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Establishment Age and Wages: Evidence from German Linked Employer-Employee Data

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Establishment Age and Wages: Evidence from German Linked Employer-Employee Data*

Arnd Kölling[a], Claus Schnabel[b] and Joachim Wagner[c]

ABSTRACT: Prominent reasons why people make more or less money in the labor market include personal characteristics of the employee (e.g., human capital), job characteristics, and characteristics of the employer (e.g., firm size). An emerging empirical literature suggests that one hitherto overlooked firm characteristic matters, too: Employers who are in business for a longer period of time tend to pay higher wages. Using a unique set of linked employer-employee data we present the first empirical evidence on this firm age - wage nexus for Germany. We find that older firms pay on average higher wages for workers with the same broadly defined degree of formal qualification. This firm age differential vanishes after controlling for further worker characteristics and other firm characteristics besides age; if anything, younger firms pay more ceteris paribus.

ZUSAMMENFASSUNG: Zu den häufig genannten Gründen, warum Arbeitnehmer mehr oder weniger verdienen, zählen u.a. persönliche Charakteristika (wie Humankapital), Arbeitsplatzmerkmale und Arbeitgebercharakteristika (wie Firmengröße). Eine zunehmende empirische Literatur deutet darauf hin, dass ein bisher übersehenes Firmenmerkmal ebenfalls eine Rolle spielt: Arbeitgeber, deren Firma schon länger besteht, zahlen tendenziell höhere Löhne. Unter Verwendung eines einzigartigen Arbeitgeber-Arbeitnehmer-Datensatzes präsentieren wir erste empirische Ergebnisse für Deutschland zu diesem Zusammenhang. Wir stellen fest, dass innerhalb vergleichbarer Arbeitnehmergruppen ältere Firmen im Durchschnitt höhere Löhne zahlen. Dieser Firmenalterunterschied verschwindet jedoch, wenn für weitere Arbeitnehmer- und Firmenmerkmale kontrolliert wird; falls überhaupt ein Unterschied besteht, dann zahlen jüngere Firmen ceteris paribus mehr.

KEYWORDS: Establishment age, wage, linked employer-employee data, Germany

JEL-CLASSIFICATION: J3

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1. MOTIVATION

Understanding wage differentials is at the core of labor economics. At least since Adam Smith wrote on wages in the different employments of labor in chapter X of book I of his *Inquiry into the Nature and Causes of the Wealth of Nations* back in 1776 we know that on competitive labor markets personal characteristics (e.g., human capital) and job characteristics (working conditions that demand compensating wage differentials) matter. More recently it has been pointed out that characteristics of the employer (i.e., of the work place[1]) do matter, too. These firm characteristics include size (Oi and Idson 1999), industry (Krueger and Summers 1988), regional location (Blanchflower and Oswald 1994) and, at least in some countries, unionization (Lewis 1986).

An emerging literature suggests that there is another firm characteristic which plays a role in determining the individual wage, namely firm age, i.e. the time span an employer has been in business. Summarizing the literature from labor economics, Brown and Medoff (2001) discuss the following reasons why we might expect that wages are linked to firm age:

- *Worker quality*: Workers in newly established firms cannot have high levels of tenure, and workers in older firms are likely to have more overall experience, too. Firm age and wage, therefore, can be expected to be positively related.
- *Firm age and survival*: Younger firms are much more likely to expire than older ones, and prospective job loss can be regarded as a negative job characteristic demanding a compensation. According to this line of reasoning, firm age and wage can be expected to be negatively related.
- *Fringe benefits*: Pension plans and health insurance are more often offered by older firms, and these benefits might be considered as substitutes for high wages by workers of a given quality in older firms (leading to a negatively shaped firm age - wage nexus).
- *Ability to pay*: As Brown and Medoff (2001, p. 7) put it, any claim of inability to pay higher wages is much more credible (and, therefore, more often accepted by the workers) when made by a new firm whose long-run existence is in doubt than when made by a long-surviving firm.

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[1] We will speak of the work place as a firm in this paper irrespective of its legal form. In our empirical investigation we will use data collected at the level of the local production unit, or establishment, and we will take care of differences between branch plants and single plant establishments.

The discussion of theoretical links between firm age and wages clearly shows that it is important to control for worker characteristics and other firm characteristics in an empirical study that looks for a firm age - wage differential and its size. Empirical evidence showing that in the U.S. firms that have been in business longer pay higher wages, however, is based on data sets for employers only which do not allow to control for characteristics of the employees and in which information about the employer other than age, size, and industry is rather scarce, too (for a survey, see Brown and Medoff 2001). In a comprehensive recent empirical study using U.S. data from a survey of employees augmented by information from a credit rating agency Brown and Medoff (2001) find that firms that have been in business longer pay higher wages, but pay if anything lower wages after controlling for worker characteristics. However, the Brown and Medoff study (which is the best empiricial investigation hitherto published on this topic) is based on a quite small sample of 1,410 workers only, and information on both worker and firm characteristics is rather limited.

This paper contributes to the literature by presenting the first empirical evidence on the firm age - wage nexus for Germany[2] based on a unique and rich data set which links comprehensive information of 2,796 establishments from western Germany to detailed individual level information on all its employees (covered by social insurance) in 1996, using data of 907,823 workers. The rest of the paper is organized as follows: Section 2 introduces the linked employer-employee data, section 3 reports raw differentials in median wages for establishments from three size classes and for four broad groups of employees with different degrees of formal qualification, section 4 gives results on firm age - wage differentials from wage regressions controlling for a large number of individual and firm level characteristics, section 5 discusses the role played by collective bargaining, and section 6 concludes.

2. The Matched Employer-Employee Data

The use of matched employer-employee data has recently become popular as it allows a more detailed analysis of economic relationships. In particular, various analyses of the labor market can benefit from the availability of employer-employee data.[3] In this paper, we use the LIAB, which combines the employment statistics of

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[2] We are only aware of one paper that touches upon this question based on German data: Bellmann and Kohaut (1999) use data for 2,670 (2,392) establishments from western (eastern) Germany to estimate wage regressions with the average wage in 1996 as the endogenous variable. Their empirical model includes a dummy variable for new firms (founded after 1994). The estimated regression coefficient for this dummy is negative in both models, but only marginally significant (at an error level of 10 percent) for western Germany and insignificant at any conventional level for eastern Germany.

[3] A survey of matched employer-employee data sets can be found in Abowd and Kramarz (1999).

the German Federal Labor Services with plant level data from the IAB-Establishment Panel.

The employment statistics (cf. Bender, Haas and Klose 2000) cover all employees and trainees subject to social security and exclude, among others, a part of the civil servants (“Beamte”), the self-employed, family workers, students enrolled in higher education and those in marginal employment. The employment statistics cover nearly 80% of all employed persons in western Germany and about 85% in eastern Germany.

The employment statistics are collected by the social insurance institutions for their purposes according to a procedure introduced in 1973 and are made available to the Federal Employment Services. Notifications are prescribed at the beginning and at the end of a person's employment in a plant. In addition an annual report for each employee is compulsory at the end of a year. Misreporting is legally sanctioned. The employment statistics contain information on an employee's occupation, the occupational status and gross earnings up to the contribution assessment ceiling and on individual characteristics like sex, age, nationality, marital status, number of children and qualification. Each personnel record also contains the establishment identifier, the industry and the size of the plant.

Starting in 1993, the IAB-Establishment Panel (cf. Kölling 2000) is drawn from a stratified sample of the plants included in the employment statistics, where the strata are defined over industries and plant sizes (large plants are oversampled), but the sampling within each cell is random. In 1993, the sample started with 4,265 plants, covering 0.27% of all plants in western Germany (2 million) and 11% of total employment (29 million). In 1996, the eastern German establishment panel started with 4,313 establishments representing 1.10% of all plants (391 thousand) and 11% of total employment (6 million). Altogether, the number of establishments interviewed increased until the year 2001 up to 15,000, in order to make regional analysis on the federal state level feasible.

The IAB-Establishment Panel is created for the needs of the Federal Labor Services to provide further and detailed information about the demand side of the labor market. Therefore, information on the composition of the workforce and its development through time constitutes a major part of the questionnaire. Further questions include training, working time, business activities and establishment policies. Other topics, for instance, questions on innovations or flexibility of labor, are asked biannually or triannually. In addition, each annual wave provides information

on particular topics; in 2000, for example, this has been the lack of skilled employees.

The LIAB is created by linking the employment statistics and the IAB-Establishment Panel through a plant identifier which is available in both data sets.[4] This matched employer-employee data-set, which is unique for Germany, comprises currently the years 1993-1997. For our purposes we use data from 1996, where it is possible to identify the year of plant formation for each firm. We exclude establishments that are located in the eastern part of Germany since the economic situation (and the level of wages) in post-communist eastern Germany still differs considerably from that in western Germany. Also, non-profit organizations and public firms are dropped from the sample for similar reasons. Therefore, in the regressions we end up with a sample of 907,823 observations of employees from 2,796 establishments.

3. ESTABLISHMENT AGE AND AVERAGE WAGES

As a first step in our empirical investigation of the relationship between establishment age and wage we look at differences in average wages in firms from three age cohorts. Information on the founding year of an establishment is taken from the IAB-Establishment Panel. Firms that started to operate in 1985 or before and, therefore, have been in business at least eleven years in 1996, form the group of *old firms* (termed cohort A in Table 1). Firms that were six to ten years old in 1996 (founded between 1986 and 1990, i.e. in the years just before German re-unification) are considered to be *younger firms* (cohort B), and firms founded in 1991 or later are named *new firms* (cohort C).

Given that wages tend to be closely related to formal qualification of the employees, we sort the employees in each establishment into four broadly defined groups, using information from the statistics of workers covered by social insurance: Employees without a high school degree and without industrial training (*group 1*), employees without a high school degree and with industrial training (*group 2*), employees with a high school degree and without a degree from a university (*group 3*), and employees with a university degree (*group 4*).

For each of the three firm age cohorts and each of the four qualification groups we computed the average of the employees' median daily wage (measured in Pfennige: 100 Pfennige = 1 DM) in 1996. We use the median (instead of the mean) because

[4] Both data sets are confidential but not exclusive. Those interested in using the data for scientific (non-commercial) research should contact the first author at arnd.koelling@iab.de.

wages are only reported correctly up to the contribution assessment ceiling of the social security system. Since higher earnings are truncated at the ceiling in our data set, mean daily wages based on reported wages would be biased downwards.[5] Results for each of the four qualification groups by the three age cohorts are reported in Table 1.

[Table 1 near here]

It turns out that *old firms* pay higher wages on average than both *younger firms* and *new firms*, and this difference is statistically significant at an error level of ten percent or better for all qualification groups. Furthermore, at least some of the computed average differences in wages between the cohorts are of an order of magnitude that matters economically, too. For example, an employee from *group 2* earns on average 17.69 DM per day more in an old firm compared to a younger firm, and this amounts to some 371 DM in a month with 21 working days.[6]

In the second step of our empirical investigation we move from the establishment level to the individual level. We estimated wage equations for individuals from each of the four broad qualification groups regressing the log of daily individual wages on dummy variables for *younger firms* and *new firms*, using *old firms* as a reference group. The recorded earnings variable in our data is censored at the maximum that was taxable under social security; that is, anyone earning more than this maximum is recorded as having earned the maximum. Standard ordinary least squares regression using censored data will typically result in coefficient estimates that are biased toward zero. Therefore, we used a Tobit-type estimator. We have more than one observation (in fact, sometimes hundreds of observations) from one establishment, and while the observations can be considered to be independent across firms this is not the case within a local production unit. This has to be taken care of when estimating the variance-covariance matrix of the estimators. To do so, we used the cluster option of the intreg-estimator provided in Stata.[7] The estimated regression coefficients give point estimates of differentials in average wages between age cohorts. Furthermore, we performed this exercise separately for male and female employees. Results are reported in Table 2.

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[5] Note that we excluded establishments from the public sector and non-profit organizations. Furthermore, employees with a daily wage of less than DM 60 were excluded because the reported earnings seem unreliably low.

[6] Contrary to this, *new firms* from the cohort 1991 to 1995 tend to pay more than *younger firms* founded between 1986 and 1990. Again, most of these differences are statistically significant, and economically relevant, too.

[7] Stata Release 7.0 was used to compute the regression models in this and the following sections.

[Table 2 near here]

Almost all (22 of 24) estimated regression coefficients for the age cohort dummies have a negative sign, indicating that *old firms* pay more. However, only five of these are statistically different from zero at a conventional error level. Given the large samples used to estimate the wage regressions and the low values of the t-statistics reported, therefore, evidence for a positive relationship between establishment age and wages is at best weak.

4. ESTABLISHMENT AGE AND INDIVIDUAL WAGES

It has been argued in the introductory section that it is important to control for other characteristics of the firm besides age, and for characteristics of the employees, in any empirical study on the (non)existence of a firm age - wage nexus. To do so in this section we will look at the results from wage regressions. The dependent variable is the log of the daily wage. Independent variables include the age of the employee (plus its square) to proxy experience; four categories of the employees' professional status (using unskilled blue collar workers as the reference group); dummy variables indicating whether or not a person is married, and German; detailed information on the structure of the workforce in the establishment (percentage shares of employees who are females, foreigners, have a university degree, are part-time workers or workers with a fixed-length contract, or trainees) and labor turnover (percentages of hires and layoffs during the first half of 1996); an indicator for the economic performance of the firm (bad, average, good); dummy variables indicating whether or not the firm used overtime work, shift work, is covered by collective bargaining agreements, uses the latest technology, and invested in information and communication technology; firm size (and its square); a dummy for single-establishment enterprises; information on the legal form of the firm; detailed controls for the profession of the employee (84 categories); 15 dummies for industries; nine dummies for federal states; and two dummies for the firm age cohorts *younger firms* and *new firms*. The empirical models were estimated for each of the four broad qualification groups. We computed the models for male and female employees together (adding a sex dummy) and separately. Results are reported in Tables 3 to 5.[8]

[Tables 3 to 5 near here]

[8] Detailed descriptive statistics are given in an appendix that is available on request.

All independent variables besides the age cohort dummies are included here only to control for "other characteristics of the employer and the employee".[9] Although in interpreting the results we will not be able to comment on all the estimated regression coefficients for these control variables, some comments on the results in Table 3 are in order. For all four groups of workers it can be seen that individual characteristics play an important role: wages increase significantly with the age of employees (albeit with a decreasing rate), they are higher for men and lower for foreign workers, and they are affected by the professional status of employees. In contrast, not all establishment characteristics prove to be significant, but the composition of the workforce, a good economic performance of the establishment and (at least for some groups) the size and the legal form of the establishment seem to play a role for wages.

From the estimated regression coefficients for the dummy variables identifying a *younger firm* and a *new firm* we can conclude that ceteris paribus *old firms* do not pay higher wages. If anything, the opposite is the case. In Tables 3 to 5 all but one coefficients have a positive sign, and in the wage regressions for female employees these are significantly different from zero at an error level of five percent or better for two of the four broad qualification groups. To put it differently, controlling for a wide range of employer and employee characteristics wipes out any hints to a positive nexus between firm age and wages stemming from simple descriptives.

5. Establishment age, collective bargaining and wages

Some readers who followed our analysis up to this point might be tempted to argue that this result – the absence of a positive firm age - wage nexus in Germany – is exactly what they expected, because the process of wage determination in Germany is dominated by collective bargaining between labor unions on the one hand and employers' associations (or single employers) on the other hand, and the resulting collective agreements do never consider the age of the firm to be a relevant variable.

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[9] Selection of control variables was limited by the information available in the linked employer-employee data set for 1996. Our specification illustrates that this is really a rich data set. Unfortunately, however, we are unable to control for length of tenure with the current employer, for fringe benefits (pensions) and profit sharing, and for (un)pleasant working conditions. But as The Rolling Stones once put it, you can't always get what you want. Note that there is no such thing as a unionized establishment in Germany, so there is no need to control for this. The role of coverage by collective bargaining agreements, however, will be discussed in detail in the next section.

However, it should not be overlooked that not all firms and not all employees are covered by collective agreements. An empirical study by Bellmann, Kohaut and Schnabel (1999) based on representative data for the private sector from the IAB-Establishment Panel shows that in 1997 just 49% of establishments in western Germany were covered by sectoral (i.e. industry-wide) collective agreements, and these agreements applied to 65% of employees. The collectively agreed wages are minimum terms, and companies bound by sectoral agreements may not undercut these minimum wages (unless they can make use of an “opening clause” and get special permission by the labor union to reduce wages, e.g. in order to save jobs in cases of emergency). Companies are free, however, to improve upon these minimum conditions and pay higher wages, fringe benefits etc. Representative data from the IAB-Establishment Panel show that in 1997 about 49% of private western German firms bound by sectoral agreements paid more than the collective contract wage, the average wage premium being 11% (Kohaut and Schnabel 1998).

These wage premiums (as well as the cuts in sectoral contract wages in firms invoking an “opening clause”) could well be related to the age of the establishment, and being bound or not by a collective agreement may make a difference for company wage policy. In order to test whether the establishment age - wage nexus differs between firms that are covered by collective bargaining or not, the regression models discussed in detail in section 4 above were estimated separately for three groups of firms: firms covered by a sectoral agreement at the industry level, firms with an agreement on the firm or establishment level, and firms not covered by a collective agreement (see Table 6).

[Table 6 near here]

The results reported in Tables 3 to 5 showed that firms bound by collective agreements have to pay significantly higher wages for low-skilled workers (*group 1*) than other firms. Taking into account different regimes of collective bargaining, however, does not change our conclusions concerning the establishment age – wage nexus. In Table 6 the estimated regression coefficients for the dummy variables identifying a *younger firm* and a *new firm* are never negative and significant, and they are seldom positive and significant. This means that ceteris paribus *old firms* do not pay higher wages; if anything, the opposite is the case. More importantly, in this respect firms do not behave differently when they are not bound by a collective agreement.

6. Concluding remarks

Based on a unique rich set of linked employer-employee data this paper presents the first empirical evidence on the firm age - wage nexus for Germany. We find that older firms pay on average higher wages for workers with the same broadly defined degree of formal qualification. This firm age differential, however, vanishes after controlling for further worker characteristics and other firm characteristics besides age. Detailed regression analyses suggest that, if anything, younger firms pay more ceteris paribus. These results are in line with findings from a recent study by Brown and Medoff (2001) using U.S. data.

Our findings are consistent with the line of reasoning pointing to the higher risk of failure of young firms and the need to compensate employees in these firms for their higher risk of job loss. Furthermore, they might be linked to the fact that certain kinds of fringe benefits which can be substitutes for higher wages (e.g. pension plans or profit sharing schemes) - and which we are unable to control for in our empirical models due to lack of information in the data used - are more often found in older firms. Our results (and the open questions just mentioned) show that it is important to use the new generation of linked employer-employee data for empirical investigations related to both the supply and the demand side of the labor market.

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Table 1: Median wage and age of establishment

Daily median wage in Pfennige (no. of establishments)	Group 1 (no high school degree, no training)	2 (no high school degree, training)	3 (high school degree, no university degree)	4 (high school degree, university degree)
Cohort				
A (1985 and before)	14003.25 (1712)	15728.19 (2295)	18765.76 (1387)	23867.54 (1404)
B (1986 - 1990)	12381.86 (74)	13959.68 (186)	17575.75 (56)	21999.23 (60)
C (1991 - 1995)	13319.01 (275)	14685.58 (527)	17883.13 (204)	23211.06 (207)
T-tests				
A vs. B	+++	+++	++	+++
A vs. C	+++	+++	+++	+
B vs. C	--	--	(-)	--

Note: For a precise definition of groups, see also text. Values in the upper part of the table are average median wages per establishment in the respective group and cohort. The number of establishments is given in parenthesis. The lower part of the table reports the results of t-tests on differences between average median wages (unequal distribution of variances). The signs indicate differences to the cohorts with younger establishments: If older establishments pay more (less) than younger ones, a + (-) is shown in the tables, the number of + or - indicates the level of significance (three signs: 1%, two signs: 5%, one sign: 10%)**,** insignificant differences are presented in parentheses.

Table 2: Tobit regressions of individual remuneration

(endogenous variable: log. wage per day in DM/100, recognition of establishment clusters, parsimonious model, definition of groups see text)

	Overall				Men				Women			
Variables / Groups	1	2	3	4	1	2	3	4	1	2	3	4
Constant	9.614***	9.811***	9.918***	10.241***	9.674***	9.844***	10.009***	10.259***	9.483***	9.655***	9.779***	10.021***
	(910.168)	(1396.766)	(1014.795)	(1039.656)	(948.849)	(1420.566)	(945.760)	(1121.166)	(976.912)	(1145.538)	(1032.575)	(736.969)
Year of establishment formation (reference: 1985 and before)												
1986 - 1990	-0.078	-0.069	0.004	-0.063	-0.106	-0.065	-0.022	-0.046	-0.044	-0.062	0.036	-0.116**
	(0.975)	(1.325)	(0.127)	(1.467)	(1.174)	(1.468)	(0.778)	(1.251)	(0.902)	(1.178)	(0.727)	(2.031)
1991 - 1995	-0.029	-0.030	-0.045*	-0.014	-0.040*	-0.020	-0.042	-0.010	-0.064**	-0.055	-0.040	-0.046*
	(1.281)	(1.501)	(1.806)	(0.588)	(1.852)	(1.015)	(1.373)	(0.508)	(2.115)	(1.516)	(0.967)	(1.733)
Obs. (censored)	173854	599182	40122	94665	119996	492805	24741	84228	53858	106377	15381	10437
	(2046)	(53639)	(7717)	(54102)	(1711)	(50876)	(6795)	(51569)	(335)	(2763)	(922)	(2533)
Number of establishm.	1788	2646	1416	1428	1616	2424	1279	1377	1345	2287	1042	902

Source: LIAB 1996. Absolute values of t-statistics are presented in parenthesis. * resp. ** (***) indicate a level of significance of 10% resp. 5% (1%).

Table 3: Tobit regressions of individual remuneration

(endogenous variable: log. wage per day in DM/100, recognition of establishment clusters, full model, definition of groups see text)

Variables	Groups 1	2	3	4
Constant	6.021***	5.093***	-2.719***	-2.875***
	(33.822)	(19.592)	(5.262)	(6.598)
Logarithm of age of employee	1.674***	2.106***	5.846***	6.114***
	(18.516)	(20.142)	(21.760)	(28.498)
Logarithm of age of employee (squared)	-0.217***	-0.262***	-0.742***	-0.768***
	(17.630)	(18.645)	(19.999)	(26.733)
Sex (1 = male)	0.134***	0.184***	0.094***	0.104***
	(35.515)	(55.542)	(21.893)	(23.172)
Professional status: (reference: unskilled blue collar worker)				
Skilled blue collar worker	0.056***	0.058***	0.105***	0.101***
	(7.204)	(7.555)	(7.669)	(3.615)
Master craftsmen, foremen	0.311***	0.310***	0.334***	0.439***
	(22.367)	(38.378)	(15.002)	(14.054)
White collar worker	0.214***	0.245***	0.283***	0.469***
	(20.894)	(30.528)	(15.617)	(21.298)
Marriage (1 = yes)	0.018***	0.022***	0.038***	0.042***
	(5.907)	(9.367)	(11.018)	(15.013)
Nationality (1 = foreigner)	-0.009**	-0.017***	-0.039***	-0.025***
	(2.441)	(6.815)	(5.160)	(5.161)
Proportion of female workers in establishment	-0.291***	-0.176***	-0.031	-0.067**
	(11.171)	(7.876)	(1.009)	(2.259)
Proportion of foreign workers in establishment	0.004	-0.029	-0.080	-0.115**
	(0.112)	(0.697)	(1.395)	(2.355)
Proportion of workers with graduation in establishment	0.175***	0.254***	0.146***	0.173***
	(3.044)	(5.812)	(3.579)	(6.067)
Proportion of part-time workers in establishment	-0.044	-0.170***	-0.201***	-0.148*
	(1.201)	(3.907)	(4.059)	(1.757)
Proportion of fix-term workers in establishment	0.160*	0.197***	0.137	0.160**
	(1.928)	(2.754)	(1.254)	(2.129)
Proportion of industrial trainees in establishment	-0.354***	-0.323***	-0.365***	-0.319**
	(2.734)	(3.587)	(2.960)	(2.087)
Proportion of hires in establishment	-0.248***	-0.216**	-0.356***	-0.100
	(2.582)	(2.340)	(2.578)	(0.751)
Proportion of layoffs in establishment	0.042	-0.052	0.087	-0.061
	(0.398)	(0.327)	(0.883)	(0.805)
Economic performance of establishment (reference: bad performance)				
Average performance	0.008	0.015**	0.018*	-0.004
	(0.916)	(1.975)	(1.721)	(0.447)
Good performance	0.074***	0.067***	0.040*	0.049***
	(4.119)	(3.689)	(1.895)	(3.096)

Still Table 3

Variables	Groups 1	2	3	4
Overtime work in establishment (1 = yes)	0.026***	0.027***	0.007	0.010
	(2.817)	(3.273)	(0.602)	(0.754)
Shift work in establishment (1 = yes)	0.004	0.014	0.023**	0.001
	(0.339)	(1.490)	(2.268)	(0.100)
Collective agreement (reference: no collective agreement)				
Collective agreement on sectoral level	0.057***	-0.007	-0.015	0.016
	(2.940)	(0.305)	(0.597)	(0.870)
Collective agreement on firm level	0.074***	0.010	0.042	0.042**
	(3.001)	(0.377)	(1.505)	(2.099)
Use of newest technology (1 = yes)	0.019*	0.016*	0.018*	0.025***
	(1.794)	(1.807)	(1.771)	(2.996)
Investment in information and	-0.003	0.003	0.008	-0.008
communication technologies (1 = yes)	(0.355)	(0.418)	(0.844)	(1.059)
Logarithm of establishment size	-0.039**	-0.002	0.044*	0.020
	(2.082)	(0.154)	(1.908)	(1.040)
Logarithm of establishment size	0.005***	0.002	-0.001	0.001
(squared)	(3.392)	(1.589)	(0.818)	(0.533)
Independent single company (1 = yes)	-0.010	-0.013*	-0.025**	-0.016**
	(1.315)	(1.902)	(2.483)	(2.311)
Legal form of establishment (reference: individual enterprise)				
Partnership	0.119***	0.094***	0.064	0.081*
	(3.575)	(3.058)	(1.509)	(1.853)
Limited company	0.140***	0.107***	0.057	0.079*
	(4.326)	(3.605)	(1.376)	(1.833)
Incorporated company	0.136***	0.128***	0.060	0.096**
	(4.112)	(4.195)	(1.444)	(2.230)
Other legal form	0.166***	0.121***	0.048	0.080*
	(3.078)	(3.536)	(1.126)	(1.718)
Year of establishment formation (reference: 1985 and before)				
between 1986 and 1990	0.016	0.012	0.056**	0.025
	(0.502)	(0.585)	(2.534)	(1.272)
between 1991 and 1995	0.010	0.018	0.039**	0.033**
	(0.619)	(1.607)	(2.274)	(2.266)
84 dummies for individual profession	yes	yes	yes	yes
9 dummies for federal states	yes	yes	yes	yes
15 dummies for industries	yes	yes	yes	yes
Number of observations (censored)	173854 (2046)	599182 (53639)	40122 (7717)	94665 (54102)
Number of establishments	1788	2646	1416	1428

Source: LIAB 1996. Absolute values of t-statistics are presented in parentheses. * resp. ** (***) indicate a level of significance of 10% resp. 5% (1%).

Table 4: Tobit regressions of individual remuneration of men

(endogenous variable: log. wage per day in DM/100, recognition of establishment clusters, full model, definition of groups see text)

Variables	Groups 1	2	3	4
Constant	6.371***	5.875***	-2.173***	-3.656***
	(29.585)	(24.274)	(3.053)	(7.412)
Logarithm of age of employee	1.817***	1.820***	5.747***	6.629***
	(17.254)	(19.136)	(15.652)	(26.944)
Logarithm of age of employee (squared)	-0.237***	-0.224***	-0.722***	-0.837***
	(16.584)	(17.537)	(14.439)	(25.540)
Professional status: (reference: unskilled blue collar worker)				
Skilled blue collar worker	0.059***	0.057***	0.085***	0.089***
	(7.702)	(7.112)	(5.988)	(2.923)
Master craftsmen, foremen	0.304***	0.308***	0.306***	0.425***
	(21.554)	(36.270)	(14.006)	(13.444)
White collar worker	0.220***	0.247***	0.270***	0.456***
	(17.822)	(28.236)	(14.442)	(19.215)
Marriage (1 = yes)	0.039***	0.035***	0.061***	0.047***
	(9.631)	(13.051)	(14.247)	(16.442)
Nationality (1 = foreigner)	-0.016***	-0.019***	-0.027***	-0.023***
	(3.846)	(6.797)	(2.599)	(4.606)
Proportion of female workers in establishment	-0.346***	-0.195***	-0.033	-0.067**
	(10.963)	(7.781)	(0.953)	(2.431)
Proportion of foreign workers in establishment	0.032	-0.035	-0.079	-0.115**
	(0.749)	(0.791)	(1.339)	(2.426)
Proportion of workers with graduation in establishment	0.167**	0.252***	0.122***	0.165***
	(2.343)	(5.404)	(2.620)	(5.798)
Proportion of part-time workers in establishment	0.002	-0.123**	-0.204***	-0.072
	(0.052)	(2.362)	(3.514)	(1.153)
Proportion of fix-term workers in establishment	0.269***	0.183**	0.114	0.127*
	(2.745)	(2.373)	(1.147)	(1.741)
Proportion of industrial trainees in establishment	-0.414**	-0.258***	-0.372***	-0.254*
	(2.573)	(2.615)	(2.693)	(1.866)
Proportion of hires in establishment	-0.333***	-0.202**	-0.231	-0.051
	(2.998)	(2.242)	(1.435)	(0.378)
Proportion of layoffs in establishment	-0.021	-0.050	0.028	-0.038
	(0.149)	(0.320)	(0.243)	(0.595)
Economic performance of establishment (reference: bad performance)				
Average performance	0.014	0.017**	0.024**	-0.002
	(1.474)	(2.118)	(2.208)	(0.252)
Good performance	0.076***	0.065***	0.038	0.042***
	(4.088)	(3.508)	(1.631)	(2.643)

Still Table 4

Variables	Groups 1	2	3	4
Overtime work in establishment (1 = yes)	0.031***	0.032***	0.011	0.014
	(3.390)	(3.696)	(1.027)	(1.124)
Shift work in establishment (1 = yes)	0.012	0.018*	0.025**	0.005
	(0.953)	(1.860)	(2.211)	(0.449)
Collective agreement (reference: no collective agreement)				
Collective agreement on sectoral level	0.071***	-0.012	-0.016	0.011
	(2.990)	(0.430)	(0.617)	(0.612)
Collective agreement on firm level	0.099***	-0.001	0.040	0.032
	(3.490)	(0.019)	(1.370)	(1.614)
Use of newest technology (1 = yes)	0.029**	0.019**	0.015	0.026***
	(2.316)	(2.077)	(1.469)	(3.125)
Investment in information and	0.007	0.002	0.010	-0.011
communication technologies (1 = yes)	(0.808)	(0.318)	(0.993)	(1.428)
Logarithm of establishment size	-0.053***	-0.015	0.036	0.011
	(2.589)	(0.952)	(1.457)	(0.591)
Logarithm of establishment size	0.006***	0.003**	-0.001	0.001
(squared)	(3.542)	(2.057)	(0.535)	(0.803)
Independent single company (1 = yes)	-0.002	-0.013*	-0.027**	-0.015**
	(0.191)	(1.798)	(2.547)	(2.305)
Legal form of establishment (reference: individual enterprise)				
Partnership	0.113***	0.075**	0.089*	0.062*
	(3.483)	(2.481)	(1.814)	(1.675)
Limited company	0.131***	0.090***	0.081*	0.061*
	(4.166)	(3.115)	(1.706)	(1.701)
Incorporated company	0.125***	0.114***	0.080*	0.079**
	(3.859)	(3.809)	(1.693)	(2.179)
Other legal form	0.170***	0.111***	0.060	0.057
	(2.893)	(3.031)	(1.216)	(1.418)
Year of establishment formation (reference: 1985 and before)				
between 1986 and 1990	-0.006	0.012	0.028	0.029
	(0.170)	(0.496)	(1.089)	(1.602)
between 1991 and 1995	0.001	0.018	0.031*	0.030**
	(0.044)	(1.465)	(1.735)	(2.221)
84 dummies for individual profession	yes	yes	yes	yes
9 dummies for federal states	yes	yes	yes	yes
15 dummies for industries	yes	yes	yes	yes
Number of observations (censored)	119996 (1711)	492805 (50876)	24741 (6795)	84228 (51569)
Number of establishments	1616	2424	1279	1377

Source: LIAB 1996. Absolute values of t-statistics are presented in parentheses. * resp. ** (***) indicate a level of significance of 10% resp. 5% (1%).

Table 5: Tobit regressions of individual remuneration of women

(endogenous variable: log. wage per day in DM/100, recognition of establishment clusters, full model, definition of groups, see text)

Variables	Groups 1	2	3	4
Constant	6.731***	2.817***	-5.106***	-5.124***
	(25.359)	(9.734)	(8.868)	(7.126)
Logarithm of age of employee	1.200***	3.246***	7.712***	7.200***
	(9.728)	(21.807)	(25.082)	(19.061)
Logarithm of age of employee (squared)	-0.151***	-0.416***	-1.019***	-0.941***
	(9.066)	(20.435)	(23.331)	(17.767)
Professional status: (reference: unskilled blue collar worker)				
Skilled blue collar worker	0.041***	0.114***	0.187***	0.083
	(2.966)	(11.660)	(7.924)	(1.261)
Master craftsmen, foremen	0.295***	0.333***	0.480***	0.354***
	(5.370)	(9.951)	(4.449)	(5.582)
White collar worker	0.210***	0.242***	0.287***	0.437***
	(20.218)	(24.648)	(10.289)	(9.823)
Marriage (1 = yes)	-0.016***	-0.032***	-0.009**	-0.012**
	(5.439)	(13.304)	(2.183)	(2.191)
Nationality (1 = foreigner)	0.007**	-0.012***	-0.049***	-0.025**
	(2.287)	(2.883)	(5.565)	(2.433)
Proportion of female workers in establishment	-0.206***	-0.111***	-0.008	-0.042
	(7.275)	(4.721)	(0.234)	(1.032)
Proportion of foreign workers in establishment	-0.040	-0.040	-0.049	-0.110
	(0.965)	(0.949)	(0.759)	(1.447)
Proportion of workers with graduation in establishment	0.179***	0.257***	0.171***	0.222***
	(3.321)	(5.518)	(4.101)	(4.965)
Proportion of part-time workers in establishment	-0.086**	-0.194***	-0.180***	-0.271***
	(2.013)	(5.469)	(3.545)	(3.118)
Proportion of fix-term workers in establishment	0.054	0.241***	0.206	0.238**
	(0.720)	(2.877)	(1.627)	(2.098)
Proportion of industrial trainees in establishment	-0.202*	-0.467***	-0.290**	-0.388**
	(1.668)	(4.811)	(2.393)	(2.085)
Proportion of hires in establishment	-0.111	-0.322***	-0.417***	-0.225
	(1.215)	(2.709)	(3.659)	(1.607)
Proportion of layoffs in establishment	0.105*	-0.024	0.137*	-0.298
	(1.901)	(0.158)	(1.700)	(1.487)
Economic performance of establishment (reference: bad performance)				
Average performance	-0.008	0.004	0.008	-0.019
	(0.937)	(0.506)	(0.691)	(1.541)
Good performance	0.063***	0.051**	0.027	0.045**
	(2.811)	(2.456)	(1.225)	(2.228)

Still Table 5

Variables	Groups 1	2	3	4
Overtime work in establishment (1 = yes)	0.012	0.006	0.003	-0.010
	(1.115)	(0.695)	(0.211)	(0.468)
Shift work in establishment (1 = yes)	-0.009	0.002	0.021**	-0.010
	(0.672)	(0.164)	(2.036)	(0.662)
Collective agreement (reference: no collective agreement)				
Collective agreement on sectoral level	0.039**	0.006	-0.014	0.018
	(2.134)	(0.328)	(0.515)	(0.790)
Collective agreement on firm level	0.029	0.038*	0.043	0.073***
	(1.155)	(1.670)	(1.406)	(3.075)
Use of newest technology (1 = yes)	-0.002	0.000	0.023**	0.017
	(0.191)	(0.029)	(2.105)	(1.421)
Investment in information and	-0.019**	0.004	0.004	-0.005
communication technologies (1 = yes)	(2.149)	(0.547)	(0.425)	(0.324)
Logarithm of establishment size	-0.024	0.026*	0.053*	0.036
	(1.219)	(1.656)	(1.947)	(1.288)
Logarithm of establishment size	0.005***	0.001	-0.002	0.001
(squared)	(3.217)	(0.480)	(0.920)	(0.302)
Independent single company (1 = yes)	-0.032***	-0.016**	-0.027**	-0.019
	(3.554)	(2.132)	(2.548)	(1.460)
Legal form of establishment (reference: individual enterprise)				
Partnership	0.121***	0.129***	0.065	0.129
	(3.250)	(3.483)	(0.931)	(1.216)
Limited company	0.143***	0.142***	0.061	0.126
	(3.972)	(3.894)	(0.879)	(1.185)
Incorporated company	0.141***	0.156***	0.070	0.132
	(3.862)	(4.134)	(1.007)	(1.229)
Other legal form	0.143***	0.152***	0.063	0.132
	(3.135)	(3.894)	(0.896)	(1.198)
Year of establishment formation (reference: 1985 and before)				
between 1986 and 1990	0.095***	0.035	0.095***	0.004
	(3.875)	(1.177)	(4.292)	(0.109)
between 1991 and 1995	0.035**	0.023*	0.051***	0.042*
	(2.063)	(1.908)	(2.942)	(1.757)
84 dummies for individual profession	yes	yes	yes	yes
9 dummies for federal states	yes	yes	yes	yes
15 dummies for industries	yes	yes	yes	yes
Number of observations (censored)	53858 (335)	106377 (2763)	15381 (922)	10437 (2533)
Number of establishments	1345	2287	1042	902

Source: LIAB 1996. Absolute values of t-statistics are presented in parentheses. * resp. ** (***) indicate a level of significance of 10% resp. 5% (1%).

Table 6: Tobit regressions of individual remuneration according to collective agreement status

(endogenous variable: log. wage per day in DM/100, recognition of establishment clusters, full model, definition of groups, see text)

	Collective agreement on sectoral level				Collective agreement on firm or establishment level				No collective agreement			
	Groups											
Variables	1	2	3	4	1	2	3	4	1	2	3	4
Constant	6.206***	5.262***	-1.406***	-3.278***	5.765***	4.149***	0.536	-2.425*	7.215***	4.318***	-5.406**	-2.471
	(34.477)	(20.384)	(2.606)	(6.705)	(10.155)	(6.145)	(0.412)	(1.809)	(12.510)	(9.113)	(2.078)	(1.570)
Logarithm of age of employee	1.604***	2.054***	5.792***	6.328***	1.436***	2.220***	4.412***	5.311***	1.150***	2.587***	7.670***	5.614***
	(17.761)	(19.260)	(20.749)	(26.651)	(5.610)	(5.470)	(6.756)	(7.375)	(3.784)	(10.061)	(5.301)	(6.509)
Logarithm of age of employee (squared)	-0.207***	-0.254***	-0.734***	-0.796***	-0.188***	-0.281***	-0.553***	-0.657***	-0.147***	-0.318***	-0.987***	-0.677***
	(16.902)	(17.820)	(19.048)	(24.954)	(5.413)	(5.191)	(6.204)	(6.799)	(3.692)	(8.865)	(4.996)	(5.638)
Sex (1 = male)	0.132***	0.184***	0.093***	0.118***	0.140***	0.161***	0.090***	0.095***	0.138***	0.207***	0.090***	0.082***
	(34.142)	(55.004)	(21.285)	(21.938)	(10.887)	(16.245)	(7.447)	(6.566)	(16.045)	(14.336)	(2.937)	(6.358)
Professional status: (reference: unskilled blue collar worker)												
Skilled blue collar worker	0.054***	0.057***	0.104***	0.114***	0.073***	0.047***	0.035	0.195***	0.091***	0.094***	0.238***	0.158*
	(6.657)	(7.235)	(7.877)	(4.129)	(5.929)	(3.261)	(0.820)	(2.997)	(4.404)	(7.257)	(3.455)	(1.649)
Master craftsmen, foremen	0.306***	0.315***	0.339***	0.466***	0.276***	0.221***	0.231***	0.334***	0.372***	0.330***	0.340**	0.633***
	(21.031)	(38.336)	(14.022)	(15.508)	(8.271)	(13.981)	(4.371)	(5.184)	(7.241)	(15.681)	(2.252)	(5.723)
White collar worker	0.209***	0.251***	0.291***	0.539***	0.195***	0.179***	0.175***	0.526***	0.204***	0.245***	0.322***	0.476***
	(20.582)	(30.796)	(14.825)	(32.842)	(7.246)	(9.539)	(4.006)	(13.934)	(7.280)	(13.729)	(4.551)	(7.956)
Marriage (1 = yes)	0.019***	0.022***	0.038***	0.045***	0.024***	0.022***	0.031***	0.051***	0.010	0.007	0.036***	0.031**
	(5.782)	(9.269)	(10.460)	(15.308)	(4.815)	(6.921)	(3.381)	(7.306)	(1.548)	(1.360)	(2.607)	(2.328)
Nationality (1 = foreigner)	-0.009**	-0.019***	-0.034***	-0.032***	-0.006	0.005	-0.056***	-0.036**	-0.009	-0.011	-0.083***	0.025
	(2.387)	(7.204)	(4.196)	(5.502)	(1.018)	(0.835)	(2.869)	(2.312)	(1.330)	(1.381)	(3.761)	(1.602)
Proportion of female workers in establishment	-0.293***	-0.185***	-0.050	-0.020	-0.260***	-0.200***	-0.026	-0.104	-0.110*	-0.132***	-0.172**	-0.200**
	(11.075)	(8.073)	(1.520)	(0.644)	(3.954)	(3.089)	(0.203)	(1.493)	(1.725)	(2.700)	(2.264)	(2.270)
Proportion of foreign workers in establishment	0.023	-0.017	-0.083	-0.088*	-0.050	-0.017	-0.058	-0.158*	-0.119	0.087	-0.186	0.052
	(0.565)	(0.410)	(1.469)	(1.741)	(0.494)	(0.170)	(0.386)	(1.695)	(1.330)	(0.869)	(1.284)	(0.271)
Proportion of workers with graduation in establishment	0.174***	0.229***	0.160***	0.164***	0.290*	0.543***	0.317***	0.292***	0.217*	0.197***	-0.116	0.074
	(2.798)	(5.187)	(3.475)	(5.250)	(1.800)	(7.105)	(3.834)	(4.490)	(1.773)	(2.826)	(1.416)	(1.058)
Proportion of part-time workers in establishment	-0.088**	-0.188***	-0.118**	-0.134	-0.227***	-0.169**	-0.368***	-0.100	-0.008	-0.180***	-0.294**	-0.308*
	(2.495)	(4.068)	(2.211)	(1.379)	(2.750)	(2.055)	(3.343)	(1.509)	(0.080)	(2.747)	(2.366)	(1.753)

Still Table 6

	Collective agreement on sectoral level				Collective agreement on firm level				No collective agreement			
	Groups											
Variables	1	2	3	4	1	2	3	4	1	2	3	4
Proportion of fix-term workers in establishment	0.078	0.088	-0.002	0.066	-0.402	-0.351*	-0.318	0.108	-0.032	-0.137	0.542	0.487
	(1.055)	(1.185)	(0.016)	(0.718)	(1.456)	(1.847)	(0.857)	(0.810)	(0.164)	(1.022)	(1.639)	(1.407)
Proportion of industrial trainees in establishment	-0.438***	-0.373***	-0.356***	-0.343**	1.191***	0.454	-0.169	-0.393	-0.156	-0.566***	0.188	0.519
	(3.013)	(3.789)	(2.781)	(2.196)	(3.003)	(1.476)	(0.417)	(1.125)	(0.347)	(2.825)	(0.429)	(1.101)
Proportion of hires in establishment	-0.005	0.046	0.042	0.015	-0.333	-0.094	-0.065	0.439*	-0.379***	-0.599***	-0.710***	-0.581***
	(0.056)	(0.578)	(0.349)	(0.124)	(1.385)	(0.469)	(0.202)	(1.901)	(2.586)	(5.282)	(4.972)	(2.665)
Proportion of layoffs in establishment	0.091	0.021	0.094	-0.084	-0.846	-1.480***	-1.199*	-1.579***	-0.224	-0.551**	-0.273	0.150
	(1.311)	(0.186)	(1.562)	(1.262)	(1.175)	(2.986)	(1.850)	(3.652)	(1.132)	(2.377)	(0.764)	(0.639)
Economic performance of establishment (reference: bad performance)												
Average performance	0.004	0.011	0.008	-0.006	-0.023	-0.002	0.000	0.012	0.073***	0.014	0.028	0.035
	(0.470)	(1.446)	(0.759)	(0.674)	(1.362)	(0.088)	(0.001)	(0.706)	(2.989)	(0.685)	(1.138)	(0.940)
Good performance	0.068***	0.071***	0.046**	0.052**	-0.005	-0.007	-0.010	-0.007	0.078	-0.008	0.076	0.037
	(3.710)	(3.934)	(2.203)	(2.563)	(0.095)	(0.175)	(0.217)	(0.253)	(1.458)	(0.201)	(1.585)	(0.570)
Overtime work in establishment (1 = yes)	0.026***	0.028***	0.006	0.009	-0.012	0.050*	0.017	0.052***	0.068***	0.062***	0.061	0.095**
	(2.669)	(3.199)	(0.497)	(0.651)	(0.407)	(1.954)	(0.478)	(2.620)	(2.654)	(2.832)	(1.572)	(2.392)
Shift work in establishment (1 = yes)	0.009	0.014	0.013	0.008	0.009	0.043*	0.024	-0.025	-0.030	-0.001	0.087***	-0.057*
	(0.813)	(1.466)	(1.418)	(0.698)	(0.274)	(1.784)	(0.763)	(1.209)	(1.007)	(0.035)	(2.843)	(1.788)
Use of newest technology (1 = yes)	0.014	0.017*	0.004	0.023***	-0.034	0.002	-0.017	-0.023	0.079***	0.021	0.101***	0.011
	(1.305)	(1.874)	(0.375)	(2.590)	(1.213)	(0.093)	(0.509)	(1.024)	(2.811)	(1.032)	(3.727)	(0.377)
Investment in information and communication technologies (1 = yes)	-0.003	0.001	0.002	-0.008	-0.037	-0.046**	-0.043	-0.058***	0.040	0.016	0.044	0.001
	(0.360)	(0.182)	(0.224)	(0.941)	(1.637)	(2.266)	(1.507)	(2.859)	(1.588)	(0.667)	(1.249)	(0.014)
Logarithm of establishment size	-0.049**	-0.016	0.000	-0.014	0.073	0.066**	0.044	0.044	0.012	0.049**	0.002	-0.090*
	(2.312)	(1.023)	(0.012)	(0.558)	(1.640)	(2.440)	(0.651)	(1.596)	(0.290)	(1.984)	(0.039)	(1.665)
Logarithm of establishment size (squared)	0.006***	0.003**	0.002	0.003	-0.002	-0.003	0.001	-0.002	0.001	-0.003	0.004	0.014***
	(3.513)	(2.311)	(0.779)	(1.591)	(0.457)	(1.108)	(0.133)	(0.934)	(0.239)	(0.933)	(0.871)	(2.776)
Independent single company (1 = yes)	-0.015*	-0.018**	-0.024**	-0.011	0.005	0.001	-0.001	-0.017	0.016	-0.002	-0.019	-0.032
	(1.816)	(2.472)	(2.328)	(1.564)	(0.175)	(0.053)	(0.031)	(1.599)	(0.622)	(0.103)	(0.738)	(0.866)

Still Table 6

	Collective agreement on regional or industry level				Collective agreement on firm or establishment level				No collective Agreement			
	Groups											
Variables	1	2	3	4	1	2	3	4	1	2	3	4
Legal form of establishment (reference: individual enterprise)												
Partnership	0.067**	0.067***	0.082	0.071	0.080	-0.042	-0.070	-0.048	0.021	0.190***	0.180***	0.197**
	(2.431)	(2.735)	(1.550)	(1.540)	(1.284)	(0.832)	(0.217)	(0.829)	(0.434)	(4.814)	(2.710)	(2.029)
Limited company	0.089***	0.068***	0.059	0.057	0.102*	0.018	-0.055	-0.045	0.107**	0.226***	0.159**	0.310***
	(3.413)	(2.959)	(1.121)	(1.266)	(1.681)	(0.381)	(0.170)	(0.820)	(2.449)	(6.906)	(2.563)	(3.147)
Incorporated company	0.087***	0.090***	0.063	0.083*	0.066	0.039	-0.043	-0.025	0.087*	0.265***	0.108	0.194*
	(3.212)	(3.787)	(1.219)	(1.869)	(1.136)	(0.752)	(0.132)	(0.492)	(1.754)	(6.496)	(1.520)	(1.901)
Other legal form	0.167***	0.095***	0.058	0.052	0.206**	0.123**	-0.082	0.952***	0.089***	0.137***	0.159*	0.330***
	(4.292)	(3.367)	(1.099)	(1.052)	(2.017)	(1.972)	(0.257)	(4.784)	(6.216)	(3.853)	(1.654)	(2.673)
Year of establishment formation (reference: 1985 and before)												
between 1986 and 1990	0.048	0.006	0.025	0.029	0.045	0.015	-0.091	-0.018	0.015	0.072**	0.091*	0.006
	(1.562)	(0.233)	(0.998)	(1.029)	(0.926)	(0.343)	(1.277)	(0.417)	(0.334)	(2.037)	(1.880)	(0.105)
between 1991 and 1995	-0.002	0.023*	0.034**	0.048***	0.033	0.046*	-0.021	-0.005	0.052	0.024	0.093**	0.047
	(0.127)	(1.693)	(2.083)	(3.384)	(1.075)	(1.852)	(0.535)	(0.210)	(1.613)	(1.092)	(2.487)	(1.135)
84 dummies for individual profession	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
9 dummies for federal states	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
15 dummies for industries	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Number of observations	1561464	531468	35792	81699	12387	49049	2452	6093	5003	18665	1878	6873
(censored)	(1886)	(47794)	(6774)	(46743)	(123)	(3658)	(558)	(3321)	(37)	(2187)	(385)	(4038)
Number of establishments	1405	1892	1089	1102	189	280	148	150	194	474	179	176

Source: LIAB 1996. Absolute values of t-statistics are presented in parentheses. * resp. ** (***) indicate a level of significance of 10% resp. 5% (1%).

APPENDIX

Table A.1: Descriptive Statistics (definition of groups see text)

	Groups							
	1		2		3		4	
	173,854 observations		599,182 observations		40,122 observations		94,665 observations	
Variables	mean	s. d.	mean	s. d.	mean	s. d.	mean	s. d.
Daily wage in Pfennige (log.)	9.61	0.23	9.80	0.25	9.88	0.27	10.10	0.14
Age (log.)	3.70	0.26	3.64	0.27	3.52	0.25	3.68	0.22
Sex (1 = male)	0.69	0.46	0.82	0.38	0.62	0.49	0.89	0.31
Marriage (1 = yes)	0.65	0.48	0.60	0.49	0.44	0.50	0.63	0.48
Nationality (1 = foreigner)	0.30	0.46	0.06	0.24	0.05	0.21	0.04	0.20
Proportion of female workers in establishment	0.21	0.18	0.20	0.17	0.30	0.18	0.22	0.15
Prop. of German workers in establishment	0.84	0.11	0.90	0.09	0.92	0.08	0.90	0.09
Prop. of workers with university degree in est.	0.07	0.07	0.09	0.09	0.14	0.11	0.21	0.18
Proportion of part-time workers in establishment	0.05	0.09	0.06	0.09	0.08	0.08	0.05	0.06
Proportion of fixed-term workers in establishment	0.03	0.05	0.03	0.04	0.02	0.04	0.02	0.03
Proportion of industrial trainees in establishment	0.03	0.02	0.03	0.03	0.04	0.03	0.03	0.03
Prop. of hires in the first half year of 1996 in est.	0.03	0.05	0.02	0.04	0.03	0.05	0.03	0.04
Prop. of layoffs in the first half year of 1996 in est.	0.01	0.05	0.01	0.03	0.00	0.03	0.00	0.02
Overtime work in establishment (1 = yes)	0.88	0.33	0.90	0.30	0.91	0.28	0.92	0.27
Shift work in establishment (1 = yes)	0.91	0.29	0.87	0.34	0.76	0.43	0.81	0.39
Collective agreement on sectoral level (1 = yes)	0.90	0.30	0.89	0.32	0.89	0.31	0.86	0.34
Collective agreement on firm level (1 = yes)	0.07	0.26	0.08	0.27	0.06	0.24	0.06	0.25
Use of newest technology (1 = yes)	0.24	0.43	0.26	0.44	0.24	0.43	0.27	0.45
Investment in ICT (1 = yes)	0.75	0.43	0.79	0.41	0.88	0.33	0.85	0.35
Number of employees in establishment	7.28	1.28	7.38	1.36	7.41	1.21	7.58	1.17
Single establishment firm (1 = yes)	0.27	0.45	0.27	0.44	0.20	0.40	0.18	0.39

Source: LIAB 1996

Table A.2: Distribution of Employees (definition of groups see text)

	Groups							
	1		2		3		4	
	Number of employees / %							
Year of establishment formation								
1985 and before	162,097	19.15	558,525	65.98	37,108	4.38	88,821	10.49
1986 - 1990	3,097	18.48	11,667	69.62	887	5.29	1,107	6.61
1991 - 1995	8,660	19.45	28,990	65.13	2,127	4.78	4,737	10.64
Total	173,892	19.15	599,318	66.00	40,132	4.42	94,682	10.43
Professional Status								
Unsk. blue collar worker	131,569	75.68	132,980	22.19	1,904	4.75	301	0.32
Skilled blue collar worker	24,451	14.06	215,859	36.03	1,475	3.68	251	0.27
Master craftsmen, foreman	698	0.40	18,745	3.13	299	0.75	313	0.33
White collar workers	17,136	9.86	231,598	38.65	36,444	90.83	93,800	99.09
Total	173,854	100	599,182	100	40,122	100	94665	100
Industry								
Agriculture, hunting and forestry; fishing	105	0.06	436	0.07	70	0.17	35	0.04
Mining, quarrying; energy and water supply	7,586	4.36	41,752	6.97	1,422	3.54	4,344	4.59
Manufacturing of primary goods	45,569	26.21	115,689	19.31	6,811	16.98	18,037	19.05
Manufacturing of investment goods	80,696	46.42	278,634	46.5	11,335	28.25	46,631	49.26
Manufacturing of consumer goods	17,030	9.80	34,219	5.71	1,640	4.09	2,371	2.5
Construction	2,343	1.35	10,929	1.82	249	0.62	1,049	1.11
Wholesale and retail trade	5,417	3.12	34,090	5.69	2,929	7.3	3,979	4.2
Transport, storage and communication	4,931	2.84	19,963	3.33	665	1.66	1,015	1.07
Monetary intermediation	3,037	1.75	23,775	3.97	7,975	19.88	5,540	5.85
Insurance and pension funding	1,327	0.76	13,738	2.29	3,867	9.64	3,411	3.6
Hotels, restaurants, laundries, barbers	1,092	0.63	3,052	0.51	267	0.67	137	0.14
Education, publishing	796	0.46	5,246	0.88	1,197	2.98	1,398	1.48
Human and veterinary health activities	1,357	0.78	8,469	1.41	500	1.25	472	0.5
Miscellaneous services[1]	1,490	0.86	6,617	1.1	1,002	2.5	5,934	6.27
Other personal services	1,078	0.62	2,573	0.43	193	0.48	312	0.33
Total	173,854	100	599,182	100	40,122	100	94,665	100

[1] Real estate, renting, business activities, other community and social activities.

Still Table A.2

	Groups							
	1		2		3		4	
	Number of employees / %							
Federal State								
Berlin (West)	6,962	4.00	27,384	4.57	3,372	8.40	4,923	5.20
Schleswig-Holstein	2,651	1.52	11,642	1.94	555	1.38	1,481	1.56
Hamburg	9,588	5.51	36,093	6.02	5,034	12.55	7,929	8.38
Niedersachsen	13,963	8.03	56,466	9.42	2,477	6.17	5,162	5.45
Bremen	1,077	0.62	13,135	2.19	1,016	2.53	2,413	2.55
Nordrhein-Westfalen	52,454	30.17	160,342	26.76	10,550	26.29	23,326	24.64
Hessen	10,777	6.20	46,733	7.80	5,072	12.64	11,777	12.44
Rheinland-Pfalz / Saarland	10,810	6.22	32,293	5.39	1,275	3.18	2,405	2.54
Baden-Württemberg	29,143	16.76	93,698	15.64	6,488	16.17	21,093	22.28
Bayern	36,429	20.95	121,396	20.26	4,283	10.67	14,156	14.95
Total	173,854	100	599,182	100	40,122	100	94,665	100
Legal form								
Individual enterprises	1,585	0.91	4,988	0.83	109	0.27	167	0.18
Partnerships	17,564	10.10	46,361	7.74	2,176	5.42	4,516	4.77
Limited companies	81,802	47.05	249,381	41.62	12,837	31.99	37,939	40.08
Incorporated companies	70,835	40.74	287,435	47.97	23,177	57.77	50,754	53.61
Other legal forms	2,068	1.19	11,017	1.84	1,823	4.54	1,289	1.36
Total	173,854	100	599,182	100	40,122	100	94,665	100
Economic performance								
Bad	78,165	44.96	247,528	41.31	10,101	25.18	33,863	35.77
Average	91,243	52.48	331,864	55.39	27,066	67.46	53,771	56.80
Good	4,446	2.56	19,790	3.30	2,955	7.37	7,031	7.43
Total	173,854	100	599,182	100	40,122	100	94,665	100

Source: LIAB 1996.

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