   | 0.0218<br>(0.2376)      | -0.3817<br>(0.2650)   |
| Age 16-17                  | -0.5068**<br>(0.1990) | -0.3784<br>(0.2813)     | -0.7045**<br>(0.3347) |
| Age 20-22                  | 0.1403<br>(0.1593)    | -0.0447<br>(0.2215)     | 0.1209<br>(0.2780)    |
| Age 23-                    | 0.3088<br>(0.2054)    | 0.3287<br>(0.3092)      | 0.1983<br>(0.3515)    |
| Less than<br>comp. school  | 0.4056*<br>(0.2078)   | 0.1238<br>(0.3076)      | 0.5355<br>(0.3479)    |
| Vocational<br>sec. school  | 0.0719<br>(0.1586)    | -0.1403<br>(0.2108)     | 0.2248<br>(0.2783)    |
| Theoretical<br>sec. school | -0.2064<br>(0.2077)   | -0.2310<br>(0.2755)     | 0.3695<br>(0.3881)    |
| University                 | 0.2665<br>(0.2871)    | 0.9163*<br>(0.5433)     | 0.5361<br>(0.5202)    |
| Employment<br>experience   | 0.0257<br>(0.0431)    | -0.0327<br>(0.0591)     | 0.0937<br>(0.0750)    |
| Unemployment<br>spells     | 0.0012<br>(0.0194)    | 0.0124<br>(0.0338)      | -0.0114<br>(0.0315)   |
| Unemployment<br>experience | -0.0808<br>(0.0803)   | 0.2917*<br>(0.1533)     | -0.2662**<br>(0.1278) |

continued

Table 3 cont.

|                            |                       |                       |                     |
|----------------------------|-----------------------|-----------------------|---------------------|
| Program spells             | -0.0399<br>(0.0526)   | 0.1735<br>(0.1259)    | -0.0828<br>(0.0904) |
| Program experience         | 0.0213<br>(0.1836)    | -0.6238**<br>(0.2773) | 0.3216<br>(0.3225)  |
| Following programs         | 0.1815<br>(0.2517)    | -0.0300<br>(0.3454)   | 0.6193<br>(0.4776)  |
| Vacancies/<br>unemployment | -0.0217**<br>(0.0110) | -0.0034<br>(0.0158)   | -0.0228<br>(0.0186) |
| Scale                      | 0.7235<br>(0.0273)    | 0.6576<br>(0.0478)    | 1.0741<br>(0.0603)  |
| Log L                      | - 848.3               | - 294.5               | - 629.8             |
| Noncens. spells            | 471                   | 112                   | 221                 |
| Right cens spells          | 86                    | 445                   | 336                 |

## Note:

a Spells censored at 78 weeks. For additional censoring, see text.

\*\* and \* indicates significantly different from 0 at the 5 and 10 % level, respectively. All tests based on  $\chi^2$ -statistics.

## Appendix

### Data description

Figure A1. Occurrence-exposure rates for concatenated employment

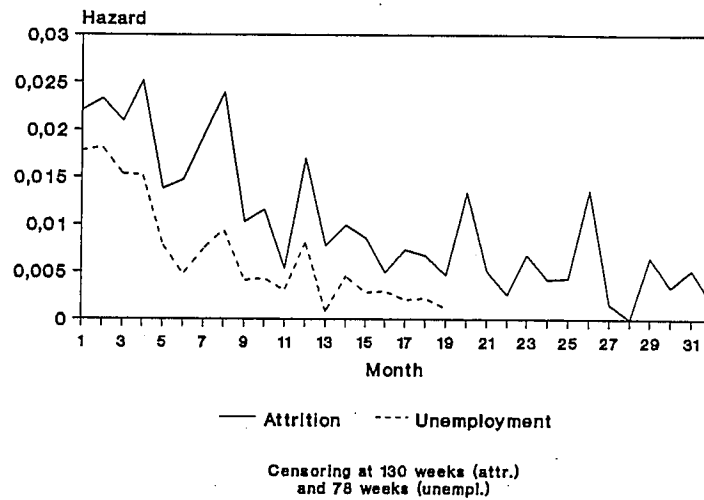


Figure A2. Occurrence-exposure rates for permanent employment

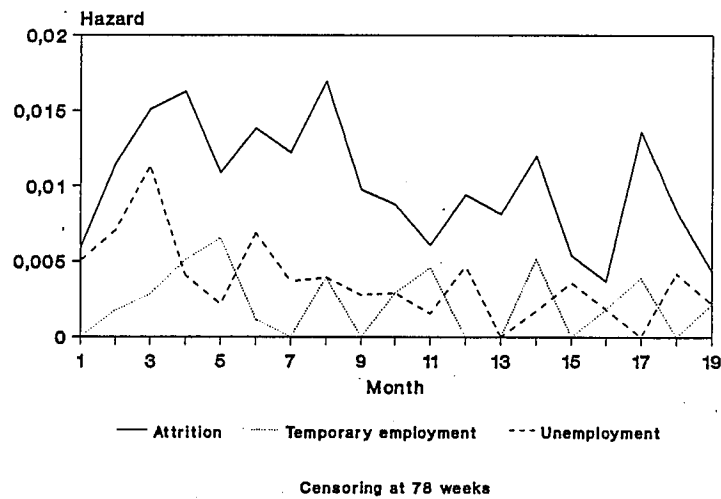


Figure A3. Occurrence-exposure rates for temporary employment

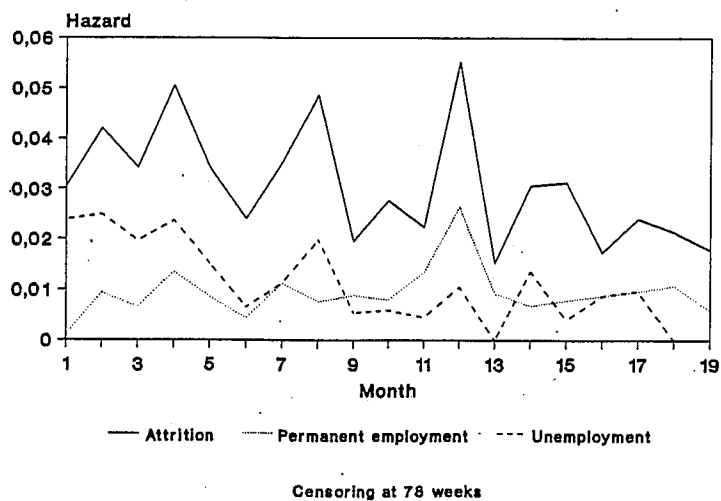


Table A1. Variable definitions and descriptive statistics.

| Variables and their definitions   | Sample descriptive statistics |         |      |                        |      |         |                        |      |      |         |
|---|-------------------------------|---------|------|------------------------|------|---------|------------------------|------|------|---------|
|   | Concatenated empl. spells     |         |      | Permanent empl. spells |      |         | Temporary empl. spells |      |      |         |
|   | Mean                          | Std dev | Min  | Max                    | Mean | Std dev | Min                    | Max  | Mean | Std dev |
| SPELL DURATION (WK)<br>Definitions in text  | 59.3                          | 66.0    | 1    | 243                    | 47.5 | 28.7    | 1                      | 78   | 24.1 | 22.4    |
| <b>Demographic</b>  |                               |         |      |                        |      |         |                        |      |      |         |
| FEMALE <sup>a</sup>   |                               |         |      |                        |      |         |                        |      |      |         |
| IMMIGRANT BACKGROUND <sup>a</sup>   | 0.47                          |         | 0    | 1                      | 0.44 |         | 0                      | 1    | 0.49 |         |
| Foreign citizen or born outside Sweden  | 0.15                          |         | 0    | 1                      | 0.14 |         | 0                      | 1    | 0.16 |         |
| AGE <sup>a</sup>  |                               |         |      |                        |      |         |                        |      |      |         |
| Partitioned into 16-17, 18-19, 20-22, and 23 years of age and above   | 20.5                          | 2.7     | 16   | 28                     | 20.2 | 2.7     | 16                     | 28   | 20.6 | 2.7     |
| <b>Educational<sup>b</sup></b>  |                               |         |      |                        |      |         |                        |      |      |         |
| LESS THAN COMPULSORY SCHOOL <sup>a</sup>  | 0.09                          |         | 0    | 1                      | 0.08 |         | 0                      | 1    | 0.09 |         |
| Less than Swedish (nine-year) compulsory school   |                               |         |      |                        |      |         |                        |      |      |         |
| COMPULSORY SCHOOL <sup>a</sup>  | 0.56                          |         | 0    | 1                      | 0.54 |         | 0                      | 1    | 0.57 |         |
| Swedish compulsory school   |                               |         |      |                        |      |         |                        |      |      |         |
| VOCATIONAL GYMNASIUM <sup>a</sup>   | 0.18                          |         | 0    | 1                      | 0.18 |         | 0                      | 1    | 0.18 |         |
| Vocational upper secondary school   |                               |         |      |                        |      |         |                        |      |      |         |
| THEORETICAL GYMNASIUM <sup>a</sup>  | 0.12                          |         | 0    | 1                      | 0.15 |         | 0                      | 1    | 0.11 |         |
| Non-vocational upper secondary school   |                               |         |      |                        |      |         |                        |      |      |         |
| UNIVERSITY <sup>a</sup>   | 0.04                          |         | 0    | 1                      | 0.04 |         | 0                      | 1    | 0.05 |         |
| Post-secondary education  |                               |         |      |                        |      |         |                        |      |      |         |
| <b>Labor market history</b>   |                               |         |      |                        |      |         |                        |      |      |         |
| EMPLOYMENT EXPERIENCE (YR)  | 2.15                          | 1.9     | 0    | 10.7                   | 2.25 | 2.0     | 0                      | 10.7 | 1.87 | 1.6     |
| Total duration of all employment spells after compulsory school graduation  |                               |         |      |                        |      |         |                        |      |      |         |
| UNEMPLOYMENT EXPERIENCE (YR)  | 0.74                          | 0.8     | 0    | 5.8                    | 0.56 | 0.6     | 0                      | 4    | 0.84 | 0.8     |
| Total duration of all unemployment spells after compulsory school graduation  |                               |         |      |                        |      |         |                        |      |      |         |
| RECENT UNEMPLOYMENT EXPERIENCE (MO) <sup>c</sup>  | 2.52                          | 2.7     | 0.23 | 20.9                   |      |         |                        |      |      |         |
| Duration of most recent unemployment spell  |                               |         |      |                        |      |         |                        |      |      |         |
| EARLIER UNEMPLOYMENT EXPERIENCE (YR)  | 0.65                          | 0.8     | 0    | 4.9                    |      |         |                        |      |      |         |
| Total duration of all unemployment spells after compulsory school graduation but preceding the most recent unemployment spell |                               |         |      |                        |      |         |                        |      |      |         |

continued

Table A1 cont.

| UNEMPLOYMENT SPELLS   | 3.54 | 3.1 | 1    | 30   | 2.90 | 2.5 | 1 | 20  | 3.90 | 3.3 | 1 | 30  |
|---|------|-----|------|------|------|-----|---|-----|------|-----|---|-----|
| Number of unemployment spells after compulsory school graduation  |      |     |      |      |      |     |   |     |      |     |   |     |
| PROGRAM PARTICIPANT <sup>a</sup>  |      |     |      |      |      |     |   |     |      |     |   |     |
| Participated in labor market program immediately prior to becoming employed, program in turn immediately preceded by an unemployment spell  | 0.06 |     | 0    | 1    | 0.05 | 0   | 0 | 1   | 0.06 |     | 0 | 1   |
| PROGRAM SPELLS  |      |     |      |      |      |     |   |     |      |     |   |     |
| Number of relief job spells after compulsory school graduation but before most recent unemployment spell, and labor market training spells after 1979 but before most recent unemployment spell                               | 0.73 | 1.6 | 0    | 30   | 0.56 | 1.2 | 0 | 10  | 0.83 | 1.8 | 0 | 30  |
| PROGRAM EXPERIENCE (YR)   |      |     |      |      |      |     |   |     |      |     |   |     |
| Total duration of all relief job spells after compulsory school graduation and all labor market training spells after 1979  | 0.31 | 0.6 | 0    | 5    | 0.25 | 0.5 | 0 | 3.1 | 0.34 | 0.6 | 0 | 5   |
| RECENT PROGRAM EXPERIENCE (MO) <sup>c</sup>   |      |     |      |      |      |     |   |     |      |     |   |     |
| Duration of relief job or labor market training spell subsequent to most recent unemployment spell and immediately preceding employment spell analyzed, zero if no such spell   | 0.45 | 2.2 | 0    | 25.6 |      |     |   |     |      |     |   |     |
| EARLIER PROGRAM EXPERIENCE (YR)   |      |     |      |      |      |     |   |     |      |     |   |     |
| Total duration of all relief job spells after compulsory school graduation but preceding the most recent unemployment spell, and all labor market training spells after 1979 but preceding the most recent unemployment spell | 0.32 | 0.6 | 0    | 5    |      |     |   |     |      |     |   |     |
| Labor demand  |      |     |      |      |      |     |   |     |      |     |   |     |
| VACANCIES/UNEMPLOYMENT  | 0.00 | 5.6 | -8.0 | 7.1  |      |     |   |     |      |     |   |     |
| Ratio of vacancies and unemployed registered at the employment agencies in the County of Stockholm in the initial month of employment (difference from mean)  |      |     |      |      |      |     |   |     |      |     |   |     |
| No. spells (= observations)   |      | 859 |      |      |      | 301 |   |     |      |     |   | 557 |

**Notes:**

a 1 if in category, 0 otherwise.

b Highest completed level of education at the first interview, Swedish or equivalent thereof.

c Statistics based on 590 observations.

### Specification tests

The choice of a log-logistic parameterization has been supported by graphical goodness-of-fit tests based on transformations of the estimated survivor function (Lawless (1982), see also Wu (1990)). The log-logistic model has been compared to a Weibull model, a specification that allows for constant, monotonic increasing, and monotonic decreasing hazards over time. In all models estimated, the log-logistic model has performed better than the Weibull specification, although the differences have been small. (In addition, estimates of the models of Table 1 in which the log-logistic specification have been exchanged for a Weibull specification have not provided any substantively new information.)

A further test regarded collinearity among the variables. The test is basically consists of an examination of the condition indexes of the models along the lines suggested by Belsley, Kuh, and Welsch (1980), with a large condition index indicating a high degree of collinearity. There does not yet exist a consensus on what is to be considered as "large", but a point of reference are the experiments reported by Belsley et al. These indicate indexes of less than 10 to be unproblematic, of around 30 to be evidence of moderate collinearity, and of above 100 to be seriously problematic. The largest condition index in the models of Column 1 to 4 of Table 1 have been respectively 37, 56, 39, and 69, and collinearity has therefore not been judged to be serious problem in these models.

Finally, goodness-of-fit tests based on graphical examination the generalized residuals (see e.g. Kalbfleisch and Prentice (1980), Lawless (1982)) have been carried out. Such examinations have been proposed to check the appropriateness of the maintained model. The test consist of comparing the distribution of the residuals with an Exponential distribution. The tests suggest that the models have performed fairly well, that is the plots of minus the logarithm of the residual survivor function against the residuals have roughly lain along a straight line with gradient 1. Note, however, that the interpretation of agreement with or divergence from the proscribed pattern is problematic, in particular in cases with censored observations.

Additional estimates**Table A2. Log-logistic model estimates of the duration of concatenated employment. Standard errors in parentheses.<sup>a</sup>**

| Variable                        | Attrition             | Attrition             | Attrition             |
|---------------------------------|-----------------------|-----------------------|-----------------------|
| Intercept                       | 3.9424**<br>(0.2110)  | 3.9563**<br>(0.2124)  | 3.9640**<br>(0.2142)  |
| Female                          | -0.0080<br>(0.1217)   | -0.0166<br>(0.1212)   | -0.0421<br>(0.1396)   |
| Immigrant<br>background         | -0.2066<br>(0.1778)   | -0.2137<br>(0.2146)   | -0.2089<br>(0.1764)   |
| Age 16-17                       | 0.0028<br>(0.2010)    | 0.0003<br>(0.2015)    | -0.0082<br>(0.2018)   |
| Age 20-22                       | 0.0863<br>(0.1703)    | 0.0937<br>(0.1702)    | 0.0762<br>(0.1700)    |
| Age 23-                         | -0.1057<br>(0.2198)   | -0.0946<br>(0.2180)   | -0.1231<br>(0.2184)   |
| Less than<br>comp. school       | 0.5921**<br>(0.2247)  | 0.5721**<br>(0.2246)  | 0.5834**<br>(0.2251)  |
| Vocational<br>sec. school       | 0.4880**<br>(0.1747)  | 0.4767**<br>(0.1746)  | 0.4837**<br>(0.1751)  |
| Theoretical<br>sec. school      | -0.0077<br>(0.2114)   | -0.0073<br>(0.2125)   | -0.0077<br>(0.2125)   |
| University                      | 0.6126*<br>(0.3195)   | 0.6275**<br>(0.3176)  | 0.6144*<br>(0.3202)   |
| Employment<br>experience        | 0.2051**<br>(0.0426)  | 0.2069**<br>(0.0426)  | 0.2074**<br>(0.0427)  |
| Unemployment<br>spells          | -0.0491**<br>(0.0235) | -0.0562**<br>(0.0245) | -0.0487**<br>(0.0235) |
| Unemployment<br>experience      | -0.0292<br>(0.0927)   | -0.0337<br>(0.0912)   | -0.0384<br>(0.0916)   |
| Program<br>spells               |                       | -0.0970<br>(0.0656)   | -0.0935<br>(0.0690)   |
| Progr.sp.*<br>Immigrant backgr. |                       | 0.0781<br>(0.2320)    |                       |
| Progr.sp.*<br>Female            |                       |                       | 0.0232<br>(0.1974)    |

continued



Table A2 cont.

|                                   |                       |                       |                       |
|-----------------------------------|-----------------------|-----------------------|-----------------------|
| Relief work spells                | -0.1095*<br>(0.0676)  |                       |                       |
| Training spells                   | -0.2174<br>(0.2539)   |                       |                       |
| Program experience                |                       | 0.4084*<br>(0.2187)   | 0.4046<br>(0.2622)    |
| Progr.exp.*<br>Immigrant backgr.  |                       | 0.1986<br>(0.7059)    |                       |
| Progr.exp.*<br>Female             |                       |                       | 0.0093<br>(0.4781)    |
| Relief work experience            | 0.5070**<br>(0.2417)  |                       |                       |
| Training experience               | 0.4746<br>(0.4069)    |                       |                       |
| Following program                 |                       | 0.9799**<br>(0.3019)  | 0.5643<br>(0.3604)    |
| Foll.progr.*<br>Immigrant backgr. |                       | -1.1528*<br>(0.6198)  |                       |
| Foll.progr.*<br>Female            |                       |                       | 0.3494<br>(0.5243)    |
| Following relief work             | 0.5640*<br>(0.3422)   |                       |                       |
| Following training                | 0.4479<br>(0.5345)    |                       |                       |
| Temporary employment              | -1.1076**<br>(0.1290) | -1.0980**<br>(0.1288) | -1.1024**<br>(0.1292) |
| Vacancies/<br>unemployment        | -0.0391**<br>(0.0117) | -0.0394**<br>(0.0116) | -0.0392**<br>(0.0116) |
| Scale                             | 0.9313<br>(0.0325)    | 0.9300<br>(0.0324)    | 0.9320<br>(0.0325)    |
| Log L                             | -1285.5               | -1283.9               | -1285.8               |
| Noncens. spells                   | 568                   | 568                   | 568                   |
| Right cens. spells                | 291                   | 291                   | 291                   |

## Note:

a Spells censored at 130 weeks. For additional censoring, see text. \*\* and \* indicates significantly different from 0 at the 5 and 10 % level, respectively. All tests based on  $\chi^2$ -statistics.

