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Do Internal Labour Markets Protect the Unskilled from Low Payment? - Evidence from Germany -

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Abstract

To date, it remains unsolved how firms shape inequality in interaction with other mechanisms of stratification on the individual and occupational level. Accordingly, we analyse whether workers of different occupational classes are exposed to different degrees to wage effects of firm internal labour markets. This question become particularly important since results may shed light on the role of firms for the recent rise of overall wage inequality. We refer to the argument stated by Kalleberg (2003) that whether workers are able to benefit from firms' internal or external strategies for flexibility depends on resources available on the individual and occupational level. Matched employer-employee data from official German labour market statistics are used to estimate firm specific wage components, which are then regressed on the degree of firms' openness respectively closure to the external market as measured by firms' churning rate. Results show that across-firm wage effects of internal labour markets are largest among unskilled workers and also strongly pronounced among qualified manual workers. Effects are clearly smaller among classes of qualified and high qualified non-manual workers. This implies that the most disadvantaged workers in the labour market are also most contingent upon employers' increasingly heterogeneous policies of recruitment and remuneration.

1. Introduction

Since the beginning of the 1990s, in a wide range of OECD-countries the employment chances of unskilled workers have decreased due to economic globalization and increasing competition within domestic markets. Aside from remarkable differences between countries, unskilled manual and non-manual workers are increasingly confronted with fixed term employment, part time jobs, temporary agency employment and long-term unemployment (e.g. Blossfeld et al., 2006a,b; Kalleberg et al., 2000; Gebel and Giesecke, 2009; Muffels, 2008). Not surprisingly, this rapid change has been followed by an increase in income inequality (OECD, 2011; Giesecke and Verwiebe, 2009). These changes suggest that there may be reason to institute social mechanisms which protect the most vulnerable workers from losing further material life chances. Rather than investigating political institutions or collective action strategies as is common in other studies, in this article we pay attention to a social entity located at the very centre of the labour market: the firm. We query to what extent the wages of workers within different occupational classes are affected by the attachment to firms with and without internal employment strategies. As recent studies have shown, the impact of firms on social inequality is large and increasing (Card et al., 2013). Firm internal labour markets give rise to inequality across firms, since they potentially protect workers against job insecurity and wage competition in the external market. We therefore ask whether the wages of unskilled workers depend to a greater extent on employment at firms with an internal labour market than medium and high skilled employees do.

In section 2 we present arguments adapted from economic and sociological labour market research which claim that the lower the occupational class status of an employee, the more his or her wage will depend on the existence of an internal recruitment strategy. In order to test this hypothesis, we use German employer-employee data for the years 2005 and 2010 (section 3). This includes, alongside an extensive set of variables, information on firm-level worker turnover that exceeds changes in the number of jobs (churning). To identify the wage effects of internal employment systems, we apply a two-step estimation strategy. First, fixed firm wage effects are estimated while controlling within firms for employees' individual characteristics. Second, the relation between the obtained firm wage effects and the firm-specific churning rate is estimated, while other relevant firm characteristics such as size and collective bargaining status are controlled for. By referring to the class concept proposed by Erikson and Goldthorpe (1992), we compare wage effects for five occupational classes.

Our findings show that individual wages are determined to a greater extent by firm heterogeneity within the lower skilled classes than within the intermediate and highly qualified classes (section 4). The positive wage effects of internal labour markets are largest among lower qualified occupations and somewhat smaller in qualified manual occupations. The wage effects of internal labour markets are clearly smaller within qualified service, clerical and professional occupations. These findings indicate that low skilled employees particularly rely on the protection from external market forces that is provided by employers. The article concludes with a short summary and discussion of some remaining open questions.

2. Organisations and Wage Inequality

Wage inequality can occur both between and within firms. Between-firm inequality refers to cases in which workers with equal individual characteristics receive unequal remunerations due to their attachment to different firms. This phenomenon has recently been called "horizontal inequality" (Lengfeld, 2010), implying that wage differentiation is to a certain extent caused by the heterogeneity of firm structures. In contrast, "vertical inequality" refers to unequal wages within firms which stem from heterogeneous worker characteristics (i.e. the individual's level of human capital) and the allocation of workers to positions within the same firm (ibid.). The aim of this paper is to combine both dimensions of inequality by querying the degree to which heterogeneity of organisational structures affects wage inequality within different occupational classes. In the following we refer to studies belonging to the "new structuralism" approach (Baron and Bielby, 1980; Baron, 1984) which has emphasised the importance of the organisational level and subsequent distributive effects.

2.1 Wage Inequality across firms and internal labour markets

The literature offers competing explanations for inequality of wages between firms (see Groshen, 1991 for an overview). Generally speaking, it is assumed that wage differentials between firms result from diverse strategies that firms choose to address the basic functional requirements of human resource management. This may entail the need to hire, motivate and keep qualified employees as well as the need for flexibility and cost reduction, depending on the type of product market and other factors external to the organisation. Referring to segmented labour market theory (Doeringer and Piore, 1971) and the theory of open and closed positions (Sorensen, 1983), the degree of openness is an important char-

acteristic of an employment strategy that impacts the level and disparity of remunerations.

According to Doeringer and Piore (1971), firms may establish internal labour markets, characterised by initial access through entry-level positions, well defined career opportunities and long term employment of staff. In contrast, firms may recruit predominately from the external labour market, which in turn goes hand in hand with short term employment and a higher degree of wage competition between workers. The theory of social closure interprets internal labour markets as institutions which restrict access to organisations and particularly to higher positions within organisations (Sorensen, 1983). Thus, internal labour markets pose an alternative to market forces with respect to the determination of attainment processes. Usually, positions within internal (closed) labour markets cannot be terminated at the whim of the employer. Moreover, there are a limited number of vacancies and candidates. Both facts lend employees a relatively high degree of power compared to what they would have in the external market. Thus, members of an organisation can generate rents from this process of monopolization (Sorensen, 1983, 1996; see also Lindbeck-Snowder, 1988 arguing from a different theoretical perspective).

Additionally, gains in efficiency provide an explanation for higher wages within internal labour markets. Efficiency wages are wages paid above the market rate that aim to motivate employees and to strengthen their commitment to the employer. This monetary incentive is assumed to complement internal labour markets well, since both measures aim at long term employment relationships. This applies particularly for efficiency wages that are paid for reasons of fairness (Akerlof, 1984) or to avoid costs from frequent adjustment of wage schedules to the conditions of the external market (Groschen, 1991, 370). The payment of persistent wage premiums leads to the protection of the workforce against market volatilities and has been referred to as the price dimension of internal labour markets (Groschen and Levine, 1998). An opposing argument is given by the theory of compensating wage differentials (Rosen, 1986), which states that in a competitive labour market, undesirable job characteristics are compensated by higher wages. Therefore, wages would be expected to be higher in firms which recruit externally, since jobs are more insecure due to higher fluctuation.

Empirical evidence suggests that closed firms pay higher wages than firms which fill vacancies predominately by recruiting from the external labour market (e.g. Alexander, 1974; Kalleberg and Van Buren, 1996; Lengfeld, 2010). Studies considering wage variation with respect to unobserved individual characteristics imply that part of this positive relation may be due to selection of "high wage workers" into internal labour markets (Abowd and Kramarz 1998; Corneließen and Hübler, 2011). These results do not, however, allow for differentiation be-

tween occupational classes. In fact, research comparing the wage effects of internal labour markets within different occupational classes is rare. Although previous studies have shown that firm wage differentials are of greater importance for wage determination among blue collar workers than among white collar workers (Davis and Haltiwanger, 1991; Bronars and Famulari, 1997; Stephan, 2001), these differences have not been explored in detail. Instead, it has been emphasized that firms paying above average wages tend to do so for all occupational groups, which is in line with sorting of equally skilled employees into firms (Kremer, 1993). Lane et al. (2007), however, assert that positive correlations of firm wage effects are lowest between occupational groups that are furthest apart in the hierarchy. This result points to differences in firm wage effects that are due to occupation-specific tasks and associated problems of monitoring workers' productivity (Groschen, 1991b, 882).

2.2 Wage inequality across firms within occupational classes

Given that firm internal labour markets play at least some role in determining wage inequality, we raise the question of whether different workers are exposed to this kind of inequality to different degrees. Thus, we focus on across-firm wage effects of internal versus external recruitment strategies. Workers are categorised into five classes, according to the level of skills required and similarities of tasks performed (see section 3.2 for more details). With reference to Goldthorpe (2000) these occupational classes are assumed to differ systematically with respect to the specificity of skills and the feasibility of monitoring by the firm.

We expect that wages are determined to greater extent by firm attachment within low skilled classes than within intermediate and high skilled classes. A general explanation for this is that variations of individual skills as well as strategies of social closure at the occupational level (credentialism) are particularly important for the determination of wages within the high skilled category (Weeden, 2002). In contrast, the ability to achieve returns to individual skills or from occupational closure is smaller within classes of less skilled workers. Instead, for these classes, wages depend to a greater extent on strategies that make use of insider power. More specifically, it has been reasoned that the consequences of internal and external employment systems "...differ depending on workers' individual and collective control over skills and other valued resources" (Kalleberg 2003). There are several arguments in favour of this claim.

First, although the typical notion of unskilled work is that of external market relations (Goldthorpe, 2000), wages may deviate substantially from that rationale because of requirements on the firm level. From the firm perspective, loss of un-

skilled workers is usually less costly compared to more qualified workers, since the skills required are rather basic and general. Furthermore, the performance of unskilled workers' often is easily observed, which facilitates a close connection of wages to productivity. However, training on the job and internal opportunities for promotion are important means for less skilled workers to attain higher wages. This situation is reflected by the often found empirical result of high returns to tenure in blue collar jobs, while returns to skills and experience are higher in white collar jobs (Kramarz et al., 1996, 376). Therefore, payment of less skilled workers may be substantially higher if the firm has reason to retain workers and thus close positions off, caused by an arbitrary strategic decision or by external factors such as scarce labour supply. In contrast, high skilled workers are likely to receive wage premiums that aim at maintaining a long-term employment relationship because of their occupational position (Goldthorpe, 2000). Thus, they are less contingent on firms' employment policies.

Second, a differentiation of wages within the group of unskilled workers is likely to occur at the firm level because differences in (monitoring) technologies are assumed to be greatest at the bottom of the occupational hierarchy (Bulow and Summers, 1986, 388). This refers to the notion that performance of managers is generally difficult to monitor, while productivity of unskilled workers may be well observed in one firm (e.g. by the number of produced pieces) but not in another (e.g. when teamwork is involved).

A third argument comes from human capital theory. Wage inequality such as that between firms is assumed to be due to the skills of employees, which may be unobservable to the researcher. Thus, wage differentials between firms may stem from a sorting of workers into firms based on workers' informal (statistically unobserved) qualifications. Given that job security is desired by workers, highly productive workers may sort into firms with an internal labour market (see also Corneließen and Hübler 2011). If this selection is most pronounced among the unskilled, across-firm wage effects of firms' internal labour markets would be particularly large for this class. Given that unskilled workers potentially face greater barriers in accessing internal labour markets due to their lack of educational degrees, we assume that the unskilled could access internal recruiting firms only if they possess informal qualifications that are above average for their class.

To sum up, relative wage gains from employment in firms using internal labour market strategies are expected to be more pronounced for less qualified occupational classes. Workers belonging to these classes are also more likely to forfeit substantial wage gains when employment stability and opportunities of promotions are not present in the respective firm. In contrast, intermediate and highly qualified workers largely enhance their chances of wage attainment

through greater amounts of human capital, greater specificity of skills and greater difficulty of monitoring. Accordingly, for these classes, attaining higher wages is less tied to the firm's recruitment policy. Thus, we formulate the following hypothesis:

H1: The impact of the presence of a firm internal labour market on wages is larger for unskilled occupational classes than for the intermediate and highly qualified classes.

3. Data, Variables, and Methods

3.1 Data

In order to test our hypothesis we make use of linked employer-employee data (LIAB) from state-run German employment statistics and an annual business establishment survey provided by the German Institute for Employment Research (IAB). Germany is an interesting case for analysing the role of firms' employment strategies in the determination of wage inequality because the German labour market is considered to be relatively strictly regulated compared to liberal market economies like e.g. the U.S. or Great Britain (OECD, 2009, p.8). However, against a background of increasing globalisation and the decline of collective bargaining, greater demand and opportunities for flexible employment have become prevalent in Germany. Several labour market reforms took place in the late 1990s and early 2000s which facilitated the proliferation of temporary and low-wage jobs (Jacobi, Kluve 2006). At the same time, rising demand for highly qualified personnel may have strengthened the role of long-term employment relations, opportunities for internal promotion and measures of functional flexibility. It is therefore likely that firms' strategies for employment and remuneration have begun increasingly to diverge for different occupational classes and have thus led to greater segmentation in the workforce.

The data are obtained by merging information on employers from the IAB-establishment panel with information on all regular employees working in these establishments from the employment statistic of the German Federal Labour Services (see Alda et al. 2005 for an overview). The IAB-establishment panel is an annual survey of German establishments that covers information on establishment structures and human resource decisions.¹ The sample is based on the employment statistics as of 30 June of a year. The sample is random and stratified

¹ The sample unit is the establishment which refers to a firm's head office or a local subsidiary. However, the terms firm and establishment are used as synonyms throughout this article.

by industry and firm size. Since the calculation of a firm's specific wage component requires a minimum of two employees per firm, firms with less than one employee are excluded from the sample. Our data set is thus a representative sample of German establishments which employ at least two employees eligible for social security.

The IAB-employment statistic covers all persons who were employed for at least one day since 1975 and have contributed to social security with the exceptions of civil servants and the self-employed. The data include information on employees' education, occupation, sex, age, nationality, industry and daily gross earnings. It is a limitation of the data that earnings are censored from above. If the wage rate exceeds the upper earnings limit for social insurance contributions ("Beitragsbemessungsgrenze"), the threshold is reported instead of real earnings. This problem is approached by applying an imputation strategy that has been developed specifically for these data (Gartner, Rässler 2005). For comparability, the analysis was restricted to full-time employees in the private sector in West Germany, ages 20 to 60. We excluded jobs with earnings below 400 euros per month because these are unlikely to be full time jobs. Furthermore, trainees and interns were excluded from the sample.

We used cross-sectional data from two waves, 2005 and 2010. These two waves were chosen due to the financial and economic crisis in Europe which began in 2008. We must bear in mind that data from the recent 2010 wave may be affected by unobserved economic turbulence. Thus we compare findings from the 2010 data with those derived from data collected three years before the crisis emerged.

3.2 Variables

The degree to which firms maintain an internal or external human resource strategy is measured by a firm's churning rate (CR). The churning rate describes that part of labour turnover which occurs independently of changes in the number of jobs in a given period of time within a firm (in our data the first six month of the respective year). It is therefore a measure of the openness to the external labour market. It is calculated as follows: $CR = (H + S - |H - S|) / L$, where H is the number of hires, S the number of leaving employees and L the average number of jobs in the firm (Davis 2006)). Other establishment characteristics that are relevant for a firm's wage level were controlled for in our models. These include establishment size, existence of a collective bargaining agreement, existence of a works council and condition of technological equipment. Furthermore, the composition of a firm's workforce was controlled for its share of women and

foreigners as well as its share of different skill groups within the establishment (see appendix for descriptive statistics).

In order to aggregate employees with similar occupations, the occupational classification of Blossfeld (1985) is used. This scheme originally comprised twelve groups, classifying three levels of qualification - unskilled, skilled and high skilled - and several categories of performed tasks: manual, service, clerical, professional and managerial tasks. We further aggregated these groups into five occupational classes comparable to the well-known class scheme of Erikson and Goldthorpe (1992): (1) unskilled manual workers, (2) unskilled non-manual service and clerical occupations, (3) skilled manual workers, (4) skilled service and clerical occupations and (5) high skilled employees, which comprise technicians, engineers, semi-professionals, professionals and managers.

3.3 Methods

In order to determine across-firm wage effects of internal versus external employment strategies within different occupational classes, we apply a two-step estimation strategy. First, we calculate firm specific wage components, while individual characteristics of individuals within firms are controlled for. The variance of wage levels across firms could be illustrated preliminarily by calculating the distribution of mean wages of each establishment in the sample. However, differences in establishments' mean wages may arise not only from differences in organisational structures but also if employees are sorted into establishments according to their qualifications. Since we are interested in the wage effects of organisational structures, the firm's wage levels are adjusted for effects of the composition of the workforce, as far as observed. We accomplish this by estimating an OLS wage regression including fixed effects for each firm (ψ_i), as well as individual variables reflecting human capital, gender and foreign nationality (x_i) (see equation 1, with individuals i and firms j).² Human capital is measured in terms of educational degree, labour market experience (age in years, simple and quadratic) and years of tenure in the current firm. Hence, the coefficients of the firm dummies can be interpreted as the wage level of each firm, controlled for observed characteristics of the employees. This firm-specific constant may also be referred to as the base wage of a firm. Since the data provide only limited information on individuals and unobserved characteristics cannot be controlled for in the cross-sectional setting, the obtained firm wage differentials may still reflect

² The Stata procedure calculates the model by differencing out the fixed effects, and therefore their coefficients are not obtained directly. It is possible, however, to predict the coefficients using post-estimation commands.

sorting of individuals into firms to some degree. This problem is mitigated by including the shares of educational degrees at the firm level in the second step of the analysis, since unobserved abilities are presumably correlated with formal qualifications.

In the second step, the obtained firm wage differentials function as the dependent variable. We test whether the heterogeneity of firm wage effects can be explained by the openness or closure of a firm to the external market, which is operationalized by the churning rate (CR_j). Using OLS regression at the firm level, we control for additional organisational structures that might influence a firm's wage level (z_j) (see equation 2). The control variables are described in section 4.2 (and table A.2 in the appendix). In order to evaluate differences between classes, the described analyses are performed for the total sample of employees as well as separately for each occupational class.

$$(1) \quad \ln y_{ij} = \psi_j + \beta x_i + \mu_{ij}$$
$$(2) \quad \psi_j = \alpha + \delta CR_j + \lambda z_j + \varepsilon_j$$

4. Results

Table 1 reports descriptive statistics of the distribution of daily gross wages by occupational class in Germany in 2005 and 2010 respectively. As expected, wages are higher in occupational classes that require higher levels of qualification. Earnings have risen for each class over the two years (data do not account for inflation). The average earnings of unskilled employees are lowest in unskilled service and clerical occupations and somewhat higher in unskilled manual occupations. Employees in occupations that require intermediate levels of qualifications earn considerably more in service and clerical occupations than in manual occupations. Wages of employees in highly qualified occupations (technicians, professions and managerial occupations) are again substantially higher. The respective coefficients of variation show that there are also distinct differences in the dispersion of wages within occupational classes. Manual occupations exhibit small overall variances in wages, while wages among service and clerical as well as highly skilled occupations are relatively heterogeneous.

4.1 Decomposition of Variance of Wages

To what degree can the variance of wages be explained in cross-sectional wage regressions by individual characteristics and employees' attachment to firms? Regarding individual characteristics, we obtained typical results for a mincer type wage regression, i.e. positive returns to measures of education, tenure and experience. Inclusion of fixed firm effects leads to smaller coefficients of the individual variables, compared to a conventional OLS specification.³

However, the focus of our interest is not on returns to individual characteristics but on across-firm wage effects. As a starting point for our main analysis we examine which part of the variance can be explained by employees' attachment to firms and how far these findings differ across classes. Table 2 shows the determination coefficients for the specifications with and without firm dummies for each class. The gain in explained variance, by including fixed firm effects, is substantial for all classes. It is largest, however, in manual occupations (unskilled and qualified) as well as in unskilled service and clerical classes. This means that, within these classes, wage inequality is caused to a greater degree by inter-firm variance than it is for non-manual intermediate and high skilled occupations. This finding applies to both years under review. However, wage determination by heterogeneous firms is greater in 2010 than in 2005 for all occupational classes, with the exception of unskilled service and clerical occupations.

In sum, results show that firm attachment matters particularly for wage determination among the unskilled and manual occupational classes. This result is in line with previous studies that indicated that wage inequality between firms is of greater importance for blue collar workers (Davis and Haltiwanger 1991; Stephan, 2001; Lane et al., 2007), but goes beyond these studies by further disaggregating occupational classes. Furthermore, it becomes obvious that vertical dispersion of wages within firms is limited for unskilled and qualified manual occupations.⁴ This finding supports the notion that wages are closely linked to general skills in these occupations and that career ladders are shorter than in more highly qualified non-manual occupations (see Goldthorpe, 2000; Groshen, 1991b, 876).

³ Detailed results are available on request.

⁴ See appendix table A.1 for a detailed decomposition of wages into inter-firm and firm internal components.

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Table 1: Distribution of Daily Gross Wages by Occupational Group

| Year | Total | | Unskilled manual | | Unskilled service/clerical | | Qualified manual | | Qualified service/clerical | | High qualified | |
|-------------------------------|-----------|---------|------------------|---------|----------------------------|---------|------------------|---------|----------------------------|---------|----------------|---------|
| | 2005 | 2010 | 2005 | 2010 | 2005 | 2010 | 2005 | 2010 | 2005 | 2010 | 2005 | 2010 |
| Mean | 114.8 | 126.1 | 95.0 | 103.6 | 88.3 | 93.3 | 104.6 | 115.2 | 118.2 | 126.8 | 148.1 | 166.1 |
| Standard-deviation | 55.4 | 65.3 | 25.3 | 30.7 | 40.0 | 43.9 | 26.3 | 33.9 | 56.0 | 65.0 | 73.2 | 86.3 |
| Coeff. of variation | 0.48 | 0.52 | 0.27 | 0.30 | 0.45 | 0.47 | 0.25 | 0.29 | 0.47 | 0.51 | 0.49 | 0.52 |
| Number of observations | 1,348,122 | 869,776 | 291,082 | 192,424 | 172,772 | 102,232 | 208,529 | 140,896 | 326,514 | 200,523 | 346,157 | 230,824 |

Source: LIAB 2005, 2010.

Table 2: Decomposition of Variance in Wages

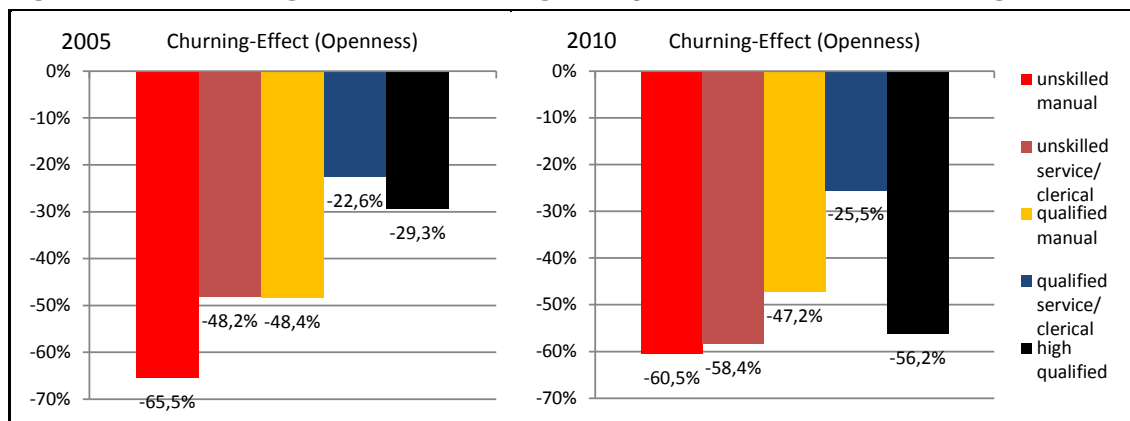
| Year | Total | | Unskilled manual | | Unskilled service/clerical | | Qualified manual | | Qualified service/clerical | | High qualified | |
|--|-------------|-------------|------------------|-------------|----------------------------|-------------|------------------|-------------|----------------------------|-------------|----------------|-------------|
| | 2005 | 2010 | 2005 | 2010 | 2005 | 2010 | 2005 | 2010 | 2005 | 2010 | 2005 | 2010 |
| Coeff. of Determination | | | | | | | | | | | | |
| (1) Individual characteristics | 0.41 | 0.42 | 0.31 | 0.33 | 0.32 | 0.36 | 0.29 | 0.29 | 0.35 | 0.36 | 0.49 | 0.48 |
| (2) Individual characteristics + establishment | 0.56 | 0.59 | 0.59 | 0.64 | 0.60 | 0.63 | 0.49 | 0.62 | 0.51 | 0.53 | 0.61 | 0.62 |
| Marginal contribution | | | | | | | | | | | | |
| (2)-(1) Establishment | 0.15 | 0.17 | 0.28 | 0.30 | 0.28 | 0.27 | 0.20 | 0.33 | 0.17 | 0.18 | 0.12 | 0.14 |

Source: LIAB 2005, 2010.

4.2 Wage Effects of Internal Recruitment Strategies

The second step of our analysis uses the obtained firm-wage differentials as dependent variables and seeks to analyse their relation to the degree to which firms access internal or external labour markets. To begin with, Figure 1 descriptively compares the inter-firm wage effects of the churning rate from bivariate OLS-regressions for each occupational class. Wages are significantly lower in firms whose recruiting strategies are externally directed for each class in both 2005 and 2010. In total, a churning rate that is 100 percentage points (pp) higher is associated with a 31pp lower firm wage level in 2005, irrespective of the human capital endowments of a firm's workforce. The gross wage effect of a firm's churning rate is larger in 2010 and amounts to 37pp. This indicates a general complementarity between internal employment systems and wages above the expected rate among firms. In 2005, the firm wage effects of external employment systems are clearly larger within low qualified and manual occupations than within intermediate and high qualified non-manual occupations. In 2010 most of the occupational groups show similar results as in 2005. However, the wage effect of the churning rate is exceptionally high within the group of high qualified employees in 2010.

Figure 1: Bivariate regression of firm wage components on a firm's churning rate



Source: LIAB 2005, 2010. Firm samples are described in the appendix.

All coefficients are significant at the .001 level.

Table 3 shows multivariate results for the impact of the churning rate on wages at the firm level. We control for firms' structural characteristics that potentially affect wages, including firm size (in logs), sector, collective bargaining status, assessments of technical equipment and business situation as well as the proportion of the workforce of qualified employees, women and foreign employ-

ees. Overall, the wage effects of the indicator for more external employment systems are smaller in magnitude once control variables are added to the model. Nevertheless, in 2005 effects are clearly largest for unskilled occupational classes and also among qualified manual occupations – the classes that earn the lowest average wages (see table 1). While for unskilled manual workers an increase in a firm's churning rate by 100pp is associated with a decrease in wages by 34pp, the related effects amount to 10pp among qualified non-manual employees and are insignificant among the group of high qualified employees. In 2010, after the outbreak of the financial crisis in Europe, the conclusions are less clear. As with the bivariate result, the existence of an open or closed employment system makes a greater difference in remuneration among the unskilled and manual workers than among qualified service or clerical ones. However, in 2010 the greatest effect is found among the highly qualified. A possible explanation could be that firms use worker churning as a measure of cost reduction in times of recession not only for the typically affected low skilled workers but also for highly qualified personnel. For instance, new employees are hired at lower wages than their predecessors, while wages are rigid for those who keep their jobs.

Furthermore, we obtained some interesting results on how wage effects of other important firm structures vary across occupational classes. These effects are for the most part similar in 2005 and 2010. Employees of all classes benefit significantly from being employed in large firms. These effects are largest for qualified service and clerical occupations as well as for highly qualified occupations, which may be interpreted as an effect of rent sharing. If one assumes that larger firms are more productive and thus are able to generate higher rents, it is reasonable to assume that the employees in the most powerful positions can benefit most directly from this. Employees in lower status groups are more likely to attain rent sharing through collective bargaining.

Collective bargaining agreements at the sectoral level show the largest inter-firm wage effect for unskilled manual occupations, while the effect of collective bargaining at the firm level is largest among unskilled non-manual workers. This can be explained by the fact that collective agreements often define minimum wages and thus apply mostly to workers at the bottom of the wage hierarchy. Works councils represent the interests of the workforce at the firm level and have legally secured rights of voicing in social and personnel matters (Hübler and Jirjahn 2003). The existence of a works council at a firm has a relatively large wage effect for each occupational group. Compared to other classes, this inter-firm differentiation is relatively slight among the high qualified employees.

Additionally, firm wages are significantly lower in firms employing higher shares of women. This finding is in line with existing studies on the wage effects of firms' gender composition (see Reskin et al., 1999 for an overview). It does,

however, apply particularly within the classes of unskilled employees. Interestingly, things are different for the share of foreign employees within firms, a group that is typically also disadvantaged in the labour market. There is no inter-firm wage effect of the share of foreign employees within unskilled groups. However, effects are positive for intermediate and highly qualified groups of non-manual employees. This result points to the productivity enhancing effects of ethnic diversity in qualified positions.

In sum, our findings seem to support the hypothesis that the degree of openness or closure of an employment system plays a significant role in determining wages particularly among less skilled workers. Additionally, it is clear that gains and losses that are associated with open and closed employment systems are of greater importance for manual occupations than for non-manual occupations. On the one hand this implies that segmentation caused by internal labour markets is particularly common among unskilled and manual workers, while this form of segmentation is present to lesser extent within the classes of qualified non-manual employees. On the other hand it implies that internal labour markets decrease inequality between occupational classes, because they protect less qualified workers from reduced wages.

5. Conclusion

In this article we have analysed the extent to which internal labour markets have implications for wages of employees belonging to different occupational classes. Our findings indicate that for lower qualified classes (manual workers and unskilled non-manual workers) individual wages are determined to greater extent by attachment to a given firm than for medium and high qualified classes. The positive wage effects of internal labour markets are largest for unskilled occupations but are also strongly pronounced among qualified manual occupations. The wage effects of internal labour markets were clearly smaller for classes of qualified non-manual employees in the year 2005, while in 2010, we find that internal labour markets have an exceptionally high wage effect within the group of high qualified employees. This effect can be explained by the appearance of the financial and economic crisis in autumn 2008.

To put it in a nutshell, results suggest that employees most vulnerable with respect to non-standard employment relations and low wage levels rely heavily on the degree of organisational protection from external market forces. In other words, the most disadvantaged in the labour market are most contingent upon employers' increasingly heterogeneous policies of recruitment and

remuneration. In contrast, better situated classes seem to receive higher wages which are less contingent on specific employers, but have greater dependence on individual assets. Accordingly, internal employment systems can be an effective measure for the greater inclusion of unskilled workers, while from the perspective of the low qualified worker it is desirable to gain access to firms with an internal labour market. This may be achieved by above average effort, but is to some extent beyond the control of individuals due to its reliance on organisational decisions. The most promising alternative individual strategies for firm inclusion seem to be to engage in collective action or, if possible, to invest in education.

However, these results should be interpreted with caution. This study is limited to the analysis of cross sectional data and thus, unobserved sources of wage heterogeneity at the individual level cannot be fully controlled for. This limitation is of potential importance to the selection of highly productive employees into internally focused firms. If this were the case, by not considering these effects, the overall impact of internal labour markets on wages would be overestimated.

Additionally, findings do not allow us to draw extensive conclusions about the importance of the expounded mechanisms of social stratification in other OECD-societies. However, to a certain extent literature has demonstrated that the distributive effects of organisations are large in coordinated market economies like Germany (Stephan 2001) and France (Kramarz, Lollivier and Pelé 1996) as well as in liberal market economies like the U.S. (Davis and Haltiwanger 1991). One may suppose that, along with a more pronounced segmentation into core and peripheral workforces (Atkinson 1987), differences in the organisational wage effects across occupational classes are more pronounced within liberal market economies (Lengfeld, 2010, 222ff). Thus, less labour market regulation and welfare system may facilitate greater scope for diversification at the organisational level.

Finally, our results on class-specific wage effects of organisational heterogeneity are potentially connected to a rise in wage inequality, which has occurred recently in Germany and in most other industrial countries (OECD, 2011). Despite the common assumption that internal labour markets are in decline, empirical findings do not suggest that internal employment systems are in the process of disappearing (Groschen 1998). In fact, evidence instead suggests that employment systems are becoming more and more diverse and polarised (Card et al. 2013). Our findings suggest that in this process the low qualified workers may be most affected by diversification across firms. Therefore, future research may intensively consider the interaction between occupational classes and organisational structures in explanations of rising wage inequality.

Table 3: Determinants of Firm-Wage Effects 2005 and 2010

| | 2005 | | | | | |
|--|-----------|------------------|-----------------------------|------------------|-----------------------------|----------------|
| | Total | Unskilled manual | Unskilled service/ clerical | Qualified manual | Qualified service/ clerical | High qualified |
| Churning rate | -0.197*** | -0.343*** | -0.219*** | -0.292*** | -0.103** | -0.061 |
| Log firm size | 0.043*** | 0.030*** | 0.025*** | 0.035*** | 0.040*** | 0.041*** |
| Sectoral collective bargaining | -0.014 | 0.035** | 0.012 | 0.022** | 0.018 | -0.005 |
| Firm collective bargaining | -0.013 | -0.009 | 0.046* | 0.021 | -0.009 | -0.014 |
| Works council | 0.102*** | 0.082*** | 0.074*** | 0.063*** | 0.119*** | 0.070*** |
| Share women | -0.275*** | -0.430*** | -0.428*** | -0.210*** | -0.212*** | -0.203*** |
| Share foreign | -0.005 | -0.024 | 0.030 | 0.085* | 0.196*** | 0.184** |
| Training in firm | 0.070*** | 0.034* | 0.068*** | 0.045*** | 0.049*** | 0.046*** |
| Good revenue situation | 0.046*** | 0.045*** | 0.037*** | 0.033*** | 0.047*** | 0.026** |
| New technical equipment | 0.029*** | 0.020* | 0.015 | 0.012 | 0.026** | 0.028** |
| Share no occupational degree | | | reference | | | |
| Share vocational training | 0.112*** | 0.134*** | 0.016 | 0.026 | 0.006 | -0.016 |
| Share vocational training and A-levels | 0.336*** | 0.070 | 0.562*** | 0.199** | 0.237*** | 0.100 |
| Share university degree | 0.326*** | 0.213*** | 0.693*** | 0.378*** | 0.358*** | 0.031 |
| Mean age | 0.003*** | 0.010*** | 0.007*** | 0.005*** | 0.001 | 0.008*** |
| Sector dummies | yes | yes | yes | yes | yes | yes |
| Constant | 3.071*** | 3.139*** | 3.118*** | 3.359*** | 3.318*** | 3.125*** |
| Number of establishments | 5,768 | 2,295 | 3,227 | 2,965 | 4,135 | 2,997 |
| Adj. R-squared | 0.433 | 0.414 | 0.414 | 0.465 | 0.431 | 0.348 |

| | 2010 | | | | | |
|--|-----------|------------------|-----------------------------|------------------|-----------------------------|----------------|
| | Total | Unskilled manual | Unskilled service/ clerical | Qualified manual | Qualified service/ clerical | High qualified |
| Churning rate | -0.232*** | -0.202*** | -0.248*** | -0.204*** | -0.078 | -0.319*** |
| Log firm size | 0.048*** | 0.032*** | 0.029*** | 0.039*** | 0.044*** | 0.044*** |
| Sectoral collective bargaining | 0.001 | 0.032* | 0.020 | 0.043*** | 0.011 | 0.052*** |
| Firm collective bargaining | 0.005 | 0.008 | -0.001 | 0.033* | 0.008 | 0.026 |
| Works council | 0.130*** | 0.103*** | 0.110*** | 0.101*** | 0.131*** | 0.075*** |
| Share women | -0.257*** | -0.379*** | -0.409*** | -0.223*** | -0.185*** | -0.233*** |
| Share foreign | 0.077* | 0.076 | 0.147* | 0.084 | 0.282*** | 0.167* |
| Training in firm | 0.072*** | 0.040** | 0.074*** | 0.040*** | 0.072*** | 0.048** |
| Good revenue situation | 0.018* | 0.014 | 0.023 | 0.008 | 0.013 | 0.013 |
| New technical equipment | 0.037*** | 0.020 | 0.029* | 0.014 | 0.014 | 0.012 |
| Share no occupational degree | | | reference | | | |
| Share vocational training | 0.176*** | 0.213*** | 0.094** | 0.118*** | 0.103** | 0.032 |
| Share vocational training and A-levels | 0.413*** | 0.342*** | 0.428*** | 0.416*** | 0.287*** | 0.200** |
| Share university degree | 0.416*** | 0.559*** | 0.706*** | 0.624*** | 0.504*** | 0.079 |
| Mean age | 0.001 | 0.009*** | 0.004* | 0.006*** | -0.001 | -0.003 |
| Sector dummies | yes | yes | yes | yes | yes | yes |
| Constant | 3.065*** | 3.100*** | 3.083*** | 3.120*** | 3.405*** | 3.400*** |
| Number of establishments | 4,907 | 1,837 | 2,586 | 2,375 | 3,349 | 2,315 |
| Adj. R-squared | 0.410 | 0.424 | 0.395 | 0.472 | 0.428 | 0.369 |

Source: LIAB 2005, 2010. Firm samples are described in the appendix.

Additionally, eight sector dummies are included, see appendix for descriptive statistics; * p<0.05; ** p<0.01; *** p<0.001

References

- Abowd, J.M. and Kramarz, F. (1998), "Internal and External Labor Markets: An Analysis of Matched Longitudinal Employer-Employee Data", Haltiwanger, J., Manser, M.E. and Topel, R. (eds.), *Labor Statistics Measurement Issues*, University of Chicago Press, Chicago, pp. 357-370.
- Alda, H., Bender, S. and Gartner, H. (2005), "The linked employer-employee dataset created from the IAB establishment panel and the process-produced data of the IAB (LIAB)", *Schmollers Jahrbuch*, Vol. 125, pp. 327-336.
- Akerlof, G.A. (1984), "Gift Exchange and Efficiency-Wage Theory: Four Views", *The American Economic Review*, Vol. 74 No. 2, pp. 79-83.
- Alexander, A.J. (1974), "Income, experience, and the structure of internal labor markets", *Quarterly Journal of Economics*, Vol. 88, pp. 63-85.
- Atkinson, J. (1987), "Flexibility or fragmentation? The United Kingdom labour market in the eighties", *Labour and Society*, Vol. 12, pp. 87-105.
- Baron, J.N. (1984), "Organizational Perspectives on Stratification", *Annual Review of Sociology*, Vol. 10, pp. 37-69.
- Baron, J.N. and Bielby, W.T. (1980): "Bringing the firms back in: stratification, segmentation, and the organization of work", *American Sociological Review*, Vol. 45, pp. 737-765.
- Bulow, J.I. and Summers, L.H. (1986), "A Theory of Dual Labor Markets with Application to Industrial Policy, Discrimination and Keynesian Unemployment", *Journal of Labor Economics*, Vol. 4 No. 3, pp. 376-414.
- Blossfeld, H.-P. (1985), *Bildungsexpansion und Berufschancen*, Campus, Frankfurt.
- Blossfeld, H.-P. and Hofmeister, H. (eds.) (2006a), *Globalization, Uncertainty and Women's Careers: An International Comparison*, Edward Elgar, Cheltenham, UK / Northampton, MA, USA.
- Blossfeld, H.-P., Mills M. and Bernardi, F. (eds.) (2006b), *Globalization, Uncertainty and Men's Careers: An International Comparison*, Routledge, London / New York.
- Bronars, S.G. and Famulari, M. (1997), "Wage, Tenure, and Wage Growth Variation Within and Across Establishments", *Journal of Labor Economics* Vol. 15 No. 2, pp. 285-317.
- Card, D., Heining, J. and Kline, P. (2013), "Workplace Heterogeneity And The Rise In West German Wage Inequality", *Quarterly Journal of Economics*, Vol. 128 No. 3, pp. 967-1015.
- Corneließen, T. and Hübler, O. (2011), "Unobserved Individual and Firm Heterogeneity in Wage and Job-Duration Functions: Evidence from German Linked

- Employer-Employee Data", *German Economic Review*, Vol. 12 No. 4, pp. 469-489.
- Davis, S.J., Faberman, R.J. and Haltiwanger, J. (2006), "The flow approach to labor markets: New data sources and micro-macro links", *Journal of Economic Perspectives*, Vol. 20 No. 3, pp. 3-26.
- Davis, S.J. and Haltiwanger, J. (1991), "Wage Dispersion Between and Within US Manufacturing Plants, 1963-1986", *Brookings Papers on Economic Activity: Microeconomics*, pp. 115-200.
- Doeringer, P.B. and Piore, M.J. (1971), *Internal Labor Markets and Manpower Analysis*, Heath, Lexington.
- Erikson, R. and Goldthorpe, H. (1992), *The constant flux. A study of class mobility in industrial societies*, Clarendon Press, Oxford.
- Fligstein, N., Hicks, A. and Morgan, S.P. (1983), "Toward a Theory of Income Determination", *Work and Occupations*, Vol. 10 No. 3, pp. 289-306.
- Gartner, H. and Rässler, S. (2005), "Analyzing the changing gender wage gap based on multiply imputed right censored wages", *Discussion Paper, Institute for Employment Research, Nuremberg, 05/2005*.
- Gebel, M. and Giesecke, J. (2009), "Labour market flexibility and inequality: the changing risk patterns of temporary employment in West Germany", *Journal for Labour Market Research*, Vol. 42, pp. 234-251.
- Giesecke, J. and Verwiebe, R. (2009), "The Changing Wage Distribution in Germany between 1985 and 2006", *Schmollers Jahrbuch. Zeitschrift für Wirtschafts- und Sozialwissenschaften*, Vol. 129 No. 2, 191-201.
- Goldthorpe, J.H. (2000), *On Sociology. Numbers, narratives, and the integration of research and theory*, Oxford University Press, Oxford.
- Groshen, E.L. (1991a), "Five reasons why wages vary among employers", *Industrial Relations*, Vol. 30, pp. 350-381.
- Groshen, E. L. (1991b), "Sources of Intra-Industry Wage Dispersion: How Much Do Employers Matter?", *The Quarterly Journal of Economics*, Vol. 106 No. 3, pp. 869-884.
- Groshen, E.L. (1998), "The Rise and Decline (?) of U.S. Internal Labor Markets", *Discussion Paper, Federal Reserve Bank, New York, 07/1998*.
- Hübler, O. and Jirjahn, U. (2003), "Works Councils and Collective Bargaining in Germany: The Impact on Productivity and Wages", *Scottish Journal of Political Economy*, Vol. 50 No. 4, pp. 471-491.
- Jacobi, L. and Kluge, J. (2006), "Before and after the Hartz Reforms: The Performance of Active Labour Market Policy in Germany", *Discussion Paper 2100, Institute for the Study of Labor, Bonn*.

- Kalleberg, A. (2003), "Flexible Firms and Labor Market Segmentation: Effects of Workplace Restructuring on Jobs and Workers", *Work and Occupations*, Vol. 30 No. 2, pp. 154-175.
- Kalleberg, A., Reskin, B.F., and Hudson, K. (2000), "Bad Jobs in America: Standard and Nonstandard Employment Relations and Job Quality in the United States", *American Sociological Review*, Vol. 65, pp. 256–78.
- Kalleberg, A. and VanBuren, M.E. (1996), "Is bigger better? Explaining the relationship between organization size and job rewards", *American Sociological Review*, Vol. 61, pp. 47-66.
- Kramarz, F., Lollivier, S. and Pelé, L.P. (1996), "Wage Inequalities and Firm-Specific Compensations Policies in France", *Annales d'Économie et de Statistique*, Vol. 41/42, pp. 369-386.
- Kremer, M. (1993), "The O-Ring Theory of Economic Development", *Quarterly Journal of Economics*, Vol. 108, pp. 551-576.
- Lane, J.I., Salmon, L.A. and Spletzer, J.R. (2007), "Establishment Wage Differentials", *Monthly Labor Review*, April, pp. 3-17.
- Lengfeld, H. (2010), *Klasse – Organisation - soziale Ungleichheit. Wie Unternehmensstrukturen berufliche Lebenschancen beeinflussen*, Verlag für Sozialwissenschaften, Wiesbaden.
- Lindbeck, A. and Snower, D. S. (1988), *The insider-outsider theory of employment and unemployment*, The MIT Press, Cambridge.
- Muffels, R.J.A. (Ed.) (2008), *Flexibility and Employment Security in Europe. Labour Markets in Transition*. Edward Elgar, Cheltenham.
- OECD (2011), *Devided We Stand: Why Inequality Keeps Rising*, OECD Publishing, Paris.
- Reskin, B., McBrier, D.b. and Kmec, J.A. (1999), "The determinants and consequences of workplace sex and race composition", *Annual Review of Sociology*, Vol. 25, pp. 335-361.
- Rosen, S. (1986), "The Theory of Equalizing Differences", Ashenfelter, O. and Layard, R. (eds.), *Handbook of Labor Economics Vol. 1*, Elsevier Science/North-Holland, Amsterdam, pp. 641-692.
- Stephan, G. (2001), *Firmenlohndifferenziale. Eine Analyse für die Bundesrepublik Deutschland*, Campus, Frankfurt/Main.
- Sorensen, A.B. (1983), "Processes of allocation to open and closed positions in social structure", *Zeitschrift für Soziologie*, Vol. 12, pp. 202-224.
- Sorensen, A.B. (1996), "The structural basis of social inequality", *The American Journal of Sociology*, Vol. 101 No. 5, pp. 1333-1365.
- Sorensen, J.B. (2007), "Organizational Diversity, Labor Markets, and Wage Inequality", *American Behavioral Scientist*, Vol. 50 No. 5, pp. 659-676.

Venn, D. (2009), "Legislation, collective bargaining and enforcement: Updating the OECD employment protection indicators", Working Paper 89, OECD, Paris.

Weeden, K.A. (2002), "Why do some occupations pay more than others? Social closure and earnings inequality in the United States", *American Journal of Sociology*, Vol. 108, pp. 55-101.

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Do Internal Labour Markets Protect the Unskilled from Low Payment? Evidence from Germany

Appendix

Table A.1: Standard Deviations of Wage Components (from fixed effects wage regressions)

| 2005 | Total | Unskilled manual | Unskilled service/ clerical | Qualified manual | Qualified service/ clerical | High qualified |
|----------------------------------|-----------|---------------------|--------------------------------|---------------------|--------------------------------|----------------|
| Log Wage | 0,47 | 0,31 | 0,48 | 0,28 | 0,50 | 0,53 |
| Firm wage effect | 0,19 | 0,17 | 0,28 | 0,16 | 0,22 | 0,22 |
| Observed individual component | 0,25 | 0,12 | 0,17 | 0,12 | 0,24 | 0,29 |
| Residual | 0,31 | 0,20 | 0,30 | 0,17 | 0,34 | 0,33 |
| Number of observations | 1.348.122 | 291.082 | 172.772 | 208.529 | 326.514 | 346.157 |
| Number of establishments | 6.351 | 2.511 | 3.661 | 3.293 | 4.615 | 3.487 |

| 2010 | Total | Unskilled manual | Unskilled service/ clerical | Qualified manual | Qualified service/ clerical | High qualified |
|----------------------------------|---------|---------------------|--------------------------------|---------------------|--------------------------------|----------------|
| Log wage | 0,51 | 0,36 | 0,51 | 0,33 | 0,53 | 0,56 |
| Firm wage effect | 0,23 | 0,22 | 0,30 | 0,20 | 0,24 | 0,25 |
| Observed individual component | 0,25 | 0,12 | 0,19 | 0,12 | 0,25 | 0,28 |
| Residual | 0,32 | 0,21 | 0,30 | 0,20 | 0,36 | 0,35 |
| Number of observations | 869.776 | 192.424 | 102.232 | 140.896 | 200.523 | 230.824 |
| Number of establishments | 5.512 | 2.033 | 2.952 | 2.639 | 3.810 | 2.772 |

Source: LIAB 2005, 2010.

Table A.2: Description of Firm Samples 2005 and 2010

| Variable name | Remarks | 2005 | | 2010 | |
|---|--|------------------------|----------|------------------------|-----------|
| | | Number of Firms = 5768 | | Number of Firms = 4907 | |
| | | Mean | Std. Dev | Mean | Std. Dev. |
| Production | Sector dummy (reference) | | | | |
| Gastronomy | Sector dummy | 0,03 | 0,16 | 0,00 | 0,00 |
| Trade | Sector dummy | 0,18 | 0,38 | 0,18 | 0,38 |
| Finance | Sector dummy | 0,05 | 0,22 | 0,05 | 0,21 |
| Construction | Sector dummy | 0,10 | 0,30 | 0,08 | 0,28 |
| Agriculture and mining | Sector dummy | 0,04 | 0,21 | 0,04 | 0,19 |
| Health care | Sector dummy | 0,07 | 0,26 | 0,10 | 0,30 |
| Other services | Sector dummy | 0,22 | 0,41 | 0,23 | 0,42 |
| Share no vocational training or university degree | Share of qualification level in firm (reference) | | | | |
| Share vocational training | Share of qualification level in firm | 0,73 | 0,25 | 0,73 | 0,25 |
| Share vocational training and A-levels | Share of qualification level in firm | 0,05 | 0,11 | 0,06 | 0,12 |
| Share university degree | Share of qualification level in firm | 0,08 | 0,16 | 0,08 | 0,15 |
| Mean age | Mean age of workers in firm | 40,86 | 4,63 | 42,02 | 5,09 |
| Share women | Share of women in firm | 0,38 | 0,30 | 0,40 | 0,32 |
| Share foreign | Share of foreign employees in firm | | 0,11 | 0,05 | 0,11 |
| New technical equipment | Dummy: yes if firm's technology is 1 or 2 on ordinal index from 1 (state of the art) to 5 (outdated) | 0,69 | 0,46 | 0,69 | 0,46 |
| Good revenue situation | Dummy: yes if revenue situation is 1 or 2 on ordinal index from 1 (very good) to 5 (bad) | 0,33 | 0,47 | 0,35 | 0,48 |
| No collective bargaining | Dummy: firm not covered by collective bargaining agreement (reference) | | | | |
| Sectoral collective bargaining | Dummy: firm covered by sector-level collective bargaining agreement | 0,56 | 0,50 | 0,48 | 0,50 |
| Firm collective bargaining | Dummy: firm covered by firm-level collective bargaining agreement | 0,07 | 0,26 | 0,06 | 0,25 |
| Works council | Dummy: firm has works council | 0,41 | 0,49 | 0,36 | 0,48 |
| Firm size | Number of workers per firm | 261,31 | 1229,91 | 206,53 | 1227,29 |
| Log firm size | Log number of workers per firm | 3,90 | 1,69 | 3,74 | 1,62 |
| Churning rate | Firm's churning rate | 0,04 | 0,11 | 0,05 | 0,13 |
| Labour turnover rate | Firm's labour turnover rate | 0,09 | 0,17 | 0,10 | 0,18 |
| Training in firm | Employer provided training | 0,73 | 0,44 | 0,71 | 0,45 |

Source: LIAB 2005, 2010. Samples of regressions at the firm level.