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ABSTRACT

The Effects of Vocational Training Programmes on the Duration of Unemployment in Eastern Germany

This paper focuses on the effects of vocational training programmes on the duration of unemployment in Eastern Germany. We use information from administrative data of the Federal Employment Office. To allow for observable and possible unobservable influences we apply a multivariate mixed proportional hazard model. Furthermore, particular interest is spent on possible locking-in effects by separate estimation of in- and after-programme effects. Regarding several different programme durations our results show insignificant in- and after-programme effects for short-term programmes, insignificant in-programme and negative after-programme effects for mid-term programmes and negative in- and after-programme effects for long-term programmes.

JEL Classification: J64, J24, I28, J68

Keywords: vocational training, programme evaluation, duration analysis, treatment effect

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1. Introduction

Unemployment is a serious problem for Eastern Germany. Its burden for the economy consists not only in a reduced output and consequently a decreased welfare, but also a decay of human capital. Therefore, an efficient labour market policy has to aim at a continuous adjustment of labour supply to the requirements of labour demand and a prevention of human capital exhaustion by the provision of jobs or programmes that improve the individual qualification. The most important aim of active labour market policy (ALMP) is to increase the re-employment chances of unemployed persons. In general, they consist of public employment services, labour market training and subsidized employment. However, although ALMP have become more important over the last two decades (see for example the EU Employment Guidelines or OECD Jobs Strategy), there is no clear evidence for a general effectiveness in the literature.[1] While ALMP were seen as a panacea for the labour market in the early 1990s (as the political emphasis reflects), recent studies disagree. The experiences of Calmfors, Forslund, and Hemström (2002) for Sweden show rather discouraging results from the efforts of the implementation of ALMP on a large scale. From their overview of several OECD countries, Martin and Grubb (2001) deduce several reasons. One reason might be the rareness of evaluation studies and the fact that they are mostly rather rigorous evaluations in the sense of only monitoring the outcomes of participants. In addition, there is only very little evidence on long-run effects. Since studies are often evaluations of demonstration or pilot programmes, it is unclear how the effects may behave if programmes are extended to a larger scale. Furthermore, the utility of programmes is interpreted in terms of impacts on future earnings and/or re-employment prospects in most studies, and therefore they include no guidance for evidence on potential social benefits. To overcome these possible uncertainties, regular evaluation of the effectiveness and efficiency of ALMP is one postulation in the EU Employment Guidelines and is also anchored in the Social Code III, the legal basis for ALMP in Germany. Anyhow, additional to that ALMP may also be used to reduce unemployment, the definition of a adequate evaluation question might be difficult.

The most important instrument of ALMP in terms of fiscal volume and the number of promoted individuals in Eastern Germany are vocational training programmes (Fortbildungs- und Weiterbildungsmaßnahmen, FbW). In 2000 there were 213,654 entries into the programmes and the fiscal costs amounted to 2,748.1 million Euro (Bundesanstalt für Arbeit, 2001). They aim at the increase of the individual employment probability by qualification transfer. Regarding the tense situation of the Eastern German labour market, programmes are used on a large scale to enhance the economic reorganisation by supply of qualified employees on the one hand, but also to cushion the ongoing employment reduction on the other hand. Furthermore, the use of vocational training programmes on a large scale may also impose spillovers and general equilibrium effects. If a large number of unemployed individuals are assigned to these programmes,

[1] See Hagen and Steiner (2000), Calmfors, Forslund, and Hemström (2002) and Martin and Grubb (2001) for an overview.

the quantity of laborers with certain skills rises and is thereby likely to lessen its price relative to a situation in which only a modest fraction of the unemployed receive such training (Lechner and Smith, 2003). This might be also a reason for the bad picture in the literature.

In this paper we analyse the effects of vocational training programmes on the individual transition from unemployment to employment in Eastern Germany. If the purpose of ALMP is achieved by these programmes, there must be a positive effect on the average unemployment duration due to an increased employment probability. Our analysis is based on an inflow-sample into unemployment in the last quarter of 1999 and the observations are followed until December, 2002.

Although there are several studies[2] for Eastern Germany that analyse the impact of vocational training programmes, this is the first study that applies a multivariate mixed proportional hazard rate model in the timing-of-events methodology where the duration until regular employment and training participation are simultaneously modelled. The primary advantage of this methodological setup is the consideration of the influence of potential unobservable factors. As there might be participating individuals that have an a-priori high probability of leaving unemployment without training anyway, ignoring the resulting selectivity in the sample might lead to biased results. Furthermore, it allows to examine the way how individual training effects change over time. Recently, the approach has been applied in a set of studies for other countries, like Lalive, van Ours, and Zweimüller (2002) for Switzerland, Richardson and van den Berg (2002) for Sweden, Bonnal, Fougere, and Serandon (1997) for France, and van Ours (2000) for Slovakia. A comprehensive survey on the methodology can be found in van den Berg (2001).

As noted above, vocational training programmes aim at the qualification and re-qualification of unemployed persons. Due to that, completion of the programmes is more probable than it is for other instruments of ALMP. Therefore, it has to be assumed that during programme participation the exit probability from the programme and also from unemployment is lowered. This effect is called locking-in effect.[3] In our empirical application we regard for this special instance of vocational training programmes by estimating the in- and after-programme effect separately for different programme durations and compare them to the estimates of a model without this distinction.

The remainder of this paper is organised as follows: Section two gives some stylised facts of vocational training programmes in Eastern Germany. The third section presents the econometric methodology. In section four we describe the available data and show some descriptive results. The results of our empirical application are given in section five. The final section concludes the paper.

[2] Hagen and Steiner (2000) give a survey on these studies including the applied methods and results.
[3] See van Ours (2002) for a further discussion

2. Stylised Facts on Vocational Training Programmes

The main purpose of ALMP is the permanent integration of unemployed and in particular disadvantaged unemployed into regular employment, i.e. they should improve the matching on the labour market. Following Calmfors (1994), the main functions are: First, adjusting the individual qualification to the demand of vacant occupations. Second, maintaining or increasing the search efforts of the unemployed. Third, participation as a substitute for regular employment in the awareness of the demand side, i.e. a positive signal for the willingness to work and productivity of the participant.

Vocational training programmes are primarily orientated according to the first objective, but might also achieve the others. They aim to adjust the individual qualification to modified requirements on the labour market in order to improve the employment probabilities. Alternatively, they offer a qualification to individuals without a completed professional training. The legal basis of vocational training programmes in Germany is §§77–96, 153–159, and 417 Social Code III (SGB III). Unlike the former regulations in the Work Support Act (replaced by SGB III in 1998), there is no distinction between further training and retraining measures. Financial support is usually provided as a maintenance allowance and for the coverage of the direct costs like course costs, learning material, travel costs, or costs for child care etc. Financial support can be obtained by employed and unemployed workers, if the programmes are necessary in order to bring the unemployed back to work or to avoid unemployment of someone directly threatened by it, or to offer a qualification to someone without a completed professional training. The eligibility rules for participation contain former episodes of employment, an individual counselling and the approval of the scheme by the local labour office. Vocational training programmes for individuals without completed professional training can also be offered to individuals with completed professional training but with no work experience in their profession for more than six years. The 'former duration of employment' rule is accomplished if the individual has contributed at least for twelve months of the last three years to the unemployment insurance and fulfils the eligibility rules for unemployment benefits. Several exceptions reduce the strictness of this rule. Full maintenance allowance is granted for individuals in full-time vocational training programmes. Individuals who participate in part-time programmes can achieve partial maintenance allowance. The duration of vocational training programmes that contain a professional training should be up to two-thirds of the regular duration. Other programmes are in general restricted to twelve months of promotion. Vocational training programmes must conclude with a certification that attests the job proficiency of the participant. The local labour offices are obligated to do quality checks of the courses.

Theoretically, vocational training programmes should positively affect the individual's qualification, productivity and thus the individuals set of attainable jobs. They should decelerate or even reverse the decay of human capital during times of unemployment. Furthermore, they might improve job search skills through preparation of job applications and interviews. Since long-term

unemployment may be regarded as a negative signal towards potential employers, interruption of long-term unemployment episodes might help to prevent individuals from permanent 'scars' (Wellner, 2000). On the other hand, participation is joined with individual costs, like hardship of studying, course fees, travel costs, loss of income or leisure. As seen above, the labour office provides financial incentives or compensation for these costs.

There are a number of evaluation studies of vocational training programmes in Eastern Germany. Hagen and Steiner (2000) provide a comprehensive overview. Unfortunately, the results allow no clear tendencies for the effects of the programmes. The majority of studies find insignificant or tightly negative results. Since vocational training programmes transfer qualification, participants normally do not leave these schemes before the regular end. Due to this, we have to assume that the search intensity during programmes is reduced to a minimum. From their overview and the results of an aggregated impact analysis, Hagen and Steiner (2000) conclude that the extensive use of vocational training programmes in Eastern Germany raises the unemployment. The programmes might also suffer from the systematic locking-in effects. Thus, they recommend shorter programme durations. This recommendation agrees with the conclusions from international experiences. From their OECD countries experiences review, Martin and Grubb (2001) note four crucial features for effective training programmes: First, there should be a tight targeting on participants, i.e. only people in need and with an expected gain from participation should be treated. Second, programmes should be executed on a relatively small scale. Third, since programmes include a further training or retraining of educated people, they should result in a qualification that is recognised by the market. Fourth, if the treatment contains a strong on-the-job component, links to local employers could be established. In addition, Calmfors, Forslund, and Hemström (2002) note that a rapid expansion of a programme in the presence a very low labour demand, is likely to distort the programme incentives, if the infrastructure of the programme is not appropriate. In their study for Sweden Richardson and van den Berg (2001) suggest that the negative locking-in effect more or less offsets a positive treatment effect once the programme has been completed.

3. Econometric Methodology

The evaluation of the impact of vocational training on the inflow into regular employment is done with a bivariate duration model. Normalising the point in time when an individual enters unemployment to zero, we measure the duration until the individual enters a regular employment T_e and the duration until the individual enters a vocational training programme T_p. T_e and T_p are assumed to be non-negative and continuous random variables, where their realisations are denoted with t_e and t_p.

Basic assumption for the empirical analysis of vocational training is that the distribution of T_e is affected by a treatment if this treatment occurs before t_e. Following Abbring and van den

Berg (2000), this assumption implies that the realisation t_p affects the distribution of T_e in a deterministic way from t_p onwards. The treatment effect is then the causal effect of T_p on the distribution of $T_e|t_p$ for $t > t_p$ (Abbring and van den Berg, 2000).

The durations T_e and T_p are assumed to vary with observable characteristics x and unobservable characteristics v_e and v_p. Following Abbring and van den Berg (2000), we assume that $T_p \perp v_e | x, t_p, v_p$ and $T_e \perp v_p | x, v_e$, which allows us to write the conditional distributions as $T_e|t_p, x, v_e$ and $T_p|x, v_p$ respectively. Although not necessarily the x are assumed to be the same for both distributions, i.e. no exclusion restrictions on x are imposed.

In order to specify the model for the joint distributions $T_e, T_p|x, v_e, v_p$ we focus on the conditional hazard rates $\theta_e(T_e|t_p, x, v_e)$ and $\theta_p(T_p|x, v_p)$. The hazard rate is defined as the probability of exit from a state in a short interval of length dt after t, conditional on the state still being occupied at t, i.e. $\lim_{dt\to 0} \frac{Pr(t<T\leq t+dt, T>t)}{dt}$. The hazard rate specifies fully the distribution of the durations, where the survivor function is defined as $1 - F(t) = \exp(-\int_0^t \theta(s)ds)$ and the probability density function as $f(t) = \theta(t)(1 - F(t))$ (see Lancaster (1990) or Kalbfleisch and Prentice (2000)).

For the specification of the hazard rates we use a mixed proportional hazard model. Basic feature of this model is that the duration dependence, observable and unobservable covariates enter the hazard rate multiplicatively.

$$\theta_e(t|t_p, x, v_e) = \lambda_e(t) \exp[x'\beta_e + \mu(t - t_p)I(t > t_p) + v_e] \tag{1}$$

$$\theta_p(t|x, v_p) = \lambda_p(t) \exp[x'\beta_p + v_p] \tag{2}$$

The hazard rate for the transition into regular employment at time t consists of the baseline hazard $\lambda_e(t)$ that determines the duration dependence, the systematic part $\exp(x'\beta_e)$ that determines the individual level of the hazard rate conditional on the observable characteristics and the unobserved heterogeneity term $\exp(v_e)$ that determines the level of the hazard conditional on the unobserved characteristics. The treatment effect $\exp[\mu(t - t_p)I(t > t_p)]$ with $I(t > t_p)$ as an indicator function taking the value 1 if $t > t_p$, is specified as a function of the difference $t - t_p$. In general we allow the treatment effect to vary over the time after the treatment has started.[4] This is useful if we think about a time-varying effect of a treatment, for example due to a locking-in effect. The treatment effect can be interpreted as a shift of the hazard rate by $\exp(\mu(t - t_p))$, that is directly associated with the expected remaining unemployment duration, i.e. a positive treatment effect will shorten the expected remaining unemployment duration. The transition rate from unemployment into programme participation is analogously specified as a

[4] In the notation of Abbring and van den Berg (2000) the treatment effect is also allowed to vary with the moment of treatment and the individual characteristics x.

mixed proportional hazard model with the baseline hazard $\lambda_p(t)$, the systematic part $\exp(x'\beta_p)$ and the unobserved heterogeneity term $\exp(v_p)$.

As stated by Abbring and van den Berg (2000) for the identification of the treatment effect, the selectivity of the programme participation must be considered. Selectivity is present if individuals with a relatively high transition rate into employment also have a relatively high transition into programme participation. If we observe such a pattern this can result from two sources. First, a positive treatment effect rises for the group of participants the transition rate into regular employment. Second, individuals with treatment have a relatively high v_e and therefore have a higher transition rate anyway. In the second case we obviously would observe a positive correlation between v_e and v_p and therefore a dependence between the indicator function $I(t > t_p)$ and the unobserved heterogeneity term v_e. Hence, if the possible dependence between v_e and v_p is ignored the estimate of the treatment effect may be inconsistent (Abbring and van den Berg, 2000). In order to account for the possible dependence in the unobserved heterogeneity terms, we allow v_e and v_p to follow an arbitrary joint distribution function $G(v_e, v_p)$. Abbring and van den Berg (2000) show that with assumptions similar to those made in standard univariate mixed proportional hazard models, the bivariate model in (1) and (2) and especially the treatment effect is identified. The identification is nonparametric, since it does not require any parametric assumptions with respect to the baseline hazard and the unobserved heterogeneity distribution (Abbring, van den Berg, and van Ours, 2000). Furthermore the identification does not require exclusion restrictions on x which are often hardly to justify from a theoretical point of view.

The specified model for the transition rates θ_e and θ_p rules out any anticipatory effects of vocational training programmes. An anticipatory effect is given if the realisation t_p has an effect on θ_e before t_p. This may be the case if the individual anticipates a future training and may want to wait for the treatment by reducing his search activity (Richardson and van den Berg, 2002). If anticipatory effects of training programmes exists, our analysis would lead to inconsistent results. However, the main eligibility criteria for vocational training in Germany require that potential participants have small employment chances before treatment. Since caseworkers have to place unemployed workers as early as possible into programmes, are obliged to check potential alternative regular employment offers, and the duration between informing the participant about participation and the actual starting date of the programme is short, it is unlikely that individuals voluntarily reduce their employment opportunities for a long period only to obtain treatment.

A second type of ruled out anticipatory effects result, if the individuals anticipate future realisations of T_e and use this information to modify their optimal strategy, which in turn affects the current transition rate into programme participation θ_p (Richardson and van den Berg, 2002). This is the case if an individual has private information about a future job opportunity and therefore wants to avoid a training. Besides the ruled out anticipatory effects, Abbring and van den Berg (2000) note that there may be ex-ante effects that are not ruled out by the model

specification. If the individuals know the determinants of the distribution of T_p they may adjust their optimal behaviour in order to become more eligible for a treatment. Although such effects are not estimated by the model they does not lead to inconsistent estimates of the treatment effect. That is individuals are allowed to know the determinants of T_p but not the realisations of T_p.

The duration dependence is for both hazard rates specified as piecewise constant

$$\lambda_j = \exp\left[\sum_{k=1}^{4} \lambda_{j,k} \cdot I_k(t)\right] \tag{3}$$

where k is a subscript for the time interval and $I_k(t)$ is an indicator function that takes the value 1 if t lies in the interval k. The interval used for the analysis are 0-3 months, 3-9 months, 9-18 months and more than 18 months. As we include a constant term in the systematic parts of both hazard rates we normalise $\lambda_{e,1}$ and $\lambda_{p,1}$ to zero.

The probability density functions for T_e and T_p are given by:

$$f_e(t|t_p, x, v_e) = \theta_e(t|t_p, x, v_e) \cdot \exp[-\int_0^{t_e} \theta_e(s|t_p, x, v_e)ds] \tag{4}$$

$$f_p(t|x, v_p) = \theta_p(t|x, v_p) \cdot \exp[-\int_0^{t_p} \theta_p(s|x, v_p)ds] \tag{5}$$

In order to build the likelihood function for the estimation of the model we have to account for censored observations. Thereby we allow only for right censoring, i.e. we only observe that the spell has not been finished until t. Define the censoring indicators δ_e and δ_p, with $\delta_e = 1$ ($\delta_p = 1$) if t_e (t_p) is right censored, the individual likelihood-contributions are given by:

$$\ell_e(t|t_p, x, v_e) = f_e(t|t_p, x, v_e)^{\delta_e} \exp[-\int_0^{t_e} \theta_e(s|t_p, x, v_e)ds]^{1-\delta_e} \tag{6}$$

$$\ell_p(t|x, v_p) = f_p(t|x, v_p)^{\delta_p} \exp[-\int_0^{t_p} \theta_p(s|x, v_p)ds]^{1-\delta_p} \tag{7}$$

With the assumption that $t_e|x, t_p, v_e$ is independent from $t_p|x, v_p$ we can write (see van den Berg (2001)):[5]

$$\ell_{e,p}(t|x) = \int_e \int_p \ell_e(t|t_p, x, u) \cdot \ell_p(t|x, p)dG(e, p) \tag{8}$$

[5] Since if $f_{e,p}(t|x) = \int_e \int_p f_e(t|t_p, x, e) f_p(t|x, p)dG(e, v)$ then
$F_{e,p}(t|x) = \int_e \int_p F_e(t|t_p, x, e) F_p(t|x, p)dG(e, v)$ and the censoring indicator takes either unity or zero.

Following Heckman and Singer (1984), the arbitrary distribution function $G(v_e, v_p)$ can be approximated by a discrete distribution with a finite number of support points. For the empirical analysis we assume that $G(v_e, v_p)$ has two points of support for each argument v_e and v_p with the associated probabilities $\pi_1 = P(v_{e,1}, v_{p,1})$, $\pi_2 = P(v_{e,2}, v_{p,1})$, $\pi_3 = P(v_{e,1}, v_{p,2})$ and $\pi_4 = P(v_{e,2}, v_{p,2})$.

The individual likelihood contribution can then be written as:

$$l_{e,p}(t|x) = \pi_1 \cdot \ell_e(t|t_p, x, v_{e,1})\ell_p(t|x, v_{p,1}) + \pi_2 \cdot \ell_e(t|t_p, x, v_{e,1})\ell_p(t|x, v_{p,2}) \tag{9}$$

$$+\pi_3 \cdot \ell_e(t|t_p, x, v_{e,2})\ell_p(t|x, v_{p,1}) + \pi_4 \cdot \ell_e(t|t_p, x, v_{e,2})\ell_p(t|x, v_{p,2}) \tag{10}$$

The estimates are done with the method of maximum likelihood, where the probabilities of the mixing distribution are specified as logistic probabilities,

$$\pi_1 = \frac{1}{1 + \exp(q_1) + \exp(q_2) + \exp(q_3)} \quad \pi_2 = \frac{\exp(q_1)}{1 + \exp(q_1) + \exp(q_2) + \exp(q_3)} \tag{11}$$

$$\pi_3 = \frac{\exp(q_2)}{1 + \exp(q_1) + \exp(q_2) + \exp(q_3)} \quad \pi_2 = \frac{\exp(q_3)}{1 + \exp(q_1) + \exp(q_2) + \exp(q_3)}, \tag{12}$$

where q_1, q_2 and q_3 are free parameters to be estimated.[6] The mass points for $v_{e,1}$ and $v_{p,1}$ are normalised to zero since a constant term is included in both hazard rates.

4. Data and Descriptive Results

4.1. Data

Our empirical analysis is based on an inflow-sample of unemployment entrants in Eastern Germany. The information is merged from several administrative sources of the Federal Employment Office (FEO). These sources are the job seekers' data base and an adjusted version for statistical purposes that record the characteristics of all registered job seekers in Germany and is updated monthly with information from the labour offices. The data contains information on socio-demographic characteristics, qualification and placement restraints as well as a short labour market history. In addition to that, we use data from the programme participants' master data set (MTG) to identify episodes of vocational training programmes. Our outcome of interest, the transition to regular employment, is derived from an excerpt of the employment data base

[6] Alternatively the model could be estimated by a EM-Algorithm as suggested by Heckman and Singer (1984) although the convergence speed is extremely slow.

which is the base for the individual pension claims and contains information on all episodes of dependent employment.

Our sample consists of 30,539 individuals, who entered unemployment in the last quarter of 1999. These individuals are followed until December 2002. To avoid possible influences from former ALMP programmes, we excluded 3,597 individuals who were participating in ALMP before their current unemployment spell. Furthermore, 4,928 individuals participating in other ALMP programmes during the observation period are excluded, since the number of individuals in these programmes is too small for a reliable analysis. For homogeneity reasons we restricted the sample to native Germans (352 dropped), without any health restrictions (3,013), and aged between 20 to 50 (5,005). The remaining data contains information on 13,644 individuals.

For these individuals the labour market history in the observation period consists of four possible states: unemployment, employment, out of labour force and participation in a vocational training programme. Since our focus is on the effects of vocational training programmes on the duration of unemployment, the unemployment ends if an individual finds a regular job or leaves the labour force, i.e. for participating individuals the time of treatment is not excluded. Thereby, we consider only those transitions to regular employment as a success, where the following employment spell lasts for at least six months, which is the usual probation period of an occupation in Germany. This is reasonable because we are interested in the transition rate into a regular and lasting employment. With this restriction, uncensored transitions into employment can only be observed until June 2002.

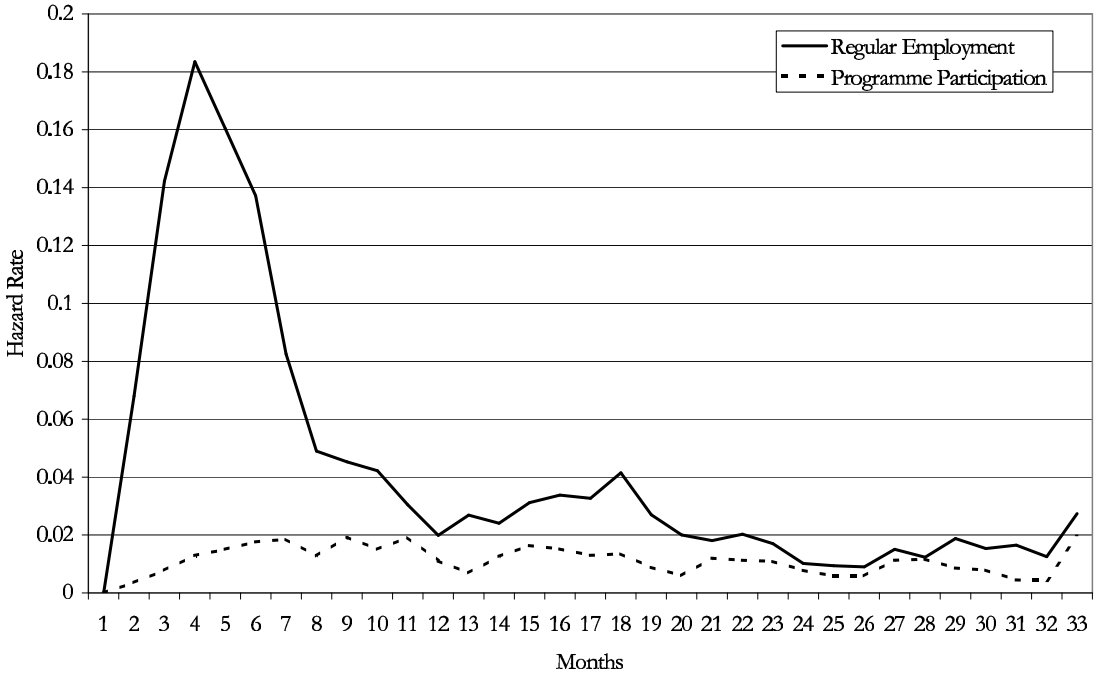
The transition to programmes is measured in terms of the duration until the first participation, independent of the following treatment duration. Therefore, repeated participation (multiple treatment) is not considered. The duration of unemployment t_e is right-censored, if the individual leaves the labour force within the observation period. If the unemployment spell is continuing at the end of the observation window, the duration of unemployment is also right-censored. Analogously, the unemployment duration until treatment T_p is right-censored if there is no transition to a vocational training programme within the observation period, or if the spell of unemployment ends before the programme starts, $t_e < t_p$. As noted above, for censored observations we can only observe that the spell has not been finished until the censoring point. In the data 27.77 percent of the individuals have censored unemployment spells until employment (t_e) and 88.96 percent of the individuals have censored unemployment spells until treatment (T_p), i.e. we observe 1,506 individuals participating in a vocational training programme.

4.2. Descriptive Results

Non-parametric estimates of the transition rates into regular employment and programme participation are given in figure 1. The transition rate into regular employment rises at the beginning of the unemployment spell up to 18 percent and falls gradually back to 2 percent afterwards.

The hazard rate for the transition into programmes oscillates relatively constant between zero and 2 percent for the observation period.

Fig. 1: Non-Parametric Estimates of the Transition Rates to Programme and Employment



As noted above, eligibility for participation refers with exceptions to former employment and completed professional training. Due to that, these characteristics might influence the propensity to participate. Furthermore, since the duration of unemployment depends on the individual placement restraints, we employ a set of relevant observable characteristics. These characteristics include dummies for females (FEMALE), whether or not the individual is married (MARRIED), the former profession in terms of the occupational group (OG1-OG5), the educational degree (PT1-PT5), and present work experience of the individual (TENURE). Further variables regarded for the empirical application are the number of children (NOKIDS), the individual's age in January 2000 (AGE), the duration of the last employment spell (DUR_EMP), and the number of placement propositions by the local labour office (PLACPROP).

The six occupational groups are jobs in *agriculture, plant cultivation and fishery industry* (OG1), *miners and mining industry* (OG2), *manufacturing professions* (OG3), *technical occupations* (OG4), and *services* (OG5). The reference category for these variables is *other professions*. Since a higher educational degree implies a higher value of the worker's human capital, we consider six types of different educational groups. The reference category are individuals without any professional training and without General Certificate of Secondary Education (CSE). The

second class are individuals that also miss a completed professional training, but hold a CSE (PT1). Individuals with industrial training are outlined as PT2. People who exhibit a full-time vocational school degree are included in PT3. Category PT4 contains workers with polytechnic degree. The highest human capital value conditional on the educational degree is assumed for the last category. It contains all individuals with college or university certificates.

Tab. 1: Descriptive Results of Selected Characteristics

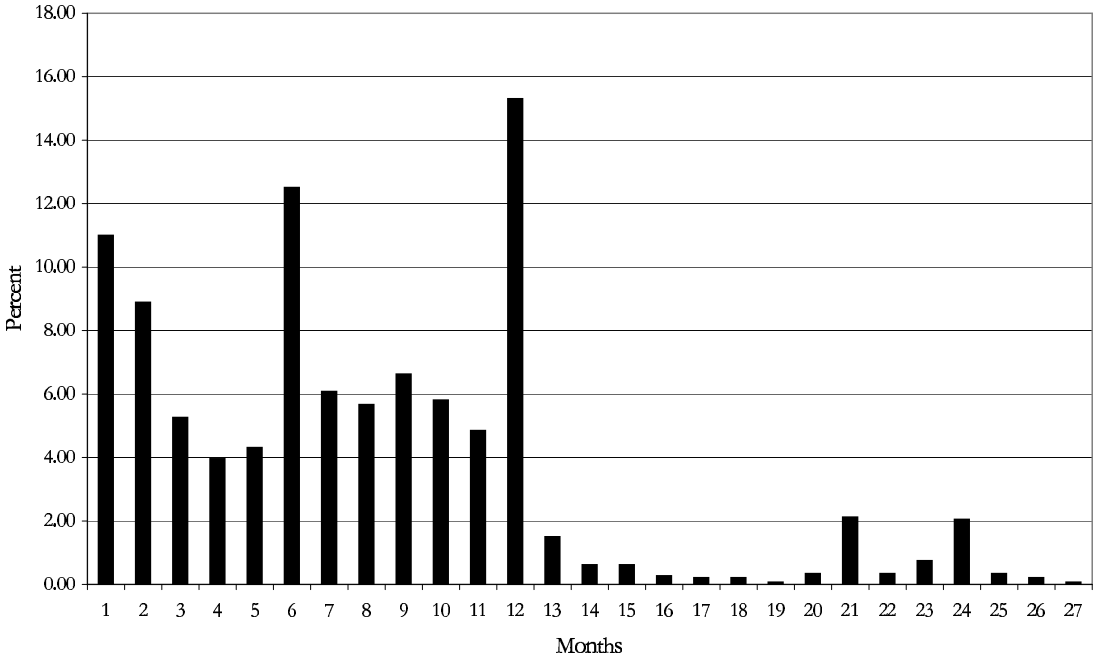
	Total	Participants	Non-Participants
Observations	13,644	1,506	12,138
Frequencies (in %)			
Women (FEMALE)	30.94	40.24	29.79
Married (MARRIED)	46.50	44.49	46.75
With work experience (TENURE)	91.54	89.24	91.83
Occupational Group			
Agriculture and fishery industry (OG1)	9.18	3.98	9.82
Mining industry (OG2)	0.07	0.13	0.06
Manufacturing industry (OG3)	55.50	52.72	55.84
Technical occupations (OG4)	2.31	3.59	2.15
Service professions (OG5)	32.56	39.38	31.71
Other professions	0.40	0.20	0.42
Educational Degree			
No CSE, no professional education	14.32	17.46	13.93
CSE, no professional education (PG1)	80.80	76.10	81.38
Industrial training (PG2)	0.59	1.13	0.53
Full-time vocational school degree (PG3)	2.10	3.39	1.94
Polytechnic degree (PG4)	0.34	0.46	0.33
College and university graduates (PG5)	1.84	1.46	1.89
Means			
Age (AGE)	34.44	34.07	34.48
No. of children (NOKIDS)	0.67	0.74	0.66
Duration of last employment (months) (DUR_EMP)	23.22	28.62	22.55
No. of placement propositions (PLACPROP)	2.27	2.80	2.21

Table 1 shows some descriptive results for these characteristics for the total sample and the treatment and non-treatment group separately. While the majority of variables denotes no clear differences between participants and non-participants, some particularities should be recognised. First, the proportion of women in the participating group is about ten percent higher than in the group of non-participants. This might reflect a possible gender discrimination in the employment probabilities due to lower employment probabilities for women and consequently a higher degree of necessary promotion by vocational training programmes. Second, comparing the duration of the last employment spell before unemployment shows a longer mean duration for the participating group. A possible reason could be the eligibility criteria for participation that rely on an existent professional degree and contributions to the unemployment insurance. Third,

even though the shares of individuals from the mining industry and technical occupations are small in the population, the proportions in the treatment group are twice respectively one and a half as much as in the non-treatment group. This is not surprising since vocational training programmes should assist the structural reorganisation of the labour market. Unfortunately, from the review of the observable characteristics, expecting per se differences in the labour market outcomes for participants and non-participants besides the fact of participation is not possible. But on the other hand it reflects the need for consideration of further unobservable influences.

Regarding the already mentioned locking-in effects of vocational training programmes, the distribution of the durations of the programmes requires special interest. As noted above, courses in general last for twelve months or in cases of programmes with professional training degree up to two thirds of the regular duration. Figure 2 depicts this distribution. Obviously, the majority of courses in our sample last no longer than twelve months. Furthermore, we can identify three peaks in the period up to this point. A share of 11 percent lasts no longer than one month, programmes with a duration of six months amount to 13 percent of the sample and the modus is at twelve months with a proportion of 15 percent.

Fig. 2: Distribution of Programme Durations



5. Empirical Analysis

The empirical analysis is separated into two steps. First, we estimate the effect of vocational training on the transition rate into regular employment with a basic model where the treatment effect is specified as a permanent shift of the hazard rate. The analysis of the basic model enables us to investigate the general effect of vocational training as well as the issue of selectivity with respect to programme participation. Second, we estimate an extended model that allows for a time varying treatment effect, in order to analyse the in-programme and after-programme effects separately.

For the basic model the treatment effect is assumed to be of the from $\exp[\mu I(t > t_p)]$. In this case the hazard rate shifts permanently by $\exp(\mu)$ if the individual starts treatment. In order to assess the problem of selectivity with respect to the programme participation, we compare both, the estimation results of the model with unobserved heterogeneity and of the model without unobserved heterogeneity. For the estimation of the model without unobserved heterogeneity v_e and v_p are restricted to zero, i.e. only one point of support for mixing distribution is imposed.

Table 2 presents the estimation results for the basic model without unobserved heterogeneity and the basic model allowing for unobserved heterogeneity. Considering the coefficients of the observable characteristics on the transition rate into regular employment we find a significant higher exit rate for married persons and individuals with work experience and a significant lower exit rate for females. The hazard rate declines with the age, the number of children, the duration of the last employment spell and the number of placement propositions.

Turning to the coefficients for the occupational groups, we find remarkably larger coefficients for the model accounting for unobserved heterogeneity. For both models we find the highest exit rate for the individuals out of the agriculture and fishing industry. With respect to the educational degree we find the largest exit rate for individuals with a polytechnical degree followed by the college and university graduates.

For the transition rate into programme participation we find a higher transition rate for married persons and individuals with work experience. Furthermore the transition rate into programme participation declines with the age and rises with the number of children, the duration of the last employment spell and the number of placement propositions. With respect to the occupational groups we find the largest transition rate for the unemployed from the mining industry. This may primarily result from the fact that vocational training in Eastern Germany is extensively used to retrain workers from the mining industry. Regarding the coefficients for the educational degree we find the largest transition rate for individuals with a full time vocational degree, followed by individuals with a industrial training. The results show that vocational training is primarily assigned to individuals with a usual vocational degree and not to highly or lowly educated individuals.

The treatment effect estimated from the model without unobserved heterogeneity is with $\mu =$

-0.93 negative and significant. Since $\exp(-\mu) = 0.3945$, the transition rate is permanently reduced by 60 percent at the point in time the individual enters treatment. Allowing for unobserved heterogeneity the negative effect becomes much stronger with $\exp(-\mu) = 0.1746$. Hence accounting for unobserved heterogeneity the hazard shifts by more than 80 percent. The clear difference between both treatment effects indicates that selectivity is relevant.

Considering the distribution of the unobserved heterogeneity term we find only for 6.2 percent of the individuals a low transition rate into employment and a high transition rate into programme participation ($v_{e1} = -8,009, v_{p1} = -7,924$). Therefore, individuals with low labour market opportunities seem to be less eligible for programme participation. 36 percent have for both transition rates simultaneously a low heterogeneity term ($v_{e1} = -8,009, v_{p2} = -10.891$). A positive selection can be found for 19 percent of the individuals, where people with good labour market opportunities are more often selected to participate in vocational training programmes ($v_{e1} = -5.386, v_{p1} = -7,924$). Finally 38 percent have good labour market opportunities but have a low transition rate into programme participation ($v_{e1} = -5.386, v_{p1} = -10.891$). The programme selectivity is stated more explicitly by the fact that nearly 75 percent of the individuals with a high transition rate into programme participation have also a high transition rate into regular employment.

The so far estimated treatment effect is a constant shift of the hazard rate from the beginning of the training programme. But if we think of a locking-in effect such a specification is not useful. The locking-in effect results from a reduced search activity during the period the individual is participating in the programme. Therefore it is reasonable that we distinguish between an in-programme effect and an after-programme effect. For the following we assume that for the period the individual is placed into the programme the hazard rate shifts by $\exp(\mu_1)$. At the point in time the individual leaves the programme and becomes unemployed again we assume the hazard rate is shifted by $\exp(\mu_2)$. With this assumption the treatment effect is given by $\exp[\mu_1 I(t_p < t \leq t_p + c) + \mu_2 I(t < t_p + c)$ where c denotes the programme duration.

If the programme duration is determined by the individual labour market performance, the identification of the in-programme and the after-programme effect would again suffer from a selectivity problem with respect to the programme duration. In order to avoid this selectivity we restrict the analysis to those programmes, where the programme duration is equal to a predetermined length, e.g. 6 months. That is, we exclude all individuals from the data that are participating in other programmes and specify c as a constant equal to the predetermined programme duration. In this case c is a constant and therefore the identification of μ_1 and μ_2 depends only on the variation of t_p.

Our analysis will cover short term programmes (1 to 3 months), medium term programmes (6 months) and long term programmes (12 months). Due to the small number of participants, it was necessary to include different programme length's for the analysis of the short term programmes. Therefore we cannot identify the in-programme and the after-programme effect

Tab. 2: Estimation Results for the Basic Model

Transition Rate into Regular Employment

	One Point of Support		Two Points of Support	
Variables	Param.	t-Value	Param.	t-Value
$\lambda_{u,2}$	1.993	55.81	2.565	69.19
$\lambda_{u,3}$	0.664	15.35	2.310	38.71
$\lambda_{u,4}$	0.239	4.95	2.278	30.01
μ	-0.936	-17.64	-1.745	-17.41
v_u			2.623	48.36
CONST	-5.114	-21.99	-8.009	-28.03
FEMALE	-0.586	-21.12	-0.757	-19.90
MARRIED	0.376	14.56	0.431	11.90
AGE	-0.010	-6.66	-0.010	-4.97
NOKIDS	-0.037	-3.05	-0.075	-4.41
DUR_EMP	-0.001	-4.64	-0.001	-3.97
PLACPROP	-0.030	-10.38	-0.044	-11.34
OG1	1.495	6.61	2.068	7.75
OG2	0.737	1.58	1.625	2.78
OG3	0.887	3.95	1.301	4.93
OG4	0.789	3.34	1.442	5.15
OG5	0.867	3.86	1.272	4.81
PT1	0.524	16.22	0.701	16.03
PT2	0.420	3.00	0.427	1.93
PT3	0.502	6.08	0.677	6.35
PT4	0.701	3.96	0.858	3.75
PT5	0.440	5.23	0.796	6.97
TENURE	0.333	8.13	0.563	9.69

Transition Rate into Programme Participation

	One Point of Support		Two Points of Support	
Variables	Param.	t-Value	Param.	t-Value
$\lambda_{p,2}$	2.484	16.59	2.777	18.12
$\lambda_{p,3}$	2.519	16.66	3.643	20.82
$\lambda_{p,4}$	2.085	13.40	4.120	17.29
v_p			-3.600	-20.18
CONST	-7.924	-13.03	-7.291	-9.79
FEMALE	-0.006	-0.09	-0.094	-0.91
MARRIED	0.132	2.06	0.188	1.97
AGE	-0.014	-3.75	-0.023	-4.17
NOKIDS	0.072	2.62	0.075	1.66
DUR_EMP	0.003	4.79	0.004	4.35
PLACPROP	0.014	2.48	0.016	1.85
OG1	0.903	1.52	1.596	2.20
OG2	2.178	2.38	3.996	3.82
OG3	1.371	2.37	2.226	3.16
OG4	1.656	2.78	2.756	3.73
OG5	1.376	2.37	2.298	3.26
PT1	0.117	1.69	0.101	1.01
PT2	0.541	2.15	0.682	1.88
PT3	0.531	3.30	0.758	3.25
PT4	0.585	1.49	0.543	0.92
PT5	-0.179	-0.79	-0.258	-0.80
TENURE	0.011	0.12	0.084	0.66
q_1			1.765	14.40
q_2			1.142	6.45
q_3			1.832	13.43
π_1			0.062	
π_2			0.360	
π_3			0.193	
π_4			0.385	
Log-Likelihood:	-41455.476		-40628.619	

Tab. 3: No. of Observations for the Different Programme Durations

	1-3 Months	6-Months	12 Months
Observations	12,022	11,848	11,901
Participants	249	133	197
Censored Spells	2,769	2,696	2,745

for these programmes directly. However, setting $c = 3$ we can distinguish the effect for the first three months after the programme has started and the effect for the period 3 months after the programme has started. For the analysis of the medium term programmes we set $c = 6$ and can therefore distinguish directly between the in-programme effect $\exp(\mu_1)$ and the after-programme effect $\exp(\mu_2)$. Analogously we analyse the long term programmes with $c = 12$. The number of observations, participants and censored spells for the restricted data is given in table 3.

The estimation results for the short-term, medium term and long-term programmes are presented in table 4. Comparing the estimates of the extended model and the basic model we find especially for the transition rate into programme participation larger coefficients and larger standard errors. These differences primarily result from the relatively small number of participants in extended models. With respect to the transition rate into employment these differences are only marginal. More interesting are the differences in the treatment effect between the different programme durations and the basic model.

For the short-term programmes we find for both, μ_1 and μ_2, an insignificant effect. Thus, short-term programmes do not have an negative impact on the hazard rate in the first 3 months. This can be seen as an evidence that short-term programmes do not suffer from a locking-in effect. As the programmes are even ineffective for the period where all programmes have expired, short-term vocational training seems not to be able to affect the unemployment duration.

For the medium term programmes we do find a negative significant in-programme effect and an insignificant after-programme effect. Therefore, vocational training programmes with a duration of 6 months have a strong locking-in effect. Unfortunately they are not able to compensate this negative effect, because after the completion of the programme the participants have the same transition rate as non-participants.

Finally long-term programmes have negative significant in- and after-programme effects. Hence, long-term vocational training programmes rise the duration of unemployment for the participants. Furthermore it should be noted that the negative locking-in effect is stronger than the negative after-programme effect.

Summarising the results of this section we find that vocational training generally rises the unemployment duration of the participants, i.e. has a negative effect on the individual level. This is especially stated by the negative estimate of the basic model. The further analysis of the extend model shows that a locking-in effect of vocational training is a serious problem especially

Tab. 4: Estimation Results for the Extended Model

Transition Rate into Regular Employment

Programme Length	1-3 Months		6 Months		12 Months	
Variables	Param.	t-Val.	Param.	t-Val.	Param.	t-Val.
$\lambda_{u,2}$	2.636	63.92	2.632	68.84	2.613	65.16
$\lambda_{u,3}$	2.208	32.92	2.249	35.93	2.267	32.17
$\lambda_{u,4}$	1.916	21.87	1.982	25.31	2.066	22.22
μ_1	0.106	0.41	-1.404	-4.18	-2.784	-11.04
μ_2	-0.205	-1.10	-0.240	-0.71	-1.385	-5.21
v_u	2.368	38.97	2.410	46.39	2.459	35.74
CONST	-7.745	-22.44	-7.763	-24.84	-7.848	-22.30
FEMALE	-0.741	-16.83	-0.731	-18.54	-0.736	-16.60
MARRIED	0.446	10.29	0.436	11.62	0.415	9.49
AGE	-0.012	-5.12	-0.012	-5.72	-0.011	-4.72
NOKIDS	-0.050	-2.52	-0.049	-2.76	-0.055	-2.73
DUR_EMP	-0.001	-1.93	-0.001	-1.73	-0.001	-2.02
PLACPROP	-0.046	-9.98	-0.045	-10.90	-0.044	-9.25
OG1	2.138	6.74	2.127	7.21	2.143	6.62
OG2	1.818	3.11	1.825	2.62	1.873	3.25
OG3	1.416	4.50	1.412	4.83	1.435	4.47
OG4	1.584	4.68	1.569	5.09	1.562	4.52
OG5	1.399	4.44	1.398	4.77	1.413	4.39
PT1	0.713	13.34	0.690	15.03	0.689	12.71
PT2	0.444	1.89	0.423	1.84	0.375	1.64
PT3	0.869	5.74	0.868	7.79	0.784	5.16
PT4	0.764	2.81	0.869	3.31	0.867	3.37
PT5	0.736	5.22	0.766	6.57	0.821	5.74
TENURE	0.571	7.84	0.546	8.84	0.525	7.15

Transition Rate into Programme Participation

Programme Length	1-3 Months		6 Months		12 Months	
Variables	Param.	t-Val.	Param.	t-Val.	Param.	t-Val.
$\lambda_{p,2}$	2.279	6.62	3.907	3.49	2.650	6.98
$\lambda_{p,3}$	2.109	5.45	4.806	4.01	3.689	8.29
$\lambda_{p,4}$	1.881	4.35	4.900	3.96	3.911	6.66
v_p	-13.392	-0.05	-13.915	-0.00	-5.281	-5.71
CONST	-6.706	-5.01	-22.358	-0.00	-15.576	-0.71
FEMALE	-0.061	-0.30	0.330	0.91	0.217	0.86
MARRIED	0.066	0.34	-0.263	-0.76	0.254	1.07
AGE	-0.011	-1.03	0.040	1.95	0.005	0.31
NOKIDS	0.101	1.18	-0.164	-1.07	0.074	0.69
DUR_EMP	0.002	1.11	0.008	2.42	0.004	1.98
PLACPROP	0.027	1.71	0.013	0.35	0.010	0.43
OG1	0.177	0.15	11.317	0.00	7.155	0.33
OG2	-11.359	-0.01	3.851	0.00	3.028	0.08
OG3	0.904	0.82	12.181	0.00	7.518	0.34
OG4	0.690	0.56	13.681	0.00	8.521	0.39
OG5	0.554	0.50	11.552	0.00	7.780	0.35
PT1	0.060	0.30	0.484	1.40	0.947	3.18
PT2	0.378	0.41	2.343	1.86	1.523	1.87
PT3	-0.254	-0.38	-1.539	-1.01	1.513	2.85
PT4	2.267	1.70	-10.180	-0.00	1.189	1.00
PT5	-0.219	-0.33	0.077	0.06	1.200	1.59
TENURE	-0.214	-0.88	0.249	0.54	-0.004	-0.01
q_1	1.415	2.14	2.623	5.73	3.240	8.59
q_2	-0.337	-0.69	0.866	1.70	2.166	4.40
q_3	1.737	2.83	2.849	6.00	3.374	8.02
π_1	0.087		0.029		0.016	
π_2	0.358		0.400		0.396	
π_3	0.062		0.069		0.135	
π_4	0.493		0.502		0.453	
Log-Likelihood	-30774.06		-29589.65		-30094.46	

for medium- and long-term programmes. But even if the analysis accounts for locking in effects the results show that vocational training is at best ineffective.

6. Conclusion

Vocational training is the most important instrument of active labour market policy in Eastern Germany. Considering the tense labour market situation in Eastern Germany and the large scale of vocational training programmes the question of the effectiveness has become most important.

The empirical analysis investigates whether vocational training programmes are able to reduce the unemployment duration of the participants. This is done with a bivariate mixed proportional hazard model in the timing of events methodology, where the transition rate into employment and programme participation is simultaneously modelled. Possible selectivity problems with respect to the programme participation are solved by allowing the transition rates to depend on observable and unobservable characteristics.

The empirical analysis with a basic model where the treatment effect is modelled as time invariant shift of the transition rate, shows a negative and significant effect of vocational training on the transition rate into employment. Since vocational training aims at qualification or requalification a completion of the programmes is most likely. Therefore, the locking-in effect may be a major problem of the programmes. In order to account for the locking-in effect we use an extended model that allows for different in- and after-programme effects. The analysis with the extended model is separated into an analysis of short term programmes with a programme duration of 1 up to 3 months, medium term programmes (6 months) and long term programmes (12 months). The results from the extended model show that short term programmes do not suffer from a locking-in effect but are generally incapable of shortening the unemployment duration. Medium term programmes have a strong locking-in effect that is not compensated by a positive after-programme effect. Finally, long term programmes have a negative in- and after-programme effect, i.e. generally lead to a rise of the unemployment duration. Our results show that the locking-in effect is a serious problem of medium and long term vocational training programmes. Furthermore, the after-programme effect of all programmes is at best insignificant.

Considering our results it should be noted that the negative effect may result from the actual labour market situation in Eastern Germany. The unemployment problem in Eastern Germany primarily results from a shortage of the labour demand that cannot be counteracted by a measure that aims at adjusting the structure of labour supply to the requirements of the labour demand. Therefore, vocational training seems not to be a well-suited measure to fight the unemployment problem in Eastern Germany.

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