THE DANISH
NATIONAL CENTRE
FOR SOCIAL RESEARCH

Jan Høgelund
Anders Holm

02:2011 WORKING PAPER

LONG-RUN EMPLOYMENT EFFECTS OF VOCATIONAL REHABILITATION

RESEARCH DEPARTMENT OF EMPLOYMENT AND INTEGRATION

LONG-RUN EMPLOYMENT EFFECTS OF VOCATIONAL REHABILITATION

Jan Høgelund
Anders Holm

Research Department of Employment and Integration
Working Paper 02:2011

Long-Run Employment Effects of Vocational Rehabilitation

February 2011

Jan Høgelund
The Danish National Centre for Social Research, Herluf Trolles Gade 11, DK-1052 Copenhagen K, Denmark
Fax: +45-3348-0833, E-mail: jh@sfi.dk

Anders Holm
School of Education, University of Aarhus, Tuborgvej 164, DK-2400 Copenhagen NV, Denmark
Fax: +45-8888-9960, E-mail: aholm@dpu.dk

Abstract

Previous studies find that vocational rehabilitation in terms of education has no or even a negative effect on long-term sick-listed employees' probability of returning to work. This paper extends previous analyses by assessing the employment effect, using both a return-to-work measure and a measure of the subsequent employment duration. With data on 637 Danish long-term sick-listed employees, we simultaneously estimate a random effects hazards rate model comprising four durations: (1) the duration until participation in an educational measure, (2) the duration until returning to work for the pre-sick leave employer, (3) the duration until returning to work for a new employer, and (4) the duration of the employment after returning to work for a new employer. In line with previous studies, we find that educational measures have a negative effect on the sick-listed employees' probability of returning to work for a new employer. However, our findings do not support the hypothesis that educational measures increase the employment duration of sick-listed employees after they have returned to work for a new employer.

1. Introduction

Many countries use vocational rehabilitation to reduce the problem of health related labour market exit. However, the evidence about the employment effect of vocational rehabilitation is mixed. While the literature provides mixed evidence about the employment effect of vocational rehabilitation in general, studies of vocational rehabilitation in terms of education suggest that these measures at best have no (Høgelund and Holm 2005; 2009) or even a negative employment effect (Frölich, Heshmati and Lechner, 2004) (see section 2). Given the anticipated human capital effects of education, these findings are surprising.

The lack of an employment effect may simply indicate that educational measures on average have only a limited effect, perhaps because some vocational rehabilitation measures are more effective than others or because certain types of vocational rehabilitation yield positive employment effects for only some people. However, the mixed findings could also be related to methodological problems. Many studies assess the employment effect of vocational rehabilitation in terms of whether it increases the probability of returning to work. Even though return-to-work measures are widely accepted, they do not necessarily give a correct assessment of sick-listed or work-injured people's labour market attachment in the long run (Butler, Johnson, Baldwin, 1995).

This paper adds to the existing literature by extending the traditional assessment of employment effects of educational measures. In contrast to previous studies, we measure the employment effect by using not only a return-to-work measure but also a measure of the employment duration after returning to work. Using Danish panel data of 637 long-term sick-listed employees, we estimate a random effects hazards rate model with four durations: (1) the duration until enrolment in education, (2) the duration until returning to work for the pre-sick leave employer, (3) the duration until returning to work for a new employer, and (4) the duration of this employment.

In line with previous studies we find that participation in education does not increase the sick-listed employees' probability of returning to work. Neither do our findings support the hypothesis that educational measures increase the employment duration of employees returning to work after a long-term sick leave period.

The paper is organised as follows. Section 2 surveys the literature on employment effects of vocational rehabilitation and section 3 outlines the most important characteristics of the Danish sick leave policy. Section 4 presents our empirical strategy, and section 5 describes our data

and shows some descriptive statistics. Section 6 presents the findings of our analysis, and section 7 concludes.

2. Previous studies

North American studies have predominantly assessed employment effects of vocational rehabilitation in a cost-benefit framework (e.g. Berkowitz et. al., 1988; Dean and Dolan, 1991; Lewis et. al., 1992; Wood and Morrison, 1997; Dean, Dolan and Schmidt, 1999). These studies suggest that the benefits of vocational rehabilitation in terms of increased labour market earnings clearly exceed program costs. An earnings effect may consist of a wage effect (the treatment increases the wages of employed people) and an employment effect (the treatment increases the employment chance of unemployed people), or both. Consequently, the cost-benefit studies are not directly comparable to our study, as the cost-benefit studies do not distinguish between employment and wage effects.[1]

In addition, none of the cost-benefit studies distinguished between educational measures and other measures such as job training and job counselling. Positive employment or earning effects of job training and job counselling may therefore hide negative employment effects of educational measures.

Several studies have assessed whether participation in vocational rehabilitation increases the probability of returning to work (Allingham and Hyatt, 1995; Heshmati and Engström, 2001; Frölich, Heshmati and Lechner, 2004; Aakvik, Heckman and Vytlacil, 2005; Høgelund and Holm, 2005, 2009). All of these studies took account of unobserved differences between treated and untreated individuals (or performed matching on observables). Three studies measured the effect of vocational rehabilitation without distinguishing between different types of measures. A Swedish study of 8,839 long-term sick-listed individuals found that vocational rehabilitation had a positive employment effect (Heshmati and Engström, 2001). In contrast, a Canadian study of 6,613 permanently injured employees found that participation in vocational rehabilitation harmed the participants' employment chance (Allingham and Hyatt 1995). Similarly, in a study of 1,924 Norwegian long-term sick-listed women, Aakvik, Heckman and Vytlacil (2005) found that participation in vocational rehabilitation reduced the chance of returning to work.

[1] The literature surveys of LaLonde (1995) and Heckman, LaLonde and Smith (1999) suggest that the majority of the reported cost-benefit effects are related to an employment effect rather than an earnings effect.

Some studies have measured the return-to-work effect of educational measures (Frölich, Heshmati and Lechner, 2004; Høgelund and Holm, 2005, 2009). These studies suggest that education has no effect or even a negative effect. Frölich, Heshmati and Lechner (2004) studied 6,287 long-term sick-listed individuals, using a matching technique to compare the employment effect of five different vocational rehabilitation measures. The study showed that education had a strong and negative employment effect. While workplace rehabilitation was the most effective measure, it was no more effective than no treatment.

Høgelund and Holm (2005) studied 433 Danish long-term sick-listed employees with low-back pain. Using random effects hazard rate model, they estimated two effects of educational measures: an effect during participation (lock-in effect) and an effect of having ended the educational measure (ex-post effect). While educational measures had a strong and negative lock-in effect, the ex-post effect was close to zero and insignificant. A 2009 study by Høgelund and Holm comprised 646 Danish employees who had been sick-listed at least 3 months. The authors, who studied the effect of educational measures on the probability of returning to work for a new employer, also found a strong and negative lock-in effect and an ex-post effect close to zero.

In sum, the evidence about the employment effect of vocational rehabilitation is mixed. While the few existing studies of educational measures suggest that such measures do not increase long-term sick-listed employees' probability of returning to work, no one has studied whether educational measures have positive long-term employment effects.

3. The Danish sick leave policy

The Danish Sickness Benefit Act covers wage earners, self-employed and unemployed persons, and the act gives full wage compensation up to a ceiling corresponding to the maximum unemployment benefit. Often employers topup sickness benefits to match wages. A person can normally receive sickness benefits for up to 52 weeks within a period of 18 months, but the period may be extended in certain cases, e.g. if recovery is anticipated within half a year. The Sickness Benefit Act does not distinguish between work incapacity caused by non-work related circumstances and work-related circumstances. In the latter case, employees can claim a benefit under the workers' compensation scheme. This scheme operates independently of the sickness benefit scheme, and workers compensation benefits are paid on the top of sickness benefits.

Local authorities (municipalities) are responsible for payment of sickness benefits and case management. The authorities must assess all sickness benefit cases within at least eight weeks after the first day of work incapacity. Thereafter, the municipal case manager must perform follow-up assessments every fourth week in complicated cases or every eight weeks in uncomplicated cases (during the observation period of this study, follow-up assessments had to be performed after 13 weeks in all sickness benefit cases, and thereafter every 13 weeks). The purpose of the assessments is to verify that the sick-listed individual qualifies for benefit receipt and to return the sick-listed individual to the labour market as quickly as possible. Follow-up assessments must rely on updated medical, social, and vocational information, and they are to take place in cooperation with the sick-listed individual and other relevant agents such as the employer, medical experts, and vocational rehabilitation institutions.

To enhance return to work, the municipality can apply a broad range of vocational rehabilitation measures such as test of working capacity, economic support for workplace adaptations, reduced working hours with supplementary sickness benefits, job counselling, wage subsidised job training, and educational measures (ranging from courses lasting a few weeks to post-secondary education at the university level). Vocational rehabilitation last for up to five years. During this period the sick-listed individual is entitled to a vocational rehabilitation benefit of the same amount as the sickness benefit.

If a sick-listed person with lasting reduced working capacity (despite medical and vocational treatment) is unable to work in an ordinary job, the municipality may refer the sick-listed employee to a permanent wage-subsidised job (*flexjob*). In such a job the working conditions are individually tailored to meet the individual's reduced working capacities, e.g. by reducing working hours and job demands. If the disabled individual is too incapacitated to work in a wage-subsidised job, the municipality must award a disability benefit.

4. Empirical strategy

To study the employment effect of educational measures, we apply a structural duration analysis framework (hazard rate model). Our model comprises four durations: (1) the duration until participation in an educational measure, (2) the duration until returning to work for the pre-sick leave employer, (3) the duration until returning to work for a new employer, and (4) the duration of the employment after returning to work for a new employer.

Often municipalities refer sick-listed employees to educational measures when returning to work for the pre-sick leave employer is no longer possible. Therefore, individuals participating in educational measures not only return to work for a new employer more often than individuals who do not participate in education but they also return to work later (see section 5). Thus a comparison of return-to-work rates of individuals participating in education and individuals who do not participate may lead to biased estimates of the treatment effect. Therefore, we include two return-to-work durations in our model: the duration until returning to work for the pre-sick employer and until returning to work for a new employer, respectively. These two are competing-risk durations, i.e. when a sick-listed employee returns to work for the pre-sick leave employer, the employee can no longer return to work for a new employer, and vice versa.

In our data only five sick-listed employees who participated in an educational measure returned to work for the pre-sick employer, making it is impossible for us to identify how participation in education affects the duration until returning to work for the pre-sick leave employer. Therefore, we estimate only the effect of education on the probability of returning to work for a new employer. In a similar vein, we estimate only our main effect of interest, the effect of education on the subsequent job duration for sick-listed employees returning to work for a new employer.

Using a piecewise constant hazard model with random effects (van den Berg, 2001), we formalise the way in which sick-listed employees' participation in education causally affects their probability of returning to work for a new employer and the duration of this employment. As we want to estimate two effects, i.e. the effect of educational measures on the hazard to work for a new employer and on the hazard out of this employment, we need two sources of exogenous variation in the hazard to education. We use two approaches to obtain such exogenous variation, the timing-of-event assumption and the instrumental variables (IV) method.

Abbring and van den Berg (2003, 2004) show that the hazard rate model with random effects yields an unbiased estimate of the causal treatment effect when individuals cannot completely anticipate the exact timing of their enrolment in the treatment. When this assumption is fulfilled, random or quasi-experimental variation between the expected and realised time until the treatment exists. When we condition on all relevant observed and unobserved information available to the sick-listed individual, the remaining variation in the timing until the treatment is random and the correlation between the residual timing of the treatment and any subsequent changes in the duration of the outcome must be causal. In our setting, the no-anticipation assumption implies that

we assume that the sick-listed employees, at the beginning of the sick leave, cannot anticipate the exact timing of their enrolment in educational measures. This does not preclude that the sick-listed employees have expectations of the likihood of different timings of educational measures. The sick-listed employees may know the distribution of the duration until enrolment in education, but they should not know exactly when their individual enrolment will take place. When we condition on all observed and unobserved factors we implicitly condition on the ability and information set available to the sick listed in order to determine his expectations on the timing of potential participation in education

There are good reasons for believing that the no-anticipation assumption is credible in our application. First, it is unlikely that an employee will consider participating in a specific type of education at the very beginning of a long-term sick-leave period. Instead, the employee will probably concentrate on his or her health condition and the possibilities of returning to work for either the pre-sick leave employer or a new employer. Second, even if the sick-listed employee is determined to enrol in an educational measure, participation demands the consent of the municipality (see section 3). Therefore, the sick-listed employee will know only whether participation in an educational measure is possible after the municipality has performed one or more follow-up assessments and made a decision about the sick-listed employee's participation in education. To enrol in education the sick-listed employee will often also need acceptance from an educational institution. Thus some of the time until enrolment must be unknown to the sick-listed individual at the out-set of the sick leave, meaning that the timing of enrolment is quasi-experimental (i.e. like throwing dice to determine the exact timing of enrolment into education). This quasi-experimental variation allows us to identify the employment effect of educational measures without exclusion restrictions (instrumental variables).

As a second method to obtain exogenous variation, we use the IV method. This method introduce exogenous variation in the treatment variable, here participation in education that is irrelevant in the outcome variable, here duration of employment after sick leave. This variation corresponds to partially randomizing sick-listed into education. We follow Aakvik, Heckman and Vytlacil (2005), who used the share of vocational rehabilitation applicants who did not participate in the vocational rehabilitation program as an instrument. In a similar vein, we exploit information about the municipalities' use of vocational rehabilitation. We assume that the municipalities' tendency to use vocational rehabilitation influences the selection of sick-listed employees to education, i.e. that a sick-listed employee's probability of participating in an educational measure is

positively correlated with the municipalities' use of vocational rehabilitation. We also assume that the municipalities' use of vocational rehabilitation does not influence the sick-listed employees' employment duration after returning to work for a new employer, except indirectly through the educational measure.

The validity of our instrument will be violated if it is correlated with a covariate that also affects the probability of returning to work. This problem will occur if municipalities' use of vocational rehabilitation is related to the demand for labour, meaning that municipalities in areas with a low labour demand often use vocational rehabilitation and vice versa. To handle this potential problem, we include the lagged regional unemployment rate as a time-varying covariate.

Conditional on observed covariates, the model consists of four parts describing (1) the transition to an education, (2) the transition to work for either the pre-sick leave employer or a new employer, (3) the transition out of the return-to-work employment, and (4) the distribution of unobserved effects.

The *participation* in education at a particular time is measured in months, and we specify the discrete time hazard rate into education as logistic[2]:

$$P(D_1(t) = d_1^t) = \frac{\exp\left(\delta_t + \beta_1 x_1 + \varepsilon_1\right)^{d_1^t}}{1 + \exp\left(\delta_t + \beta_1 x_1 + \varepsilon_1\right)}$$

where

$$d_1^t = \begin{cases} 1 & \text{if entering into education in period } t \\ 0 & \text{otherwise} \end{cases}$$

Furthermore, x_1 is a set of covariates affecting the transition to education, and β_1 is a corresponding row vector of regression coefficients. The parameter δ_t is a time-specific intercept term that measures duration dependence in the transition rate to education, and ε_1 is a random variable measuring the impact of unobserved covariates. As is customary in random effects hazard rate models, these covariates are assumed to be independent of observed covariates and constant throughout the duration until the sick-listed employee returns to work. To arrive at a parsimonious model, we assume that conditional on entering education the completion of education is exogenous, i.e. the duration of education is exogenous. Completion is indicated by:

[2] The logistic assumption is not a very restrictive parametric assumption (Han and Hausmann, 1990), and it allows for a very flexible modeling of the entire distribution of the different durations in our model.

$$d_2^t = \begin{cases} 1 & \text{if education is completed before period } t \\ 0 & \text{otherwise.} \end{cases}$$

An individual's probability of *returning to work* for the pre-sick leave employer or a new employer at time t_{rtw} is:

$$P(D_3(t)=j) = \frac{\exp\left(\delta_{21t} + \beta_{21}x_{21} + \varepsilon_{21}\right)^{d_{31}^t} \cdot \exp\left(\delta_{22t} + \gamma_{21}d_1^t + \gamma_{22}d_2^t + \beta_{22}x_{22} + \varepsilon_{22}\right)^{d_{31}^t}}{1 + \exp\left(\delta_{21t} + \beta_{21}x_{21} + \varepsilon_{21}\right) + \exp\left(\delta_{22t} + \gamma_{21}d_1^t + \gamma_{22}d_2^t + \beta_{22}x_{22} + \varepsilon_{22}\right)}; j = 0,1,2,$$

where

$$j = 1 \Leftrightarrow d_{31}^t = \begin{cases} 1 & \text{if returning to work for the pre-sick leave employer in period } t \\ 0 & \text{otherwise} \end{cases}$$

$$j = 2 \Leftrightarrow d_{32}^t = \begin{cases} 1 & \text{if returning to work for a new employer in period } t \\ 0 & \text{otherwise} \end{cases}$$

and x_{21}, x_{22} are observed covariates[3], and β_{21}, β_{22} are the corresponding row vector of regression coefficients. The coefficient $\gamma_{j2}, j = 1,2$ measures the impact of entering and completing education on the probability of returning to work for a new employer. Finally, $\varepsilon_{21}, \varepsilon_{22}$ denote the unobserved effects in the transition to work for the pre-sick leave employer and a new employer, respectively.

Conditional on returning to work for a new employer, the probability of *ending this employment* is:

$$P(D_4(t') = d_4^{t'}) = \frac{\exp\left(\delta_{3t} + \gamma_3 1\left(\sum_{t=0}^{t=t_{rtw}} d_2^t > 0\right) + \beta_3 x_3 + \varepsilon_3\right)^{d_4^{t'}}}{1 + \exp\left(\delta_{31t} + \gamma_3 1\left(\sum_{t=0}^{t=t_{rtw}} d_2^t > 0\right) + \beta_3 x_3 + \varepsilon_3\right)}$$

where

$$t' = t - t_{rtw}$$

$$d_4^{t'} = \begin{cases} 1 & \text{if terminating employment in period } t' \\ 0 & \text{otherwise.} \end{cases}$$

and where 1(.) is an indicator function equal to one when the term inside the bracket is true and zero otherwise.

The parameter of interest is γ_3 measuring the effect of having completed an educational measure on the probability of terminating employment after having returned to work for

[3] Note that the subscript from now on refers to number of sets of coefficients and regressors (and not the corresponding duration). We use this notation because we do not model the duration of the educational spell measured through d_2^t.

a new employer. In addition, we are interested in the parameters γ_{21} and γ_{22}, measuring the effect of education on the probability of returning to work for a new employer.

The fourth part of the model is the *density of the unobserved effects*, which is denoted $\varphi(\boldsymbol{\varepsilon}); \boldsymbol{\varepsilon} = \varepsilon_1, \varepsilon_{21}, \varepsilon_{22}, \varepsilon_3$. Then choosing a multivariate density allowing the random effects to be correlated becomes possible. We return to this issue below.

Denoting the discrete duration until either return to work or censoring as T_i, we arrive at the following individual contribution to the log-likelihood function:

$$\ln L_i = \ln\left[\int \varphi(\boldsymbol{\varepsilon}) \prod_{t=1}^{T_i} P(D_1(t) = d_1)^{1-d_1^t} \times P(D_3(t) = j) \times P(D_4(t') = d_4^{t'}) \partial \boldsymbol{\varepsilon}\right] \qquad (1)$$

(1) is a mixture model with a logit model of entering education, a multinomial model of returning to work for either the pre-sick leave employer or a new employer, and a logit model of terminating the employment.

To estimate (1), we need to numerically integrate out the distribution of the unobserved effects. We do this by approximating the unknown distribution of random effects by a discrete distribution with a finite number of mass points, according to Heckman and Singer (1984), and sum over the number of mass-points during the estimation. We use an approach by which the data can determine both the location of the mass-points and their weights, leading to a very flexible correlation structure between the four random variables representing unobserved heterogeneity, see van den Berg, Holm and van Ours (2002).

5. Data and descriptive statistics

We use panel data of employees aged 18 to 55 who were continuously sick-listed for at least three months in 1995. The 1,063-person sample was drawn in the 24 largest municipalities in Denmark and it consists of two groups. One group of 619 employees was sick-listed with low-back pain disorders. The employees were interviewed by telephone four times: on average 5½ months after the first day of work incapacity, 13 months after, 25 months after, and on average 57 months after the first day of work incapacity. Five hundred twenty nine sick-listed employees participated in the first interview (85 percent). The 454 persons who also participated in the second interview (86 percent) are included in our sample.

Another group of 444 sick-listed employees with disorders other than low-back pain were interviewed twice: on average 5 months and 25 months after the first day of sick leave. Three hundred persons participated in the first interview (68 percent). The 233 persons who also participated in the second interview (78 percent) are included in our sample.

In total, our data includes 687 persons, 454 persons with low-back pain disorders and 233 with other disorders. We exclude 32 persons with missing or incorrect information on the dependent variables (41) or on the covariates (9), meaning that the sample consists of 637 persons.

Dependent variables

Our empirical model comprises four outcome durations measured in months after the first day of work incapacity, the duration until: (1) the duration until enrolment in education, (2) the duration until returning to work for the pre-sick leave employer, (3) the duration until returning to work for a new employer, and, for those returning to work for a new employer, (4) the duration of this employment (see section 5). Forty-eight percent of the sample (305 persons) returned to work; of those, 52 percent returned to work for a new employer (160 persons) and 48 percent returned to work for the pre-sick leave employer (145 persons).

The data lacks information about the employment duration for 10 individuals returning to work for a new employer. We have censored these cases at the time of returning to work, meaning that they do not contribute to the estimation of the duration of the return-to-work employment. Consequently, our estimations are based on 637 individuals in the education duration and the two return-to-work durations and 150 individuals in the employment duration.

Educational measures include taking both courses and formal education. In contrast to previous studies, our data allow us to measure participation in up to three educational measures.[4] Twenty percent of the sick-listed employees participated in at least one measure. Among these 129 persons, 22 participated in two measures, while one individual participated in three measures. On average the sick-listed employees enrolled 15.6 months after the beginning of the sick leave and their education lasted for 8.4 months (see table 1). Among the 150 sick-listed employees returning to work for a new employer 27 percent (41 persons) participated in at least one educational

[4] This is possible only for the sick-listed employees with low-back pain disorders for whom we have information about participation in educational measures from each of the three panels (after one year, two years, and after five years). For employees with other disorders, we can measure participation in only one measure, because we have information only from one panel (after two years).

measure. On average these individuals enrolled 13.5 months after the beginning of the sick leave, and the education lasted 7.3 months.

As previously noted, educational measures are likely to give rise to two diverse effects: a lock-in effect that reduces the probability of returning to work during treatment and a positive post-treatment effect. To capture both effects, we use two time-varying covariates. One covariate is set to 1 during participation in education and 0 during periods without education and captures the lock-in effect. Another covariate is 0 until the first educational measure ends and equals 1 until the sick-listed employee either returns to work or enrols in a second measure and this variable captures the post-treatment effect. The covariate equals 0 during participation in a second measure and becomes 1 again when the measure ends.

Explanatory variables

The data includes one health indicator and information about the individuals' socio-economic characteristics. All the covariates are measured at the first interview. The socio-economic characteristics are gender, age, cohabitation status, educational attainment, seniority in the pre-sick leave job and years of employment experience before the sick leave. Educational attainment and employment experience can be considered as proxies for general human capital, whereas seniority can be considered as a proxy for company-specific human capital. Our health measure is a dummy indicator of the sick-leave disorder, equalling 1 for individuals with low-back pain and 0 for persons with other disorders.[5]

To assess the municipalities' use of vocational rehabilitation, we estimate whether the number of vocational rehabilitation beneficiaries in each of the 24 municipalities is bigger or smaller than the average for the 275 Danish municipalities. We define the outcome variable as the ratio of adult inhabitants (in the sick-listed employee's municipality of residence) who received vocational rehabilitation benefit in 1996. To adjust for structural conditions that may influence the demand for vocational rehabilitation, we include covariates measuring the ratio of inhabitants receiving social assistance[6], the ratio of owned residences, and the ratio of apartments with four rooms.[7] The OLS regression yields an R^2 value of 0.24 (results are not shown) (see table 1 for descriptive statistics of the covariate). From this OLS regression we use the exponential of the

[5] In addition, we have information about self-rated pain intensity (measured on a scale from 1 to 10). This variable does not significantly affect the employment duration after returning to work for a new employer, and it affects the magnitude of other explanatory variables. Therefore, we have excluded pain intensity from our analysis.
[6] In addition to sick-listed employees, social assistance beneficiaries can enter the vocational rehabilitation program.
[7] The regression is based on data from Statistics Denmark (Danmarks Statistiks Databank).

standardised residuals to construct an explanatory (instrumental) variable that affects the sick-listed employees' probability of participating in an educational measure.

Finally, to adjust for the impact of demand-side conditions, we include the lagged regional unemployment rate as a time-varying covariate.[8] The unemployment level may affect both the sick-listed employees' probability of returning to work for a new employer and the municipalities' tendency to establish vocational rehabilitation. Consequently, the assumptions underlying the IV method may potentially be violated if the unemployment rate is not included in the analysis.

Our estimation of the employment duration is based on 150 sick-listed employees who returned to work for a new employer. To increase the efficiency of our estimations, we include only covariates that are significant at a 25 percent significance level in the equation for the employment duration (in the other three durations we include all covariates).

Table 1 shows descriptive statistics for the 637 long-term sick-listed employees, and Table 2 shows descriptive statistics for the 150 sick-listed employees who returned to work for a new employer.

<<<<<<<< Table 1 and 2 about here >>>>>>>>

From Table 1 we see that sick-listed employees participating in education are younger, have less seniority in the pre-sick leave job, are more often sick-listed with low-back pain disorders, and are more often living in regions with a low unemployment rate than sick-listed employees who do not participate in education. Among sick-listed employees returning to work for a new employer, Table 2 shows that individuals participating in education are more often better educated, have longer seniority, are more often sick-listed with low-back pain disorders, and are more often living in regions with a low unemployment rate than sick-listed employees who do not participate in education. If these characteristics also affect the probability of returning to work for a new employer and/or the probability of ending this employment, we must include them in our estimations to avoid bias in the estimated effects of education.

[8] The covariate is based on information about the regional unemployment rate. The average of the unemployment rate in the two quarters before the beginning of a sick leave period is allowed to affect the probability of returning to work during the first 12 months of the sick leave. Similarly, the unemployment rate during the second year of a sick leave is calculated as the average of the unemployment rates in the two quarters before the beginning of the second year, etc.

Figures 1 and 2 show unadjusted hazard rates to education and to first returning to work for the pre-sick leave employer and for a new employer, respectively.

<<<<<<<Figure 1 and 2 about here>>>>>>>

The transition to an educational measure peaks around 15 months after the first day of the sick leave. As most of our sample began their sick leave mid-year, this peak may indicate that admission to education often takes place yearly at specific dates in the autumn.

Figure 2 shows that returning to work for the pre-sick leave employer predominantly happens early in the observation period: the hazard rate peaks six months after the beginning of the sick leave. Thereafter the hazard rate decreases, and after 20 months it is virtually zero. The hazard rate of returning to work for a new employer peaks after nine to thirteen months after the beginning of the sick leave. However, in contrast to the pre-sick-leave-employer hazard rate, this rate remains at a fairly high level during most of the observation period.

Giving an initial rough descriptive assessment of how participation in education affects the sick-listed employees employment duration after they return to work for a new employer, Figure 3 shows the unadjusted hazard rate out of the return-to-work employment separately for sick-listed employees who participated in education and for those who did not.

<<<<<<<Figure 3 about here>>>>>>>

The hazard rate has a constant level during the first four or five months for both groups. While remaining at a relatively high level for individuals who did not participate in an educational measure, the hazard rate decreases after the fourth month for individuals who participated in education. In other words, the graphic assessment indicates that educational measures may reducing the hazard rate (thereby increase the employment duration) after returning to work for a new employer. The graphs do not adjust for observed and unobserved differences between individuals who participated in education and those who did not. Consequently, the graphs may show a biased effect.

6. Findings

Table 3 shows the results of the hazard rate model described in section 4 (table A.1 in the appendix shows the results of a similar model without random effects). The coefficients in column (1) cover the sick-listed employees' transition to an educational measure, and the coefficients in column (2) and (3) cover the transition to a new employer and to the pre-sick leave employer, respectively. Finally, the coefficients in column (4) cover the transition out of the return-to-work employment for employees returning to work for a new employer.

<<<<<<<<<<< Table 3 about here >>>>>>>>>>

Transition to education

Age and seniority in the pre-sick leave job significantly influence the probability of participating in an educational measure. Young employees with little seniority have an above average probability of participating in education. The impact of the random effects supports the assumption that sick-listed employees who are unable to return to work for the pre-sick leave employer often participate in education. Thus the coefficients of the random effects show that a group consisting of 63 percent of the sick-listed employees have a high probability of participating in education, a low probability of returning to work for the pre-sick leave employer, and a high probability of returning to work for a new employer.

Transition to work for a new employer

Education has a negative effect on the probability of returning to work for a new employer. The lock-in effect is negative, meaning that during enrolment the participants have a significantly lower probability of returning to work than sick-listed employees who are not enrolled in education. This time-varying covariate has a coefficient of -2.693 and a p-value of 0.000. Moreover, the coefficient of the covariate measuring the effect of ending education is negative but insignificant, i.e. the coefficient of the covariate is -0,404 with a p-value of 0.371.

As expected, we find that age has a negative and highly significant effect on the probability of returning to work for a new employer. Similarly, we find that the measures of general human capital in terms of educational attainment and previous labour market experience have a positive effect, i.e. sick-listed employees with much experience and post-secondary education have a high probability of returning to work. In contrast, the effect of company specific human capital in terms of seniority in the pre-sick leave job is negative. This effect may indicate that sick-listed

employees with long tenure have high demands for job content and wage level, which in turn reduce their chance of finding new employment. Moreover, the negative effect of seniority may also indicate that company specific human capital is of little or no relevance in jobs with a different content from the pre-sick leave job. We also find that females have a lower probability than males of returning to work for a new employer. The covariates measuring cohabitation status, low-back pain disorder, and the unemployment level do not significantly influence the probability of returning to work for a new employer.

Transition to work for the pre-sick leave employer

Many of the covariates have the same impact on the sick-listed employees' probability of returning to work for the pre-sick leave employer as they have on the probability of returning to work for a new employer. That is, age has a negative effect, and educational attainment and previous labour market experience have a positive effect, whereas cohabitation status and the unemployment level have no effect. In contrast to the results for returning to work for a new employer, seniority has a positive effect on the probability of returning to work for the pre-sick leave employer, indicating that company specific human capital is important for work retention.

A priori, one could expect that general employment experience would only affect the chance of returning to work for a new employer. However, employment experience also has a positive effect on the probability of returning to work for the pre-sick leave employer. This finding may indicate that our measure of previous labour market experience captures not only general experience but also company-specific human capital.

Transition out of employment

Our analysis suggests that participation in education has no significant effect on sick-listed employees' employment duration after they returned to work for a new employer. Thus the coefficient of the covariate measuring the termination of the education measure is -0.181 with a p-value of 0.660. In other words, the analysis suggests that educational measures have no significant long-term employment effects.

While sick-listed employees with a post-secondary education and lot of employment experience have a high probability of returning to work for a new employer, employees with these characteristics also have a high probability of ending their employment again. This finding may

indicate that it is difficult for highly specialised employees to find a job matching their qualifications and job demands.

The influence of unobserved heterogeneity

Unobserved characteristics influence the estimated employment effects of educational measures. The coefficients of the random effects in Table 3 indicate that a group of sick-listed employees often participating in education has a high probability of returning to work for a new employer and a low probability of ending this new employment (i.e. a long employment duration). Consequently, without adjustment for unobserved heterogeneity, we would overestimate the employment effects of educational measures. Thus the hazard rate model with random effects shows that the effect of having completed education is insignificant, whereas this effect is positive and significant in the model without random effects, i.e. the coefficient is 0.686 with a p-value of 0.002. Similarly, the coefficient of the effect of having completed an educational measure is smaller in the model with random effects (-0.181) than in the model without random effects (-0.414).

Robustness check

While the comparison of the model with and without random effects show that unobserved characteristics influence the estimated employment effects, we cannot be sure that our specification of unobserved heterogeneity (with two mass points, cf. Section 4) takes sufficiently account of unobserved heterogeneity. A more flexible specification of the unobserved heterogeneity, with more mass points included in the model, could possible provide a better adjustment for the influence of unobserved characteristics. However, with only 150 individuals returning to work for a new employer, we were unable to estimate a model with three mass points.

To assess whether our model with two mass points provides a sufficiently adjustment unobserved characteristics, we have re-estimated the model in Table 3 with the duration until returning to work for a new employer included in the equation for the employment duration. We expect that the return-to-work duration is a good proxy for both observed and unobserved characteristics that affect the sick-listed employee's labour market resources. Therefore, we expect that the coefficient of the return-to-work duration is bigger in a model without random effects than in our model with two mass points. The data supports this assumption (see table A.2 in the appendix).

While the coefficient of the return-to-work duration is 0.182 in a model without random effects, it is 0.011 in the model with two mass points. This reduction in the magnitude of the coefficient suggests that our model with two mass points reduces the bias from unobserved characteristics. However, the return-to-work duration is insignificant in both models, with a p-value of 0.199 in the model without random effects and a p-value of 0.548 in the model with random effects. The insignificance of the return-to-work duration in both models may suggest that only little unobserved heterogeneity exists among the sick-listed employees who return to work for a new employer. The p-value of 0.548 in the random-effects model also suggests that there is only little unobserved heterogeneity that the model does not take into account.

7. Conclusions

Previous studies have found that vocational rehabilitation in terms of education has a limited employment effect at best. We test the hypothesis that educational measures have positive long-term employment effects. This hypothesis suggests that the negative findings of previous studies could be caused by a too-short observation period. Therefore, in contrast to previous studies, we measure the employment effect by both a return-to-work measure and a measure of the subsequent employment duration. Using panel data of 637 long-term sick-listed employees, we estimate a random effects hazards rate model with four durations: (1) the duration until participation in an educational measure, (2) the duration until returning to work for the pre-sick leave employer, (3) the duration until returning to work for a new employer, and (4) the duration of the employment after returning to work for a new employer.

Our findings do not support the existence of a long-run employment effect of educational measures. First, we find that educational measures have a negative effect on returning to work. Thus educational measures have a negative lock-in effect that reduces the probability of returning to work for a new employer during participation in education and a negative and insignificant effect of having ended education. Second, participation in education does not affect the duration of the employment spell following a return to work for a new employer. In other words, the analysis does not support the hypothesis that educational measures have short-term employment effects, nor does it support the hypothesis that the measures have a significant long-term employment effect.

This study benefited from panel data with detailed information about participation in up to three educational measures, return-to-work durations, and subsequent employment durations. While this information allowed us to perform an assessment of both short-term and long-term employment effects of educational measures, the study also has some shortcomings. The small sample size, with only 150 individuals returning to work for a new employer, reduces the precision of the estimated employment-duration effect of education. Furthermore, with a small sample we were unable to study whether certain types of educational measures yield positive effects (and other measures yield negative effects), and whether education is effective for some groups of sick-listed employees (but not for other groups). Therefore, future studies may benefit from a larger data set.

Acknowledgements

This work was funded by the Danish Council for Independent Research for Social Sciences (grant number 09-062122), the Danish National Centre for Social Research, and the School of Education, Aarhus University.

Literature

Aakvik, A., Heckman, J.J., Vytlacil, E.J., 2005. Estimating treatment effects for discrete outcomes when responses to treatment vary: an application to Norwegian vocational rehabilitation programs. *Journal of Econometrics***,** 125(1-2)

Allingham, R., Hyatt, D., 1995. *Measuring the impact of vocational rehabilitation on the probability of post-injury return to work* in Thomason, T, Chaykowski, R. (ed.): Research in Workers' Compensation, Kingston: Queen's University, p.158-180.

Berkowitz, M. et al., 1988. *Measuring the Efficiency of Public Programs. Costs and Benefits in Rehabilitation*. Temple Univeristy Press: Philadelphia.

Butler, R.J., Johnson, W.G., Baldwin, M.L., 1995. Managing work disability: Why first return to work is not a measure success. *Industrial Labor and Relations Review*, vol. 48(3): pp. 452-469.

Dean, D. H., Dolan, R. C., 1991. Assessing the Role of Vocational Rehabilitation in Disability Policy. *Journal of Policy Analysis and Management*, vol. 10, no. 4: 568-587.

Dean, D. H., Dolan, R. C., Schmidt, R.M., 1999. Evaluating the Vocational Rehabilitation Program Using Longitudinal Data. Evidence for a Quasiexperimental Research Design. *Evaluation Review*, vol. 23, no. 2, pp. 162-189.

Frölich, M., Heshmati, A., Lechner, M., 2004. A Microeconometric Evaluation of Rehabilitation of Long-term Sickness in Sweden. *Journal of Applied Econometrics*, vol. 19, no. 3: pp. 375-396.

Gibbs, W.E., 1990. Alternative Measures to Evaluate the Impact of Vocational Rehabilitation Services. *Rehabilitation Counseling Bulletin*, vol. 34, no. 1, pp. 33-43.

Han, A., Hausman J., 1990. Flexible parametric estimation of duration and competing risk models, *Journal of Applied Econometrics*, 5: 1-28.

Heckman, J.J., LaLonde, R.J., Smith, J.A. 1999. *The Econometrics of Active Labor Programs*, in: Ashenfelter, O. and Card, D. (Eds.), Handbook of labor economics, vol. 3A. Elsevier: Amsterdam, pp. 1865-2097.

Heckman J, Singer B (1984) A Method for Minimizing the Impact of Distributional Assumptions in Econometric Models for Duration, Econometrica 52: 271-320

Hennessey, J.C., Muller, S.L., 1995. The Effect of Vocational Rehabilitation and Work Incentives on Helping Disabled-Worker Beneficiary Back to Work. *Social Security Bulletin*. vol. 58, no. 1.

Heshmati, A., Engström, L.G., 2001. *Estimating the effects of vocational rehabilitation programs in Sweden*, in: Lechner, M., Pfeiffer, F. (eds.), Econometric Evaluation of Labour Market Policies. ZEW Economics Studies 13. Physica-Verlag: New York, pp. 183-210.

Høgelund, J., Holm, A., 2005. *Returning the Long-Term Sick-Listed to Work: The Effects of Educational Measures and Employer Separations*, in: Saunders, P. (eds.): Social Security and the Welfare to Work Transition. International Studies on Social Security, volume Ten, pp. 211-238. Aldershot: Ashgate.

Høgelund, J., Holm, A., 2009. *Why do Educational Measures not Improve Disabled Employees' Employment Chances?* Paper presented at the European Society of Populations Economics 2009 conference in Seville, June.

LaLonde, R.J., 1995. The Promise of Public Sector-Sponsored Training Programmes. *Journal of Economic Perspectives* 9, 149-168.

Lewis, D.R., Johnson, D.R., Chen, T., Erickson, R.N., 1992. The use and reporting of benefit-cost analyses by state vocational rehabilitation agencies. *Evaluation review*, vol. 16, no. 3, pp. 266-287.

van den Berg, G. J. (2001). Duration Models: Specification, Identification and Multiple Durations, in: J. J. Heckman and E. Leamer, Handbook of econometrics, vol. 5K.

van den Berg GJ, Holm A, van Ours JC (2002) Do stepping stone jobs exist? Early career paths in the medical profession, Journal of Population Economics 15: 647-665

Wood, G.R., Morrison, D.L., 1997. Vocational Rehabilitation Programmes: A Financial Appraisal. *Safety Science*, Vol. 25, no. 1-3, pp. 247-260.

Table 1 Descriptive statistics (n=637).

	Participated in education (n=161)		Did not participate in education (n=476)	
	Mean	Std.dev	Mean	Std.dev
Female (yes=1)*	0.634	0.483	0.557	0.497
Age***	37.441	9.366	40.286	9.760
Living with spouse (yes=1)	0.714	0.453	0.662	0.474
Educational attainment				
Primary[a] (yes=1)	0.416	0.494	0.412	0.493
Secondary[a] (yes=1)	0.379	0.487	0.353	0.478
Post-secondary[a] (yes=1)	0.205	0.405	0.235	0.425
Seniority (measured in months)**	65.935	72.854	86.483	93.709
Number of years employed prior to the sick leave***	15.137	8.991	18.095	9.739
Low-back pain disorder (yes=1)***	0.789	0.409	0.630	0.483
Unemployment rate, 1-12 months***	11.888	2.580	12.682	2.841
Unemployment rate, 12-24 months***	10.161	2.324	10.903	2.584
Unemployment rate, 24-36 months***	9.211	2.090	9.882	2.340
Unemployment rate, 36-48 months***	7.567	1.845	8.151	2.057
Unemployment rate, 48 months and more***	6.252	1.379	6.607	1.503
Number of months until start of (first) educational measure	15.640	11.365	--	--
Duration of educational (measured in months)	8.398	9.810	--	--
Returning to work for pre-sick leave employer (yes=1)***	0.037	0.190	0.292	0.455
Returning to work for a new employer (yes=1)	0.261	0.440	0.248	0.432

[a] Primary education covers the compulsory school period, i.e. nine years of basic school, and other preparatory schooling such as high school. Secondary education in Denmark includes all 'terminal' educations, i.e. preparing the students for entry directly into working life (e.g. carpenter education), except university degrees. Post-secondary education includes all types of university degrees.

Table 2 Descriptive statistics for sick-listed returning to work for a new employer (n=150)

	Participated in education (n=41)		Did not participate in education (n=109)	
	Mean	Std.dev	Mean	Std.dev
Female (yes=1)	0.610	0.494	0.523	0.502
Age	36.951	10.351	36.954	10.255
Living with spouse (yes=1)	0.732	0.449	0.642	0.482
Educational attainment				
Primary[a] (yes=1)	0.366	0.488	0.367	0.484
Secondary[a] (yes=1)*	0.463	0.505	0.312	0.465
Post-secondary[a] (yes=1)*	0.171	0.381	0.321	0.469
Seniority (measured in months)**	62.723	65.572	36.161	48.364
Number of years employed prior to the sick leave	15.220	10.177	15.220	10.116
Low-back pain disorder (yes=1)***	0.854	0.358	0.615	0.489
Unemployment rate, 1-12 months*	11.768	2.527	12.667	2.912
Unemployment rate, 12-24 months*	10.010	2.243	10.850	2.680
Unemployment rate, 24-36 months*	9.087	1.978	9.813	2.443
Unemployment rate, 36-48 months	7.511	1.700	8.117	2.232
Unemployment rate, 48 months and more	6.196	1.358	6.547	1.778
Number of months until start of (first) educational measure	13.512	6.882	--	--
Duration of educational (measured in months)	7.341	8.896	--	--

[a] Primary education covers the compulsory school period, i.e. nine years of basic school, and other preparatory schooling such as high school. Secondary education in Denmark includes all 'terminal' educations, i.e. preparing the students for entry directly into working life (e.g. carpenter education), except university degrees. Post-secondary education includes all types of university degrees.

Table 3 Random effects hazard rate model (n=637).

	(1) Participation in an educational measure		**(2)** Returning to work for a new employer		**(3)** Returning to work for the pre-sick leave employer		**(4)** Ending employment for new employer	
Enrolment in an educational measure (yes=1)	--	--	-2.693	(0.629)***	--	--	--	--
Completed an educational measure (yes=1)	--	--	-0.404	(0.451)	--	--	-0.181	(0.410)
Municipalities' vocational rehabilitation tendency	0.030	(0.010)***	--	--	--	--	--	--
Female (yes=1)	0.161	(0.234)	-0.391	(0.201)*	-0.108	(0.204)	--	--
Age	-0.068	(0.027)**	-0.081	(0.027)***	-0.094	(0.027)***	-0.070	(0.047)
Living with spouse (yes=1)	0.178	(0.229)	0.136	(0.194)	-0.138	(0.209)	--	--
Educational attainment								
Secondary (yes=1)	0.287	(0.241)	-0.075	(0.214)	0.511	(0.221)**	--	--
Post-secondary (yes=1)	0.247	(0.296)	0.512	(0.242)**	0.756	(0.249)***	0.777	(0.284)***
Seniority (measured in months)[1)]	-0.565	(0.171)***	-0.991	(0.205)***	0.453	(0.123)***	--	--
Number of years employed before the sick leave	0.015	(0.028)	0.066	(0.027)**	0.062	(0.027)**	0.079	(0.048)*
Low-back pain disorder (yes=1)	0.254	(0.385)	-0.061	(0.310)	-0.049	(0.305)	--	--
Unemployment level	-0.043	(0.055)	0.006	(0.051)	0.075	(0.049)	--	--
Baseline, period 2	0.999	(0.249)***	0.643	(0.249)***	0.073	(0.235)	-0.226	(0.294)
Baseline, period 3	2.422	(0.281)***	0.647	(0.391)	-0.535	(0.241)**	-1.158	(0.336)***
Baseline, period 4	1.822	(0.326)***	0.132	(0.510)	-2.170	(0.276)***	--	--
Constant	-1.530	(1.182)	-1.142	(1.117)	-3.774	(1.524)**	-2.176	(1.102)**
Random effects	-3.013	(0.329)***	-1.670	(0.660)**	2.716	(1.189)**	0.721	(0.574)
Fraction of observations with random effect	0.628							

Note: The equations, (1)-(4), are estimated simultaneously. Baseline dummies in (1): Reference: 1-7 months after beginning of sick leave, period 2: 8-12 months after, period 3: 13-16 months after, period 4: 17+ months after. Baseline dummies in (2): Reference: 3-7 months after beginning of sick leave, period 2: 8-12 months after, period 3: 13-21 months after, period 4: 21+ months after. Baseline dummies in (3): Reference: 3-4 months after beginning of sick leave, period 2: 5-6 months after,

period 3: 7-10 months after, period 4: 11+ months after. Baseline dummies in equation (4): Reference: 1-4 months after return to work, period 2: 5-11 months after, period 3: 11+ months after. Standard errors are between brackets. Significance levels: *** significant at 1%, ** significant at 5%, * significant at 10%.

1): Estimate multiplied by 100.

Appendix

Table A.1 Hazard rate model without random effects (n=637).

	(1) Participation in an educational measure		**(2)** Returning to work for a new employer		**(3)** Returning to work for the pre-sick leave employer		**(4)** Ending employment for new employer	
Enrolment in an educational measure (yes=1)	--	--	- 1.665	(0.517)***	--	--	--	--
Completed an educational measure (yes=1)	--	--	0.686	(0.227)***	--	--	-0.414	(0.337)
Municipalities' vocational rehabilitation tendency	0.013	(0.007)*	--	--	--	--	--	--
Female (yes=1)	0.105	(0.171)	-0.388	(0.177)**	-0.083	(0.186)	--	--
Age	- 0.056	(0.019)***	-0.074	(0.024)***	-0.080	(0.025)***	-0.068	(0.045)
Living with spouse (yes=1)	0.077	(0.172)	0.090	(0.174)	-0.077	(0.186)	--	--
Educational attainment								
Secondary (yes=1)	0.391	(0.173)**	-0.015	(0.193)	0.438	(0.205)**	--	--
Post-secondary (yes=1)	0.110	(0.211)	0.497	(0..210)**	0.648	(0.227)***	0.786	(0.274)***
Seniority (measured in months)[1)]	-0.169	(0.113)	-0.754	(0.155)***	0.377	(0.105)***	--	--
Number of years employed before the sick leave	0.014	(0 .020)	0.060	(0.024)**	0.054	(0.026)**	0.070	(0.045)
Low-back pain disorder (yes=1)	0.410	(0.286)	-0.063	(0.284)	-0.074	(0.285)	--	--
Unemployment level	-0.013	(0.042)	0.011	(0.048)	0.007	(0.046)	--	--
Baseline, period 2	0.850	(0.240)***	0.485	(0.230)**	0.026	(0.232)	-0.254	(0.290)
Baseline, period 3	1.792	(0.238)***	0.124	(0.257)	-0.613	(0.236)***	-1.208	(0.324)***
Baseline, period 4	0.660	(0.250)***	-0.582	(0.316)*	-2.262	(0.267)***	--	--
Constant	-3.336	(0.862)***	-2.166	(0.971)**	-1.789	(0.979)*	-1.798	(1.014)*

Note: The equations, (1)-(4), are estimated simultaneously. Baseline dummies in (1): Reference: 1-7 months after beginning of sick leave, period 2: 8-12 months after, period 3: 13-16 months after, period 4: 17+ months after. Baseline dummies in (2): Reference: 3-7 months after beginning of sick leave, period 2: 8-12 months after, period 3: 13-21 months after, period 4: 21+ months after. Baseline dummies in (3): Reference: 3-4 months after beginning of sick leave, period 2: 5-6 months after, period 3: 7-10 months after, period 4: 11+ months after. Baseline dummies in equation (4): Reference: 1-4 months after return to work, period 2: 5-11 months after, period 3: 11+ months after. Standard errors are between brackets. Significance levels: *** significant at 1%, ** significant at 5%, * significant at 10%.

1): Estimate multiplied by 100.

Table A.2 Hazard rate models with and without random effects. Time to returning to work included in the equation of ending the employment (n=637).

	Model without random effects	Model with random effects
	Ending employment for new employer	Ending employment for new employer
Time until returning to work for a new employer[1)]	0.182 (0.141)	0.011 (0.018)
Completed an educational measure (yes=1)	-0.784 (0.452)*	-0.486 (0.664)
Age	-0.069 (0.044)	-0.069 (0.046)
Educational attainment		
Post-secondary (yes=1)	0.792 (0.274)***	0.779 (0.278)***
Number of years employed before the sick leave	0.073 (0.045)	0.077 (0.046)*
Baseline, period 2	-0.234 (0.291)	-0.231 (0.292)
Baseline, period 3	-1.148 (0.328)***	-1.154 (0.329)***
Constant	-2.062 (1.038)**	-2.203 (1.086)**

Note: In the model with random the equation of ending employment for a new employer is simultaneously estimated with equations for enrolment in education, returning to work for the pre-sick leave employer, and of returning to work for a new employer. Estimates of these equations are not shown. Baseline dummies: Reference: 1-4 months after return to work, period 2: 5-11 months after, period 3: 11+ months after. Standard errors are between brackets. Significance levels: *** significant at 1%, ** significant at 5%, * significant at 10%.

1): Estimate multiplied by 10.

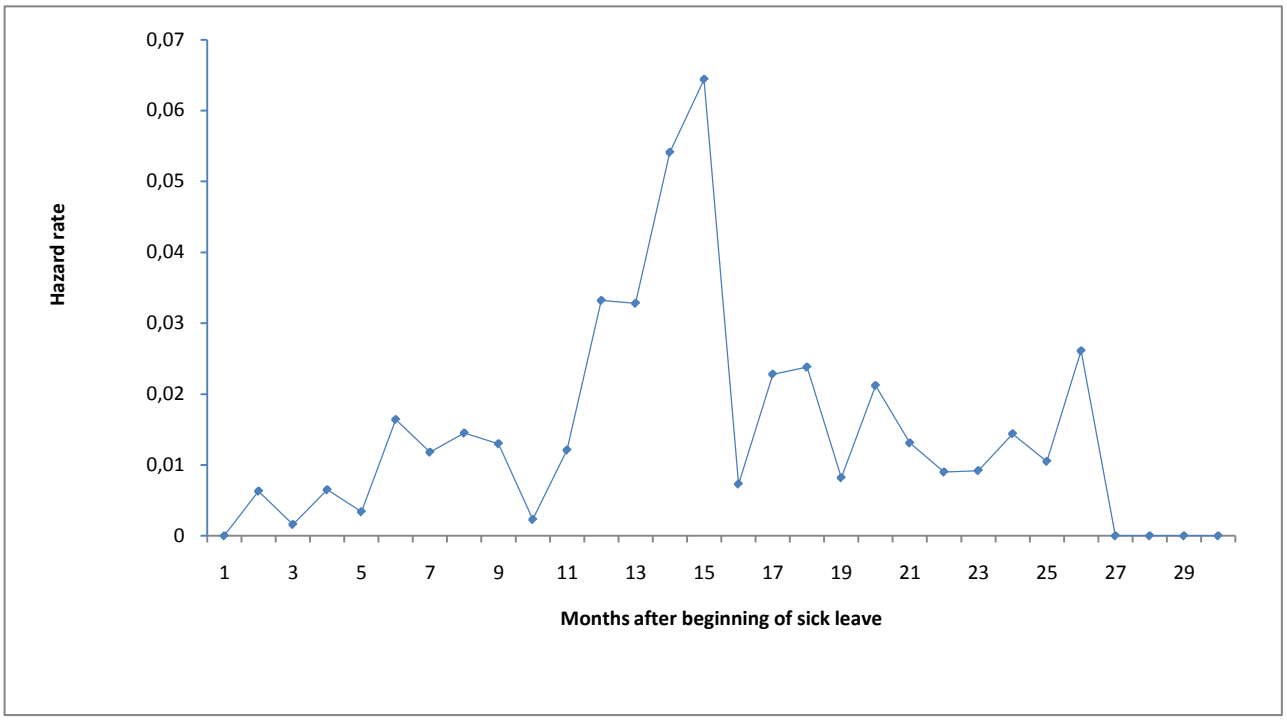

Fig. 1: Hazard rate to educational measures

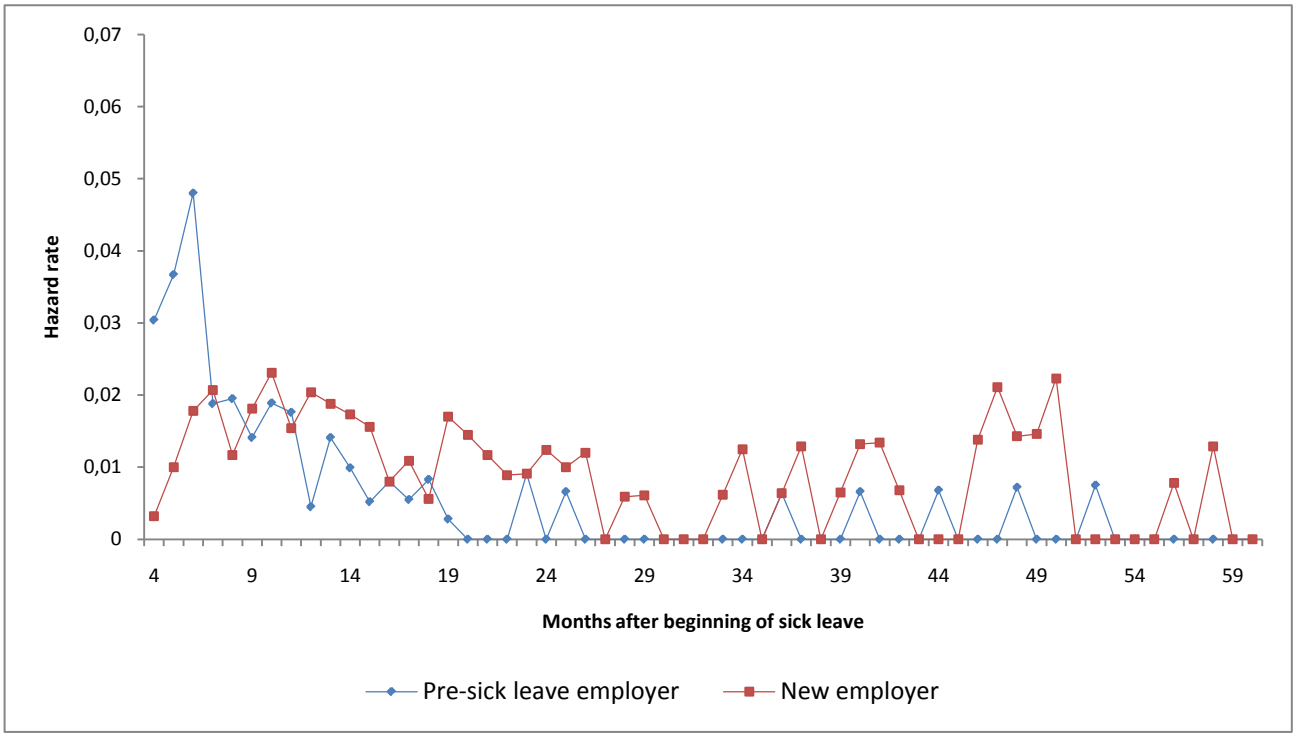

Fig. 2: Hazard rate of returning to work.

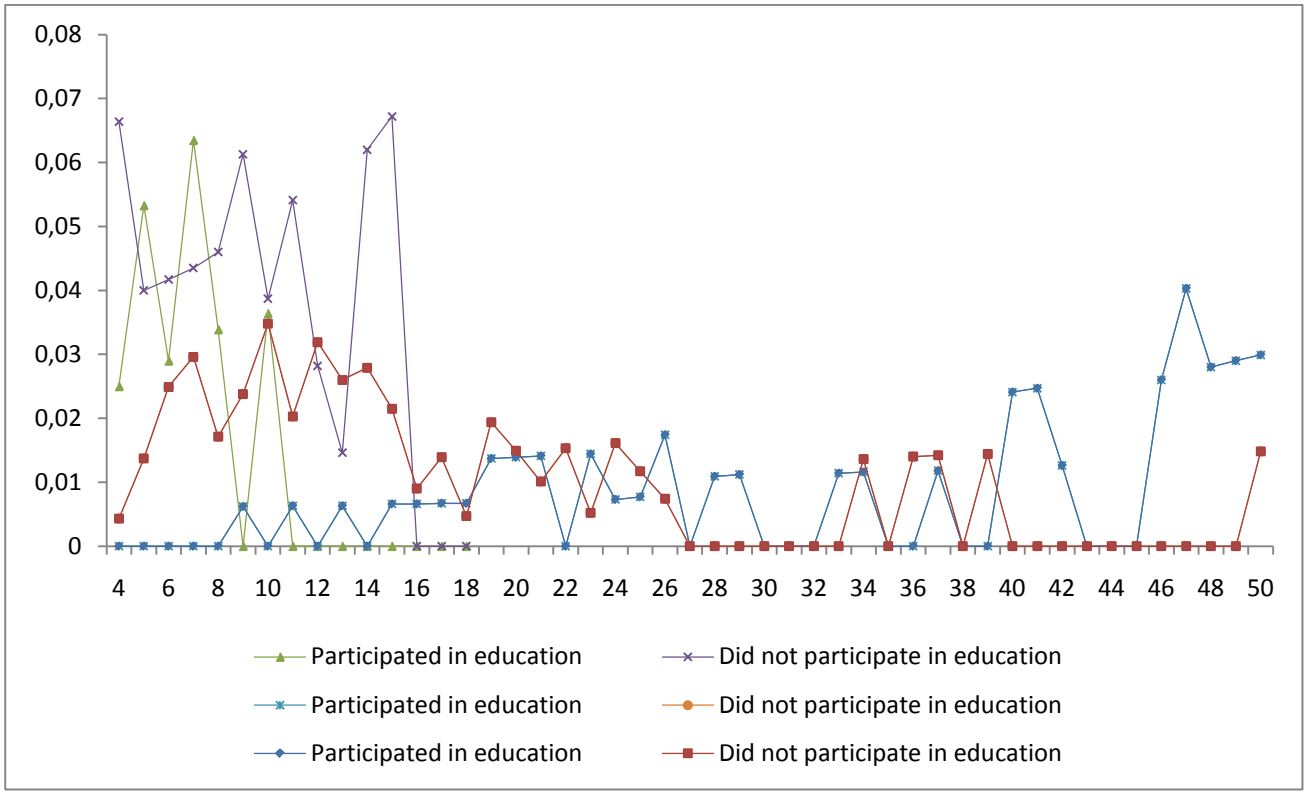

Fig. 3: Hazard rate out of employment after returning to work for a new employer.