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Labour Market Dynamics and Employee Expectations in East Germany Following Reunification

by Michael Lechner, Friedhelm Pfeiffer and Gert G. Wagner

The uncertainty involved in the economic transformation of former East Germany both on the aggregate and on the individual level is obviously an issue of ongoing public and scientific debate. Three years after the fall of the Berlin wall in 1989, the East German economy has fallen into a dramatic recession with an unparalleled decline in output and growing unemployment.

We are interested in the subjective expectations of East German workers about their chances on the labour market in the near future. Expectations are oriented towards the future. The formation of expectations takes time and results from workers' experiences and ability to gather and evaluate available information, which differs among individuals. In order to capture this heterogeneity, we take detailed account of individual heterogeneity, the individual's information set and the economic and social environment of the individual.

Modelling Expectations

General Considerations

In the empirical literature various hypotheses on the formation of expectations have been tested. In recent years the interest of researchers has shifted from the use of macro data to micro data, since the expectation formation process is done by individuals. Furthermore, since the underlying structure of the problem is a dynamic one, the availability of panel data fosters the empirical applications.

While the hypothesis of rational expectations cannot be rejected when one has a sample of experts forecasting the price level (Keane and Runkle, 1990), most other empirical work with representative samples of the firm or household population tells a different story. In the special case of the underlying rapid transformation process, the hypothesis of rational expectations is irrelevant, or at least extremely difficult to adapt in a sensible way, for modelling workers' expectations, because these models assume that individuals behave as if they knew the underlying structural processes when formulating their expectations. But the transformation of the East German economy is a highly erratic and very complicated process. Besides the underlying uncertainties in the political process that determine industrial policies, the impact of the revolutionary changes in the Soviet Union and other Eastern European countries are not well understood. This work builds on our previous work with the 1990 cross-sections where we address the question in a static setting (Lechner et al. 1991, 1993)[1].

Model

Before the fall of the Berlin wall in November 1989 firing was almost impossible in the GDR, except for political reasons, and hence there was no need to build expectations on job loss. In June 1990 individuals were asked about their job loss expectations. We assume that these expectations were built using the available information about human capital, labour market experience, and firm information. This model of the individual expectation formation process is called the augmented error learning model by Pesaran (1987).

Generally, the subjective beliefs in period t can take the following latent form:

$$_{t+1}E^*_{t,1} = E(R^*_{t+1,i} | R^*_{t,1}, _tE^*_{t-1,i}, I_{t,i}) \quad i = 1,...,N, \quad t = 0,1,... \qquad (3.1)$$

where $_{t+1}E^*_{t,i}$ denotes expected job loss from individual i for the period $t+1$ in period t, $R^*_{t,1}$ denotes the realized job loss, and $I_{t,i}$ denotes the remaining parts of the information set available for individual i at time t. The asterisk denotes possibly unobserved variables, but the usefulness and restrictiveness of this formulation is discussed later. The information set contains variables which are observed both by the individual and the researcher, called $X_{t,1}$, and information which is only observed by the individual and hence will be subsumed in the error term. The common information contains measurable information about that part of the human capital which is easily observed, e.g., education, and forecasts about other exogenous variables, e.g., the rise of sectoral unemployment as discussed in the newspaper or on TV, or the public mood. Optimism and pessimism indicators are included as well. Specifically, we adopt the following latent linear expectation formation hypothesis, which is called (in its linear observed form) the augmented error learning model by Pesaran (1987):

$$_{t+1}E^*_{t,i} = \alpha_{E_t} E^*_{t-1,i} + \alpha_R R^*_{t,i} + X_{t,i}\beta_t + \epsilon_{t,i} \qquad t = 0,1 \qquad (3.2)$$

The augmented error learning model comes from the inclusion of the information set variables t,i. It indicates that expectations are not only formed through learning about the endogenous variable itself, but that individuals may use all information available.

Taking into account that the process in the initial period (July 1990) depends on neither lagged realisations nor lagged expectations, and that we have only information about expectations two periods ahead, we obtain:

$$_2E^*_{0,i} = X_{0,i}\beta_0 + \epsilon_{0,i} \qquad i = 1,....,N. \qquad (3.3)$$

$$_3E^*_{1,i} = \alpha_{E_2} E^*_{0,i} + \alpha_R R^*_{1,i} + X_{t,i}\beta_1 + \epsilon_{1,i} \qquad (3.4)$$

Note that typically a realization is observed only in discrete terms, which means that either one was fired or not. Here we assume that the actual realization is not taken into the expectation formation process but rather an index which has to be estimated by the researcher and the indi-

[1] Lechner and Pfeiffer (1993) analyze the individual worker's plans to become an entrepreneur after the introduction of the market economy.

vidual. What matters here is the inference people draw from observing people being fired. They recognize that people with a specific age, firm specific human capital and so on are fired and estimate from this observation the probability of their own job loss.

This index is built using:

$$R^*_{1,i} = Z_{0,i}\gamma + \epsilon^R_{1,i} \qquad i = 1,\ldots,N \tag{3.5}$$

where $Z_{t,i}$ is an information set available to the individual and the researcher, and which is generally not the same as $X_{t,i}$.

We can estimate equation (3.4) and identify the parameters α_E, α_R and the parametervectors β_t and γ up to scale and thereby learn the way expectations are formed in this framework.

The model formulation is flexible enough to capture economic as well as sociological and psychological elements of the expectation formation process. It allows the individual to learn from previous mistakes. However, when new information comes rapidly and economic adjustments are radical, past expectations or experiences should have little effect in the labour market.

But even then, gathering information may be too costly, or new information may just be ignored[2] so that new expectations are built on the old expectations. "While initially often formed by means of conscious reasoning, the expectations many times function as an automatic cognitive, affective, and conative process" (Vanden Abeele 1988, 484.) We cannot distinguish irrational from rational behaviour; we can only say something about reasonable and unreasonable behaviour when we as researchers have to define what reasonable is and where it comes from. But the model formulation captures relevant facts for job loss expectations, which are not the same for all individuals.

Econometrics

The previous considerations leads to the following equations, the coefficients of which have to be estimated:

$$_2E^*_{0,i} = X_{0,i}\beta_0 + \epsilon_{0,i} \quad ; \quad {}_2E_{0,i} = I(_2E^*_{0,i} \geq 0) \tag{4.1}$$

$$R^*_{1,i} = Z^R_{0,i}\gamma + \epsilon^R_{1,i} \quad ; \quad R_{1,i} = I(R^*_{1,i} \geq 0) \tag{4.2}$$

$$_3E^*_{1,i} = \alpha_{E_2}E^*_{0,i} + \alpha_R R^*_{1,i} + X_{t,i}\beta_1 + \epsilon_{1,i} \; ; \; {}_3E_{1,i} = I(_3E^*_{1,i} \geq 0) \tag{4.3}$$

To estimate the parameters of interest of equations (4.1), (4.2) and (4.3) we have to consider the following. First, two of the regressors, $_1E_0^*$ *and* R_1^*, are unobserved. Using the observed counterparts, $_1E_0$ and R_1, is not appropriate, since on the one hand this leads to a different model, and on the other hand they may be correlated with ϵ_1 since we cannot rule out the possibility that ϵ_0, ϵ^P_1 $\alpha\nu\delta$ ϵ_1 are correlated.

One reason they may be correlated is unobserved, individual specific factors influencing all three left hand side variables. We therefore estimate the reduced form (4.3') instead of (4.3):

$$_3E^*_{1,i} = \alpha_E X_{0,i}\beta_0 + \alpha_R Z_i\gamma + X_{1,i}\beta_1 + \omega_i \; ; \; \omega_i = \epsilon_{1,i} + \alpha_E\epsilon_{0,i} + \alpha_R\epsilon^R_{1,i} \tag{4.3'}$$

Second, equation (4.3) or (4.3') is only observable if the individual works in 1991. Performing the estimation on the working subpopulation may lead to a selectivity bias. We introduce an additional equation which indicates whether the individual works or not in 1991 and is in itself a reduced form summarizing the different labour supply and demand side aspects.

$$S^*_{1,i} = Z^S_{0,i}\gamma^S + \epsilon^S_{S,i} \quad ; \quad S_{S,i} = I(S^*_{1,i} \geq 0) \tag{4.2a}$$

$Z^S_{0,1}$ is a vector of exogenous variables and γ^S the respective coefficient vector. Let us assume that $\tilde{\epsilon}_i = (\epsilon_{0,i}, \epsilon^R_{1,i}, \epsilon^S_{1,i}, \epsilon_{1,i})$ is normally distributed with mean zero and covariance matrix Σ.

$$\Sigma = \begin{pmatrix} 1 & \varrho_V & \varrho_{OS} & \varrho_{OI} \\ & 1 & \varrho_{RS} & \varrho_{R1} \\ & & 1 & \varrho_{S1} \\ & & & 1 \end{pmatrix}$$

The normalization on the main diagonal is necessary due to the ordinal nature of all left hand side variables. This implies that $\tilde{\epsilon}_i = (\epsilon_{0,i}, \epsilon^P_{1,i}, \epsilon^S_{1,i}, \omega_{1,i})$ is also normally distributed with mean zero and a covariance which can be deduced from Σ by standard means.

Since Full Information Maximum Likelihood estimations of (4.1), (4.2), (4.2a) and (4.3') would involve four-fold integration of the normal distribution, which is prohibitively expensive in computation time, we suggest the following sequential estimation strategy. Estimate β_0, γ and ϱ_V by a bivariate probit from (4.1) and (4.2) alone. Then use the consistent estimates of γ_0 and in equation (4.3') instead of β_0 and α and estimate α_E, α_R, β_1 and ϱ_{SW} jointly by a bivariate probit with partial observability (Poirier, 1981). Note that we can only identify the scaled coefficients

$$\frac{\beta_0}{\sigma_0}, \; \frac{\gamma}{\sigma_{R,1}}, \; \frac{\gamma^S}{\sigma_{S,1}}, \; \frac{\beta_1}{\gamma_\omega} \text{ and } \alpha_0\frac{\sigma_0}{\sigma_\omega}, \; \alpha_R\frac{\sigma_R}{\sigma_\omega}.$$

The last two expressions result from the fact that the latent variable used in equation (4.3') can only be consistently estimated up to scale. The remaining parameters of Σ could be estimated with the following steps. Two bivariate probits or one trivariate probit of equation (4.1), (4.2) and (4.2a) will identify ϱ_{OS} and ϱ_{RS}. Two other trivariate probits of (4.1), (4.2a) and (4.3) and (4.2), (4.2a) and (4.3) will identify ϱ_{OW} and ϱ_{RW}. ϱ_{OW}, ϱ_{RW} and ϱ_{SW} can be used, after appropriate renormalisation to recover the structural correlation ϱ_{OI}, ϱ_{RW} and ϱ_{S1}. However, given computation time is high especially for trivariate probits, we will not recover these remaining elements of the covariance matrix.

Since limited dependent variables models are very sensitive to misspecifications of the stochastic structure, we

[2] This is the case of cognitive dissonances which are discussed by Hirshman (1965) and Akerlof and Dickens (1982). Takatoshi (1990) talks of wishful thinking.

will perform some specification tests. These procedures will be based on the univariate probits of equation (4.1), (4.2) and (4.2a). We conduct score tests against heteroscedasticity, omitted variables and information matrix tests as suggested by Laisney et al. (1991) or Lechner (1991). Although tests for bivariate probit models with partial observability can be basically constructed on the same lines as the ones mentioned, this will be left to future research.

All variances, t-values and score tests which are given later are based on pseudo maximum-likelihood theory and have the advantage that they are more robust to misspecifications than the usual ones which are based either on the hessian, the sample analog of the information matrix or the matrix of the outer product of the gradient to estimate the covariance matrix.

Data

The data of our analysis are taken from a balanced subsample of the first two waves from the German Socio-Economic Panel (SOEP) for East Germany, 1990 and 1991. All working members of the household are asked the following question: "What are your future job expectations?" and, in a more detailed form, "Do you think that you will lose your job within the next two years?". The response categories are "definitely", "probably", "probably not" and "definitely not". To keep things tractable for the dynamic analysis, we aggregate the first and the last two categories. Our aim is to explain the determinants of these answers. It is noteworthy that the dropout rate between the two waves for those people who expected unemployment in the first wave is only a little bit higher (9.1 %) than the average dropout rate (8.3%). This is at least an indication, though admittedly slight that attrition can be ignored and hence an explicit modelling of the attrition process is not necessary for this analysis. Following Lechner et al. (1991, 1993) we choose only individuals with German citizenship between the ages of 20 and 57 and exclude apprentices from our sample. In addition, we disregard those not regularly employed and the self-employed.

Table 1 shows the number of workers who definitely or probably expected to lose their job in the next two years in 1990 and in 1991, and the number of workers who actually lost their job between 1990 and 1991. Expectations became worse in 1991, since 46.3% expected a job loss in 1991 compared to 43% in 1990. Between 1990 and 1991 14.4% of the workers actually lost their job. In the last two rows of Table 1 expected and realized job loss are compared. Although only 20.2% of those workers who expected to lose their job definitely or probably actually lost their job, this number is clearly less for the workers who didn't expect to lose their job, which is only 10.1%.

Overall we have to specify exogenous variables for the four different equations (4.1, 4.2, 4.2a, 4.3'), corresponding to $X_{0,i}$, $X_{1,i}$, $Z^R_{0,i}$, $Z^S_{0,i}$. For the analysis of the expectations in the two years we adopted nearly the same specification as in our previous work (see Lechner et al., 1993). This specification has the advantage of having been tested extensively. However, there are several differences in the present paper.

We neglect all interaction terms, which were important in our previous analysis, because of the high computional burden in the trivariate probit. We constructed some new variables and leave out others, which will be discussed below. For the realization equation the same variables are used as for the expectations in 1990. This seems to be an obvious procedure. It relates the same information set to expectations and realizations. The last equation to be specified is the selection equation in 1991. There we take the same variables constructed for the equation which determines the job loss realizations as well as the information about the easiness of getting a place for little children in a kindergarten. This can't be the reason for being laid off, but it may be of importance in the decision to participate in the labour market.

The first group of variables concerns the firm's economic environment (see Table 2). Besides seven sectoral dummy variables (comparable to the one-digit level of the official statistic) we have information about the number of employees. The size of firms in former East and West Germany differ significantly. About 20.4% of those working in West Germany are employed in firms with fewer than 20 employees; in East Germany it is only 10%. We expect that the small firm sector ("firm size 0-20") promises above average growth in East Germany. Between 1990 and 1991 the industry structure, however, didn't change much.

The variable "layoffs" equals one if job reductions have been announced in the firm. Another variable, which was included in our previous work, and that indicated whether the individual was directly affected by job reductions, will not be used any longer, since it contains the same information as what we want to explain. Furthermore, indicators are included to control for regional determinants (this indicators relate to the regions East Berlin and Gera/Chemnitz only). This first group of variables is available in the 1990 and 1991 data. In 1991 all workers were asked about their expectations of the employment development in their

Table 1

Expected and Realized Job Loss in 1990 and 1991

job loss expectations	definitely/ probably	probably/ definitely not
1990 [observations: 1672]	719 (43.0 %)	953 (57.0 %)
1991 [observations: 1477]	684 (46.3 %)	793 (53.7 %)
job loss realization 1991	yes	no
all observations [1672]	240 (14.4 %)	1 432 (85.6 %)
definitely/probably expected 1990	145 (20.2 %)	574 (79.8 %)
probably/definitely not expexted 1990	96 (10.1 %)	857 (89.9 %)

Source: SOEP-East 1990, 1991.

firm in the next year. Only 9% of the workers in 1991 expected increased employment ("expect incr empl"), while 24% believed decreased employment ("expect decr empl"). This information is not available in 1990, and the regional, sectoral and structural indicators are substituted instead.

The current job position in the firm is defined by three dummy variables: skilled workers ("skilled"), masters in trade ("master") and managers ("manager"). The unskilled and semi-skilled workers serve as the reference category. We also include two dummies to indicate whether the workers themselves feel over- or underqualified for their current occupation. 20% (4%) feel that they are overqualified (underqualified) for their current occupation in 1990 and 1991. Our hypothesis is that overqualification might shelter a worker from the threat of unemployment.

"Relatives in WG" represents workers who have close contact with relatives in West Germany in 1991, which was true for 24% of all workers[3]. This additional qualification guarantees that the relationships are still active, i.e., that a regular information flow exists.

[3] This question was not included in the personal questionnaire in 1990.

Table 2

Description of Variables

Variable	Mean 1990	Mean Working in 1991	Description
light industry [0,1]	0.19	0.19	*light* industry, 1990
agriculture [0,1]	0.13	0.13	agriculture, 1990
construction [0,1]	0.07	0.07	construction, 1990
trade [0,1]	0.08	0.08	trade, 1990
communic., transp. [0,1]	0.07	0.08	communication and transportation, 1990
public sector [0,1]	0.07	0.07	public sector, 1990; reference of sectors: *heavy* industry
other services [0,1]	0.22	0.22	services, 1990
firm size 0-20[0,1]	0.10	0.10	employment in the firm less than 20 employees, 1990
firm size 0-200 [0,1]	0.31	0.29	employment in the firm with less 200 employees, 1990
lay-offs [0,1]	0.43	0.43	lay-offs in same firm, 1990
expect incr empl [0,1]		0.09	expected increasing employment in firm
expect decr empl [0,1]		.24	expected decreasing employment in firm
self-employed [0,1]		0.02	self-employed in 1991
new firm [0,1]		0.16	working in newly founded firm
overtime [0,1]		0.26	working overtime
bonuses [0,1]		0.10	bonus payments on the job, 1991
short-time work [0,1]		0.21	unvoluntary short-time work
net income	973	991	net monthly labour income in DM
state employee [0,1]	0.35	0.35	employed by state (subjective), 1990
temporary contract [0,1]	0.04	0.03	temporary contract, 1990
skilled worker [0,1]	0.55	0.56	*Facharbeiter,* 1990
master [0,1]	0.06	0.06	*Meister,* 1990
management [0,1]	0.20	0.21	higher management, 1990
underqualified [0,1]	0.04	0.04	less qualified than necessary for current occupation, 1990, subjective rating
overqualified [0,1]	0.20	0.20	more qualified than necessary for current occupation, 1990, subjective rating
tenure	12.1	12.3	years of employment in the same firm
days of illness	4.9	4.6	number of days not working (illness), 1990
schooling: 10 years [0,1]	0.54	0.55	schooling: degree after 10 years
schooling: 12 years [0,1]	0.16	0.16	schooling: university entrancequalification (schooling reference: degree after 8 years, no degree)
age	38.3	38.2	age in years in 1990
confused [0,1]	0.07	0.06	confused by new circumstances, 1990, 1991
July 1990 [0,1]	0.03	0.03	interview in July 1990
May 1990 [0,1]	0.08	0.07	interview in May 1991
female [0,1]	0.49	0.47	female
Gera/Chemnitz [0,1]	0.16	0.16	living in districts Gera and Chemnitz
East Berlin [0,1]	0.07	0.07	living in East Berlin
relatives in WG [0,1]		0.24	relatives in West Germany
big worries kinderg. [0,1]		0.15	big worries about availability of kindergarten places
some worries kinderg. [0,1]		0.09	some worries about availability of kindergarten places, refences: no worries about availability of kindergarten places

East German society has been caught in a rapid process of change since the fall of the Berlin wall in November 1989, which has led to large swings in public opinion in short periods of time. The euphoria immediately after the opening to the West soon gave way to a more realistic point of view. July 1, the day of the "Economic, Monetary and Social Unification" (EMSU) is a reasonable date to separate expectations, since we assume labour market expectations were more pessimistic thereafter. The variable "JULY 1990" equals one for those who responded to the survey in July, i.e., after the EMSU. "MAY 1991" equals one for those who responded to the survey after April 1991.

Table 3

Estimation Results

Variables	${}_2E_0^*$ coefficient	t-value	R_1^* coefficient	t-value	${}_3E_1^*$ coefficient	t-value
constant	**−0.51**	−2.6	0.16	0.3	−0.53	−0.2
light industry	0.14	1.3	−0.15	−1.1	*	
agriculture	0.00	0.0	**−0.66**	−4.2	*	
construction	**0.38**	2.6	−0.24	−1.2	*	
trade	**0.44**	3.1	−0.23	−1.3	*	
communication, transport	0.29	1.7	0.35	1.4	*	
public sector	0.27	1.5	−0.32	−1.5	*	
other services	**0.38**	2.6	−0.04	−0.2	*	
firm size 0-20	0.44	3.6	−0.19	−1.3	*	
firm size 0-200	0.09	1.2	−0.14	−1.5	*	
lay-offs	**−0.39**	−5.6	**−0.36**	−4.2	*	
expect increase of employment	n.a.		n.a.		0.32	1.7
expect decrease of employment	n.a.		n.a.		**−1.01**	−9.1
self-employed	excl.		excl.		0.43	1.0
new firm	0		0		**0.41**	2.5
overtime	0		0		0.16	1.7
bonuses	0		0		0.24	1.8
short-time work	n.a.		n.a.		**−0.84**	−6.5
net income/100	**0.06**	4.6	0.02	1.4	**0.03**	2.0
state employee	0.13	1.1	−0.22	−1.6	0.17	1.6
temporary contract	−0.12	−0.7	−0.05	−0.3	**−0.87**	−4.5
skilled	**0.20**	2.1	0.10	0.9	0.11	0.7
master	**0.41**	2.5	0.05	0.3	0.12	0.5
management	0.04	0.3	0.28	1.6	−0.10	−0.5
underqualified	−0.20	−1.2	−0.21	−1.2	−0.19	−1.0
overqualified	−0.08	−0.9	0.16	1.5	−0.03	−0.3
tenuretenure (L0/21)	**0.016**	2.4	0.01	1.2	0.01	1.3
days of illness	**−0.14**	−2.7	−0.00	−0.0	−0.04	−1.1
schooling: 10 years	−0.003	−1.3	0		0	
schooling: 12 years	0		**−0.23**	−1.9	0	
age/10	0		**−0.56**	−3.5	0	
age²/1000	0		**0.96**	2.9	0.08	0.6
confused	0		**−1.53**	−3.6	−1.31	−0.8
July 1990, May 1991	−0.17	1.2	0		**−0.56**	−3.0
female	−0.18	−1.0	−0.34	−2.5	−0.22	−1.1
Gera/Chemnitz	**−0.17**	−2.2	−0.19	−1.9	−0.19	−1.0
East Berlin	**0.35**	3.8	0.06	0.6	*	
relative in WG	0.06	0.4	0.18	1.1	*	
big worries	n.a.		—		0.16	1.7
kindergartensome worries	n.a.		—		−0.44	−1.4
kindergarten	n.a.		—		**−0.23**	−2.0
α^E	—		—		**−0.31**	2.2
α^R	—		—		−0.21	−0.5
ϱ_V	**0.23**		**4.7**		—	—
ϱ_{SW}					−0.09	−0.1
log likelihood (obs)	1241 (1672)				1658 (1672)	

Note: A positive coefficient implies increased job security. — 0 coefficient restricted after preliminary specification search. — * proxies have been substituted by direct question. — n.a. not available. — - coefficients restricted on a priori reasons.

Results

The results of the estimations are given in Table 2. For the sake of brevity we will discuss only the economically important equations, namely (4.1), (4.2) and (4.3').

The overall impression is that the three processes are different. Before unification the individual expectations about a job loss were wrong. The determinants of expectations nine month after unification are different. It is an interesting open question whether this expectation will continue incorrect as well.

Only the one coefficient for females has the same sign and approximately the same magnitude in all equations. The negativ expectations of females are proved to be correct. Equation 4.3' gives a deeper insight into the poor labour market conditions of women. Mothers who have worries about day care (Kindergarten) have a higher subjective probability of job loss.

Before unification most of the expectations concerning job stability in different sectors were wrong. Employees in small firms felt more secure than others, but they were wrong too. The same is true for more skilled employees with tenure. What came about is a large increase in job losses for older workers and for employees with a higher level of schooling.

After unification expectations seem to be more realistic. Employees working in a firm whith a propensity to lay off workers have strong negative expectations. The same is true for employees on short time work. On the other hand employees of new firms feel much more secure, as do employees with a higher income.

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