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Long-Term Unemployment during the Transition to a Market Economy - Eastern Germany after Unification

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by

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Summary: Long–term unemployment in Eastern Germany in the two-years period since Currency, Economic and Social Union is analyzed by means of a discrete hazard rate model of individual re-employment behaviour estimated on the first three waves of the German Socio–Economic Panel. Although most unemployment spells end in employment within a few months, long–term unemployment has already become an important phenomenon of the transition process in Eastern German. While for prime–aged married males long–term unemployment is of little importance, its incidence is particularly high among older workers and married females, especially those with small children. There is strong evidence for duration and occurrence dependence effects in the unemployment process: the hazard rate from unemployment into employment declines sharply after the first few months and stabilizes at a relatively low level, while the experience of previous unemployment reduces an individual's future re-employment probabiltiy significantly.

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1 Introduction

The transition process from a centrally planned to a market economy involves profound economic and institutional changes in production and employment. In Eastern Germany, where the exchange rate and the West German institutional setting have been implanted with a stroke of the pen on 1st July 1990, employment losses and the increase in unemployment have been particularly severe. In the wake of Currency, Economic and Social Union, employment in the economy fell from roughly 9 million in the second quarter of 1990 to a yearly average of just over 6 million in 1992. By the end of this period, the official unemployment rate has stabilized at some 17 percent, starting from virtually zero in 1990, and even higher unemployment has so far only been avoided by the use of massive labour market policy measures (for a general survey of labour market developments in Eastern Germany after unification see Franz; 1993).

The restructuring of Eastern German labour markets has been accompanied by large flows into and out of registered unemployment (Burda, 1993) and a considerable increase in long-term unemployment which, as a recent representative survey of the Eastern German population shows, has reached 39 percent in May 1992 (see Bellmann/Buttler, 1993). Furthermore, long-term unemployment seems to be concentrated among certain groups, in particular females and older workers. Given the relatively short transition period, the high incidence and strong concentration of long-term unemployment is a surprising phenomenon of labour market developments in Eastern Germany, where one would have rather expected a relatively high level of frictional unemployment associated with huge labour market flows and short unemployment spells. The reasons for this phenomenon are obviously important for both an understanding of the functioning of the Eastern German labour market and the efficient application of policy measures to avoid the development of structural unemployment that may persist in the future.

Since individual data covering a sufficiently long period of time have only recently become available for research, there is little empirical knowledge on the structure and the main determinants of long-term unemployment in Eastern Germany after unification. The studies by Bellmann et al. (1992) and Büchel/Pannenberg (1992) do analyze transitions into and out of unemployment at the individual level, but are not directly concerned with the analysis of long-term unemployment. In particular, these studies give no or only partial information on

- the relative contribution of certain individual characteristics, such as age, education, gender and household structure to the concentration of long-term unemployment in the population;
- regional differences in long-term unemployment and the effect of changes in demand conditions in the aggregate labour market on individual re-employment probabilities;
- the effect of income variables and, in particular, the entitlement to unemployment benefits on individual behaviour, and
- the importance of state dependence effects for individual unemployment dynamics.

In this paper, these questions will be analyzed by means of a discrete hazard rate model of individual re-employment behaviour estimated on the first three waves of the German Socio-Economic Panel for Eastern Germany which covers the two-years period from June 1990 to July 1992 and contains detailed information on individual monthly labour force transitions. On the basis of the estimated model it will be possible to sort out the relative importance of individual characteristics, income variables, the general labour market situation for the determination of long-term unemployment, and to .test for both duration and occurence dependence in individual unemployment dynamics.

The remainder of the paper will proceed as follows. After the data base and the sample design have briefly been described in the next section, the econometric model is presented in some detail in section 3. The main results of the study are summarized and discussed in section 4, and section 5 concludes.

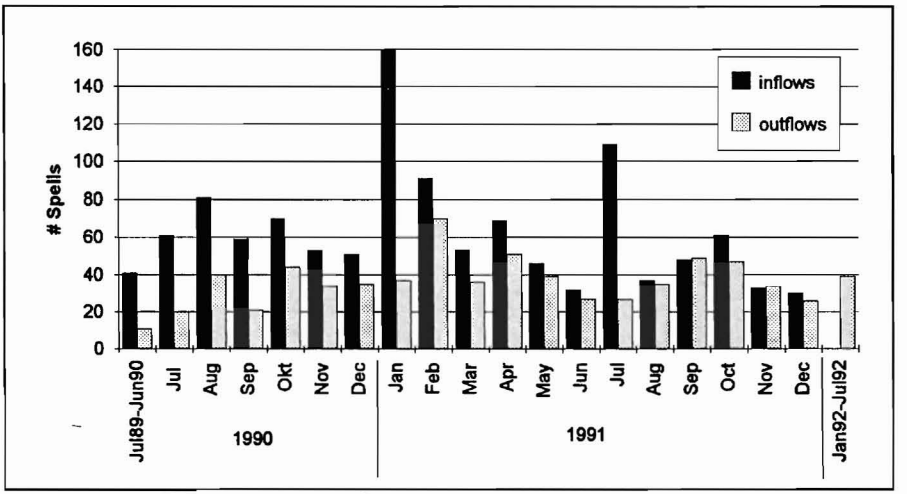
2 Data and Sample Design

The Socio-Economic Panel for Eastern Germany (GSOEP-East) is a representative sample of the resident population on a household basis (for a general description of the GSOEP-East see Schupp/Wagner, 1990). At present, there are three waves of the GSOEP-East; in the first wave, which was carried out in June 1990 immediately before the introduction of the Currency, Economic and Social Union, some 4,000 individuals older than sixteen years of age living in about 2,000 households were interviewed. The answers to the questionaire give information on an individual's employment status, personal characteristics, educational and occupational indicators, industry and region of residence, various types of income etc.. Most of these questions were also included in the second and third waves, which were conducted around March 1991 and the first half of 1992, respectively. In addtion, at the date of interview of each wave, retrospective monthly "calendar" information on an individual's detailed labour force status is recorded on a retrospective basis.[1]

On the basis of this calendar information the monthly flows into and out of unemployment can be calculated. In Figure 1, these flows are plotted for the observation period, where the few spells entering and leaving the unemployment pool before July 1990 and the spells ending after December 1991 have been aggregated. Note that, since the questionaire refers to *registered* unemployment, its definition used here is, in principle, the same as in official statistics, and has the same well-known problems of both over- and underreporting.

[1] In nine (first wave), ten (second wave) and eleven (third wave) categories; there is information on whether or not an employee is on a public employment scheme ("Arbeitsbeschaffungs-maßnahme") at the date of interview and calendar information on whether or not she has received financial support from the labor office for participating in certain vocational training programmes ("Fortbildungs- und Umschulungsmaßnahmen").

Figure 1. Monthly flows into and out of unemployment, July 1989 — December 1991



Note: # unemployment spells = 1,184
Source: GSOEP-East, waves 1—3; own calculations

The development of the unemployment flows in Figure 1 shows that, after a steady increase and two pronounced jumps in the inflow series, at the end of the observation period flows are roughly in balance. The prominent spikes in unemployment inflows in January and in July 1991 can be explained by institutional factors: the first wave of mass lay-offs occurred after the first general election in united Germany and became effective by the end of the year; in July short-time work contracts for many workers expired and were not renewed, and special provisions for employment continuation in the public sector ("Warteschleifenregelung") ended. The stabilization of the unemployment stock at after its jump in July 1991 is probably the result of a massive employment of labour market policy measures since mid-1991, in particular vocational training programmes and public employment schemes.[2]

Somewhat surprisingly, only a few transitions from unemployment into nonparticipation are recorded in the calendar data of the first three waves; virtually all completed unemployment spells end in employment, including public employment schemes subsidized by the federal labour office. For males, this can be explained by the fact that transitions into nonparticipation are mainly due to early retirement and originate from employment without an intervening unemployment spell (see Licht/Steiner, 1993). For females, the small number of transitions into nonparticipation may seem somewhat surprising, given the institutional changes in the Eastern German labour market, e.g. the large-scale

[2] The monthly stock of participants in these measures almost doubled from 420 to 825 thousand between June and December 1991 (see Amtliche Nachrichten der Bundesanstalt für Arbeit, various issues).

closure of nursery schools ("Kindergärten") run by firms and the shortage of cheap public facilities, which has increased the opportunity costs of market work for females with small children.[3] Although the stability of the female participation rate could simply be due to the entitlement to unemployment benefits or other transfers depending on formally registering as unemployed, it is also possible that, given the precarious income situation in most households, an "added worker" effect is at work here.

For the following analysis, an individual's labour force status will therefore be aggregated into just two categories, namely

(i) *unemployment* and

(ii) *employment*.

The latter category also includes employees on firm training and public employment schemes as well as commuters and migrants to the western part of Berlin and Western Germany, of whom there is a rather small number identifiable in the GSOEP–East. Since public employment schemes are not explicitely recorded in the calender data, this form of employment, part of which probably is disguised unemployment, cannot be distinguished from "normal" employment.[4] There is also a modest number of transitions from unemployment into vocational training schemes financed by the federal labour office[5]. These have been treated as not terminating an unemployment spell, because both of their small number and on stubstantial grounds.

The variable of main interest for the following analysis is the duration of unemployment which can be calculated from the calendar data on labour force transitions. Since the calendar data of the third wave end in December 1991, a rather high proportion of spells entering unemployment shortly before this date are bound to be right–censored.[6] By using information on changes in an individual's labour force status between the beginning of 1991 and the date of interview in the third wave, which varies between February and July 1992, the number of right–censored spells could be somewhat reduced. From all 1184 unemployment spells 362 observations (30.6 %) remained censored after this adjustment.

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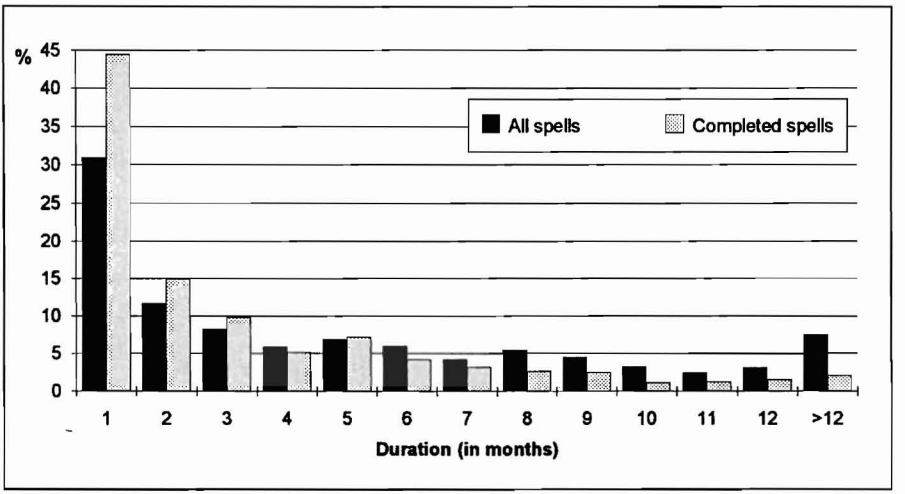
[3] There is also some evidence from the German labour force survey ("Mikrozensus") for 1991 that the female participation rate in East Germany has remained fairly stable while female unemployment has sharply increased (Wirtschaft und Statistik 2/1993, p. 92).

[4] Given the information on the number of individuals on public employment schemes and their job tenure at the date of the interview in the third wave, there were probably only a few transitions from unemployment into these schemes between July 1990 and December 1991: 135 persons were on a public employment scheme at that date, of whom only 22 had a tenure between 6 and 18 months.

[5] These can be identified by combining calender information on an individual's labour force status with the respective calender information on whether or not one receives subsistence allowance for attending vocational training programmes financed by the federal labour office.

[6] Spells of individuals who are not observed for all waves, or for whom complete information on the calendar data is not available are also treated as right–censored. For the same reasons, there is also a small number of left–censored spells in the sample.

Figure 2. Distribution of unemployment duration, July 1990—July 1992



Note: # all spells = 1,184; # completed spells = 722; % of censored spells = 39%
Source: GSOEP-East, waves 1–3; own calculations

Figure 2 shows the distribution of, respectively, the completed and all unemployment spells, including censored observations, within the observation period.. As expected, short spells (up to a duration of 3 months) are more heavily concentrated among the completed spells, of which roughly 70 percent were completed within 3 months (compared to about 50 percent of all spells). However, there is a considerable number of spells with long durations: more than 10 percent of the completed spells and roughly 30 percent of all spells have a (interrupted) duration of more than six months. Furthermore, among the latter the proportion of spells with a duration of more than 12 months is substantial. These features of the duration data must be taken into account in an empirical model aimed at explaining long–term unemployment, to which I now turn.

3 A Discrete Hazard Rate Model of Individual Re–Employment Behaviour

The standard approach to modelling individual unemployment behaviour in empirical labour economics centers on the hazard function, i.e. the conditional probabilty of leaving unemployment (see Kiefer, 1988, for a summary). For the simple case of employment as the only (absorbing) state, which, given the discussion in the previous section, will be modelled here, the hazard function can be interpreted as the reduced form of a standard neoclassical job search model. Within this rather flexible framework, an individual's re–employment probability is explained as a function of the duration he or she has been unemployed in the current spell, individual characteristics, labour market variables that account for the costs and expected returns to search and, possibly, an individual's previous

unemployment history (see Devine/Kiefer, 1991, for a recent summary of empirical search models). This general approach will be followed here.

Given the nature of the monthly calendar data described in the previous section, individual unemployment behaviour will be analyzed within a discrete hazard rate model. The main advantages of this specification relative to a more convential continuous time duration models (for a summary see, e.g., Kiefer, 1988) are (i) strong ties of observations in the monthly calendar data pose no problem, (ii) time-varying covariates and duration dependence of the hazard function can be handled in a relatively simple way, and (iii) estimation is straightforward.

The central variable of the model is the discrete hazard rate, $\lambda_i(t_i)$. For the i–th person ($i = 1, \ldots, n$) it gives the conditional probability of a transition from unemployment into employment in interval t_i, given individual i has been employed until t. Corresponding to the calendar data, the length of the interval will be a month in the empirical model. Somewhat more formally,

$$(1) \qquad \lambda_i\left(t_i|x_i\left(t_i\right)\right) = \Pr\left[T_i = t_i | T_i \geq t_i, x_i\left(t_i\right)\right]$$

where the hazard rate is conditional on a vector of covariates for individual i in interval t, $x_i(t_i)$.

Dropping the index i for a moment, the conditional probability of remaining unemployed in period t is given, in terms of the hazard function, by

$$(2) \qquad \Pr[T > t | T \geq t, \cdot] = 1 - \lambda(t|\cdot),$$

and the survivor function, which does not condition on the unemployment process, is

$$(3) \qquad \Pr[T > t|\cdot] \equiv S(t|\cdot) = \prod_{\tau=1}^{t-1}(1 - \lambda(\tau|\cdot))$$

In terms of the hazard function, the probability of a transition into employment in period t can then be written as

$$(4) \qquad \Pr[T = t|\cdot] = \lambda_j(t|\cdot)\prod_{\tau=1}^{t-1}(1 - \lambda(\tau|\cdot))$$

Given that employment is assumed to be the only (absorbing) state to which a transition from unemployment can occur[7], the specification of the hazard function chosen is a binary logit model which is relatively easy to handle and guarantees a positive hazard rate for any value of the covariate vector (for a description of the logit model see, e.g., Maddala 1983, pp. 22).

Using the index i again, the hazard and survivor functions for this model are given by

$$(5) \qquad \lambda_i(t_i|\alpha(t_i),\, z_i(t_i)) = \frac{\exp(\alpha(t_i)+\beta' z_i(t_i))}{1+\exp(\alpha(t_i)+\beta' z_i(t_i))}$$

and

$$(6) \qquad S(t_i|\cdot) = \prod_{\tau=1}^{t-1} \frac{1}{1+\exp(\alpha(\tau)+\beta' z_i(\tau))}$$

The term $\alpha(t_i)$ is a function describing duration dependence, also known as the baseline hazard function, $z_i(t_i)$ is a vector of possibly time-varying covariates affecting individual unemployment behaviour which are described below, β is a corresponding vector of parameters to be estimated, and $[x_i(t_i)] \equiv [\alpha(t_i)\ z_i(t_i)]$.

Most empirical research on unemployment dynamics seems to suggest that the hazard rate from unemployment declines with duration, which is termed *negative duration dependence* (for a general discussion see Heckman/Borjas, 1980, and for a recent survey of the empirical literature Devine/Kiefer, 1991). However, in their study for West Germany Licht/Steiner (1991) report that the hazard rate from unemployment into employment for both males and females increases for the first few months and then steadily declines. As there is no a priori reason to rule out such a pattern for Eastern Germany, it seems preferable to allow for a non-monotonic baseline hazard. Hence, $\alpha(t_i)$ is specified as in Licht/Steiner (1991) by the following rather flexible functional form:

$$(7) \qquad \alpha(t_i) = \alpha_1 t_i + \alpha_2 t_i^2 + \alpha_3 / t_i$$

which should provide a good approximation of the baseline hazard.

Before I turn to the specification of the vector of explanatory variables, the derivation of the sample likelihood function for this model will be discussed briefly. Assuming that, conditional on the explanatory variables in the model, all observations are independent the sample likelihood function is given by

[7] As discussed in section 2, the number of transitions from unemployment to nonparticipation within the observation period is too small to estimate a three-state model.

$$(8) \qquad L = \prod_{i=1}^{n} \left[\lambda_i(t_i | x_i(t_i)) \right]^{\delta_i} \prod_{\tau=1}^{t_i - 1} (1 - \lambda_i(\tau | x_i(\tau))).$$

where $\delta_i = \begin{cases} 1, \text{ if individual } i \text{ leaves unemployment} \\ 0, \text{ otherwise} \end{cases}$

For a completed unemployment spell, $\delta_i = 1$, the contribution to the likelihood function is given by the transition probabiltiy, for a censored spell, $\delta_i = 0$, it is given by the survivor function. Note that transitions from unemployment to other states than employment will be taken into account in the estimation procedure by treating them as censored at the time of transition in the same way as right–censored spells.

While the assumption that observations between individual's are independentit is standard in microeconemetric models of individual unemployment behaviour, the assumption that observations for a given individual are, conditionally on the previous state, independent[8] is probably more problematic. As discussed in the literature on individual unemployment dynamics (see, e.g., Heckman, 1981), it could be violated either in the presence of "true" state dependence effects or unobserved population heterogeneity. The model does condition on the duration of the current and the presence of previous unemployment spells, thus accounting for duration and occurrence dependence of the unemployment process, but does not control for unobserved individual effects, the presence of which would lead to (spurious) correlation of observations over time. While it is, in principle, possible to extend the present model to incorporate unobserved population heterogeneity, this would complicate matters substantially and will not be attempted here.

It can be shown that under these assumptions the likelihood function for a discrete hazard rate model, as given by eqn. (8), is equivalent to a logit model estimated on the pooled sample of all observations (see, e.g., Allison, 1982). Plugging the hazard function in eqn. (5), using the specification of the baseline hazard in eqn. (7), into eqn. (8), the likelihood function is known up to a vector of coefficients to be estimated. Given the validity of the model specification, the estimates for α_j ($j=1,2,3$) and the elements of the vector β have the standard properties of ML estimates. Since the specification of the hazard function corresponds to a standard discrete choice model, coefficients are only identified up to scale. An estimate of the asymptotic variance–covariance matrix of the estimated coefficients is obtained from the negative inverse of the information matrix, which is then used to calculate asymptotic t–values.

Having described the statistical model in some detail, I now briefly discuss the specification of $z_i(t_i)$ which includes the following groups of explanatory variables:

- *individual characteristics*
- *household structure*
- *skill level*

[8] This latter assumption defines a (semi–)Markov process.

- *household income* and *entitlement to unemployment benefits*
- *regional dummies* and *urban agglomoration*
- *unemployment/vacancy ratio*, and
- *previous unemployment experience.*

In addition to linear and quadratic terms of age, a dummy variable which takes on the value of one for age greater than 55 years, and zero otherwise, will also be included as explanatory variable in the model to allow for potential effects of early retirement on the hazard rate from unemployment.

Since gender differences are expected to exist primarily with respect to household structure, a dummy for marital status and interaction terms of sex with this variable as well as of sex with marital status, the presence of small children (<4 years) in the household, and household income are included as additional regressors.

The level of skills an unemployed can offer on the job market is usually considered an important factor of individual unemployment duration and will be proxied by dummy variables for the following broad skill groups: no occupational qualifications, completed apprenticeship, master craftsman/technical school, and university. Due to the peculiarities of the educational system in the former GDR, there are relatively few unemployed with no occupational qualification. It should also be noted that a completed apprenticeship training, which is coded as base category here, is probably the most easily transferable qualification to an economic structure which will more or less resemble the West German one after the employment structure has been adjusted.

While an individual's region of residence, disaggregated to the level of the "Länder" and East Berlin[9], and dummies for urban agglomoration control for differences between rather broad labour market areas, the level and relative change in the aggregate monthly unemployment/vacancy ratio, calculated from data issued by the federal labour office (see Amtliche Nachrichten der Bundesanstalt für Arbeit, various issues) are included to pick up the effect of the general state of the labour market in Eastern Germany on individual unemployment behaviour. The aggregate unemployment/vacancy ratio varies substantially within the observation period July 1990 to July 1992 and is, except for the first two months where its increase has been really dramatic, in the range of ±15 percent. Since a breakdown of monthly unemployment and vacancy data by the five new *Länder* is only available since October 1991, a more disaggregated specification of this variable was unfortunately not possible.

Although the observation period is relatively short, there is a small number of individuals with more than one unemployment spell (less than 5 % in the sample). In order to test whether the past occurrence of unemployment affects an individual's future re-employment probability, a dummy variable which takes on a

[9] A more detailed regional disaggregation, e.g. by the 35 Eastern German labour market districts, is unfortunately not available in the public use file of the GSOEP.

value of one if unemployment occured before the current spell, and zero otherwise, is included in the set of explanatory variables. Given that such an effect exists, individual unemployment behaviour is said to be determined by *occurrence dependence* (for a discussion see Heckman/Borjas, 1980).

Since most variables in the model may vary during an unemployment spell, information on these variables collected at the date of the interview in each of the three waves was merged with the monthly calendar data on an individual's labour force status using the following conventions. Information from the first wave is related to unemployment durations till December 1990, from the second wave to durations in the first half of 1991, and from the third wave to durations falling into the following period. If information on explanatory variables is missing in a particular wave, it was substituted from the subsequent or, if also lacking, from the previous wave.

Information on an individual's entitlement to unemployment benefits, split up in unemployment insurance ("Arbeitslosengeld") and unemployment assistance ("Arbeitslosenhilfe"), is available on a monthly basis from the income calendar data, while information on the amount of benefits received are only recorded for October in each year; in addition, there is corresponding information on other income sources, in particular public assistance ("Sozialhilfe").[10] Since matching the information on the amount of benefits collected in October to the duration of the unemployment spell in that particular year seemed somewhat haphazard, instead of the theoretically correct "replacement ratio" (for its definition see, e.g., Atkinson/Micklewright, 1991) only a dummy variable taking on a value of one if the unemployed receives benefits in a particular month, and zero otherwise, will be used here. Furthermore, because there is only a small number of spells with either unemployment assistance or public assistance in the sample, they had to be aggregated with entitlement to unemployment insurance, which may obscure potentially important differences in individual unemployment behaviour with respect to the kind of income support.

Means, and for dummy variables the proportion of observations in a particular category, are given in the first column of Table 1 below.

[10] After implantation of the West–German social security system in the wake of unification, the entitlement period to unemployment insurance payments depends on the duration of employment within the last two years and expires, on average, after 6 — 7 months. Unemployment assistance, for which only those with previous entitlement to insurance payments qualify, is means–tested, i.e. depend on family circumstances, wealth etc, and is granted for a maximum of a year in the first instance, but is renewable under certain circumstances. Public assistance is also means–tested, previous insured employment is not a prerequisite, and has no pre–specified time–limit; it thus functions as social safety–net (for details see, e.g., Der Bundesminister für Arbeit und Sozialordnung (Hrsg.), Übersicht über die Soziale Sicherheit, Bonn 1991).

4 Estimation Results

As discussed in section 2, the estimation period covers the period July 1990 to July 1992, where only unemployment spells beginning before January 1992 are included and the censoring date for each spell is given by the individual-specific date of interview in the third wave. Estimation is based on a pooled sample of 4,546 observations. Before the estimation results are presented and discussed, a general comment on the interpretation of these coefficients seems in order. Since the estimated model is a reduced form relationship with relatively little structure imposed on it, demand and supply side factors are not formally identifiable. More often than not, interpretation of the estimated effects of explanatory variables in the model on unemployment behaviour must therefore rely on somewhat informal reasoning.

The estimated coefficients together with their respective absolute t-values and, in case of joint tests of significance, χ^2 statistics are given in Table 1.[11] Since estimated coefficients in the logit model are only identified up to scale, their effects on the hazard rate have to be interpreted *relative* to the (conditional) probability of remaining unemployed. A positive (negative) coefficient, *ceteris paribus*, increases (decreases) the hazard and, as it is inversely related to the (completed) duration of unemployment, is associated with a shorter (longer) unemployment duration.

To start with the estimated coefficients for the baseline hazard, first note that a Likelihood Ratio test clearly rejects the hypothesis of a constant hazard rate (χ^2 = 19.12, with 3 d.o.f.); the estimated coefficients for the duration dependence terms imply a non-monotonic baseline hazard. To test for potential gender differences in the baseline hazard function, in an alternative specification of the model interaction variables between all duration terms and sex have also been included. A likelihood ratio test of this and the specification in Table 1 yielded a χ^2 value of only 0.42 with 3 d.o.f; thus, a common baseline hazard for both males and females, the general shape of which can be gleaned from Figure 3, cannot be rejected at a very high significance level.

The hazard rate, evaluated of sample means of the explanatory variables in the model, is increasing from the first to the second unemployment month, and then steadily decreases throughout the duration of the spell approaching a relatively low value after 12 months.[12] Hence, there is strong evidence of negative duration dependence in the unemployment process. Interestingly, a rather similar shape of the hazard function has also been found for both males and females by Licht/Steiner (1991) in their analysis for West Germany.

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[11] GAUSS 3.0 was used for estimation.

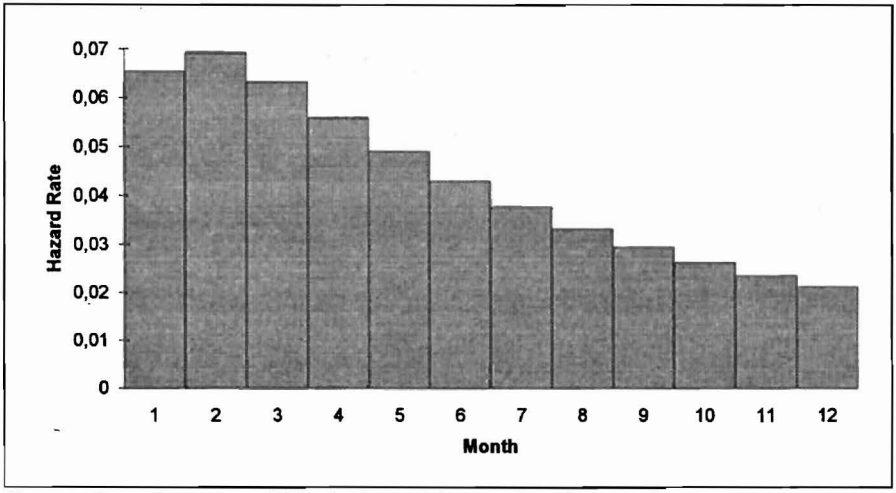
[12] Since we observe only relatively few spells with very long (completed) durations (see Figure 2), the hazard plot has been restricted to the first 12 months. Also note that the normalization of the explanatory variables in the model only shift the *level* of the hazard, but does not change its general shape.

Table 1. Hazard rate model for transition from unemployment into employment
Maximum likelihood estimates for logit model

Variable	Mean	Coef.	|t|	χ^2 (d.o.f.)
Constant	1.00	0.3514	0.31	
Age	37.39	-0.0839	1.46	9.91 (3)
Age squared	1538.40	0.0008	1.03	
Age ≥ 55 years	0.08	-0.7360	1.60	
No occupational qualification	0.13	0.0155	0.07	
Master craftsman/technical school	0.14	0.2491	1.32	
University	0.04	0.3195	1.17	
Female	0.64	0.0122	0.03	
Married	0.71	0.9657	3.86	
Female and married	0.49	-0.9708	3.34	
Female with child(ren)<4 years	0.14	-0.6170	2.37	
Household income /1000 (DM)	2.17	0.1669	2.02	
Household income * female	1.41	-0.0768	0.63	
Entitled to unemployment benefits	0.85	-0.0346	0.18	
Lives in Mecklenburg-Vorpommern	0.13	-0.3340	1.45	
Brandenburg	0.15	-0.3548	1.55	
Sachsen-Anhalt	0.19	-0.3626	1.76	
Thüringen	0.21	-0.2517	1.30	
East Berlin	0.08	0.2034	0.77	
Lives in area with				
2,000 - 20,000	0.23	-0.4736	2.58	
20,000 - 100,000	0.25	-0.3021	1.72	
> 100,000 inhabitants	0.21	-0.6135	2.87	
Monthly relative change in UVR	0.07	-2.4223	4.56	
Previous unemployment spell	0.05	-0.6911	1.84	
Baseline hazard				
Duration	5.99	-0.2010	2.16	19.12 (3)
Duration squared	0.56	0.4054	0.84	
Duration inverse	0.32	-0.5001	1.13	
Summary statistics				
log-likelihood full model	-943.62			
log-likelihood restricted mode	-1035.20			
χ^2 (d.o.f. = 26)	183.17			
# Observations	4546			

Source: All variables except the monthly unemployment/vacancy ratio (UVR) are calculated from waves 1 - 3 as described in section 2. The UVR is from the monthly bulletin of the federal labor office (ANBA-Nachrichten, various issues).

Figure 3. Estimated monthly hazard rates from unemployment into employment



Note: The explanatory variables in the model are evaluated at sample means.
Source: Estimates in Table 1

Turning to the discussion of the factors determining the level of the hazard function, the estimation results in Table 1 can briefly be summarized as follows:

- The hazard rate from unemployment into employment decreases with age, at a decreasing rate; there is a very sharp drop in the hazard rate after the age of 55 years.
- An individual's skill level does not affect his or her re-employment probability. In particular, re-employment probabilities of the unemployed with no occupational qualification are not significantly different from those of skilled workers with otherwise identical characteristics.
- There seems to be no direct effect of gender, but rather strong gender-specific indirect effects from the presence of children and marital status on the hazard rate. While marital status has a significant effect on male unemployment behaviour, there seems to be no such effect for females.
- Irrespective of gender, the hazard rate increases with household income. There is no statistically significant effect of the entitlement to unemployment benefits on the hazard rate.
- Except for Sachsen-Anhalt, where the hazard rate is significantly lower than in the reference region Sachsen, there are no direct regional effects. There are, however, substantial differences in individual unemployment behaviour with respect to urban agglomeration with the highest re-employment probabilties prevailing in thinly populated areas.

- An increase in the aggregate unemployment/vacancy ratio, which serves as a crude indicator for the development of the labour market situation in Eastern Germany, decreases the hazard rate significantly. In contrast, the level of this variable has no effect on individual unemployment behaviour.[13]
- There is some evidence for occurrence dependence in the unemployment process, i.e., the hypothesis that an individual's future re-employment probability in the current unemployment spell is reduced if he or she has experienced previous unemployment.

Some of these results may not correspond to prior expectations, perhaps derived from economic theory. The strong negative effect of age on the hazard is not compatible with a supply-side interpretation of unemployment behaviour as the older a worker gets the smaller are his expected returns from a lengthy period of job search.[14] Likewise, in a finite-horizon job search model the higher the income (or wealth) of the household, the longer the unemployed would, ceteris paribus, search for a job, which implies a negative effect on the hazard rate. Standard search theory would also predict that, given a constant job-offer arrival rate, unemployment duration to be positively correlated with benefits which reduce the opportunity costs of search.[15] However, it should be noted that, given the data limitations discussed in section 2, the benefit variable in the model is only a rough-and-ready measure with probably to little variation in the sample, which prevents one to draw too strong a conclusion from this result.

On the other hand, the results for the skill groups are perfectly compatible with search theory, because intensive search simply does not pay for unskilled jobs. Likewise, the estimated gender-specific effects of marital status and the presence of children in the household are also not in conflict with the implications of job-search theory if one allows search intensity to depend on these variables, i.e. the value of home-time. Although this theory can easily accomodate the negative effect of an increase in the unemployment/vacancy ratio on the hazard rate by allowing the individual job-offer arrival rate to depend on the state of the aggregate labour market, this is not something which distinguishes it from a simple demand-side interpretation. Theory is also not very specific on the effect previous unemployment may have on future individual unemployment behaviour; possible explanations for occurrence dependence in the unemployment process are statistical discrimination by potential employers against the former unemployed or their reduced future productivity due to a loss of human capital associated with previous unemployment, especially of long duration.

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[13] Adding the level of the unemployment/vacancy ratio to the specification in Table 1 yielded a t-value for this variable of 0.34 and left the estimated coefficients of the other variables virtually unchanged.

[14] I have examined whether the exclusion of individuals aged 55 or older from the sample changes estimated coefficients for the variables other than those for age by estimating the model on the subsample of individuals younger than 55 years. Estimated coefficients did not differ qualitatively from those in Table 1 and were alos very similar quantitatively

[15] Although the empirical evidence on the importance of this effect on unemployment duration is far from conclusive (for a recent survey see Atkinson/Micklewright, 1991, Hujer/Löwenbein/Schneider, 1990, and Licht/Steiner, 1991, for West Germany).

Having described the estimation results in Table 1 in qualitative terms, I now turn to a more quantitative assessment of the effects of selected explanatory variables on long-term unemployment, which can best be done by means of the estimated survivor function. In Table 2, the estimated values of the survivor function after the first, third, sixth, and twelvth month for alternative normalizations of the vector of explanatory variables in the model are given. While its theoretical relationship to the hazard function is given by eq. (3) above, the surival rate in month t can also be interpreted as the proportion of a particular labour market group — defined by a particular normalization of the vector of explanatory variables in the model — with an unemployment duration of more than t months. While, unemployment with a spell duration of less than three months may be termed frictional, perhaps associated with efficient job search activities, it seems sensible to define spells with a duration of more than six months as long-term unemployment, meaning something structurally different from the former category. Spells lasting between three and six months do not neatly fit into one of these two categories but may, depending on one's personal view on the functioning of the labour market, be classified in either way.

The first row in Table 2 shows that survival rates evaluated at sample means are extremely high: after six month the survival rate is still as high as 70 percent and remains at almost 60 percent after a year. How can this result be squared with the fact that most spells are relatively short (c.f. Figure 2)? The answer is that, due to the pooling of all monthly observations in the estimation procedure described above, evaluating the explanatory variables at sample means leads to an over-representation of unemployment spells with long durations, i.e. those experienced by individuals with characteristics negatively correlated with the hazard rate from unemployment.[16]

This latter comment raises the question about the factors contributing to the concentration of long-term unemployment in the population. The quantitative effects of the various covariates in the model can best be gauged by comparing the estimated survival rates for a reference group with those obtained by alternative variations of certain *significant* characteristics. The reference group — for its definition see the note to Table 2 — is meant to be representative for the "average" male Eastern German worker.

[16] This sorting process is akin to the well-known length-bias in the average duration of the unemployment stock sampled at a given point in time (see Salant, 1977).

Table 2. Estimated effects of selected variables on survival rates (in %) after 1, 3, 6 and 12 months

Group	Month			
	1st	3rd	6th	12th
Sample means	93.4	81.5	70.0	58.8
Reference group	78.9	48.8	28.4	15.0
As reference group but				
Age = 25 years	69.3	33.0	14.1	5.1
Age = 55 years	90.1	72.9	57.7	44.0
Single	90.7	74.5	59.9	46.6
Female	91.3	76.0	61.9	49.0
Female, married and small child(ren) (< 4 years)	95.1	85.9	76.9	67.6
No household income	83.9	58.8	39.5	24.8
Household income = 4000 DM	72.8	38.3	18.4	7.7
Lives in Sachsen-Anhalt	84.3	59.6	40.5	25.8
Area with a population of				
2,000 – 20,000	85.7	62.7	44.2	29.5
20,000 – 100,000	83.5	57.9	38.4	23.8
more than 100,000	87.3	66.4	48.9	34.3
Change in UVR = 10 percent	80.8	52.5	32.3	18.3
No change in UVR	76.8	45.0	24.6	12.0
Previous unemployment spell	88.2	68.3	51.4	37.0

Reference Group: Age = 40 years, skilled worker, male, married, household income = 2,000 Marks, receives unemployment benefits, lives in Sachsen, in an area with a population of less than 2,000, change in aggregate unemployment/vacancy ratio = 5 percent, no previous unemployment spell.

Source: Calculations based on Table 1

For this group, the duration of unemployment is relatively short: more than fifty percent find a new job within 3 months, less than 30 percent remain unemployed for more than 6 months, and only 15 percent are still unemployed after one year. This would suggest that long-term unemployment is not a particularly severe problem for the average male person in Eastern Germany. The situation seems even more favorable for younger males with otherwise identical characteristics as the reference group, two thirds of whom leave unemployment within three months and only 5 percent are still unemployed after a year.

In contrast, most unemployment of older workers is long-term, and it seems quite plausible that those in their late fifties will remain unemployed until they qualify for early retirement. Aside from age, there are other characteristics which

contribute substatially to the concentration of long-term unemployment. Females, in particular those with small children, and with otherwise the same characteristics as the reference group have much higher survival rates in unemployment. There are two possible explanations for this latter result: either is there some form of concealed sex-discrimination in employers' hiring decisions[17], or females, and in particular those with small children, are searching less intensively or efficiently for a job.

Another striking result in Table 2 is the very strong effect marital status has on survival rates in unemployment: for singles, the survival rate after six month is, *ceteris paribus,* twice and after twelve months even three times as high as for the reference group. Although it seems difficult to explain this result in economic terms, given that the model controls for the level of household income, the most plausible explanation probably is that the unemployed without familiy responsibilities face less pressure to take up a job quickly and, hence, search longer. Household income does have a relatively strong effect on survival rates, but — as mentioned above — not with the expected sign.

Turning to the labour market indicators, one finds strong effects of some of the regional dummy variables. However, the change in the unemployment/vacancy ratio has only a relatively small effect on individual unemployment behaviour. This does not necessarily imply that demand-side factors are less important than individual supply-side behaviour in determining unemployment duration; it could well be the case that this highly aggregated variable is simply not appropriate to capture demand-side effects at the individual level. It should also be noted that some of of the time-series variation in the unemployment/vacancy ratio may be captured by the baseline hazard. Lacking a better proxy for demand-side factors, which ideally would also allow for cross-sectional variation, the above result should obviously interpreted with some care.

An important result is the very strong negative effect the experience of previous unemployment has on the hazard rate from unemployment in the current spell. Compared to the reference group, the probabilty of remaining unemployed for more than six months almost doubles and is still relatively high after a year in the case of previous unemployment. It may be interesting to note that occurrence dependence in unemployment dynamics is also an empirically important phenomenon for West Germany (see Licht/Steiner, 1991; Flaig/Licht/Steiner, 1993).

[17] Open sex discrimination is forbidden by German law.

5 Conclusions

The preceding analysis of long-term unemployment in the first two-years of currency, economic and social union in Eastern Germany has shown a rather complex development. While unemployment has stabilized at a very high level, there are large flows into and out of unemployment. The majority of unemployment spells end in employment within a few months, and long-term unemployment is experienced by only a relatively small proportion of those entering unemployment within the observation period. These characteristics of the dynamics of unemployment in Eastern Germany are very similar to the dynamic behaviour of labour markets in market economies. Hence, the prevalent description of labour market developments in Eastern Germany with its focus on the stock rather than the flows of unemployment, which tends to exaggerate the importance of long-term unemployment, seems misleading.

For the "average" male Eastern German, long-term unemployment does not seem to be of much relevance. However, for the following reasons this does not imply that long-term unemployment is of minor importance in Eastern Germany. First, as it is well known (see, e.g., Clark/Summers, 1979), the relatively few spells with long (completed) durations contribute the bulk to overall unemployment within a year; second, long-term unemployment is heavily concentrated with respect to certain groups, in particular females and older workers. Finally, future re-employment prospects of the long-term unemployed are rather poor and, if they succeed in getting a job at all, they may have to accept a relative wage decline; for the importance of this latter effect on the Eastern German labour market see Büchel/Rendtel/Schwarze (1993).

The econometric analysis of individual unemployment behaviour has shown that the hazard rate from unemployment into employment declines sharply after the first few months and stabilizes at a relatively low level. There is also strong evidence that the experience of previous unemployment reduces an individual's re-employment probabilty in the current spell significantly. The estimation results also imply that the incidence of long-term unemployment is particularly high among older workers and married females, particularly those with small children, while for prime-aged married males it seems hardly a problem. There is no evidence that an individual's occupational qualification affects his or her re-employment probability significantly, nor is the presumption that the entitlement to unemployment benefits has a significant direct effect on individual unemployment behaviour compatible with the estimation results. The state of the aggregate labour market as well as conditions in regional and local labour markets influence individual re-employment prospects, but the quantiative effects of these factors on long-term unemployment are not as important as those of the mentioned personal characteristics. Altogether, these results would suggest that both state dependence effects and suppy-side factors play an important role for an explanation of long-term unemployment in Eastern Germany.

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