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# Intra-Firm Wage Differentials between German and Non-German Employees

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Very preliminary version! Please do not quote!

## **Abstract**

In this paper, we analyse the wage differentials between employees of German and Non-German nationality using linked employer-employee data (LIAB) for the period 1996 to 2007. By focussing on the establishment level, we explicitly consider the heterogeneity of wage setting processes within firms. Our results show that the absolute pay gap within firms (of 11.3 percent on average) is about 5 percentage points smaller than the pay gap on the labour market as a whole, thus pointing to a sorting of Non-German workers into low-paying firms. The observed wage differentials are for the most part (8.8 percentage points) explained by differences in education and work experience. When distinguishing between subgroups we find the unexplained wage gap for immigrants from transition countries (predominantly Eastern Europe and Asia) to be larger on average than for immigrants from guest worker countries. A subsequent analysis of the relationship between selected firm characteristics and the unexplained intra-firm wage differentials reveals that Non-German employees face significantly lower wage discounts in firms with a high share of exports, a high share of Non-German employees and those covered by collective bargaining agreements.

JEL Classification: J15, J31

Keywords: immigrant workers, within-firm wage differentials, unions, works councils

# 1 Introduction

There is some empirical evidence that immigrant workers in Germany receive lower wages on average than natives. As potential reasons for this observation immigrant's lack of education, non-transferability or disregard of skills acquired abroad, language difficulties, cultural and ethnic differences and discrimination are discussed. Previous studies found differences in education and work experience to be the dominating explanatory factors for wage differentials between native and immigrant employees in Germany, leaving only a small residual caused by unobserved factors or, potentially, discrimination. E.g. Diekmann et al. (1993) identified 9% higher wages for German compared to foreign men and a difference in wages of 3.5% that may potentially be attributed to discrimination. For Non-German women, the authors found almost no absolute wage differential. But once their lower labour market participation was taken into account the unexplained wage gap increased. Velling (1995) pointed out huge differences in unexplained pay gaps for foreigners depending on their nationality: Workers from European Union countries face a much lower wage discount (1% to 5%) than workers from Eastern Europe, the Middle East or Far East (13% to 22%). Constant and Zimmermann (2003) did not find direct wage discrimination to prevail when occupational status was held constant. However, they could show that discrimination is likely to happen with respect to allocation of occupations and occupational attainment. Apart from educational attainment and work experience, the labour market success of immigrants is assumed to depend also on their status of integration or assimilation into the host society.<sup>1</sup> Accordingly, language barriers (Dustmann and Van Soest 2002), assimilation theory (Licht and Steiner 1994, Bauer and Zimmermann 1995, Aldashev et al. 2007) and ethnic identity (Constant and Zimmermann 2009) have been considered as explanatory factors for income disparities between Germans and Non-Germans.

The role of firms in determining wage inequality between ethnic groups is still vastly unknown, although the idea that organizations play an important role in creating and implementing wage inequality has become more and more popular (see e.g. Baron 1984; Acker 1990). The assignments of job positions and tasks as well as wage negotiations take place at the firm-level and are substantially affected by collective bargaining agreements and employee co-determination. Furthermore the intra-firm wage distribution is presumably shaped by the firm specific exposition to international competitive pressure. It has been

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<sup>1</sup> The assimilation theory states that foreigners have to take a wage discount when they are new to the host country but can catch up after a certain period of time.

shown that these firm characteristics affect wage levels as well as overall wage distributions (see e.g. Davis and Haltiwanger 1991; Bronars and Famulari 1997; Abowd, Kramarz and Margolis 1999; Addison, Teixeira and Zwick 2006). While there are a couple of empirical studies on the effects of firm characteristics and institutions on the gender wage gap<sup>2</sup>, to our knowledge there does not exist any study on wage inequality by ethnicity that focuses on the firm as unit of analysis.

The present paper aims at closing this gap by taking into account individual and firm characteristics when investigating ethnic wage inequality in Germany. In order to control for the different mechanisms that create inequality between German and Non-German employees at the firm level, we follow the methodological approach of Heinze and Wolf (2006, forthcoming), who analyse the gender wage gap within firms. As in Heinze and Wolf (2006), our empirical analysis is based on the German LIAB data, a representative linked employer-employee panel which includes information on all employees of firms covered by the IAB-establishment-survey. The LIAB merges the survey data on establishments and process generated individual data (the Employment Statistical Register of the Institute for Employment Research (IAB), which is based on administrative social security records). As in most datasets, migration background is difficult to identify in the LIAB. We therefore distinguish respondents by nationality or citizenship, building on Aldashev et al. (2007) whose results show that the earnings prospects of German citizens (including naturalized immigrants) do not differ substantially from the earnings of “native” Germans. The incomes of naturalized immigrants other than ethnic Germans, however, are lower and comparable to people with foreign citizenship. Thus citizenship seems to be an appropriate indicator when analysing wage differentials between natives and non-natives.

In a first step we analyse the absolute wage differentials between two groups of employees, those with and those without German nationality. We thereby distinguish between an explained part due to employees’ human capital endowments and an unexplained residual, the “nationality wage gap” (NWG). We calculate the overall wage gap on the labour market and the average intra-firm wage differentials. If the distribution of foreign workers between firms is not random, the results will differ substantially. In a second step, we investigate the relationship between selected structural and institutional firm characteristics and the intra-firm

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<sup>2</sup> The importance of firm’s affection by institutions for wages has been considered e.g. by Blau and Kahn 1995, 1999, 2003; Meng and Meurs 2004; Elvira and Saporta 2001. For results on the impact of competitive pressure on the earnings of men and women see Black and Brainerd (2004), Oostendorp (2004), Black and Strahan (2001).

NWG, taking the selection into firms as given. The firm-specific NWG is calculated under the assumption that German and Non-German employees have the same characteristics within each firm (= unexplained wage gap). Using this measure as dependent variable, we can determine the impact of selected firm characteristics on the wage inequality within firms to test our theoretical hypotheses. Given the rich information on the establishments available, we can control for many firm-specific attributes, such as firm size, average wage level, share of Non-German employees, qualification level.

Our results confirm previous findings that the major part of the pay differentials is explained by individual human capital endowments. However, running separate wage regressions for every firm in the sample reveals considerable variation in the firm's remuneration structures. In addition, our results show that the absolute pay gap within firms is on average about 5 per cent smaller than the overall pay gap, which points to selection of Non-German workers into low-paying firms. As it has been shown, that immigrant's performance with respect to education and other indicators of integration, as well as the stereotypes they are facing are diverse (Woellert et al. 2009, Velling 1995), we calculate the same measures of wage inequality between Germans and more homogenous subgroups of foreign employees<sup>3</sup>, i.e. guest workers from south Europe and employees from transition countries (Eastern Europe and Asia).

The remainder of the paper is organized as follows: Section 2 discusses the theoretical background of our empirical analysis. The econometric methodology is expounded in Section 3. Section 4 describes our data sources and sampling procedure. Empirical results are presented in Section 5 and Section 6 concludes.

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<sup>3</sup> This disaggregation stays relatively broad due to the requirement of sufficient numbers of observations within every establishment. It is also for that reason, that male and female workers are not analysed separately.

## 2 Theoretical Background

Part of the wage differential between German and Non-German employees may be caused by discrimination. Discrimination may occur in the access to higher education, in the hiring process, with respect to occupational advancement and in the wage setting process. A great part of the existing research on the labour market performance of migrants/foreigners focuses on employment and occupational discrimination (e.g. Granato 2003, Kalter 2005, Bender and Seifert 2000), which indirectly lead to a lower average wage of the minority group.

We therefore follow Cain (1986) who argues that earnings are a meaningful measure for labour market success, because all forms of unequal treatment affect wages. Basically, there are three theoretical approaches to explain discrimination which can manifest in wage discrimination: (i) Preferences for discrimination, (ii) statistical discrimination and (iii) monopsony power or overcrowding. According to Becker (1957), wage discrimination arises from the employers' (or employees' or customers') preferences for members of one group over those of another despite equal labour productivities. Discriminating employers act as if hiring foreign workers will not only impose wage costs but an additional disutility to the firm. As a result, Becker's discrimination theory assumes costs for discriminating firms arising from their irrational "taste for discrimination" since they will hire fewer than the profit maximizing number of foreign employees and correspondingly employ too many natives with a higher pay. Statistical discrimination refers to underestimation of foreign workers' productivity by employers due to a lower average productivity of this group compared to German workers when incomplete information is assumed (Arrow 1973). Furthermore there are models of discrimination that are based on segmented labour markets. The theory of overcrowding explains lower wages of foreign employees by excess supply of labour in segments or occupations which are often chosen/assigned to non-natives (Edgeworth 1922). Bergmann (1974) develops this theory further, considering the possibility that firms are able to raise profits by enforcing occupational segregation. According to the approach of monopsonistic discrimination a single employer can maximize profits by differentiating wages between groups with unequal elasticity of labour supply. Therefore wage discrimination against foreign employees may arise if their labour supply is less elastic than that of German employees (Robinson 1933, Cain 1986).

Under strong *market competition*, Arrow (1973) and Cain (1986) argue among others, firms may not be able to afford discrimination any more. Assuming larger firms to have more

market power than smaller firms, this hypothesis can be tested by the firm size's relation to unexplained wage inequality. Additionally, firms operating on the world market may underlie more competition pressure than firms operating only locally or nationally. Therefore firms with a higher export quota are expected to act less discriminatory. On the other hand, large and world wide acting firms may have a higher demand for workers with knowledge of foreign languages and cultures and therefore might have fewer tendencies to discriminate against foreigners but actually pay them higher wages.

Another hypothesis derived from Becker's model is that employers who hire *a higher share of Non-German employees* are expected to have less prejudice against immigrants and hence are more likely to pay equal wages to German and Non-German employees. Therefore the impact of the share of foreign employees in the firm on the unexplained wage gap is examined.

One of the most important factors of wage determination within firms is whether wages are subject to *collective bargaining* or not (Elvira and Saporta 2001). This is particularly true for Germany, where unions still play an important part in the wage setting process. While the overall impact of unions on wage differentials is not obvious, collective bargaining models provide several reasons for arguing that collective agreements tend to reduce the wage gaps between employees within establishments. First of all, it is argued that unions generally reduce the wage dispersion among employees covered by the same collective bargaining agreement, especially those working in the same occupation (Freeman and Medoff 1984, Fitzenberger and Kohn 2005). As a consequence, unionization should reduce the wage discount for foreigners performing the same activity as German colleagues within the same firm. Cornfield (1987) points out that in the case of layoffs, bureaucratic rules consequently reduce the potential of discrimination. Elvira and Saporta (2001) apply the same logic to the wage setting process. They argue that collective wage agreements reduce the arbitrariness in wage rates and therefore reduce wage discrimination.

Furthermore, also *works councils* may affect the wage distribution within firms (Hübler and Jirjahn 2003, Addison, Teixeira and Zwick 2006). Note that works councils can not directly engage in wage bargaining but may influence the firm's wage structure by the right of co-determination in the placing of workers in different wage groups. They are also involved in decision-making on the introduction of pay systems, such as performance-related pay schemes, and the setting of wages above agreed tariff and bonus rates. According to Baron (1984), works councils often act as equalizing agents by monitoring compliance with corporate or legal principals aimed at achieving equal opportunities and avoiding

discrimination. As a result, the existence of a works council should counteract wage inequality within firms.

### 3 Methodology

For the empirical analysis of the wage differential between German and foreign workers *within* firms linked employer-employee data is necessary. In analogy to Heinze and Wolf (forthcoming), we define two measures reflecting the degree of wage inequality within a firm. First, we use the observed wage gap<sup>4</sup>:

$$(1) \text{Gap}1_j = \overline{\ln w_{ij}^{ger}} - \overline{\ln w_{ij}^{for}}$$

where  $w_{ij}$  denotes the earnings for individual  $i$  at firm  $j$ ; superscripts *ger* and *for* refer to observations of German and foreign employees. Since the wage information in our data set is right-censored (see Section 2 for more details), the observed wage gap defined in equation (1) underestimates the actual raw wage differential. In order to determine the actual observed wage gap we apply a simple Tobit model.<sup>5</sup> By estimating the following equation for each firm, we can directly derive the wage differential between German and Non-German employees:

$$(2) \ln w_{ij} = \alpha_j + \gamma_j \text{foreign}_{ij} + \mu_{ij}$$

where  $\alpha$  is an absolute term measuring the average wage rate in firm  $j$ ,  $\text{foreign}_{ij}$  is a dummy variable reflecting German or other nationality of individual  $i$  and  $\mu_{ij}$  denotes the error term. The estimated coefficient  $\hat{\gamma}_j$  then represents the raw wage gap in firm  $j$  ( $\text{Gap}1_j$ ) taking into account that  $w_{ij}$  is censored from above.

The sources of the observed wage gap can be manifold. On the one hand German citizens and foreign employees differ with regard to their human capital endowment and other labor market relevant characteristics. On the other hand the endowments of Germans and Non-Germans are remunerated in different ways. Finally, firm policy may effectively determine

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<sup>4</sup> The method is displayed for the wage gaps between German and foreign workers. It is conducted in the same way for the wage gaps between Germans and “Guest Workers” and between Germans and workers from “other” nationalities.

<sup>5</sup> Alternatively, we could use imputed wage information which is available in the data. However these wage rates are estimated in a different model. Thus other explanatory variables and a different sample are used to explain the wages.

the size of the wage gap. From an economic viewpoint the wage gap due to differences in occupational skills shall be deemed to be justified and comprehensible. Therefore, we calculate a second measure of the pay differential which is adjusted by the difference in human capital of employees:

$$(3) \text{ Gap}2_j = \text{Gap}1_j - (\hat{\beta}_j^{ger} \overline{X_{ij}^{ger}} - \hat{\beta}_j^{ger} \overline{X_{ij}^{for}})$$

$\overline{X_{ij}}$  includes mean characteristics of the individuals  $i$  at firm  $j$  and  $\hat{\beta}_j^{ger}$  is a vector of estimated coefficients – derived from wage regressions – of the individual characteristics  $X_{ij}$  of German employees in firm  $j$ . Hence, Gap2 reflects the difference in the rewards for individual human capital characteristics and unobserved wage effects between German and foreign employees within each firm  $j$ . The calculation of this measure requires the estimation of wage equations for German employees only. In order to allow for the heterogeneity and complexity of the wage setting process we estimate – as far as possible – a separate wage equation for each firm:

$$(4) \ln w_{ij}^{ger} = \beta_j^{ger} X_{ij}^{ger} + \varepsilon_{ij}^{ger}$$

The dependent variable describes the daily log wage rate. We restrict the wage equation to a standard Mincer equation aiming to adjust the observed wage rate by differences in human capital endowments between German citizens and foreign citizens. Since other possible wage determinants, such as the occupational status and the occupational group are determined by the human capital, we exclude them from our wage equation. It is a problem though, that language skills and the degree of integration/assimilation of the (foreign) employees are not observed in the data, since they may be related to productivity as well. Therefore it has to be kept in mind that the unexplained pay gap can not unambiguously be interpreted as discrimination but may also be fed by unobserved factors. Hence,  $X_{ij}^{ger}$  includes potential experience (squares), dummy variables for different education levels and job tenure. The right-censoring of the dependent variable again requires the estimation of a Tobit model. In order to make sure that our firm-specific wage estimations are reliable, we only take into account firms with at least 100 German employees and at least 10 foreign employees. This procedure is most suitable to take into account the heterogeneity among firms. However, it restricts the number of firms included. In order to exploit the information of smaller firms, we run pooled regressions for all establishments with 20 up to 99 German employees and at least 10 foreign employees:

$$(5) \ln w_{ij}^{ger} = \beta^{ger} X_{ij}^{ger} + \varepsilon_{ij}^{ger}$$

In contrast to equation (4), where we determine firm-specific coefficients ( $\beta_j$ ), we now estimate the average impact of the human capital characteristics on the wage in smaller firms ( $\beta$ ).

Given the results of the firm specific raw wage gaps (Gap1) and the results from equations (4) and (5), we can calculate Gap2 which describes the wage gap within firms that remains when equal human capital endowment in the two groups is assumed. Note however, that part of the differences in characteristics may be caused by inequality with respect to access and encouragement to education. Furthermore, there might be a discriminating element in the selection of employees such that observed characteristics of employees as well as estimated coefficients are not distributed randomly across firms.<sup>6</sup>

Using the unexplained firm-specific wage differential as dependent variable allows us to analyze the effect of firm characteristics and institutional framework on the wage inequality within firms.

$$(6) \text{Gap2}_j = \delta Z_j + \varepsilon_j$$

The wage gap, which is adjusted for the difference in human capital characteristics (Gap2), is assumed to depend on the vector  $Z_j$  including firm characteristics and information on the institutional framework of firm  $j$ .  $\delta$  captures the impact of the corresponding explanatory variables, derived from the theories expounded in Section 2. To investigate the hypotheses based on Becker's discrimination model, we use the firm size, the export quota and the proportion of foreign employees. Implications from the bargaining model are tested by variables indicating the application of collective wage agreements and existence of a works council. Apart from the mentioned variables we also use control variables such as region, industry sector and year.

In this second estimation step we can exploit the panel structure of the data by applying a random effects model<sup>7</sup>. As a result, firm specific heterogeneity is captured by the random

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<sup>6</sup> In order to correct for this selection we would have to estimate employment probabilities (Datta Gupta, 1993). Due to the lack of information on the household context and the individual background, it is difficult to implement this procedure which requires convincing exclusion restrictions.

<sup>7</sup> A Hausmann-Test revealed no significant difference between the coefficients of the random effects and fixed effects model. The fixed effects model was not chosen because of too little variation of the explanatory variables over time. The results are available on request.

effect determined by the estimation model. In the first estimation step, the Tobit wage estimation, it is not possible to apply fixed-effects panel estimation.

## 4 Data and Description of the Sample

The impact of firm characteristics and the institutional framework on wage inequality within firms can only be evaluated with data including linked information on employers and employees. Thus, the data set we use is the LIAB, which is constructed by merging the IAB-establishment panel and the IAB employment statistic of the German Federal Services based on a unique firm identification number.

The IAB-establishment panel is an annual survey of German establishments, which started in West-Germany in 1993 and was extended to East Germany in 1996.<sup>8</sup> The sample of selected establishments is random and stratified by industries, firm size classes and regions. The data is collected by personal interviews with the owners or senior managers of smaller establishments and personnel managers in larger establishments. It is performed by specially trained professional interviewers from a well-known market research institute. As far as possible, the survey is carried out by the same interviewer and interviewee each year. This procedure ensures a response rate above 70% which is high compared to other non-official German establishment panel studies (Kölling 2000) and helps to reduce panel attrition to less than 20% per year.<sup>9</sup> In order to keep the panel representative and correct for panel mortality, exits, and newly-founded units, additional establishments are drawn each year, yielding an unbalanced panel. These additional establishments are stratified with respect to ten categories of establishment size and 34 economic sectors.

The sample unit is the establishment as the local business unit. Note, however, that firm and establishment are used as synonyms in this paper. The surveyed establishments are selected from the parent sample of all German establishments that employ at least one employee covered by social security. Thus, self-employed and establishments that employ only people not covered by social security (mineworkers, farmers, artists, journalists, etc.) as well as public employers with solely civil servants do not belong to the original sample. The data set

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<sup>8</sup> Detailed information on the IAB-establishment panel is given by Kölling (2000).

<sup>9</sup> The establishments are first approached by a letter indicating the goals of the survey. This letter is accompanied by separate letters of recommendation by the president of the Federal Employment Services and the leader of the German employer's association. Some weeks after this announcement letter, the establishment is contacted by telephone in order to arrange an individual appointment for the interview.

is a representative sample of German establishments employing at least one employee who pays social security contributions. The establishments covered by the survey have been interviewed every year on turnover, number of employees, personnel problems, industrial relations, wage policies, apprenticeship training, investments, innovations, and business strategies. From time to time, additional topics, such as training, pay systems and human resource policies, were added to the questionnaire.

The IAB employment statistic of the German Federal Services, so-called Employment Statistics Register, is an administrative panel data set of all employees in Germany paying social security contributions.<sup>10</sup> The Employment Statistics are collected by the social insurance institutions for their purposes according to a procedure introduced in 1973. These data cover the period between 1975 and 2007, that is, every person who was employed for at least one day from 1975 to 2007 and/or with claims to pension benefits is included.<sup>11</sup> During this time, social security contributions were mandatory for all employees who earned more than a lower earnings limit. Civil servants, self employed and people with marginal jobs, that is, employees whose earnings are below a lower earnings limit or temporary jobs which last 50 working days at most, are not covered by this sample. Altogether, the Employment Statistics Register comprises about 80 percent of all West German employees. According to the statutory provisions, employers have to report information for all employed contributors at the beginning and end of their employment spells. In addition an annual report for each employee is compulsory at the end of a year. This report contains information on an employee's occupation, the occupational status, qualification, sex, age, nationality, industry and the size of the employer. Also the available information on daily gross earnings refers to employment spells that employers report to the Federal Employment Service.<sup>12</sup> If the wage rate exceeds the upper earnings limit ("Beitragsbemessungsgrenze"), the daily social security threshold is reported instead.<sup>13</sup> Note that the daily wage rate is therefore censored from above and truncated from below.

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<sup>10</sup> Information on the Employment Statistics Register is given by Bender, Haas and Klose (2000).

<sup>11</sup> These are people who, as employees, have paid contributions to the pension system or who have been covered by the pension system through contributions by the unemployment insurance or by being a parent (depending on the birth year of the child, a fixed number of years is counted as child caring time during which the non-working parent becomes entitled to receive pension benefits).

<sup>12</sup> To deal with the problem of overlapping spells, we apply a hierarchical order of activities where employment trumps all other activities.

<sup>13</sup> Fitzenberger and Wunderlich (2000) show that this affects particularly the wage rate of high-skilled employees. According to their results, about 50 percent of high-skilled men earn wages above the upper earnings limit. Among high-skilled full-time females, this share amounts to at least 20 percent.

Both data sets contain a unique firm identifier which is used to match information on all employees paying social security contributions with the establishment in the IAB-establishment panel. Due to the lack of explicit information on working hours<sup>14</sup> we consider only full-time employees. We also drop employees under the age of 20 and over the age of 60 in order to eliminate the particularities of early retirement and the transition from school to work. Since migration background is not captured in the data German and Non-German employees are distinguished by nationality. This means that immigrants, who were naturalized before 1996, the first year in the period under review, can not be identified as such. Foreign employees whose citizenship changed to German in the observation period are constantly regarded as Non-Germans in the wage comparisons, in order to consider migration background whenever possible<sup>15</sup>. Regarding the firm side, we exclude establishments which employ less than 10 full-time employed Germans and Non-Germans respectively who are subject to social insurance contributions, because the calculation of a firm-specific wage gap is statistically not very robust in that case. This step leads to the exclusion of a great number of mostly small establishments. Finally, we restrict our sample to West German establishments<sup>16</sup> of the private sector who participated in the IAB-establishment panel in one year from 1996 to 2007. In contrast to the private industry, pay systems in the public sector are highly centralized and regulated by the Federal Act on the Remuneration of Civil Servants (Bundesbesoldungsgesetz). This bill requires equal pay for all individuals with the same seniority and qualification who work in a specific job. As a result, the wage gap in the public sector is significantly lower than in private firms (see e.g. Melly 2005).

One innovation of our study is the firm-specific estimation of the wage equations. Based on these results, we can calculate an adjusted wage gap (Gap2) accommodating the firm specific wage setting process. To guarantee the reliability of our estimation results, we restrict this procedure to larger firms. These are firms with at least 100 German and at least 10 foreign employees who are subject to social insurance contributions. Since this condition does not hold for many smaller establishments, we would have to skip many firms and information on the determinants of the firm-specific NWG. To maximize the number of establishments in the

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<sup>14</sup>The data set only distinguishes between full- and part-time workers whereby, for instance, part-time can mean 4 or 6 hours per day.

<sup>15</sup> Also employees that changed their nationality from German to Non-German were continuously considered German. Overall switch of nationality appeared for ca. to 1% of the persons in the sample. Employees with more than one change of nationality were excluded from the sample.

<sup>16</sup> Eastern German establishments are not considered in the analysis because both the wage level as well as the wage setting process is still very different from West Germany. A separate analysis for East Germany is not possible either, because the number of firms with the required number of foreign workers, of at least 10, is too small to derive reliable results.

second estimation step, we apply an alternative estimation strategy for smaller firms. For firms that employ ten to ninety-nine German workers and at least ten foreign workers we run pooled wage estimations.

Because of the heterogeneity of Non-German employees with regard to education, work experience, unobserved productivity relevant characteristics and potential discrimination, we additionally calculate the intra-firm pay gap between Germans and different groups of Non-Germans. One more homogenous group of Non-German workers are for example the so called “guest workers”, who came to Germany in the 1960’s and 70’s because of the recruitment agreements between Germany and Italy, Greece, Turkey, Portugal and former Yugoslavia. The programme was introduced because of a shortage of low skilled workers in the industrial sector in Germany. Many of the families that came to Germany in that period probably have adopted German citizenship by now. Therefore, the information on migration background would be helpful to analyse this group. The majority of this group is represented by people from Turkey. Second, we calculate the wage gap between Germans and employees from Eastern Europe, Asia and Africa<sup>17</sup>. Velling (1995) showed that immigrants from these regions face higher unexplained wage gaps in Germany, which suggests that they are subject to more pronounced discrimination. Because of the minimum requirement of 10 employees of each group, the number of firms is smaller for the analysis of the sub groups of foreign employees<sup>18</sup>. Table 1 shows the number of firms per year for the comparison of German employees with foreigners overall, “guest workers” (from southern Europe) and employees from Eastern Europe, Asia and Africa. Table 2 shows the number of employees and the average level of education and experience respectively. Compared to Germans, a clearly higher share of Non-German employees has no (acknowledged) occupational degree. The share of employees with high school graduation or an university degree is markedly low in the group of guest workers but highest for employees from Eastern Europe, Asia and Africa.

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<sup>17</sup> In the further development of this paper it is planned to confine this group to employees from Eastern Europe and Asia only, in order to obtain a more homogenous group.

<sup>18</sup> Employees from EU-15 countries, Switzerland and USA are not analysed separately because wage discrimination is assumed to be of minor importance for them.

Table 1: Number of Firms per Year

Year	Number of Firms:			
	Comparison of Germans and:	All Non-German Employees	Guest Workers	Employees from Eastern Europe, Asia and Africa
1996		1.103	891	436
1997		983	795	397
1998		1.024	824	391
1999		1.007	808	362
2000		1.398	1.092	420
2001		1.525	1.120	455
2002		1.462	1.079	433
2003		1.302	957	386
2004		1.321	954	409
2005		1.349	988	416
2006		1.243	902	367
2007		1.097	785	307
<b>Total</b>		<b>14.814</b>	<b>11.195</b>	<b>4.779</b>

Source: LIAB 1997-2006, own calculation

Table 2: Human capital variables for different groups of nationality

1996-2007	German Employees	All Non-German Employees	Guestworkers	Employees from Eastern Europe, Asia and Africa
<b>no occupational degree</b>	12,99%	48,77%	57,06%	37,07%
<b>vocational training</b>	66,20%	41,38%	39,19%	39,77%
<b>high school graduation (German Abitur)</b>	6,85%	3,48%	1,90%	7,65%
<b>University degree</b>	13,95%	6,37%	1,86%	15,51%
	100%	100%	100%	100%
<b>Mean Age</b>	40,48	39,71	39,28	39,05
<b>Mean tenure in firm (in years)</b>	11,39	10,69	11,07	7,06
<b>Number of Employees</b>	9.898.401	1.104.424	794.308	129.446

Source: LIAB 1997-2006, own calculation

## 5 Results

The average total wage gap between German and Non-German employees within German establishments amounts to 11.3% in the years 1996 to 2007. The observed wage gap is mainly caused by differences in education and work experience between these two groups of employees (8.8 percentage points). The remaining 2.5 percentage points of wage difference are left unexplained. This pay gap may be caused by differences in unobserved characteristics affecting productivity, such as language skills or the integration to the German society. While the total pay gap within firms decreases slightly over the years under review, from 11.7% in 1996 to 9.7% in 2007 (see figure 1), the unexplained pay gap remains rather stable. This implies that the differences in education and work experience between the two groups became smaller, whereas differences in the remuneration of these human capital variables remained rather unchanged.

Figure 1 also illustrates the difference between the wage differentials on the labour market and the mean within-firm pay gaps. The clear disparity of about 5 percent in the observed wage gap suggests that there is a selection of Non-German workers into low-wage-firms. Assume that there are “high wage firms” with a high wage level for all groups of workers and “low wage firms” with a low wage level, irrespective of nationality. Both types of firms are supposed to exhibit relatively small wage gaps. If there are only few foreign employees in “high-wage” firms and many foreign employees in “low-wage” firms, the average intra-firm wage gap would be smaller than the overall pay gap on the labour market. A selection of foreign workers into lower paying firms is plausible given their lower level of education and presumably other unobservable productivity relevant variables. In fact, there is no substantial disparity between the two ways of calculation once we control for differences in human capital variables. In that case, the labour market pay gaps are on average 0.5%points smaller than the average within-firm gaps.

The distribution of the unexplained wage gap across firms (see figure 4) is less dispersed than the distribution of the observed pay gap because an important part of the variance in wages has been controlled for. While one fourth of the firms pay foreign employees at least 6.6% lower wages than Germans, despite equal qualifications, there are also over one fourth of the firms that remunerate foreign employees better than Germans.

Alternative wage regressions were run with additional explanatory variables that are not directly linked to labour productivity, but nevertheless give an insight into the composition of

wage differentials between German and foreign workers. Considering a gender variable in the decomposition of the wage differentials between German and Non-German employees yields 0.5 percentage points higher unexplained wage gaps. This is due to the lower share of women among Non-German employees, which leads to a higher level of foreigners' wage rates. The inclusion of the variable "job position"<sup>19</sup> as an indicator for the employee's occupational status reduces the unexplained wage differentials by about 2 percentage points. This shows that part of the wage gap between German and foreign employees is caused by disadvantages in occupational attainment (see also Constant and Zimmermann 2003).<sup>20</sup>

Looking at aggregate wages of all Non-German employees compared to German employees may conceal particular disadvantages of certain nationalities. Velling (1995) showed that the wage differentials vary considerable by nationality. Our approach of calculating within-firm wage differentials requires a minimum number of employees of each group of nationality and hence makes it difficult to calculate nationality-specific wage gaps. Nevertheless results on two subgroups, which are supposed to be more homogenous, are presented in the following. The total wage gap between "guest workers" (employees from Italy, Greece, Turkey, Portugal and former Yugoslavia) and Germans within establishments is higher (15.4%) than the wage gap between all Non-German and German employees (see figure 2). This result is to some extent driven by the relatively low average education level of the guest workers (see table 1). The unexplained pay gap for guest workers within firms is only slightly higher than for foreigners overall (2.7%). Similar to the results for all Non-German employees, there is a clear disparity between the observed wage gap on the labour market level and the average within firm wage gap. Also the distribution of wage gaps across firms appears quite similar to the result on foreign employees overall.

The observed pay gap for East European, Asian and African employees is much smaller than for guest workers (average 12.0%), which is consistent with the relatively high education level of these employees (see figure 3). Nevertheless they face a relatively high average unexplained wage gap of 6.0 percent which may result from greater language or cultural barriers but may also be due to more pronounced discrimination. It has to be kept in mind, that the number of firms for analysing this group of nationalities is especially small due to data restrictions (see table 1). For the employees from Eastern Europe, Asia and Africa the total as well as the unexplained wage gap is higher on the labour market level than on average

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<sup>19</sup> Job position is represented by the values "unqualified worker", "qualified worker", "foreman" and "clerk".

<sup>20</sup> The results are available on request.

within firms. This indicates a selection process into lower paying firms that can not be ascribed to differences in human capital endowment.<sup>21</sup> For this group the distribution of the observed wage gap and the unexplained wage gap across firms differ less than for foreigners overall. This reflects that the human capital variables can explain fewer parts of the dispersion of wage gaps across firms for East European, Asian and African employees and points to more pronounced discrimination in occupational advancement and wages against this group.

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<sup>21</sup> The fluctuation in the wage differentials on the labour market probably reflects changes in the composition of this group. This will be tested in the further development of this paper!

Figure 1:

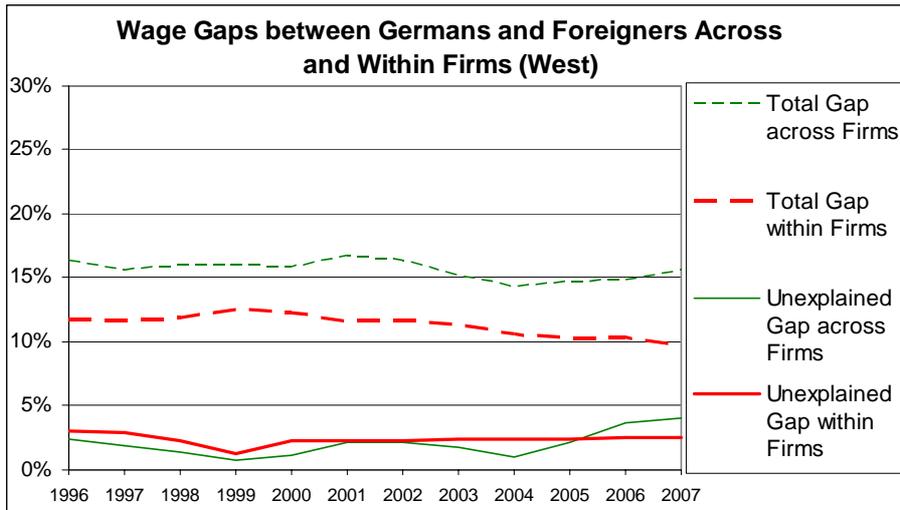


Figure 2:

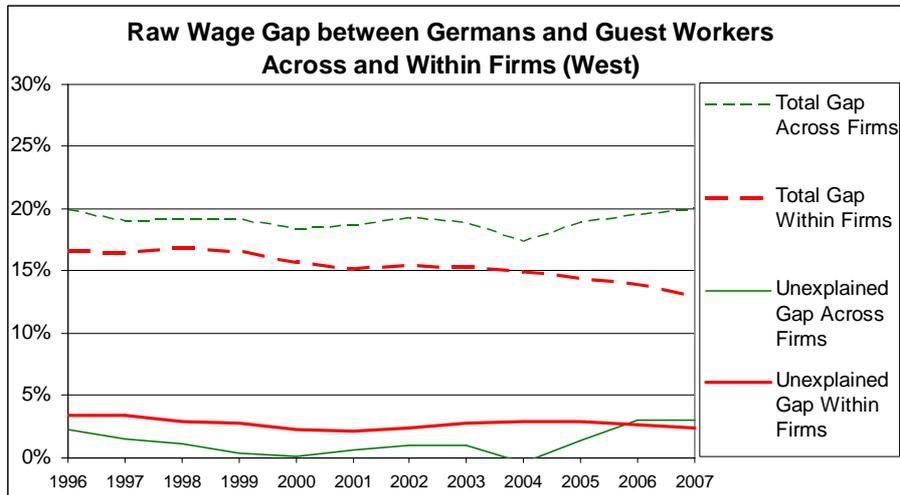
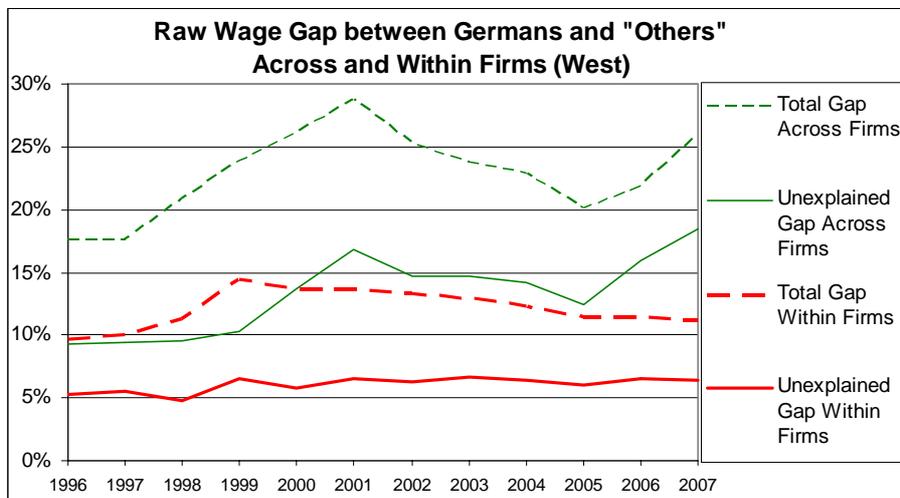
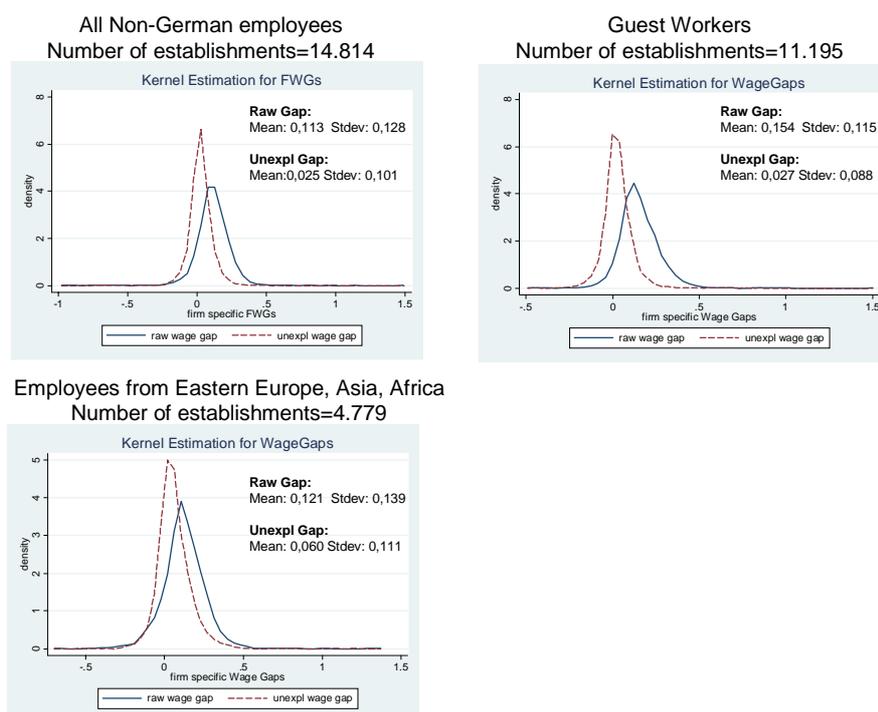


Figure 3:



Source: LIAB 1997-2006, own calculation

Figure 4: Distribution of Wage Gaps between Germans and different groups of foreign employees across firms



Source: LIAB 1996-2007, own calculation

In the second part of our empirical analysis, we investigate the impact of firm characteristics and the institutional framework on the firm-specific wage differentials between German and Non-German employees. Therefore, we take the unexplained wage gaps described above as dependant variables and estimate their correlation with selected firm-level variables. Considering that some productivity-related individual characteristics, such as language ability or the degree of integration, are not taken into account, the unexplained gap is not pure discrimination. We still assumed that the unexplained pay gap approximates wage discrimination to a certain extent. We use the export quota and firm size to test whether firms with market power discriminate more and therefore reveal a higher unexplained NWG. The impact of the institutional framework on the NWG is investigated by including a dummy variable for the existence of a works council. To test the hypothesis that collective wage agreements lead to less wage inequality between German and Non-German employees, we distinguish establishments that are bound to industry-wide or firm-specific wage agreements from those that are not subject to collective wage agreements. To investigate if firms that employ more foreign employees also behave more egalitarian with respect to wages the share of Non-German employees in the establishment is included.

The regressions include control variables for regions, industries and years. Apart from that, we include the wage bill per employee to control for differences between high and low wage firms. To exploit the panel structure of our data, we run random-effects panel estimates. The estimation results are presented in table 3. Positive coefficients imply that the corresponding variable increases the firm-specific unexplained wage gap.<sup>22</sup> The number of different establishments entering the estimations is 2,700 regarding the analysis on Germans and all Non-German employees, 2,022 concerning wage differentials between Germans and guest workers and 753 regarding employees from Eastern Europe, Asia and Africa compared to German employees.

Table 3: Determinants of the firm-specific unexplained wage gap between German and Non-German employees (Random Effects Model 1996-2007)

Variables	All Non-German Employees		Guestworkers		„Employees from Eastern Europe, Asia and Africa	
	Coeff.	Standard Errors	Coeff.	Standard Errors	Coeff.	Standard Errors
Number of employees/1000	0.0035**	0,0014	0,0013	0,0016	0,0012	0,0022
(Number of employees/1000) <sup>2</sup>	-0.0001*	0	0	0	0	0,0001
Wage bill per employee/100000	-0,0115	0,1227	0.3205**	0.192	0,0383	0,3055
Export quota (of sales)/10	-0.0009*	0,0005	-0.0009**	0,0007	0.0037**	0,0012
Share of foreign employees	-0.0366**	0,0123	-0.0604**	0,0163	-0,0771	0,0503
Works council	0.0082**	0,004	0.0078**	0,0059	-0,0008	0,0106
Collective wage agreement	-0.0119**	0,003	-0.0061**	0,0048	-0,0076	0,0083
Observations	9518		7328		2792	
R <sup>2</sup>	0,1055		0,0493		0,0871	

Note: The dummy variables for the years, regions and industry are also included in the estimation. The results are available on request. \*\* significant on 5%-level, \* significant on 10%-level.

Source: LIAB 1996-2007, own calculation

Larger firms yield significantly higher unexplained wage differentials between German and Non-German employees. This seems to confirm the hypothesis of more discrimination in firms with more market power. However, this argument would appear stronger with further verification of market power. Another possible explanation for this result could be that the wage dispersion is generally higher in large firms and that foreign employees are mainly assigned to lower occupational positions and therefore are confined to the lower part of the intra-firm wage distribution. The export quota is considered to reflect the effect of firm's exposition to international market competition, while a higher export quota implies more activity on international markets. A greater export quota entails lower unexplained wage gaps

<sup>22</sup> Negative coefficients imply lower unexplained wage gaps, while negative wage gaps express that foreign workers earn higher wages than Germans.

between German and foreign employees and thus limits potential discrimination against workers from guest worker countries, which is also in line with Becker's theory. It seems plausible as well that knowledge of foreign cultures and languages is simply better remunerated in firm's acting on international markets. This raises the question whether a firm is run by an international management, which unfortunately we can't tell from the data. Anyhow, it is found that firms that employ higher shares of foreign employees provide significantly more equality with respect to wages. This result is even clearer for the group of employees from guest worker countries.

Higher unexplained wage discounts for all employees with a foreign citizenship and guest workers were found in establishments where staff is organized in a works council. This result is in contrast with the theory that sees works councils as an advocate of equal opportunities among employees. Also it is not in line with previous studies which showed that the existence of a works council generally compresses the wage distribution within firms (Addison, Teixeira, Zwick 2006) and reduces the gender wage gap (Heinze, Wolf 2006). Although one could infer from median voter theory that works councils may act in favour of the core workforce which is most often dominated by native employees, it does not seem plausible that works councils actually contribute to higher wage inequality between employees with German and foreign citizenship.<sup>23</sup> As the collective bargaining model suggests, firms under collective agreements tend to have smaller unexplained pay gaps between German and Non-German employees. This applies as well for the pay gap between Germans and guest workers. There could not be found significant effects of firm characteristics on the intra-firm wage gap between Germans and employees from East Europe, Asia and Africa which is owing to the relatively small number of firms that employ a sufficient number of workers from this group.

The significant positive effect of the intra-firm wage level on the wage gap for guest workers may indicate that there also exists a kind of glass ceiling effect for this group of employees. This phenomenon is known from studies on wage inequality between men and women. It refers to the idea that, in this case, the wage rate of foreign employees is capped at a certain threshold, partly caused by disadvantages in occupational attainment.

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<sup>23</sup> In a fixed effects estimation this variable did not yield a significant effect.

## 6 Conclusions

This study provides a first analysis of the wage differentials between employees of different nationalities *within* establishments in Germany and compares the results with the overall wage differentials on the labour market. Personal human capital characteristics of the employees as well as firm-level determinants are considered to explain the inequality in wages. The analyses are based on the LIAB panel which includes linked information on employers and employees and is constructed by merging the IAB-establishment panel and the IAB employment statistic of the German Federal Services.

The average *observed* wage gap between German and Non-German employees within German establishments decreases slightly over time, from 11.7 percent in 1996 to 9.7 percent in 2007. In contrast to this, the corresponding *observed* wage gap at the aggregate level of the labour market amounts to more than 15 percent in most of the years. These differences, revealed by the two ways of looking at wage gaps, imply that there exists a sorting of Non-German workers into low paying firms. The *observed* intra-firm wage gaps are mainly caused by differences in education and work experience between German and Non-German employees (on average 8.8 percentage points). Hence, the *unexplained* pay gap amounts to about 2.5 percent. However, compared to all Non-German employees, Guest workers from south Europe face larger “explained” wage cuts, while for employees from transition countries (mainly East Europe and Asia) a relatively large part of the differential remains unexplained.

Nationality pay gaps also vary tremendously across establishments. This applies particularly to the observed wage gap and, to a somewhat lesser extent, to the unexplained wage gap. A second aim of our analysis was hence to investigate the impact of firm characteristics and the institutional framework on the firm-specific wage differentials between German and Non-German employees. We can show that foreign workers face significantly lower wage discounts in smaller firms<sup>24</sup> and in firms with a high share of exports, which supports the hypothesis that firms that are exposed to strong international market competition are less likely to act discriminatory. Furthermore Non-German employees are remunerated better in establishments with a high share of foreign workers and in establishments covered by collective bargaining agreements. A rather surprising result is that works councils, usually known as an institution to limit inequality within firms, do not seem to reduce the wage

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<sup>24</sup> The sample does not contain establishments with fewer than 20 employees.

differentials between German and Non-German employees. One possible explanation may be that works councils act in favour of the core workforce which is most often dominated by native employees. Another interesting result is that high wage firms exhibit larger wage cuts for guest workers. In accordance with the evidence on gender pay gaps, we interpret this effect as a sort of glass ceiling effect, meaning that the wage rates of foreign employees are capped at a certain threshold, partly because of disadvantages in occupational attainments.

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