

Gender and nationality pay gaps in light of organisational theories

A large-scale analysis within German establishments



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Abstract: This paper analyses wage inequality with respect to gender and nationality within German establishments. It is a large-scale analysis based on linked employer-employee data from the Institute for Employment Research (LIAB). Wage inequality is measured as the intra-establishment pay gap by gender and nationality, taking into account that human capital may not be equally distributed across the different groups of employees. Consistent with economic theories of discrimination we find significant pay gaps by gender and nationality, even taking into consideration employees' qualifications. We can show that pay differentials between men and women are much larger on average than those between Germans and non-Germans, and that both pay gaps exhibit a tremendous variation across establishments. Drawing on organisational theories we inquire as to how selected firm characteristics are related to the variation of these intra-firm pay gaps and derive hypotheses about which establishments have a greater incentive and/or are more able to pursue wage equality in their

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workforces. By use of regression analysis we then investigate whether variables that reflect the firms' social, institutional and cultural environment and their resource requirements are empirically related to the sizes of the pay gaps. The results are rather ambiguous, suggesting larger, innovating and foreign-owned establishments with a larger share of non-German employees and with a collective bargaining agreement to have smaller gaps, particularly with respect to gender.

Keywords: Diversity · Pay gap · Discrimination

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1 Introduction

There are several aspects, in which women and non-German workers are faced with disadvantages in the (German) labour market. In terms of earnings, women receive about 23% lower wage rates than men on average (Destatis 2010; Heinze and Wolf 2010) and immigrants receive about 15% less than German natives (Beblo et al. 2011a; Granato and Kalter 2001; Constant and Massey 2003). The possible causes for these pay gaps are manifold and differ between female and non-German employees, but differences in education and work experience are the most prominent explanatory factors. It is argued that employment breaks and time invested in household production reduce future earnings, particularly for women (see e.g. Beblo and Wolf 2003, 2002; Beblo et al. 2008). For immigrants, non-transferability of skills acquired in their home country or language difficulties may be responsible for an (initial) disadvantage in the labour market (Chiswick 1978).

While there exist a variety of theories and empirical studies investigating the average wage cut for female and non-German employees, knowledge on the intra-firm wage distributions is much more fragmentary. Also, the intersection of the wage cuts for different disadvantaged groups has only begun to be analysed (exemptions are McCall 2005 or Longhi and Platt 2008). And finally, even if the idea that organisations play an important role in creating and maintaining unequal pay has become more and more popular during the past decades, very few studies analyse the link between management strategies and the resulting wage distribution. Recent use of linked employer-employee data provided first insight into the wage structure within firms and establishments and reveals serious heterogeneity across units as well as systematic links to specific firm characteristics (see e.g. Abowd et al. 1999; Addison et al. 2006; Heinze and Wolf 2010; Beblo et al. 2011a, b). The fact that some firms do exhibit more egalitarian wage distributions and the observation of small or even positive wage gaps for women leads one to suppose that wage equality may be a targeted management strategy in some organisations. Firms offering equal opportunities to all employees may, for example, attract more productive workers or are less likely to suffer from labour turnover or skill shortage. Using a large employer-employee data set, we therefore estimate within-establishment pay differentials between female and male, non-German and German employees respectively and investigate their links with organisational theories, in particular the resource dependence and the neoinstitutional theory.

Our paper is structured as follows: Sect. 2 recalls briefly how economic theories of discrimination set off to explain the existence of wage gaps in the labour market in general. Section 3 draws on organisational theories and empirical evidence based on the business cases literature explaining why firms may want to foster wage equality. Whereupon, we derive hypotheses on the distribution of intra-firm pay gaps depending on the firms' characteristics. In Sect. 4, the data set and descriptive statistics are presented. Section 5 expounds our methodological approach: using matched employer-employee data for Germany, we calculate establishment-specific measures of observed as well as residual pay gaps, i.e. the gaps that would remain even if male and female employees or Germans and non-Germans respectively had the same education, work experience and job tenure. By regression analyses of (1) the residual intra-establishment pay gap of female employees, (2) the residual intra-establishment pay gap of non-German employees and (3) the probability of an extraordinarily large pay gap (largest 25%) for both groups within an establishment, we show which establishment environments promote a high or low degree of pay inequality. The empirical results of this approach are presented in Sect. 6 and Sect. 7 provides concluding remarks.

2 The rationale of pay gaps: economic theories of discrimination

In economic theory, only differences in the returns to *equal* endowments by gender or nationality/ethnicity are ascribed to discrimination (Arrow 1973). There are three theoretical approaches to explain discrimination in the labour market, which may manifest in non-employment, segregation or direct wage discrimination. These approaches assume either (i) preferences for discrimination, (ii) statistical discrimination or (iii) segmented labour markets which create 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, regardless of their equal labour productivities. Discriminating employers act as if hiring female or foreign workers will not only impose wage costs but an additional disutility to the firm. Since discrimination should theoretically result in a suboptimal allocation of resources it has been argued that the likelihood of discrimination is reduced under strong market competition (Arrow 1973; Cain 1986). The meta-analysis by Weichselbaumer and Winter-Ebmer (2005) provides some empirical evidence for this argument with regard to the gender pay gap across countries. The statistical discrimination approach refers to the underestimation of minority workers' productivity by employers due to a lower average productivity of this group compared to native men when incomplete information is assumed (Phelps 1972; Arrow 1973). The theory of overcrowding finally explains lower wages of female or non-German employees by their excess labour supply in specific segments or occupations which they either choose themselves or are assigned to (Edgeworth 1922; Bergmann 1974). According to monopsony theory, employers with monopsony power can maximize profits by differentiating wages between groups with unequal elasticities of labour supply. Therefore, wage discrimination may arise if the labour supply of women or immigrants is less elastic at the firm level than that of native and/or male employees (Robinson 1933; Cain 1986). While for immigrants there are no obvious reasons that this should be the case, a lower

labour supply elasticity could arise for women from lower mobility or higher travel costs compared to men, e.g. based on the assumption of higher domestic responsibilities. The empirical results from Ransom and Oaxaca (2005) and Hirsch et al. (2010) support that female labour supply at the firm level is less elastic than male labour supply and imply that a substantial part of the gender pay gap may in fact be explained by monopsony discrimination.

Whether residual wage inequality (after controlling for differences in human capital endowments), may be adequately interpreted as the result of discrimination depends obviously on the respective variables chosen to capture the employees' productivity. The more sketchy the information on productivity-relevant skills, the less precise the estimated unexplained pay gap will be and hence the measure of discrimination is reduced.¹ The widespread use of school and professional education as well as former work experience as productivity measures neglect the attribution and appreciation of potential gender- or ethnicity-specific skills. In fact, female and immigrant employees may hold—or at least be attributed—qualities, skills and potentials (such as parental skills, potential language skills, caring skills and further cultural capital) that are of particular interest to employers. Cox and Blake (1991) expounded areas where diversity management can reveal its productivity enhancing effects and generate competitive advantages. These advantages are improved resource acquisition, cost savings and “added value” through improved creativity, problem solving and flexibility. If these management goals are not equally important across firms, diversity management will differ between firms as well—and so will the pay gaps.

3 Which establishments seek to reduce pay inequality?

Companies are adopting equality and diversity policies not only for legal and moral reasons, but also for economic reasons. In Germany, the General Equal Treatment Law (Allgemeines Gleichbehandlungsgesetz (AGG) from 2006) describes the anti-discrimination rules which are relevant in all organisations. Even if pay discrimination as well as employment discrimination of various groups of potentially discriminated employees are prohibited by this law, the notion that equal opportunities now actually exist is a myth (see e.g. the BMFSFJ 2011). Apart from legislation, the enforcement of equal opportunities is supported by voluntary corporate agreements to promote equality, the German Genderdax, the audit “Beruf und Familie” as well as the Total E-Quality-Certificate which is conferred to firms with successful and sustainable concepts of equal opportunities. Comprehensive equality, however, can only be achieved if these values are part of the business culture. In order to overcome the most common obstacle, that is opposition against change amongst employees, good practice companies approach equality and diversity issues through a culture change process.

While moral and social justice arguments dominated the discussions in the 1980s, business arguments became more popular in the early 1990s—not at least because of government funded research about the firm-specific benefits of equal opportunity programs and diversity management (see e.g. ‘The Business Case for Diversity—good practices in the workplace’, a study carried out for the European Commission 2005). In the meanwhile

there exist many empirical studies pointing at specific benefits of equal opportunity programs and diversity strategies (see e.g. Thomas and Ely 1996; Richard 2000; Amstrong et al. 2010), albeit most findings are rather context specific and difficult to generalize. Despite this evidence, only 5% of all German establishments adopted a voluntary agreement of equal opportunities in 2008 (Kohaut and Möller 2009).

3.1 Theoretical frameworks

In the following, we will expound upon different theoretical approaches and some empirical evidence elaborating why establishments might be interested in adopting management strategies fostering wage equality within plants. Along these lines of arguments, we argue that pay equality among employees can be part of a comprehensive corporate strategy², independent of the prior driving force: moral and institutional motives or economic reasons.

Economic reasons to assure equal opportunities for all employees are provided by the resource dependence theory and the business case analysis of equal opportunity programs and diversity management. The core argument of the resource dependence theory by Pfeffer and Salancik (1978) is that organisations depend on decision makers in their external environment (e.g. potential employees, business partners, investors) because they are in need of resources such as capital, specific knowledge or technology. Hence, organisational strategies aim at securing the accrual of critical resources and limiting the dependency of external actors.

Different strategies can help in avoiding or manipulating resource dependence on the environment. While Pfeffer and Salancik (1978) focus mainly on the horizontal and vertical boundaries of the establishment, Ortlieb and Sieben (2008) apply the dependency idea to the recruitment of a diverse workforce. Since an organisation needs resources (e.g. knowledge about markets and institutions in other countries) which are often in the hand of other organisations, they suppose that the recruitment of immigrant employees may be an effective strategy to acquire relevant resources, one would otherwise not obtain. Based on this rationale, we will derive several hypotheses about which establishments are more likely to face binding resource dependencies and hence adopt human resource measures aiming to overcome existing labour shortages.

Empirical evidence about the economic benefits of equal opportunity programs or diversity management is provided by several business cases. A business case describes a planned proposal for business change based on terms of costs and benefits. Business Cases for Diversity (European Commission 2005) illustrates that effective, efficient diversity and equality management strategies can open up new and various opportunities, such as strengthening corporate values, tackling manpower shortages, generating more creativeness and innovation, increasing motivation and with it, efficiency among their employees, and broadening the customer base. Furthermore, the business case literature provides an important contribution to the question of which firms are most likely to benefit from the variety of equal opportunity policies and practices (see e.g. Riley et al. 2008). Based on this evidence, we can derive hypothesis about the adoption of these policies and the resulting wage gaps within heterogeneous establishments.

Neoinstitutional theory provides a framework to explain why moral-based arguments may induce establishments to reduce pay gaps across employees. The core argument

of this approach is that, apart from technical requirements and boundaries, the social, institutional and cultural environment of an organisation shape their corporate governance and decision making rules. In contrast to the classical technocratic view that successful organisational structures solely rely on the efficient coordination of internal processes, Meyer and Rowan (1977) argue that in order to survive, organisations must conform with the rules, expectations and beliefs prevailing in their environment. Common expectations towards successful firms are, for instance, that they use modern information technology, quality management, modern recruiting procedures, innovative human resource practices (i.e. team work, employee involvement or empowerment), respect sustainability and last but not least that they provide equal opportunities or even actively manage diversity. Institutional theory argues that organisations actually adopt these practices, not necessarily because they believe or know that these practices improve the efficiency of their work processes³, but rather because they rely on internal and external patronisation. Hence, organisations accommodating prevalent social norms and rules in their formal structures maximize their legitimacy⁴ and have a higher chance of survival. As a result, the adaptation to institutionalized expectations is not irrational, because legitimacy generates competitive advantages and may improve the accrual of important resources (see e.g. Zuckermann 1999 or Singh et al. 1986)

DiMaggio and Powell (1983) used these arguments to rationalise the homogeneity and persistence of organisational structures and management practices. Establishments within a specific organisational field—embedded in a common set of social, moral and institutional norms—interact in the same environment and hence adopt similar organisational structures and management practices. Organisational fields generally include more than the firms within industrial sectors, and are defined as the whole of actors (such as customers), institutions (such as the antitrust agency or unions) and regulations (such as disclosure requirements) influencing the structure, behaviour and survival of the establishments. Based on this approach, we can derive specific hypothesis about which firms are more likely to integrate equality in their business strategy and adopt organisational structures and human resource practices aiming at wage equality within the establishment.

3.2 Study hypotheses

In the following, we expound our hypotheses about the link between firm characteristics and the gender or the nationality pay gap respectively and discuss how they can be derived from the theoretical approaches and the evidence from business cases presented above.

H1: Establishments with a large number of employees exhibit smaller wage gaps with respect to gender and nationality.

Since larger establishments are in need of more employees (due to natural fluctuation), resource dependence theory would suggest that these firms will adopt management practices to enlarge their pool of potential employees. Obvious wage discrimination would presumably banish potential job candidates and hence shrink the pool of potential applicants (Riley et al. 2008). Neoinstitutional theory also predicts smaller wage gaps with respect to gender and nationality in larger establishments because inequality is more visible and hence more prone to the pressure of social norms (Edelman 1990; Ingram and

Simons 1995; Walgenbach and Meyer 2008; Süß and Kleiner 2008). Finally, business case analysis suggests that larger firms are more likely to enhance their productivity by equal opportunities measures (Riley et al. 2008). As a result, we should observe lower unexplained pay gaps both between men and women as well as between German and non-German employees.

Furthermore, one may argue that the quality of employee selection is better in larger establishments. First, the benefit from formalised and effective selection processes increases with the variance of job applicants, which is higher amongst highly qualified employees (Nerdinger et al. 2008, p. 268). As large firms employ a larger share of educated employees, they presumably attach more importance to the recruiting process. Second, the validation and subsequent improvement of an internal selection mechanism is only reliable with a certain number of observations and hence only feasible for larger firms (Nerdinger et al. 2008, p. 261). Following these arguments, we expect that larger firms have better means to assess the actual productivity of newcomers and overcome asymmetric information—a major source of statistical discrimination against job candidates. As a result, residual wage gaps with respect to gender and nationality should be smaller.

H2: Establishments that are in need of (highly) qualified employees exhibit smaller wage gaps with respect to gender and nationality.

A key element to detect the establishment-specific costs and benefits of equal opportunity agendas within the business case analysis is the recognition of global trends. Concerning labour markets, increased skill shortage due to demographic change as well as skill biased technological change are well known and ongoing trends. In general, those sectors facing serious skill shortages (such as engineering or information technology) have especially low numbers of women and ethnic minority employees. Cassell (1997) hence argues that the loss or lack of recognition of skills and potentials of women can be very costly to companies. Furthermore, considering the unbroken trend of globalisation suggests an increasing need for internationally diverse workforces. As a result, wage cuts for female or non-German employees should be small in establishments that are in need of (highly) qualified employees and/or face staffing problems.

Resource dependence theory also implies that firms relying on a (highly) qualified workforce are more likely to pursue wage equality for all groups of employees in order to enlarge the pool of job applicants in times of severe skill shortages.

H3: Innovative establishments exhibit smaller wage gaps with respect to gender and nationality.

Establishments that are involved in process and product innovations require (highly) qualified employees with new and diverse ideas, perspectives and approaches to work. We therefore expect that these establishments actively recruit a diverse workforce—especially at the management level and among highly qualified employees—in order to exploit the mixture of perspectives and approaches. In this setting, the integration of female and immigrant candidates in higher positions seems crucial to exploit the creative potentials in the workforce. According to resource dependence theory, we therefore suppose that innovative establishments use diversity strategies, promote the various abilities of women and non-German employees and hence exhibit more wage equality. Apart from that, they might improve their recruitment outcome if they adopt an equal opportunity policy.

H4: Establishments which are subject to collective bargaining exhibit smaller wage gaps with respect to gender and nationality.

H5: Establishments with work councils exhibit smaller wage gaps with respect to gender and nationality.

If establishments strongly rely on social acceptance in order to secure their moral legitimacy, and hence their access to specific resources, neoinstitutional theory predicts that they are more likely to accommodate social values, such as the conception of emancipated labour relations by approving corporative agreements and implementing work councils.

In theory, the adoption of co-determination (via work councils) as well as collective bargaining agreements help to restrain managers' discretionary power and thereby conform to the strategy of anti-discrimination.

Collective bargaining models provide further arguments for why collective agreements tend to reduce wage inequality 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 female and non-German employees performing the same activity as male and German employees within the same establishment. 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 tend to reduce wage discrimination.

Work councils are also known to have an impact on the wage distribution within an establishment (Hübler and Jirjahn 2003; Addison et al. 2006). Even if work councils cannot directly engage in wage bargaining, they may influence the firm's wage structure by their right of co-determination in placing workers in different wage groups. They are also involved in the decision-making for pay systems, such as performance-related pay schemes, and the setting of wages above the agreed upon tariff and bonus rates. According to Baron (1984), work 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 work council should counteract any policies within the establishment that are suspected to enhance wage inequality.

H6: Establishments that offer measures to foster gender equality exhibit smaller gender wage gaps.

As discussed above, a firm's corporate governance is shaped by its social, institutional and cultural environment. Measures to foster gender equality may be seen as one part of innovative human resource practices, just as a human resource management that produces lower pay gaps between female and male employees. But there may also exist a reversed causality, which is consistent with signalling theory (Spence 1973). One may argue that gender equality measures are less costly to implement for firms accommodating prevalent norms and rules in their formal structures already, and thereby exhibiting smaller pay gaps. Albeit differing motives, effective programs ease the reconciliation of work and family, improve the career opportunities of women and may further reduce the pay gap between men and women.

H7: Foreign-owned establishments exhibit smaller wage gaps with respect to gender and nationality.

It is a well established fact that foreign owned firms hold a significant and persistent productivity advantage (Bellmann et al. 2002; Jungnickel and Keller 2003; Criscuolo and Martin 2009; Mattes 2010). There exist two ways to interpret this finding. First, multinationals transfer superior technology and organisational practices to their foreign subsidiaries (see the survey of empirical evidence in Stiebale and Reize 2011). Second, multinational firms only annex the most productive and innovative domestic firms. Therefore, the selection of higher-performing domestic firms is part of the explanation (see e.g. Guadalupe et al. 2010). Either way, highly qualified and internationally experienced employees represent a key resource to foreign-owned establishment in order to master new technological challenges.

Furthermore, ownership changes generally evoke fundamental reorganisations with substantial changes in the composition of the workforce. The empirical evidence suggests that the significant wage premiums paid by foreign-owned establishments can be explained by differences in the qualification of employees, for the most part (Andrews et al. 2009; Hijzen et al. 2010). These results hint at a selection effect towards (highly) qualified workers (see also Jungnickel and Keller 2003). In order to attract adequate job applicants and limit worker turnover during the turbulent times of an organisational change, firms may try to improve working conditions and staff satisfaction by adopting equal opportunity policies.⁵

Apart from these internal adjustments due to foreign ownership, we expect establishments owned by multinational firms to operate on international markets and hence to require specific skills typically held by non-German employees (e.g. language or cultural skills). Attractive wage offers may help to attract qualified non-German employees and hence moderate the resource dependency.

H8: Establishments with a larger share of non-German or female employees exhibit smaller nationality or gender wage gaps, respectively.

Pressure to adopt equal opportunity policies may not only appear from the outside environment of an establishment, but also from the inside, that is, from their own employees (Oliver 1991). For instance, an organisation's female employees/managers have been identified as important in fostering responsiveness to work-family-issues (Goodstein 1994; Ingram and Simons 1995). Hence, women represent constitutes within establishments who claim organisational change in terms of a family friendly working arrangement. Applying this argument to wage equality within establishments implies that the higher the share of non-German or female employees, the stronger the internal pressure to implement a productivity-based pay scheme.

H9a: Establishments operating in different organisational fields exhibit different pay gaps with respect to gender and nationality.

Institutional theory suggests that organisations react to social and cultural demands in their environment in order to improve legitimacy or survival capabilities. DiMaggio and Powell (1983) hence argue that members of any sort of group—a so-called organisational field—behave in a very similar way, first because they are exposed to the same external

expectations, second because interactions, competition and dependencies within a field increase the homogeneity of organisational structures, norms and strategies. Using the industrial sector as a proxy for an organisational field, we expect significant differences between industrial sectors with respect to human resource strategies and hence wage structures.

H9b: Establishments operating in markets where the share of female customers is higher, and/or where customers may have a preference for female employees, exhibit smaller gender wage gaps.

According to the resource dependence theory, hiring female employees may be particularly observed in sectors where the market has become more attractive for female customers, which would explain higher pay for women (see also Thomas and Ely 1996). Ingram and Simons (1995) subsume this interaction under countervailing power. As long as organisations have no countervailing sources of power to respond to the demands of constituents, in our case female employees, the likelihood of resistance to pressures for institutional conformity is rather low.

4 Data

The impact of diversity strategies on wage inequality within firms can only be evaluated with data including both information on employers and employees. For this reason we use the linked employer-employee panel (LIAB) from the Institute for Employment Research (IAB Nuremberg), which is constructed by merging the IAB-establishment panel and the IAB employment statistic of the German Federal Services based on a unique establishment 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 (Kölling 2000). The sample of selected establishments is random and stratified by industries, firm size classes and regions. The sample unit is the establishment which is officially defined as the establishment's head office or a local branch office of a firm with several headquarters.⁶ The surveyed establishments are selected from the register of all German establishments that employ at least one employee covered by social security. The LIAB-data set is thus a representative sample of German establishments employing at least one employee liable to social security. The establishments covered by the survey are interviewed annually on employment trends, business strategies, investments, wage policies, industrial relations and varying special topics such as perceived personnel problems, hours of work and vocational training.

The IAB employment statistic of the German Federal Services, the so-called Employment Statistics Register, is an administrative panel data set of all employees in Germany paying social security contributions (see Bender et al. 2000). This data covers all the people who were employed for at least one day since 1975. Social security contributions are mandatory for all employees who earn more than a lower earnings limit. Civil servants, self employed and people with marginal jobs, that is, employees whose earnings are below the 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% of all West German employees. According to the statutory provisions, employers have to report information for all employed contributors at the beginning and at the end of their employment spells. In addition an annual report for every employee is compulsory at the end of each year. This report contains information on the employee's occupation, the occupational status, qualification, sex, age, nationality, industry and the size of the establishment. Also, the available information on daily gross earnings refers to employment periods that employers report to the Federal Employment Service. If the wage rate exceeds the upper earnings limit ("Beitragsbemessungsgrenze"), the daily social security threshold is reported instead. Note that the daily wage rate is therefore censored from above and truncated from below.

Both data sets contain a unique firm identifier which is used to match information on all employees paying social security contributions with their respective establishment in the IAB-establishment panel. Due to the lack of explicit information on working hours we consider only full-time employees. We also exclude employees under the age of 20 and over the age of 60 in order to eliminate the particularities of early retirement and transition from school to work. Since migration background is not captured in the data, German and non-German employees are distinguished by their nationality.

For the purpose of our analysis, we only include establishments with a minimum number of ten full-time employees in each category; men, women, German or non-German employees, because the calculation of a firm-specific wage gap would not yield very robust results in all other cases. Second, considering that non-German employees usually make up only a small fraction of the workforce, only establishments with at least 200 employees in total are selected for the sample. Moreover, we restricted our sample to West German establishments of the private sector. Eastern German establishments are not considered because both the wage levels as well as the wage setting processes are still very different in this part of the country. Unfortunately, a separate analysis for East Germany is not possible, either, because the number of firms in the data set which meet the required minimum number of employees is too small to derive reliable results. Third, 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, wage gaps in the public sector are significantly lower (though not negligible) than in private firms (see e.g. Melly 2005). We therefore focus on the private sector only. Finally we chose the cross section 2004 for our analysis, because for that year the IAB-establishment panel questionnaire included specific questions on personnel problems anticipated by the firm and questions about measures taken to foster equal opportunities for women and men. We end up with a sample of 654 establishments.

Table 1 summarizes the employees' education, work experience, age and sector attachment in our sample. Except for the group of non-German employees, the majority of all employees have completed at least one professional education degree (apprenticeship or professional school). Among the non-Germans, 44% do not have any professional education and only 8% have completed a university degree, which is the lowest percentage of all groups. The share of university graduates is highest among German men. With respect to the sector attachment, we observe significant differences between men and women, but

Table 1: Average human capital endowment and sector attachment by gender and nationality. (Source: LIAB 2004, own calculations)

2004	German employees	Non-German employees	Female employees	Male employees
No professional education (in %)	11.67	44.14	18.77	13.73
Completed professional education (in %)	64.69	43.53	57.14	64.12
High school graduation (German Abitur) (in %)	7.50	4.10	12.88	5.67
University degree (in %)	16.13	8.23	11.20	16.48
Age	41.04	40.44	39.35	41.41
Tenure in firm (in years)	12.37	12.06	10.58	12.81
Sector (in %):				
Agriculture	1.45	0.97	0.54	1.63
Manufacturing	72.38	80.58	52.58	78.63
Construction	0.34	0.28	0.19	0.38
Trade	2.65	2.00	5.08	1.93
Finance	6.45	1.74	11.82	4.46
Gastronomy	0.02	0.13	0.04	0.03
Health care	7.08	4.30	20.47	3.19
Other services	9.62	10.00	9.28	9.76
Number of employees	693,292	73,471	160,296	606,467

less variation by nationality. Women are much more likely to work in the health care, trade and finance sector, whereas men are very much concentrated in manufacturing. Compared to non-German employees, Germans are more often in the health care and finance sector. The vast majority of all groups, but particularly the non-Germans are employed in manufacturing, the traditional guest-worker sector.

Among the non-German employees, Turks represent the largest group (36.8%) (see Table 3 in the Appendix). Guest workers originally from Italy, former Yugoslavia and Greece form the other large groups. Somewhat surprising is the relatively large share of French employees (7.1%). Despite the free mobility of labour within the European Community, the percentage of employees from other European countries is much smaller.

5 Measuring and analyzing pay gaps at the establishment level

In analogy to Heinze and Wolf (2010) and Beblo et al. (2011a, 2011b), we apply the seminal Oaxaca-Blinder wage decomposition at the firm level and decompose the observed wage differentials by gender and nationality, within each firm, into an endowment and a remuneration effect. The observed wage gap is given by:

$$Gap_j^{obs} = \overline{\ln w_{ij}^1} - \overline{\ln w_{ij}^2} \quad (1)$$

where w_{ij} denotes the earnings for individual i at firm j ; superscripts 1 and 2 refer to observations of male and female, German and non-German employees respectively. Since the wage information in our data set is right-censored (see Sect. 4 for more details), the

observed wage gap defined in Eq. 1 underestimates the actual raw wage differential. In order to determine the actual observed wage gap we apply a simple Tobit model. By estimating the following equation for each firm, we can directly derive the wage differential between different groups of employees:

$$\ln w_{ij} = \alpha_j + \gamma_j D_{ij}^2 + \mu_{ij} \quad (2)$$

where α is an absolute term measuring the average wage rate in firm j , D_{ij}^2 is a dummy variable indicating that individual i is female or non-German, respectively, and μ_{ij} denotes the error term. The estimated coefficient $\hat{\gamma}_j$ represents the raw wage gap in firm j (Gap_j^{obs}) taking into account that w_{ij} is censored from above.

Secondly, we calculate the wage differential that remains even after accounting for differences in the human capital endowment between the respective groups, i. e. the residual or unexplained wage gap. For that purpose we determine the firm-specific remunerations to selected human capital variables ($\hat{\beta}_j^1$), by estimating wage equations for male and German employees, respectively, within each firm:

$$\ln w_{ij}^1 = \beta_j^1 X_{ij}^1 + \varepsilon_{ij}^1 \quad (3)$$

The dependent variable describes the daily log wage rate of individual i in firm j belonging to group 1. We use a standard Mincer wage equation aiming to adjust the observed wage gap by differences in the human capital endowment (measured by education, potential work experience and firm tenure) between male and female, German and non-German employees respectively. Since wages vary by both gender and nationality and we are interested in isolating the respective effects, we also control for the endowment effects of the “secondary” diversity feature. I.e. we control for the different shares of non-Germans among male and female employees when calculating the gender wage gap and vice versa. Other possible wage determinants, such as the occupational status and the occupational group, may be predetermined by basic human capital variables themselves. Because of its nature of labour market outcome, we do not consider information on occupations as an explanatory variable in our wage equation. It has to be stressed, however, that the residual pay gap may also be fed by unobserved individual characteristics that are related to productivity, e.g. language skills and the degree of integration of non-German employees. The right-censoring of the dependent variable again requires the estimation of a Tobit model. Given the firm specific observed wage gaps (Gap_j^{obs}) and the results from Eq. 3, we can calculate Gap_j^{unexp} :

$$Gap_j^{unexp} = Gap_j^{obs} - \left(\hat{\beta}_j^1 \overline{X_{ij}^1} - \hat{\beta}_j^1 \overline{X_{ij}^2} \right) \quad (4)$$

Where $\overline{X_{ij}^1}$ includes mean characteristics of the individuals i at firm j and $\hat{\beta}_j^1$ is a vector of estimated coefficients—derived from wage regressions—of the individual characteristics X_{ij}^1 of male respective German employees in firm j . Hence, Gap_j^{unexp} reflects the difference in the rewards for individual human capital characteristics and unobserved wage effects between the respective groups of individuals within each firm j .

Using the residual firm-specific wage differentials by gender and nationality as dependent variables allows us to analyse the relationship between our indicator variables for diversity strategies and intra-firm wage inequality.

$$Gap_j^{unexp} = \delta Z_j + \varepsilon_j \quad (5)$$

The wage gaps, which are adjusted for the difference in human capital characteristics (Gap_j^{unexp}), are assumed to depend on the vector Z_j , including selected firm characteristics, or indicator variables, that reflect the importance of different types of resources and management strategies dealing with diversity. δ captures the connection of these variables with the residual wage gaps. Supposing that firms' resource requirements are linked to different equality strategies, as expounded in Sect. 3, our analysis allows new insights into the nature and sources of gender and nationality wage gaps within establishments.

6 Estimation results

In our sample of establishments, the average within-firm wage differential observed between German and non-German employees amounts to 12% (measured by Gap_j^{obs} in Eq. 1). As such, it is about 5 percentage points smaller than the overall wage gap between these groups in the labour market as a whole (see Beblo et al. 2011a). The smaller average wage gap within establishments points to a selection of non-German employees in low-paying firms. The within-firm wage cut for non-German employees is for the most part explained by differences in education and work experience. Nonetheless, confirming the classical economic arguments for discrimination, there remains an “unexplained” wage differential of 3.1% on average (measured by Gap_j^{unexp} in Eq. 4). Furthermore, there is a substantial variance in wage inequality across firms. Figure 1 illustrates the distribution of observed and residual wage gaps with respect to gender and nationality. Positive values imply corresponding wage cuts for women and non-German employees respectively. The right tail

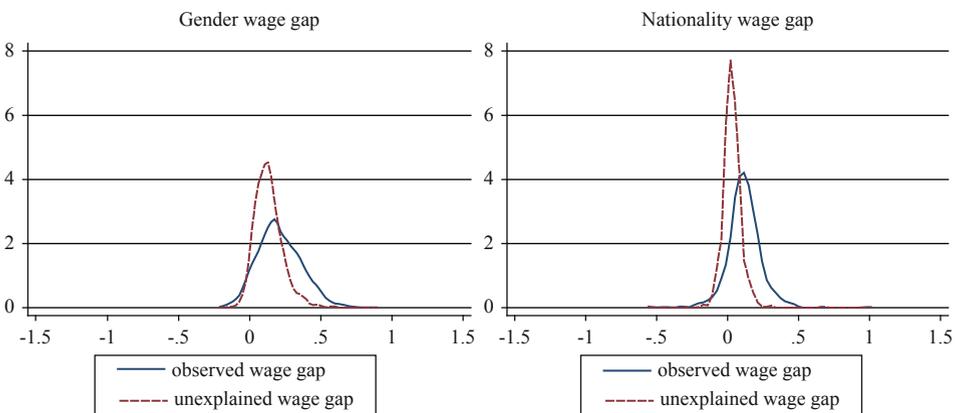


Fig. 1: Distribution of gender and nationality pay gaps within establishments. (Source: LIAB 2004, own calculations)

of the distribution shows that the quarter of firms with the largest residual nationality wage gap pays about 6–21% lower wages to non-German than to German employees. Note, however, that more than a quarter of all establishments remunerate their non-German employees at a higher rate than their German colleagues, at a given level of education and work experience. These pay schemes become plausible, if the expected benefits from equal treatment outweigh the saved labour costs due to discrimination.

The average observed within-firm wage gap between female and male employees amounts to 21%.⁷ Again, the observed gender wage gaps within establishments are much larger than the residual ones, which take 13% on average. However, the fraction of the observed wage gap which can be ascribed to differences in measured human capital endowments is much smaller compared to the explained part of the nationality wage gaps. Conditional on the level of education and work experience, less than 5% of the establishments remunerate female employees better than male employees (compared to a quarter with regard to non-German versus German employees). The firms in the highest quartile of the residual gender wage gap pay women between 18 and 43% less than men with comparable human capital endowments.

In the following, we will analyse empirically whether the variations in the residual wage inequality by gender and nationality go along with our hypothesis about the in-plant benefits and hence the adoption of equal opportunity policies. To do so, we run linear regressions with the establishments' residual gender and nationality wage gaps as dependent variables according to Eq. 5. We use the residual wage gaps as the dependent variables, as they best reflect intra-firm wage structures going beyond qualification differentials. All explanatory variables Z_j should be interpreted as proxy variables aiming to capture the establishments' resource requirements or pressure due to expectations in the organisational field or they refer to the empirical results on business cases for equality. The descriptive statistics and definitions of all explanatory variables are presented in Table 4 in the appendix. Comparing the results from the separate analyses of the nationality and gender pay gaps will help to detect similarities and discrepancies in the relative remunerations of these two groups. Additionally, we want to analyse the intersection of gender and nationality pay differences.

At first glance, the data reveal a rather weak correlation between the observed intra-firm pay gaps by gender and nationality of 0.10 which is statistically significant at the 10%-level only. The correlation between the residual pay gaps amounts to slightly larger 0.11 and is statistically significant at the 1%-level. Hence, there seems to be some statistical congruency across firms in the valuation and disesteem of employees from "minority" groups. Therefore, we also estimate the determinants of a firm's probability to exhibit extraordinary large wage cuts for both groups, female and non-German employees. In the underlying probit model, establishments with a gender pay gap in the highest quartile (among the 25% highest gender pay gaps) as well as a nationality pay gap in the highest quartile (among the 25% highest nationality wage gaps) are coded 1. Based on the probit estimation results, we will characterise those establishments with the highest potential to pay lower wages to female and non-German employees.

All estimation results are presented in Table 2. Please note that, since we have no direct information about the reasons why establishments discriminate less against female and non-German employees, we can only derive indirect evidence on the motives and use of equal opportunity policies. Of course, there may always exist alternative and economically consistent interpretations of the coefficient estimates.

Table 2: Determinants of the gender and nationality pay gaps within establishments. (Source: LIAB 2004, own calculations)

Variables	Residual gender pay gap		Residual nationality pay gap		Probit: high pay gaps for both groups ^a	
	Coeff.	Standard Errors	Coeff.	Standard Errors	Coeff.	Standard Errors
H1 Number of employees/1000	-0.004*	0.0022	0.0013	0.0017	-0.1326*	0.0805
H1 (Number of employees/1000) ²	0.0001	0.0001	-0.0000	0.0000	0.0026	0.002
H2 Share of qualified employees	-0.0096	0.0167	0.00433	0.013	0.1554	0.4050
H2 Shortage of employees (yes = 1/no = 0)	0.0016	0.0168	-0.0198	0.0131	-0.4045	0.4454
H2 Problems due to quitting of qualified employees (1/0)	-0.0178	0.0117	0.014	0.0091	0.1971	0.2735
H2 Problems with recruitment of qualified employees (1/0)	0.0241***	0.0074	-0.0073	0.0058	0.1018	0.1779
H3 Innovative Firm (1/0)	-0.0271**	0.0092	-0.0073	0.0072	-0.5216**	0.2096
H3 Research and Development (1/0)	0.0038	0.0085	-0.0004	0.0066	-0.0260	0.2087
H4 Collective bargaining agreement (1/0)	-0.0429***	0.0126	-0.0092	0.0098	0.0655	0.2751
H5 Works council (1/0)	-0.0237	0.0170	0.0169	0.0132	-0.2091	0.3536
H6 Measures to enhance gender equality (1/0)	-0.0094	0.0073	0.0028	0.0057	-0.1140	0.1763
H7 Foreign ownership (1/0)	-0.0162*	0.0086	-0.0042	0.0067	-0.1272	0.2112
H8 Share of non-German employees	-0.0933**	0.0446	0.0534	0.0347	-1.162	1.1150
H8 Share of female employees	0.1532***	0.0263	0.0949***	0.0205	1.569***	0.5812
H9 Sector: trade (1/0)	-0.0285	0.0163	0.0222*	0.0127	-0.0797	0.3244
H9 Sector: gastronomy (1/0)	-0.0847	0.0881	0.1173*	0.0686	-	-
H9 Sector: health care (1/0)	-0.1358***	0.0175	-0.0515***	0.0137	-1.4377***	0.4477
H9 Sector: other services (1/0)	-0.0345***	0.0126	-0.0115	0.0098	-0.3450	0.2939
Observations	654		654		646	
R ²	0.2592		0.1453		0.1454 (Pseudo R2)	

Dummy variables for regions are also included in the estimation. Further control variables include the remaining sector dummies and shares of atypical employment. The results are available on request

***:indicates statistical significance at the 1%-level, **at the 5%-level and *at the 10%-level

^a Only establishments with both wage gaps in the upper quartile of the distribution of gender respective nationality wage gaps are coded 1

Our results show that both, the gender pay gap as well as the probability of belonging to the groups of establishments with large wage inequality are negatively related to the number of employees (H1).⁸ With respect to the nationality pay gap, there is no statistically significant effect. We hence conclude that the impact of the firm size on the residual pay gap is weakly consistent with the implications derived from resource dependence theory, neoinstitutional theory and the business case analysis. Apart from this interpretation there may of course exist other channels for how firm size may affect the wage distribution within establishments.

For the empirical test of hypothesis H2 we assume that the need for (highly) qualified employees correlates positively with the share of qualified employees in the establishment. Furthermore, we use reported staffing problems, namely difficulties in recruiting qualified employees, general shortage of employees and quitting of qualified employees as signals of the establishment's dependency on specific human resources. As presented in Table 2, only some of the coefficients of the relevant explanatory variables are negative, and even if so, they are not statistically significant. That is, our auxiliary variables capturing the need for (highly) qualified employees are not systematically related to more wage equality for women and non-German employees. Establishments reporting problems with the recruitment of qualified employees even show significantly larger gender pay gaps. This result seems surprising at first glance, but may suggest that the pay gaps in turn are causing recruitment problems and therefore constitute incentives for a reduction of the gender pay gap in the future. Also firms struggling with quitting qualified employees tend to have larger nationality wage gaps, albeit not statistically significant. When estimating the probability of establishments to exhibit both at the same time, wage inequality against women and wage inequality against non-German employees, none of the estimated coefficients of the indicator variables for recruitment problems can be rejected to be different from zero (see probit model in Table 2). Hence, there is no empirical evidence for the argument that establishments with a need for (highly) skilled employees care more about wage equality.

In contrast to this, we do find supportive evidence for the hypothesis that innovating firms—also relying on a highly-qualified and creative workforce—attract people by offering equal opportunities (H3). Innovative establishments, that is, establishments that declare having implemented innovations within the past two years, show significantly lower differences in the remuneration of women and men as well as a lower probability of exhibiting high pay gaps for both groups at the same time. This finding is consistent with the implications of the learning strategy in the sense of Ortlieb and Sieben (2008). The authors argue that establishments that rely on their innovative capacities are in need of new perspectives and approaches to work and hence employ a more diverse workforce. In order to attract the required staff, one could argue that establishments following this strategy offer more wage equality. Activities in research and development, however, have no statistically relevant effect on the wage distribution within establishments. To summarize, the overall hypothesis that establishments concerned about the innovative potential of their employees exhibiting greater wage equality is at least partly supported by our indicator variables.

According to the estimations results in Table 2, the institutional embedding of social norms with respect to labour relations is only partly correlated with wage equality (see H4 and H5). Our results show that collective bargaining agreements go along with significantly

lower pay gaps for female employees. This finding is in line with previous evidence from Stephan and Gerlach (2003) as well as Heinze and Wolf (2010). However, Antonczyk et al. (2010) discovered that the recent drop in collective bargaining coverage led to rising wage inequality in the labour market both for male and female employees, but that the overall gender wage gap was hardly affected. The pay gap between German and non-German employees is also negatively related to agreements on collective bargaining, although the coefficient estimate is not statistically significant. In terms of the classification of diversity strategies by Ortlieb and Sieben (2008), this result could also be interpreted as a pursuit of the *anti-discrimination* strategy.

Surprisingly, an establishments' probability to exhibit notably high pay gaps with respect to both gender and nationality does not seem to be linked to the adoption of collective agreements. In contrast to our hypothesis H5, establishments with work councils do not vary significantly from those without formal co-determination with respect to unexplained wage inequality by gender or nationality. However, the signs of the point estimates are in line with the theoretical considerations.

We find only limited empirical support for the equal-opportunity-measure hypothesis H6. The regression results show that unexplained wage differentials by gender are indeed somewhat lower in firms which offer these measures. However, the estimate is not statistically significant. One way to interpret our finding is that measures fostering equal opportunities do not necessarily result in higher incomes for women, but rather facilitate the compatibility of work and family (e.g. by flexible work schedules or childcare facilities). Meyer and Rowan (1977) even argue that the adoption of management practices can not only be rationalised by their "technical efficiency", but also by their contribution to assure legitimacy. This implies that equal opportunity programs may pay off in terms of access to crucial resources, even if wage equality or the participation of women in all hierarchical levels is not effectively targeted.

As argued above, foreign ownership often goes along with a higher demand for (highly) skilled employees with international experience, that is, a scarce resource. A policy of equal opportunities may therefore help to limit labour shortage by drawing on a larger pool of candidates (see H7). In fact, our results suggest more wage equality in foreign-owned firms, albeit the coefficient is not significant in the nationality pay gap regression and the probit model.⁹

As regards the proportion of female and non-German employees (H8), the empirical analysis yielded mixed results. A larger share of non-Germans is negatively related to the gender pay gap, whereas the proportion of female employees in an establishment is significantly, positively related to wage disadvantages for both groups. This finding may indicate labour market segmentation where some low-paying establishments have a large proportion of female employees. In these establishments, diversity could be enhanced by hiring more male employees (hence, the coefficient estimate is positive). Another explanation is that these establishments employ more women because of their lower wages. According to Ortlieb and Sieben (2008), they apply a strategy of *adding value through mere labour*.

In the last set of hypotheses (H9a and H9b), we analyse the relationship between an establishment's sector attachment and the residual pay gaps. Using the industrial sector as a proxy for an establishment's organisational field, we expect the coefficient estimates

of the sector dummies to be statistically significant, indicating systematic differences in their human resource strategies and hence wage structures (H9a). The estimation results suggest heterogeneity across industries, though sometimes only for one dimension of the pay gap. We further use the sector attachment to detect markets where the share of female customers is higher or customers may have a preference for female employees (H9b). Our findings on the wage inequality by sector illustrate significant differences between industries that are dominated by female, male, German or non-German employees. Compared to the manufacturing sector, where women are underrepresented (see Table 1) and wage differentials are relatively large, unexplained gender pay gaps are significantly lower in the health care sector, where the share of female employees is high and customers may have a preference for female service providers. Other sectors with a relatively larger proportion of women (i.e. trade and finance) also exhibit lower gender pay gaps. This last interpretation is based on the point estimates, though, the coefficients do not prove significant. Establishments operating in the male dominated construction sector, both with respect to employees and customers, pay even larger wage differences between men and women. Being aware that the sector attachment provides only a very rough indicator of the specific skill requirements of an establishment, we conclude that our results are in line with hypothesis H9b.

7 Conclusion and discussion

To date, the coincidence of the well-known gender and nationality pay gaps has not been analysed in depth and neither have the respective wage distributions within establishments. Comparing within-firm wage inequality by gender and nationality can help to detect similarities and discrepancies in the relative disadvantages of these two groups. Even though the idea that organisations play an important part in creating, maintaining and even resolving wage inequality has become more popular during the past decades, very few studies have analysed the link between management strategies and the resulting pay gaps, particularly by gender and nationality.

Based on the linked employer-employee dataset LIAB for the year 2004, we therefore estimated the within-establishment wage differentials between female and male, non-German and German employees respectively. We focussed on the so-called “unexplained” pay gaps which capture wage differentials due to unequal rewards for basic human capital characteristics and could be attributed to unobserved individual characteristics and/or discriminatory behaviour according to economic theory. Unique information on the wage distribution within each establishment allowed us to analyse the heterogeneity of the pay gaps in light of organisational theories and empirical business cases. Based on neoinstitutional and resource dependence theory as well as the business cases literature, we tested hypotheses on how the (de)valuation of work performed by “fringe” groups in the labour market may be linked to a firms’ social, institutional and cultural environment and their resource requirements. Our main contribution to the existing literature is that we look at the internal wage structure of establishments with respect to organisational theories. While there exist some studies using neoinstitutional and resource dependence theory to explain the disseminations of diversity management or equal opportunity policies (see e.g. Süß

and Kleiner 2008 or Ingram and Simons 1995), we are the first to derive theory-based hypotheses of these theories with respect to the pay gaps between men and women as well as between Germans and non-German employees.

Our estimation results show that the residual pay gaps by gender are on average much higher than those between German and non-German employees, while both measures vary substantially across establishments. Despite the overall variance, there seems to be a systematic intersection of gender and nationality pay gaps at the establishment level. The statistically highly significant correlation between the residual pay gaps amounts to 0.11.

A subsequent analysis of variation in estimated residual pay gaps exposes those firm characteristics related to an establishment's wage distribution. All firm characteristics used as explanatory variables are derived from economic and organisational theory. Consistent with neoinstitutional theory, pay gaps are smaller in larger establishments and those with collective bargaining agreements and they differ significantly between industrial sectors. In support of resource dependence theory, pay gaps are smaller in larger, innovating and foreign-owned establishments with a larger share of non-German employees. On the contrary, greater pay gaps in establishments with a high share of female employees are not consistent with either theory. Finally, we can replicate some predictions from the business case literature: Larger establishments and those in need of (highly) qualified employees and/or those who face staffing problems are more likely to benefit from equal opportunity policies and hence exhibit more wage equality.

Even though our results yield some new insights, the study has some limitations: First, our results provide only indirect evidence for the pursuit of specific management strategies. When using matched employer-employee data sets, we can only conclude on the conformity of the observed outcomes with the theoretical predictions, as the personnel policy of the firms remains somewhat of a black box. Further qualitative and quantitative research is warranted to open this box and link observed outcomes to specific management strategies. A second major restriction is that only information on the nationality of the employees is available in our data. Hence, interpretation with regard to immigrant employees or second generation migrants is limited.

To conclude, the link between organisational theories and the intra-firm wage structure as well as the wage cuts for migrant and female workers should be further investigated in theory and empirical analyses.

Endnotes

- 1 Recent studies build on taste discrimination in equilibrium search models and were able to separate the effects of discrimination and unobserved characteristics (see Flabbi 2010, Bowlus and Eckstein 2002).
- 2 Also Ortlieb and Sieben (2008) argue that depending on their human resources requirements, establishments choose a specific diversity strategy and are hence more or less likely to employ immigrant employees.
- 3 The missing reliance on the effectiveness of managerial actions is a crucial antagonism to the resource dependence theory, supposing that the organisational practices actually help to overcome the existing dependencies.
- 4 Legitimacy should not be interpreted as a specific resource, such as reputation, but is rather a necessary condition to secure the accrual of specific resources. Legitimacy is supposed to

increase with the accordance between laws, regulations, normative expectations, common social values and the management principles (Walgenbach and Meyer 2008).

- 5 Hijzen et al. (2010) analyse whether foreign-owned firms differ in terms of working conditions from their domestic counterparts. In particular, they look at differences with respect to hours of work, worker turnover, union coverage and low pay and find no clear-cut evidence.
- 6 Note however that, though we try to minimize confusion, the terms firm and establishment are used as synonyms in this paper.
- 7 Deviations between this result and the overall gender pay gap of 23% reported by the German Federal Statistical Office (Destatis 2010) may result from our focus on large firms, as well as from the exclusion of part time employees, who earn lower hourly wage rates on average (Wolf 2010), in our sample. Furthermore, our figure refers to the average gender wage gap within establishments and not to the difference between average male and female wages in the whole labour market. Lower within-firm wage gaps may also indicate a selection of women into low paying firms (see Heinze and Wolf 2010).
- 8 We used the number of employees as well as the quadratic transformation of this variable as explanatory variables to allow for a non-linear relationship between firm size and pay gap.
- 9 It is also argued that foreign-owned firms have better access to export markets. We hence analysed whether exporting establishments differ in terms of wage gaps. Our results show that establishments' export quotas are negatively related to both residual wage differentials, but the point estimates are not statistically significant. As this variable suffers from a large number of missing values, we decided to skip it in the final specification presented in Table 2. However, the other estimation results did not change with the exclusion of the export quota.

Appendix

Table 3: Employees by nationality (proportion in %). (Source: LIAB 2004, own calculations)

2004	Proportion of the whole sample	Proportion of the sample of all non-Germans
Germany	90.4	–
Turkey	3.53	36.8
Italy	1.12	11.7
France	0.68	7.12
Yugoslavia, Serbia and Montenegro	0.67	6.99
Greece	0.56	5.89
Austria	0.41	4.26
Croatia	0.32	3.33
Spain	0.24	2.50
Poland	0.17	1.73
Portugal	0.15	1.60
Great Britain und Northern Ireland, Ireland	–	1.58
Netherlands, Luxembourg	0.12	1.22
USA, Canada	–	1.14
Bosnia and Herzegovina	–	1.10
Asia (open)	–	1.08

Nationality groups that amount to less than 1% of all non-German employees are not presented in the table

Table 4: Description of the estimation sample

Variable	Comment	Min.	Max.	Mean	Std. Dev.
Observed gender wage gap	See Sect. 5 Eq. 1 (in %)	-0.17	0.86	0.2111	0.1543
Unexplained gender wage gap	See Sect. 5 Eq. 4 (in %)	-0.13	0.59	0.1320	0.0970
Observed nationality wage gap	See Sect. 5 Eq. 1 (in %)	-0.53	0.99	0.1165	0.1197
Unexplained nationality wage gap	See Sect. 5 Eq. 4 (in %)	-0.56	0.67	0.0310	0.0685
Number of employees/1000		0.04	49.72	1.5408	3.1984
Share of qualified employees	Qualified employees completed a vocational training or have a university degree.	0	1	0.6917	0.2331
Share of non-German employees		0.01	0.68	0.1014	0.0862
Share of female employees		0.01	0.90	0.2622	0.1965
Measures to enhance gender equality	Indicator variable: 1 = the establishment provides child care facilities, involvement of employees during parental leave, systematic endorsement of women in career programs, mentoring, quotas etc.	0	1	0.4052	0.4913
Works council	Indicator variable: 1 = the establishment has a works council	0	1	0.9495	0.2191
Collective bargaining agreement	Indicator variable: 1 = the establishment adopts collective bargaining agreements	0	1	0.9006	0.2994
Foreign ownership	I Indicator variable: 1 = majority of ownership held by Non-Germans.	0	1	0.1972	0.3982
	The following variables are based on the question: "Which personnel problems do you expect in your establishment in the next two years?"				
Shortness of employees	Indicator variable: 1 = yes	0	1	0.0459	0.2094
Problems due to quitting of qualified employees	Indicator variable: 1 = yes	0	1	0.0963	0.2951
Problems with recruitment of qualified employees	Indicator variable: 1 = yes	0	1	0.3456	0.4759

Table 4: (continued)

Variable	Comment	Min.	Max.	Mean	Std. Dev.
Innovative firms	Product or process innovations implemented in the last two years.	0	1	0.7921	0.4062
Research and development	Indicator variable: 1 = yes	0	1	0.5734	0.495
Sectors					
Manufacturing (reference)					
Agriculture				— ^a	— ^a
Construction				— ^a	— ^a
Trade		0	1	0.0627	0.2426
Finance		0	1	0.0459	0.2094
Gastronomy				— ^a	— ^a
Health care		0	1	0.1055	0.3074
Other services		0	1	0.1086	0.3113
Schleswig-Holstein		0	1	0.0321	0.1764
Hamburg		0	1	0.0367	0.1882
Lower Saxony		0	1	0.0917	0.2889
Bremen		0	1	— ^a	— ^a
North Rhine-Westphalia		0	1	0.1223	0.3279
Hesse		0	1	0.1942	0.3959
Baden-Württemberg		0	1	0.1728	0.3783
Bavaria		0	1	— ^a	— ^a
Berlin		0	1	0.0749	0.2635
Observations				654	

^aMeans and standard deviations not published due to secrecy obligations

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