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Badi H. Baltagi
Uwe Blien
Katja Wolf

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Badi H. Baltagi
Syracuse University and IZA

Uwe Blien
IAB Nuremberg and IZA

Katja Wolf
IAB Nuremberg

ABSTRACT

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In 1994, Blanchflower and Oswald reported that they have found an 'empirical law of economics' – the Wage Curve. According to their empirical results, the elasticity of wages with respect to regional unemployment is -0.1. This holds especially for the Anglo-Saxon countries. Our paper reconsiders the western German Wage Curve using disaggregated regional data and is based on a random sample of 974,179 employees drawn from the employment statistics of the Federal Employment Services of Germany (Bundesagentur für Arbeit) over the period 1980-2004. We find that the wage equation is highly autoregressive but far from unit root. This means that this wage equation is not a pure Phillips curve, nor a static Wage Curve, and one should account for wage dynamics. The unemployment elasticity is significant but relatively small: only between -0.02 and -0.04. We also check the sensitivity of this wage elasticity for different population groups (young versus old, men versus women, less educated versus highly educated, German native versus foreigner). We confirm that the wage elasticity is more flexible the weaker the bargaining power of the particular group.

JEL Classification: J30, C23, R10

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Corresponding author:

Badi H. Baltagi
Center for Policy Research
and Department of Economics
Syracuse University
Syracuse, New York 13244-1020
USA
Email: bbaltagi@maxwell.syr.edu

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1. Introduction

Blanchflower and Oswald (1994) reported that they have found an 'empirical law of economics' – the Wage Curve, (see also Blanchflower and Oswald 2005). This empirical law stated that the elasticity of wages with respect to regional unemployment was -0.1. This result was remarkably stable across countries. Their 1994 book on the Wage Curve provoked a great deal of research in numerous countries. It has recently been the subject of a meta-analysis (Nijkamp, Poot 2005) and of several surveys (Blanchflower, Oswald 2005, Montuenga-Gomez, Ramos-Parreno 2005). This paper reconsiders the evidence on the Wage Curve for western Germany. Our data base is a panel data set obtained from the employment sample of the German Institute for Employment Research (IAB) which distinguishes 326 regional labour markets over the period 1980-2004. It is based on a 2-% random sample of the total population of employees covered by the social insurance system in western Germany. It contains information on about 974,179 employees. This data set compares well with the one used by Bell, Nickell & Quintini (2002) for the U.K. Their data source was the U.K. New Earnings Survey which is a 1% sample survey of employees. They had 10 regions and 22 years (1976-1997). By implementing an approach parallel to theirs we have the rare opportunity of a direct cross-country comparison.

Our approach focuses mainly on the analysis of a dynamic version of the Wage Curve. Blanchflower and Oswald emphasize that the Wage Curve is *not* a Phillips curve. The latter is estimated using macro time series data which relates the rate of change of wages to the aggregate unemployment rate, while the former is estimated using micro panel data which relates the level of wages to the local unemployment rate. When Blanchflower and Oswald (1994a) included lagged wages in their model, they found it to be statistically insignificant, thus rejecting the Phillips curve. Contrary evidence can be found in Blanchard and Katz (1997) for the U.S. and Bell, et al. (2002) for the U.K. More recently, Blanchflower and Oswald (2005, p.5) admit that, in hindsight, their 1994 book "…failed to examine sufficiently carefully the autoregressive nature of hourly pay in the United States". They find more autoregression in pay in the U.S. than in many nations and they emphasize wage dynamics arguing that it can be expected to play a central role.

It is in this spirit that we re-examine the *static* formulation of the West German Wage Curve considered by Baltagi and Blien (1998). We find that this wage equation is indeed *dynamic* and we estimate it for different population groups (young versus old, men versus women, less educated versus highly educated, German native versus foreigner). We confirm that the wage elasticity is more flexible the weaker the bargaining power of the particular group.

2. The Model

Following Bell, et al. (2002), we analyse the wage curve in two steps. A `first stage panel´ wage equation is estimated for each region j as follows:

$$W_{ijt}=\alpha_i+\alpha_{jt}+\sum_{k}^{K}X_{ijtk}\beta_{jk}+\varepsilon_{ijt} \qquad (1)$$

$$i = 1,...,N \qquad j = 1,...,J \quad \text{and} \qquad t = 1,...,T$$

where W_{ijt} is the log wage rate of individual i observed in region j at period t. X_{ijtk} is a set of k=1,…,K measured characteristics of individual i (such as age, age^2, gender, education, occupation, etc.), α_i is the i-th individual effect, α_{jt} is the time effect for region j, and ε_{ijt} is the remainder error term. The estimate of α_{jt}, obtained from running a panel regression with fixed effects for each region j, is denoted by the `composition corrected wage´ in the regional panel model. Bell, et al. (2002) also estimate a `first stage cross-section´ wage equation for each year t as follows:

$$W_{ijt}=\alpha_{0t}+\alpha_{jt}+\sum_{k}^{K}X_{ijtk}\beta_{tk}+\eta_{ijt} \qquad (2)$$

Here, one gets an alternative estimate of α_{jt} using the cross-section regressions for each year. Note that in (1), β_{jk} differs across regions, whereas in (2), β_{tk} differs over time. Every regression in (1) is based on NT observations, whereas, every regression in (2) is based on NJ observations. We regard the first stage panel as the preferred model since it provides better control for unobserved heterogeneity due to the inclusion of individual fixed effects. The two-stage cross-section is used for robustness checks.

For both estimates of α_{jt} - by (1) or by (2) - the second stage regression of Bell, et al.(2002) is as follows:

$$\alpha_{jt}=\mu_j+\lambda_t+\beta_1\alpha_{jt-1}+\beta_2 u_{jt}+\sum_{j=2}^{J}(\gamma_j{'}D_j)t+v_{jt} \qquad (3)$$

where u_{jt} is the log of regional unemployment rate in region j at time period t. D_j is a region dummy. The number of observations for this regression is JT. This is a dynamic panel data equation with region specific time trends included to capture systematic trends in region specific wage pressure.

Bell, et al. (2002) estimate their dynamic models with fixed effects, which is subject to the Nickell (1981) bias of order (1/T). In our case, T=25, therefore the potential bias may be small. Bell et al. argue that β_1 will be typically overstated if factors that vary systematically across regions and over time are not adequately captured. These factors include unobserved labour quality and autonomous wage pressure arising from variations in unionization, rent capture and the extent of product market competition. They emphasize the importance of including region specific trends since one cannot adequately control for these factors.

A panel version of the model on the Wage Curve using individual data is given by:

$$W_{ijt} = \alpha_i + \mu_j + \lambda_t + \beta_1 W_{ijt-1} + \beta_2 u_{jt} + \sum_{j=2}^{J} (\gamma_j{'} D_j) t + \sum_{k}^{K} X_{ijtk} \beta_k + v_{ijt} \qquad (4)$$

with individual effects α_i, region effects μ_j, time effects λ_t, and regional trends as well as lagged wages, unemployment, and other control variables. The fact that u_{jt} does not vary with i implies that the effective number of observations is JT and not NT, see Card (1995). Apart from this we follow Bell, et al. who prefer the two-stage method, since if there are unobserved variables at the regional level, the combination of time and regional fixed effects will take them into account in the first stage of the analysis. However, the model with individual data is also estimated whenever possible for robustness checks.

3. Empirical Results

Prior Wage Curve results for West Germany were reported by Blanchflower and Oswald (1994a), Wagner (1994), Baltagi and Blien (1998), Buettner (1999), Pannenberg and Schwarze (2000), and Bellmann and Blien (2001) to mention a few. The reported effects of the log of unemployment varied between -0.01 and -0.1. See also Blanchflower and Oswald (2005) for a list of over 40 country studies on the Wage Curve.

Baltagi and Blien (1998) estimated a -0.07 wage elasticity for all West German workers. The wages of male workers were slightly more responsive than wages of female workers to the local unemployment rate. The wages of younger workers were more responsive to the local unemployment rate than the wages of older workers. Wages of workers with less qualifications were also more responsive to local unemployment than wages of workers with higher qualifications. Baltagi and Blien emphasized that it was important to treat unemployment as endogenous. However, Baltagi and Blien (1998) did not account for *wage dynamics*.

In this section, we report German Wage Curve results based on a random sample from the IAB Employment Sample (see the appendix, for details). This random sample consists of 974,179 individuals drawn from the population of employees whose establishments are required to report to the social insurance system. The latter group comprises about 80% of all employment in Germany. Excluded from this group are civil servants and workers with very low income. The total number of observations of our sample is 9,188,532 covering 326 districts over the period 1980-2004. These districts are the administrative units of western Germany and are the smallest regions for which unemployment rates are available.

Since the data are extracted from administrative files used to compute the contributions to the social insurance system (and later are the basis of pensions paid), they are very reliable. No problem of recall or reporting is encountered as in population surveys. Two limitations of the data, however, should be briefly discussed. One limitation is that the wages reported are censored for groups with high income. For individuals with wages exceeding a defined threshold, the contribution assessment ceiling of the social insurance system, only the value of this threshold is reported. In these cases the exact value of the wage is unknown. For example, in 1989, this threshold was a monthly income of 3,119 Euro. Tests were carried out using refined methods of dealing with this kind of problem, i. e. multiple imputation of wages above the threshold. Using panel data on a shorter time period these tests showed only very small changes in the results on the wage curve. Since additional assumptions are required to use imputation, this line of research was not pursued any further. Another limitation is that no exact working hours are reported in the data. To avoid any contamination with working time effects as far as possible, only people working full time were included in our data base. We expect that small variations of working time due to overtime etc. are taken out by time and industry dummies. But of course, slight uncertainties about the size of this effect remain. Using a completely different data basis (the German Microcensus) Ammermüller et al. (2007) address differences in the estimation of the Wage Curve using monthly and hourly wages.

Column 1 in Table 1 gives the results for the dynamic German Wage Curve for all workers based on the `first stage panel´ wage equation given in (1), while column 2 gives the results based on the `first stage cross-sectional´ wage equation given in (2) as a robustness check. The other columns in Table 1 show the results based on the `first stage panel' wage equation by type of worker, i.e., male, female, young, old, low or high level of education and foreigners or Germans. We report the fixed effects estimator assuming the unemployment rate is exogenous, as well as the fixed effects estimator instrumenting for the unemployment rate by its lagged values, see Bell, et al. (2002).

Only the lagged wage coefficient and the short-run and long-run unemployment elasticities are reported in order to save space. The results on the control variables are available upon request from the authors. These include age, age^2, gender, four worker qualification categories, six employment status categories, fourteen occupational categories, thirty one industry categories and nine establishment size categories. For a detailed description of this data set and the variables used, see the data appendix.

The following results are robust to the method of estimation used, whether fixed effects or fixed effects IV:

(1) We find that the lagged wage is significant, i.e., β_1 is significantly different from zero, rejecting the static wage equation in favour of a dynamic wage specification.

(2) This estimate of β_1 is so far from unity (a maximum of 0.5 with a very small standard error 0.01) and we reject the unit root hypothesis implied by the pure Phillips curve. This coefficient estimate was slightly smaller when we instrumented for unemployment by its lagged values, but much smaller when our estimate was based on a `first stage cross-sectional´ rather than a `first stage panel´ wage equation (0.3 rather than 0.5).

(3) The short-run and long-run elasticities of wages with respect to unemployment are relatively small but significant. For all workers the effect of regional unemployment on wages is -0.016 in the short run and -0.037 in the long run. These elasticities were slightly smaller when we do not instrument for unemployment by its lagged values, and much smaller when our estimates were based on a `first stage cross-sectional´ rather than a `first stage panel´ wage equation.

Whereas Ammermüller et al. (2007) find with Microcensus data a German Wage Curve only for subgroups on the labour market, our results are significant for the complete population. Similar results were obtained by Pannenberg and Schwarze (2000) using regional panel data of 74 `Raumordungsregion´ (ROR) of West Germany over the period 1985-1994. They estimated a lagged coefficient on wage of 0.30 and a short-run unemployment elasticity of -0.03 for the years

1990-1994, but found no Wage Curve for the earlier period. We conclude that wages exhibit a high degree of auto-regression, both at the regional and individual level, thus favouring a dynamic rather than a static wage equation. Also, that the coefficient estimate of lagged wages is far from unit root and is not in favour of the pure Phillips curve. Montuenga-Gomez and Ramos-Pareno (2005) survey the literature on the Wage Curve and Phillips curve. Although they find ample evidence supporting one side or the other, they argue that recent successful work in this area take the intermediate position between the static Wage Curve and the pure Phillips curve and estimate a dynamic specification relating wages and unemployment that nests these two models as extreme cases.

Blanchflower and Oswald (1994a) and Card (1995) suggest the estimation of different Wage Curves for different population groups (young versus old, men versus women, white versus non-white, etc). One would expect the wage to be more flexible the weaker the bargaining power of the particular group. Blanchflower and Oswald find that younger workers have a significantly higher wage elasticity than older workers for all countries except Australia. For West Germany, the fixed effects IV-estimator of this elasticity is larger for younger workers (below the age of 30) than older workers (above the age of 45), -0.018 as compared to -0.014 in the short-run, and -0.042 as compared to -0.029 in the long-run.

Blanchflower and Oswald (1994a) and Card (1995) find that for the U.S. data, men's wages are more sensitive to the unemployment rate than women's wages. This is true for West Germany, -0.018 for males as compared to -0.014 for females in the short-run and -0.037 as compared to -0.029 in the long-run. Blanchflower and Oswald (1994a) find that more educated workers in the U.S. have a significantly lower wage elasticity than less educated workers. This is also true for Canada and one of the U.K. data sets, but not so for Australia. In West Germany, we find that the unemployment elasticity for less qualified workers is -0.013 as compared to -0.014 for highly qualified workers in the short-run, and -0.025 as compared to -0.026 in the long-run. The estimates for the high qualified are not significant, however. Other groups that are interesting to compare are those of foreigners versus Germans. Many foreigners have a background related to migration. For migrants one should expect a stronger effect of unemployment on wages since they have lower bargaining power. This is confirmed by our results The short-run effect is -0.016 in the case of Germans and -0.020 in the case of foreigners. This corresponds to long-run effects of -0.035 and -0.038.

Table 2 gives some robustness checks. There, the results for the dynamic German Wage Curve based on the individual fixed effects equation (4) are presented. These results are based on a distinction of workers according to qualification, gender and age. For example, the group of young

males, contains N=57,859 individuals observed over the period 1980-2004, which amounts to a total of 254,021 observations. The upper panel for Table 2 depicts males, the lower panel females. These fixed effects regressions are also run allowing unemployment to be endogenous and instrumenting it by its lags, see Bell, et al. (2002).

The results in Table 2 confirm that the lagged wage is significant (compare Table 1). The estimates for the lagged wage range from 0.31 for young males to 0.68 for older females. The short-run elasticities of wages with respect to unemployment for younger males are larger than those for older males (-0.02 as compared to -0.012), although the long run elasticities are about the same (-0.03). This is compared to a short-run elasticity of -0.013 for young females which is more than twice that of older females (-0.006). The corresponding long run elasticities are -0.024 and -0.019, respectively. Similarly, low qualified males/females have significantly larger short-run and long-run elasticities than highly qualified males/females. In fact, the elasticities for highly qualified males and females are in most cases not significantly different from zero. As we have emphasized earlier these results obtained with individual data are mainly robustness checks for the two-stage regressions. In general, the results with individual data confirm those of the two-step approach.

The cross-country comparison between Germany and the UK yields the result that there are similarities between both countries, since there is a wage curve in both cases. In absolute terms the coefficient is much smaller in Germany, however. This can be related to the centralised system of wage setting of the country (see Layard, Nickell & Jackman 2006, Ludsteck 2004, Flanagan 1999). Unions negotiate at the level of industries, thus the regional differentiation of negotiated wages is small. E. g. in the case of the important metal union and the corresponding employers' association the negotiated wages of the middle wage group varied between extreme values of 2607 and 2616 DM in western Germany (1992, see Bispinck et al. 1995, p. 65), that is below 1 %.

4. Conclusion

This study reconsiders the empirical evidence on the West German Wage Curve. It uses the IAB Employment Sample (IABS) over the period 1980-2004. We find support for a dynamic Wage Curve, i.e., a significant coefficient on lagged wages (0.40 for `first stage cross-sectional´ and 0.55 for `first stage panels´) that is far from unity. This tends to support the story that price and wage rigidities, along with the process of matching, bargaining and rent sharing, result in the partial adjustment of wages to shocks. The wage elasticity with respect to unemployment is relatively

small but significant (-0.016) in the short-run and about double (-0.037) in the long-run. This is much smaller than the empirical law prediction of -0.1. However, we hasten to add that Blanchflower and Oswald (1994a) themselves argue that "it would probably be unwise to treat the minus point one rule as more than one of thumb". There is a link from the institutional background of the labour market to the size of the unemployment effect. The relatively small one for western Germany can be related to the centralised system of wage setting of the country. We also find that this wage elasticity for is more elastic for groups with weaker bargaining power, i.e., younger versus older workers, men versus women, foreigners versus native Germans.

Table 1: Dynamic Regional German Wage Curve By Type of Worker
The IAB Employment Sample: 1980-2004[a]

	First Stage Panel	First Stage Cross Section	Age First Stage Panel		Gender First Stage Panel	
	All	**All**	**Young**	**Old**	**Male**	**Female**
Fixed Effects[b]	**N=7824**	**N=7824**	**N=7824**	**N=7824**	**N=7824**	**N=7824**
W_{ijt-1}	0.581 (0.0097)	0.435 (0.0109)	0.596 (0.0098)	0.556 (0.0099)	0.560 (0.0100)	0.559 (0.0100)
Short-Run u_{jt}	-0.011 (0.0008)	-0.008 (0.0010)	-0.015 (0.0015)	-0.010 (0.0009)	-0.012 (0.0009)	-0.010 (0.0014)
Long-Run u_{jt}	-0.027 (0.0018)	-0.014 (0.0018)	-0.037 (0.0038)	-0.023 (0.0020)	-0.027 (0.0020)	-0.022 (0.0031)
F Test[c]	6.76	6.02	6.03	6.98	6.90	7.02
Fixed Effects IV[d]	**N=7172**	**N=7172**	**N=7172**	**N=7172**	**N=7172**	**N=7172**
W_{ijt-1}	0.552 (0.0109)	0.404 (0.0118)	0.577 (0.0108)	0.518 (0.0109)	0.525 (0.0109)	0.535 (0.0109)
Short-Run u_{jt}	-0.016 (0.0016)	-0.014 (0.0022)	-0.018 (0.0032)	-0.014 (0.0018)	-0.018 (0.0018)	-0.014 (0.0028)
Long-Run u_{jt}	-0.037 (0.0035)	-0.023 (0.0035)	-0.042 (0.0073)	-0.029 (0.0037)	-0.037 (0.0036)	-0.029 (0.0059)
F Test[c]	5.92	5.65	5.40	6.76	6.57	6.35

	Qualification First Stage Panel		Nationality First Stage Panel	
	LowQuali	**HighQuali**	**Germans**	**Foreigners**
Fixed Effects[b]	**N=7824**	**N=7810**	**N=7824**	**N=7816**
W_{ijt-1}	0.489 (0.0107)	0.436 (0.0095)	0.581 (0.0097)	0.519 (0.0109)
Short-Run u_{jt}	-0.013 (0.0014)	-0.005 (0.0036)	-0.011 (0.0008)	-0.016 (0.0035)
Long-Run u_{jt}	-0.026 (0.0028)	-0.009 (0.0068)	-0.027 (0.0019)	-0.033 (0.0072)
F Test[c]	7.55	12.52	6.79	6.72
Fixed Effects IV[d]	**N=7172**	**N=7159**	**N=7172**	**N=7165**
W_{ijt-1}	0.462 (0.0116)	0.473 (0.0106)	0.553 (0.000)	0.488 (0.0118)
Short-Run u_{jt}	--0.013 (0.0030)	-0.014 (0.0071)	-0.016 (0.000)	-0.020 (0.0071)
Long-Run u_{jt}	-0.025 (0.0055)	-0.026 (0.0132)	-0.035 (0.0036)	-0.038 (0.0137)
F Test[c]	7.13	8.47	5.97	6.31

[a] Other control variables include Age, Age^2, Gender, Worker's Qualification (4 categories), 6 employment status categories, 14 occupational categories, 30 industry categories and 9 establishment size categories. The number of observations for the first stage panel regression is NT and varies from region to region (3982 to 219217 observations). The number of observations for the first stage cross-section regression is NJ and varies from year to year (303820 to 358642 observations).The number of observations for the second stage regression is 7824 based on 326 regions over 24 years. See the data appendix for a detailed description of these variables.

[b] This includes region dummies, time dummies and regional trends.

c This tests for the significance of the individual dummies.

[d] This instruments for unemployment by its lags, see Bell et al. (2002).

Table 2: Dynamic Regional German Wage Curve By Type of Worker
The IAB Employment Sample: 1980-2004[a]
Fixed Effects Individual Results

	High Qualified/Male	Low Qualified / Male	Old / Male	Young/Male
Fixed Effects[b]				
W_{ijt-1}	0.546 (0.002)	0.5778 (0.001)	0.610 (0.002)	0.3489 (0.001)
Short-Run u_{jt}	-0.003 (0.002)	-0.014 (0.001)	-0.012 (0.002)	-0.020 (0.002)
Long-Run u_{jt}	-0.007 (0.004)	-0.032 (0.003)	-0.030 (0.004)	-0.031 (0.003)
F Test[c]	4.28	3.18	1.79	3.24
	NT=171506, N=17582	NT=339600, N=38884	NT=324571, N=56984	NT=254021, N=57859

	High Qualified/Female	Low Qualified /Female	Old / Female	Young / Female
Fixed Effects[b]				
W_{ijt-1}	0.612 (0.005)	0.671 (0.002)	0.680 (0.002)	0.455 (0.002)
Short-Run u_{jt}	0.001 (0.008)	-0.008 (0.002)	-0.006 (0.002)	-0.013 (0.003)
Long-Run u_{jt}	0.004 (0.018)	-0.024 (0.007)	-0.019 (0.006)	-0.024 (0.001)
F Test[c]	3.68	2.87	2.27	3.03
	NT=30467, N=3631	NT=236972, N=26248	NT=269000, N=33742	NT=172670, N=35399

[a] Other control variables include Age, Age[2], Gender, Worker's Qualification (4 categories), 6 employment status categories, 14 occupational categories, 30 industry categories and 9 establishment size categories. See the data appendix for a detailed description of these variables. We include only individuals with *T>7*. This Appendix is available upon request from the authors.

[b] This includes region dummies, time dummies and regional trends.

[c] This tests for the significance of the individual dummies.

Data Appendix

The data set used in this study is a one percent random sample of the Employment Statistics which includes the total population of people gainfully employed and included in the social insurance system in western Germany. This is over 80% of all employment. The observation period is 1980-2004. The 25 waves of this panel include a total of 9,188,532 individual employment spells of people working full-time. Excluded from this data, are the self-employed, civil servants, and workers with a very small income (in 1995 less than 256 Euros a month). The Employment Statistics give continuous information on employment spells, earnings, job and personal characteristics. It is based on microdata delivered by firms about their individual employees. For every employee a new record is generated every year. The same is done if he or she changes an establishment. The duration of a spell is computed not in days worked but in calendar days. The wage variable is measured for calendar days. It is deflated by the consumer price index calculated for western Germany by the German General Statistical Office.

One of the advantages of the employment statistics is the identification of the region where a specific employee is located. For our study, 326 administrative districts (Landkreise/ kreisfreie Städte) are used as regional units. Berlin is excluded because of its special situation as an "island" in Eastern Germany.

Originally, the data of the employment statistics were taken over for administrative purposes of the social security system and were collected by the Federal Employment Agency (Bundesagentur für Arbeit), see Bender, et al. (1996). Since they are used to calculate the pensions of retired people, the income and duration information is very reliable. No wage classifications are needed because the exact individual wage is reported. Apart from the individual wage, the following variables were used in our regressions:

- *Age.* Age of the individual.
- *Sex.* Female=1 and male=0.
- *Employment status.* This variable includes 6 categories: Unskilled blue collar, skilled blue collar, white collar, apprentice, foreman, no classification applicable.
- *Qualification level of an employee.* This variable includes 4 categories: No formal education, vocational qualification, university degree, no classification applicable.

- *Industry classification.* This variable defines the specific industry to which the employing establishment belongs. These include 30 categories: primary sector, energy & mining, chemistry, plastic products, stones & earth, glass products, quarrying & metals, metal construction, motor vehicles, computers & electronic equipment, jewellery & toys, wood, paper, textiles, food products, construction, trade, transport & telecommunication, banking & insurance, hotels & catering, health care, business related services, security services, temporary help services, education, leisure related services, household related services, other social services, public administration, and not applicable.

- *Occupational group.* This variable describes the field of occupational specialization of an employee. These include 14 categories: agricultural, nonqualified blue collar worker, qualified blue collar worker, technician, engineer, simple services, qualified services, semi-professional, professional, simple administrative, qualified administrative, managers, special occupations of the former German Democratic Republic, and no classification applicable.

- *Establishment size.* The size of an establishment measured by the number of employees. This includes 9 categories. 1-4 employees, 5-9 employees, 10-49 employees, 50-99 employees, 100-199 employees, 200-499 employees, 500-999 employees, 1000-4999 employees, and more than 4999.

- *Regional unemployment:* The districts are the smallest regions for which unemployment figures can be obtained. Unemployment rates were computed by dividing this variable by the sum of regional total employment and unemployment.

The data we use is obtained from the standard IAB Employment Sample (IABS-reg01), which covers 2 % of all employment in the period of 1976 to 2001. The information basis was extended to cover also the recent years 2002-2004. For the individual-level analyses a 50% sub-sample of the original data was used to ease computation. We do not use data from the seventies because the regional information is not consistent with the one of later years.

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