

Wage Inequality in Germany and the Role of Organisations

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„The power of markets is enormous, but they have no inherent moral character. We have to decide how to manage them.“

Joseph E. Stiglitz, 2012 p.xlii

Synopsis

i. Introduction

Wage inequality is a prominent topic in the social sciences literature as well as in the political debate and the popular press. The increase of wage inequality in many developed economies within the last thirty years (OECD, 2011; Katz and Autor, 1999; Machin and Van Reenen, 2007) has reinvigorated interest by researchers and fuelled predictions of social conflict. Some of the most adversarial points of debate are exceptionally high manager incomes, the decline of incomes for the middle class and the growth of low wage employment. Although the link between organisations and social stratification has increasingly been recognised by researchers (Baron, 1984; Lengfeld, 2010; Avent-Holt and Tomaskovic-Devey, 2014; Card *et al.*, 2016), many questions remain regarding the role of organisations in the determination of inequality.

The academic debate about wage inequality is coined by different perspectives. While some argue that wage dispersion is a sign of labour market flexibility and overall economic efficiency (Okun, 1975; Heckman, 2002), others stress that wage dispersion can harm economic growth and social cohesion (Stiglitz, 2012; Atkinson, 2015; OECD, 2015). There is much agreement that inequality can provide incentives for individual efforts, investments into education and rational occupational choices. It is therefore to some extent legitimated by meritocratic principles postulating a close alignment of performance and compensation. However, imbalanced power relations of market actors can impair this relationship, allowing powerful actors to obtain compensations in excess of their expenditures. In that event inequality provides adverse incentives for opportunistic behaviour and the preservation of privileges, which lead to suboptimal and unfair outcomes (Stiglitz, 2012). Imbalances of

power are of particular importance between corporations and individuals but also regarding inequalities by social class, gender and ethnicity.

The distribution of gross wages has become substantially more unequal in the last decades in Germany as well as in most advanced economies (OECD, 2008, 2011; Gernandt and Pfeiffer, 2007; Dustmann *et al.*, 2009). This development has entailed a growth of inequality both across and within skill groups usually defined by measures of education and work experience (Davis *et al.*, 1991; Levy and Murnane, 1992; Juhn *et al.*, 1993; Fitzenberger, 2012). Inequalities by occupation (Mouw and Kalleberg, 2010) and occupational classes (Morgan and Cha, 2007) have by tendency risen and wage inequality between men and women as well as between immigrants and natives has remained at sizeable levels (Antonczyk *et al.*, 2010; Dustmann *et al.*, 2010; Algan *et al.*, 2010). Research the variation of wages across organisations has particularly benefitted from the availability of linked employer-employee data since the 1990's. These data allow the simultaneous analysis of individual and organisational influences on wage determination. The topic has especially come to the fore recently, due to the finding that firm wage differentials account for a large and rising fraction of wage inequality in Germany (Stephan, 2001; Alda, 2005; Groß, 2012; Card *et al.*, 2013) and the U.S. (Barth *et al.*, 2014). A further exploration of the sources of these wage differentials is in great demand.

The most common explanations of rising wage inequality consider either the effects of technological change and globalisation on the structure of labour demand or the effects of institutional changes, such as the decline of collective bargaining agreements. While existing evidence does imply that changes in the supply and demand for high and low skilled workers play an important role in determining wage inequality this seems to be only part of the story (Acemoglu, 2002; Machin, 2008; Fitzenberger, 2012). The weakening of union power is likely to have facilitated not only a closer relation of worker productivity to wages, but also to have allowed more differentiated processes of rent-sharing and rent destruction at the firm level. Variation of wages across firms due to wage policies can be consistent with competitive markets under certain circumstances. However, evidence has accumulated that competition on labour and product markets is limited, giving firms some scope to set wages irrespectively of market rates (Card *et al.*, 2016). This may include both firm-level wage premiums due to the sharing of economic rents between employers and workers and wage discounts due to employers' enforcement of market power towards workers. Limited competition also allows differentiations of wages within firms based on personal attributes unrelated to productivity,

e.g. gender or ethnicity. Such discriminating behaviour may be due to irrational preferences or rational but immoral considerations. Against this background, responsible firm wage policies and firms' coverage by protective institutions of worker codetermination are crucial to ensure equal treatment and equitable participation in economic rents. All the same, it is reasonable that firms differ in their capability and disposition to establish a high wage strategy.

The recent increase in wage inequality and its potentially negative effects on the economy, social cohesion and low-wage earners also give occasion to think of national regulations that promote equality and protect the most vulnerable workers. In Germany, a General Equal Treatment Act (*Allgemeines Gleichbehandlungsgesetz*) was introduced in 2006. More recently, a gender quota in supervisory boards and a general minimum wage have been implemented in 2015. These examples have shown that a priori there is great uncertainty about the distributive and economic effects of such measures. Hence, learning about the influence of organisations' internal and external conditions on wage setting is important to better gauge the field for policy measures, aimed at reducing inequality and low wage employment.

ii. Literature and research questions

Research on inequality can build upon a large body of literature in sociology and economics. Both disciplines still strongly refer to classic concepts of competition (Smith, 2008) and power (Weber, 2002; Marx, 2008). The competing role of these forces in the determination of wages and incomes are reflected in the conceptual pairs of "market forces versus institutions" (Blau and Kahn, 1996), "market or social closure" (Groß, 2009) and "markets and hierarchies" (Williamson, 1975). While sociological research on inequality has focussed on inter-generational processes of social attainment, poverty and disadvantages of women and immigrants (Morris and Western, 1999), economic scholars more intensely studied the determination of wages by human capital (Becker, 1993) and the development of wage inequality against the background of technological change (Acemoglu, 2002; Machin and Van Reenen, 2007; Atkinson *et al.*, 2011). Regarding the recent rise of inequality, Morris and Western, 1999 noted that "Sociologists have been strangely and remarkably silent on this issue" and thus called for the sociological perspective on this research area.

Researchers from both disciplines have developed approaches that regard organisations as the central entity, where inequality is generated and altered. However, this view has long been neglected compared to approaches focusing on individual resources and/or macro

structures. The study of inequality, in particular at the organisational level, is on the boundary between sociology and economics (Morris and Western, 1999). This thesis therefore empirically applies theoretical concepts and previous findings from organisational sociology, labour market sociology and labour economics to contribute to the understanding of the role that organisations play in generating and mediating inequality. The following paragraphs give an overview to the relevant literature and point out research questions arising from different perspectives.

Organisations deeply pervade modern societies and affect individuals at all areas of life. Under the term “society of organisations” James Coleman (1982), Charles Perrow (2002) and others have taken up Max Weber’s analysis of bureaucratic rationalisation (2002, pp. 551–579), to argue that, in a long-term perspective, corporate actors have spread, have accumulated wealth and social power and increasingly constrain the freedom of choice of individuals. According to Coleman, the conditions of exchange between individual and corporate actors tend to be dominated by organisations. This asymmetry of power stems from the relative sizes of the two parties and in the numbers of alternative transaction partners on each side of the relation. Consequently, wealth is accumulated by more powerful actors. For an empirical analysis of these far reaching theses regarding the social consequences of organisations, it has to be considered that organisations are heterogeneous with regard to structural characteristics and behaviour and thus unfold diverse effects on individuals (Lengfeld, 2005). Further, it must be considered that individuals are heterogeneous regarding positions within social structure and therefore react diversely to the exposure to organisations (ibid.). Accordingly, a fundamental question derived from the perspective of the society of organisations is: How do work organisations, which are heterogeneous with regard to structures and behaviour, affect the distribution of individual life chances in the form of valuable goods and chances of participation (Schimank, 2005; Lengfeld, 2005, 2010). In this thesis, I take up this general question within the more specific field of organisational stratification, which focusses the effects of organisational structures on the distribution of valuable goods. Because the explicit focus is on work organisations and the distribution of wages, this field coincides largely with labour market sociology and was heavily influenced by economic theories of segmented labour markets (Kalleberg and Sørensen, 1979).

Segmented labour market theories endeavour to explain deviances from the predictions of neo-classic labour market theories by grouping into two or more labour market segments that are subject to different modes of allocation and distribution. Differences are explained,

for example, by the need of some employers to motivate workers and to reduce labour turnover, while others can easily control workers' productivity or replace workers without significant transaction costs (Bulow and Summers, 1986; Williamson, 1981). The resulting institutional differences have been simplified into a primary segment which is assumed to have good working conditions and substantial remuneration of workers and a secondary segment, which does not provide these benefits. The most prominent such concept is that of the internal labour market (Doeringer and Piore, 1971). A main prediction of theories of segmented labour markets is that inequality in career opportunities and wages are particularly large and persistent between labour market segments (Bulow and Summers, 1986). The allocation of individuals into these segments occurs either based on human capital endowments or on different forms of ascription and discrimination in the labour market (Thurow, 1976).

Sociological neo-structuralism criticized these approaches, among other things, for their rigid distinction into two institutional settings and thus shifted the focus from labour market segments to organisations (Baron and Bielby, 1980; Baron, 1984; Baron and Bielby, 1984). Considering concepts from organisational sociology such as organizational ecology (Hannan and Freeman, 1977; Hannan, 2005), resource dependence theory (Pfeffer and Salancik, 1978) and sociological neo-institutionalism (DiMaggio and Powell, 1983), this strand of research argued that situational and structural conditions of organisations determine institutional arrangements and individual behaviour within organisations. Accordingly, opportunities of mobility and wage negotiations are shaped by organisational structures, which are themselves a product of organisational environments. This view is underlined by the following claim: "While coarse taxonomies of economic segmentation may accurately represent the economic extremes, however, they obscure the diversity of enterprises between those extremes. Stratification and work arrangements can be better understood by analysing their specific organizational and environmental determinants" (Baron and Bielby, 1984, p. 454).

Aage Sørensen's contribution to structural sociology must be highlighted because he developed a theory about the allocation of individuals to structural positions (Sørensen, 1983) as well as about the advantages associated to social positions at given levels of expenditures, i.e. rents (Sørensen, 1996, 2000). Sørensen stated that groups with different levels of power systematically differ in their chances to attain advantageous structural positions and to claim rents due to mechanisms of social closure. Social closure refers to a restriction of access e.g. to occupations, organisations or positions within organisations that secures privileges for

“insiders” that are not accessible to “outsiders”. Powerful actors are at an advantage because they have greater influence on the rules of access. Further, rents are defined as the deviation of actual wages (or prices) from those that would be paid under perfect competition and usually originate from different forms of monopolisation. In line with the neo-structuralist literature, decisions about recruitment and promotion of workers are crucial for wage attainment and potentially are not solely based on meritocratic aspects. Accordingly, organisational structures, institutions and environments can have substantial influence on wage inequality by class, gender and ethnicity as well as on changes in wage inequality over time.

Regarding the development of inequality over time the following main theses can be inferred from Sorensen’s rent-based framework (Morgan and Cha, 2007, pp. 697–699; Weeden and Grusky, 2014): 1) The conjecture that the link between wages and personal endowments becomes stronger, with the consequence of increased inequality 2) the conjecture of a general decline of worker rents, in particular of “composite rents” originating from the coincidence of internal labour markets and firm specific skills and 3) the conjecture of selective rent destruction and rent creation across groups in the labour market with different levels of power. While the first conjecture is similar to the prediction of rising inequality due to skill biased technological change, the second and third conjecture more explicitly address changes in power relations.

For the case of inequalities within work organisations, economic explanations of discrimination overlap with the rather general concept of social closure. An advantage of discrimination theory is that it allows inferring clear hypotheses about the effects of competitive pressure and institutions of worker codetermination on wage inequality between groups of workers within organisations. Becker (1971) considers employers’ preferences for one group of workers over the other as a source of differential payment for equally productive workers. Such employer behaviour causes costs, since it deviates from an alignment of worker productivity and wages. It follows from general competitive theory that employers can only afford this behaviour if they have power on product markets that provides them with rents. Monopsony theory provides another explanation, which states that wage discrimination is facilitated by employers’ power on labour markets (Manning, 2003a). Both types of discrimination should be limited if organisations are covered by collective bargaining contracts or works councils since these institutions strengthen workers’ bargaining power, control norms of equality and therefore limit employers’ discretion for discriminatory

behaviour. Further, organisations' dependence on the resources of diverse workforces can be expected to foster wage equality, e.g. dependence on innovations (Pfeffer and Salancik, 1978; Ortlieb and Sieben, 2008).

Inequality generating processes can manifest at different levels in society such as individuals, occupations and organisations (Groß, 2012). Distinguishing these levels and putting focus on the organisational level in empirical analyses can help to examine the questions and hypotheses outlined above. However, this requires that specific characteristics are measured for populations of work organisations and workers. Until the 1990s, information available for empirical research was lacking. Only case studies or small samples of firms were available, making it difficult to analyse developments over long time periods and to generalize findings to whole populations of firms. This circumstance changed with the increasing availability of large linked employer-employee panel data (Hamermesh, 1999). These data provided the opportunity to simultaneously study the supply and demand side of the labour market. Hence, numerous studies from the end of the 1990's emphasized that linking changes in firm structures to changes in employment outcomes is a key area for future research (Morris and Western, 1999, p. 642). This thesis therefore applies a large linked employer-employee data set for Germany (see Alda *et al.*, 2005), which combines a comprehensive establishment survey to administrative wage data for each worker covered by social security in the surveyed establishments. The examined entities are thus establishments, which are either main branches or local subsidiaries of firms. However, the terms "firm" and "establishment" are used interchangeably throughout the text. The reason is that most theoretical approaches refer to firms, without making an explicit distinction to establishments, while the used data refers to establishments. Like in most other studies, the wage analyses are restricted to full-time workers in their prime working age (20 to 60 years) in West-Germany.

Germany is an interesting case to analyse the role of organisations in the determination of wage inequality. In general, the German labour market has been categorized to be more strictly regulated than liberal market economies like the U.S. or Great Britain (Esping-Andersen, 1990). This becomes apparent in the protection against dismissal and the regulation of temporary forms of employment (Venn, 2009). Firm internal measures of personnel flexibility are widespread, e.g. working time accounts or short-time work, and were characteristic for Germany's successful way of coping with the economic crisis from 2008. Further, wage bargaining is to a high degree centralized and the possibility for worker codetermination in firms by works councils is established by law.

Several institutional changes have taken place during the last two decades that may have shifted the German system closer towards that of liberal market economies. Against the background of proceeding globalisation and high unemployment rates in the 1990s several labour market reforms have taken place in the late 1990s and early 2000s. The “Hartz reforms” lead to a stricter regulation of employment benefits and liberalisations of fixed term employment, marginal employment and temporary agency work (Jacobi and Kluve, 2006). Employees’ coverage by collective bargaining agreements has declined on a long-term basis, falling from about 70 percent in 1996 to about 53 percent in 2012 in West Germany (Ellguth and Kohaut, 2013). These developments went along with an increase of the amount of low wage employment (Statistisches Bundesamt, 2012; Garloff and Machnig, 2011; Kalina and Weinkopf, 2015). This background potentially explains that total wage inequality and wage inequality across work organisations in Germany is on a lower level than in liberal market economies (Lengfeld, 2010), while inequality has clearly widened in both dimensions since the mid-1990’s (Card *et al.*, 2013). The period from 2000 to 2010 therefore is well suited to study the effects of organisational factors on different aspects of wage inequality.

iii. The contributions

The purpose of this thesis is to contribute to clarifying the issues outlined above by deriving and empirically testing hypotheses about the wage effects of structures, institutions and market conditions of work organisations in Germany. The thesis is arranged in four contributions dealing with 1) wage inequality across establishments and the rise of total wage inequality over time, 2) wage effects of internal labour markets within different occupational classes, 3) the effects of competition and collective bargaining on within-establishment wage gaps between immigrants and natives and 4) consideration of a broader set of organisational determinants of within-establishment wage gaps by nationality and by gender. Table 1 gives an overview of the contributions and their publication status.

Table1: Overview of contributions

References	Peer-reviewed journal
1) Clemens Ohlert (2016), “Establishment Heterogeneity, Rent Sharing And The Rise of Wage Inequality in Germany”, <i>International Journal of Manpower</i> , Vol. 37 No. 2, pp. 210-228.	✓
2) Holger Lengfeld and Clemens Ohlert (2015), “Do Internal Labour Markets Protect the Unskilled from Low Payment? Evidence from Germany”, <i>International Journal of Manpower</i> , Vol. 36 No. 6, pp. 874-894.	✓
3) Clemens Ohlert, Miriam Beblo and Elke Wolf (2016), “Competition, Collective Bargaining and Immigrant Wage Gaps within German Establishments”, mimeo, University of Hamburg.	submitted
4) Elke Wolf, Miriam Beblo and Clemens Ohlert (2012), “Gender and Nationality Pay Gaps in Light of Organizational Theories: A Large-Scale Analysis Within German Establishments”, <i>Journal of Business Economics</i> , Vol. 82 S2, pp. 69–94.	✓

Contribution 1) was solely written and designed by the author. I am grateful for helpful comments from my supervisors as well as from my former colleagues at the University of Hamburg. Contribution 2) is joint work with Holger Lengfeld. The article builds upon Lengfeld (2010) but analyses Germany instead of the U.S. and differs substantially with regard to data and methods applied. The empirical analysis and composition of the text was to great extent performed by the author with substantive advice and edition by Holger Lengfeld. Contributions 3) and 4) are joint work with Miriam Beblo and Elke Wolf and originated from the DFG-project „Quantifizierung der innerbetrieblichen Entgeltdiskriminierung nach dem Allgemeinen Gleichbehandlungsgesetz“. Both articles apply a similar methodology as Heinze

and Wolf (2010), who analysed establishment specific wage gaps by gender but not by nationality. The empirical analysis and composition of the text of contribution 3) was mostly performed by the author with substantive advice and edition by Miriam Beblo and Elke Wolf. The empirical analysis and composition of the text of contribution 4) was to great extent performed by the author with substantive advice and edition by Elke Wolf and Miriam Beblo. The text of contribution 4) was finalised by Elke Wolf, while the texts of all other contributions were finalised by the author in consultation with the co-authors. The content of the four contributions is expounded in the following.

Chapter one examines the role wage dispersion across establishments has played in recent increases in total wage inequality in Germany and compares it to inequality changes at the individual level. Building on the previous finding that wage differentials across firms have grown in Germany (Groß, 2012; Card *et al.*, 2013) the sources of this development are investigated. The sociological concept of social closure implies that wage inequality across establishments arises from organisation-specific institutions that strengthen the bargaining power of firm insiders compared to firm outsiders (Sørensen, 1996, 2000). Accordingly, establishments' coverage by collective bargaining agreements, work councils and internal labour markets is expected to contribute to changes in across-firm wage inequality. Further, increased variety in establishment productivity may be a source of wage inequality across workplaces. Establishment productivity can be broadly measured by establishment size, establishments' technical equipment and the skill composition of establishments' workforces (separately from the consideration of skills at the individual level). Further, economic theory of skill-biased technological change, that supplants certain skills, predicts a rise of inequality across differently skilled individuals but not for equally skilled individuals in different firms (Machin, 2008). Thus, it is expected that besides a rise of inequality across establishments, inequality is rising within establishments regarding measures of human capital and unmeasured individual characteristics reflecting skills.

For the empirical analysis, linked employer-employee panel data from the institute for employment research is used (LIAB). These data allow, in contrast to the essential study by Card *et al.* (2013), to consider a large set of firm characteristics as determinants for the apparent rise in wage inequality. Applying regression-based decompositions of variance (Fields, 2003) the development of wage inequality between 2000 and 2010 is decomposed into changes associated to firm characteristics, individual characteristics and changes in the remuneration of unobserved characteristics. To consider that employees might be sorted into firms based on unobserved individual characteristics, the development of wage inequality is

additionally decomposed using panel estimations in two time periods (2000 to 2005 and 2005 to 2010).

The main findings show that about 33 per cent of the recent rise in wage inequality is accounted for by changes in the distribution and remuneration of observed establishment structures. The rise in wage inequality is partly accounted for by different bargaining regimes, establishments with and without co-determination by work councils, and establishments with internal respectively external employment strategies (together three percent). However, the largest contributions of establishment structures to the rise in wage inequality stem from establishment size (eighteen percent) and the composition of establishments' workforces with respect to human capital and occupational groups (together eleven percent). These establishment structures are presumably linked to productivity differences across establishments.

Chapter one leaves open the question whether the magnitude of wage effects of establishment characteristics differs across groups such as occupational groups, immigrants and natives or men and women. This question is approached in the following chapters.

Chapter two deals with the wage effects of internal labour markets within different occupational classes. The finding that the low wage sector in Germany has grown (Kalina and Weinkopf, 2015) and that wage inequality across firms has grown too (Card *et al.*, 2013; Barth *et al.*, 2014) suggests that inclusion and exclusion into high and low wage firms has become an important dimension of inequality. This makes firm internal labour markets a highly relevant institution for the protection of vulnerable workers such as the unskilled. Theoretically, internal labour markets provide social positions that go along with advantages (rents) for its incumbents (Sørensen, 1996, 2000). Further, workers' ability to generate rents also depends on individual control over productive assets and therefore varies by occupational class (Kalleberg, 2003).

There is empirical evidence that firms with internal labour markets pay higher wages than firms without this institution (Alexander, 1974; Kalleberg and van Buren, 1996; Lengfeld, 2010). Further, Lengfeld (2010) found that the wage effects of internal labour markets differ by occupational class in the U.S.. We build on this work to examine for Germany 1) to what extent firm heterogeneity affects wages within different occupational classes, 2) whether internal labour markets have differential wage effects for unskilled workers compared to medium and high skilled workers, and 3) whether these circumstances have changed over time.

In order to explore these questions, we analyse German employer-employee data for the years 2005 and 2010. Next to individual wage information and an extensive set of individual and establishment variables, these data include establishments' churning rate. Churning rates measure the worker turnover net of changes in the number of jobs and we apply this indicator to assess establishments' openness respectively closure towards the external market. To identify the wage effects of internal employment systems in our statistical analysis, we apply a two-step estimation strategy. First, establishment specific wage effects are estimated while controlling for workers' individual characteristics. Second, the relation between the obtained establishment wage effects and the establishment-specific churning rate is estimated, while other relevant establishment characteristics such as size and collective bargaining status are controlled for. We compare the wage effects of internal employment systems for five occupational classes, based on Erikson and Goldthorpe (1992).

Our findings show that individual wages are determined to a greater extent by firm heterogeneity within low skilled classes than within the medium and high qualified classes. The positive wage effects of internal labour markets are largest among unskilled manual and non-manual occupations and somewhat smaller for qualified manual occupations. Additionally, the wage effects of internal labour markets are distinctly smaller within qualified service, clerical and high-skill occupations. Within the class of high skilled occupations, however, they have sharply increased over time.

Chapter three deals with the effects of competition on product and labour markets as well as collective bargaining agreements on within-establishment wage gaps between immigrants and natives. Although the average wage gap between immigrants and natives in Germany can be explained to great extent by differences in the human capital endowments between the two groups, there is substantial evidence of discrimination in the German labour market (Forstenlechner and AlWaqfi, 2010; OECD, 2012; Kaas and Manger, 2011; Hirsch and Jahn, 2015; Bartolucci, 2014). Hence, this study tests the implications of different discrimination theories regarding the scope of immigrant wage gaps within firms. Investigating these hypotheses provides an indirect test of the presence of wage discrimination, it allows drawing inferences about the type of discrimination at work and informs about the mechanisms that act to reduce wage discrimination in practice.

The theory of discrimination by Becker (1971) implies that discriminatory behaviour is costly for employers and that product market competition should limit the scope for wage discrimination. Wage discrimination against immigrants can also result from limited

competition on labour markets (Cain, 1987; Manning, 2003c). Hence, unexplained wage gaps between German and non-German workers are expected to be larger if respective market shares of revenue and employment are concentrated among employers. Collective bargaining agreements and works councils usually limit unequal treatment by implementing compliance with norms of equity. Collective bargaining additionally redistributes economic rents for the benefit of workers and therefore reduces employers' scope for preference based discrimination in the sense of Becker.

For the empirical analysis, we use a large linked employer-employee panel dataset (LIAB) of German establishments for the period from 2000 to 2010 and apply two-steps of regressions. We first estimate establishment and year specific immigrant wage gaps following Oaxaca (1973) and Blinder (1973) in order to adjust for unequal human capital endowments of immigrants and natives within firms. Only establishments with at least ten workers per group are included to ensure statistical robustness of the estimations. Subsequently, we analyse the effects of collective bargaining agreements and several measures of competitive pressure on product and labour markets on the firm-specific wage gaps using panel regression models.

The average total wage gap between German and Non-German workers within establishments has decreased from about twelve percent in 2000 to about ten percent in 2010. These wage gaps stem to a great extent from differences in education and work experience between Germans and non-Germans. The remaining unexplained wage gap amounts to only about one percent on average but has increased over time and varies substantially across establishments. Our results show that non-German workers face significantly lower wage discrepancies in establishments covered by collective bargaining agreements, but that there is no effect of works councils. We further find that competition both on product and labour markets reduces unexplained wage gaps by nationality within establishments.

Chapter four considers a broader set of organisational factors as determinants of within firm wage gaps both by gender and nationality. With reference to resource dependence theory (Pfeffer and Salancik, 1978) and neoinstitutional theory (DiMaggio and Powell, 1983), we put emphasis on organisations' environments and their influence on firms' wage policies. Like Süß and Kleiner (2008), Ingram and Simons (1995), Ortlieb and Sieben (2008), we argue that firms' dependence on critical resources as well as firms' affiliation to organisational fields determine whether wage equality is enforced as a strategy of diversity management – and thus affect inequality both by gender and nationality. Firms are expected to rely on the productive

and innovative capacities of women and immigrants as workers, as well as on their loyalty as customers.

To test our hypotheses, we use cross-sectional data of the linked employer-employee data of the institute for employment research (LIAB). The wave of 2004 was chosen because for that year the IAB-establishment panel questionnaire included specific questions about anticipated personnel problems and measures to foster equal opportunities for women and men. In analogy to Heinze and Wolf (2010) and Beblo et al. (2012), we apply the method by Oaxaca and Blinder to decompose the observed wage differentials by gender and nationality within firms into a part attributable to human capital endowments and a part due to unequal remuneration of similar human capital endowments (unexplained wage gap). Using the estimated firm-specific residual wage gaps by gender and nationality as dependent variables, we then analyse the relations to indicators of firms' resource dependence and firms' affiliation to organisational fields that favour equality.

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. There seems to be a systematic intersection of establishments that exhibit relatively high pay gaps by gender and nationality. 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 organisational characteristics related to wage inequality within establishments. Consistent with neo-institutional theory, pay gaps are smaller in larger establishments, in the presence of 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. However, the finding of higher pay gaps in establishments with a high share of female employees is inconsistent with these theories. 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.

iv. Conclusions

The four contributions of this thesis provide insights into the role of work organisations in shaping different dimensions of wage inequality in Germany during the period from 2000 to 2010. The guiding research questions can be summarized as follows: 1) have work organisations become more important for the determination of individual wages? 2) does the influence of organisations on wages vary across different groups of workers? and 3) what are the causes of (increasing) wage inequality across work organisations? This section draws conclusions with regard to these questions and discusses the consequences for individuals and specific groups of workers.

Overall it can be concluded that organisations' influence on individual wages has clearly increased in the period from 2000 to 2010. As shown in (Ohlert, 2016), heterogeneity across establishments accounts for a markedly larger contribution to overall wage inequality in 2010 than in 2000 (in total and adjusted for sorting of individuals into establishments). There is evidence of rising across-establishment wage inequality over time in unqualified and qualified – manual and non-manual occupational classes (Lengfeld and Ohlert, 2015). These findings imply that it matters more and more for a given worker, where she or he is employed. Since wages are a central indicator, not only for labour market success but for overall life chances, this development is highly relevant in people's lives. Especially for unqualified workers, the characteristics of establishments can have decisive impact on workers' wages and associated risks of poverty (Lengfeld and Ohlert, 2015). The wage gaps by gender and nationality have remained almost constant in the last decades but have proven to be systematically related to establishments' structures and environments (Ohlert *et al.*, 2016; Wolf *et al.*, 2012).

For the assessment of these findings it is crucial to consider to what extent individuals can control their position in the structure of organisations and thereby in the social structure as a whole. Different perspectives can be taken for this assessment. First, individuals can obviously influence their chances to enter high wage firms by attaining educational degrees and other qualifications. Across-firm wage differentials for similar skilled workers, however, imply that at least some employers can set wages independently of a common market wage. One view on that is that firm wage differentials are at least partly contingent, meaning that they are beyond the control of individuals. This view takes on the Marxian notion that workers must work for a living and have only a limited selection of employers available. Hence, workers must accept, to some extent, the working conditions provided by employers.

From this perspective, the increase in the variation across work organisations does constrain individuals' life chances, as suggested by Coleman (1982).

The new monopsony research sees the reason for employers' ability to set wages, not so much in a small number of employers available to workers, but more so in individuals' limited information, the existence of search costs and hence individuals' limited mobility (Manning, 2003b). From this perspective, the increase of wage inequality across firms is not only a constraint for individuals but also a chance for wage attainment by intensifying search efforts and taking advantage of mobility between low and high wage firms. It is, however, reasonable that the resources necessary for mobility are distributed unequal across groups and classes in society. The moral question associated is thus to what extent regional and occupational mobility can be expected of individuals these days. Hence, monopsonistic theory can explain, but not necessarily legitimate wage differentials.

In order to disentangle causes of firm wage differentials empirically, it is important to separate between worker sorting into firms based on observed and unobserved individual attributes and "real" firm wage differentials (Stephan, 2001) caused by firm wage policies and rent-sharing between employers and workers. As shown in (Ohlert, 2016, p. 218), a large part of the total inequality contribution of organisations stems from the composition of firms' workforces with respect to unobserved individual factors. In economics it is common to assume that these factors reflect unobserved abilities and skills (e.g. Juhn *et al.*, 1993), or alternatively, preferences for non-pecuniary working conditions (Rosen, 1987). In these cases, resulting inequality is in line with meritocratic principles and does not signalize market imperfections. However, it seems likely that sorting of workers into establishments can also be based on the availability of social networks or job search intensity. Further scrutiny of the sorting mechanisms is an important challenge for further research. However, it has not been the focus of this thesis, which instead aimed at analysing organisational determinants of inequality.

Ohlert (2016) (2016) and Lengfeld and Ohlert (2015) investigated the organisational determinants of across establishment wage variation while controlling for the composition of establishments' workforces. The substantial variation across establishments found, generally points to the impact of wage policies and rent-sharing. Institutions that provide privileges to firm insiders (social closure) contribute to wage inequality across establishments and, though not much, this inequality component has grown over time. Workers at establishments covered by collective bargaining agreements and at establishments with internal labour markets are

better off. In the case of collective bargaining agreements workers have the possibility to influence the distribution of wages by union involvement. However, workers may not know firms' personnel policies before entering a firm. Also, changes in these conditions can pose a risk to workers' wage attainment, which is difficult to control individually.

Further results from Ohlert (2016) and Lengfeld and Ohlert (2015) are in line with other linked employer-employee analyses finding that large parts of wage dispersion and its increase over time are related to productivity differences across establishments and firms (Lentz and Mortensen, 2010; Card *et al.*, 2016). These finding suggests that firms that generate economic rents can pay higher wages to their employees. This form of firm specific rent sharing seems to exist independently of coverage by collective bargaining agreements. Hence, assessing the performance of employers and to participate in employer rents proportionately poses a major challenge for individuals in the labour market.

Wage inequality across work organisations plays a significant role in qualified, non-qualified, manual and non-manual occupational classes (Lengfeld and Ohlert, 2015, p. 884). However, organisations' influence on wages is not the same in different classes. It is more pronounced among unskilled occupational workers and among qualified manual workers than among qualified clerical workers and high qualified workers. This suggests that high qualification is by comparison a good predictor of wages, while for less qualified and manual workers it makes a greater difference where they work. According to the perspectives outlined above, this implies that low-qualified workers are to some extent contingent on available employers and supposedly that the extent of mobility is particularly heterogeneous among low-qualified workers.

We further found that internal labour markets, a typical institution of social closure, provide considerable advantages for unskilled workers compared to unskilled workers in establishments having extensive exchange with the external labour market. Internal labour markets therefore do not provide universal protection against low wages. The extent to which it can provide protection rather is subject to the dissemination of internal labour markets, which underlies changes over time. Regarding the period from the year 2000 to 2005, findings do support the hypothesis that the development of rents from internal labour markets is class specific (Sørensen, 2000). The observed pattern fits to lesser extent the idea of rent destruction at the bottom of the class scheme, but instead matches with the idea of rent creation at the top of the class scheme as considered by Weeden and Grusky (2014). Results

also imply that inequality between classes is smaller within firm internal labour markets than at the external labour market.

The contributions from Ohlert et al. (2016) and Wolf et al. (2012) add to answering the question of differential organisational effects for groups of workers. Results show, that the wage gaps women and immigrants face differ to great extent across establishments. Hence, the life chances of whole groups of individuals are restricted severely in some organisations while in other organisations settings are put into place to limit unequal treatment. Wage gaps by nationality (Ohlert *et al.*, 2016) and gender (Wolf *et al.*, 2012) are smaller in establishments covered by collective bargaining agreements. These findings also imply that the respective wage gaps would be smaller today, if collective bargaining coverage had not eroded. The study by Wolf et al. (2012) adds that establishments' dependence on workers' innovative potentials reduces unexplained wage gaps by nationality, too. Further, the limiting effect of competition on wage gaps by nationality indicates that an effective control of market concentration by the state is relevant for equality and fairness in the labour market. The measurement of competition respectively market concentration was approached in Ohlert et al. (2016) by comparing the effects of several alternative measures of competition respectively market concentration. This is an important issue, which has received too little attention so far (Card *et al.*, 2016, p. 35). After all, the role of organisations for labour market inequality emerges to great extent from the circumstance that firms' can set wages under imperfect competition.

The overarching finding of heterogeneous wages across work organisations, independently of individual factors, shows that institutions and policies at the organisational level generate inequalities of their own. They can never provide comprehensive protection against risks of low pay or unequal treatment, since they are restricted by the dissemination of such practices among firms. This entails chances for individuals by mobility between organisations, but also the risk that (changes in) organisational settings have adverse effects on individuals. While market competition ensures an alignment of productivity to wages in theory, it seems not to characterise real markets well. Sectoral collective bargaining agreements and works councils have to some extent provided equitable participation of workers in economic rents in the past but their dissemination has declined dramatically. Hence, economic rents are generated and distributed more and more independently of those institutions at the level of organisations. From the individual perspective two avenues become crucial: the use of individual and group specific resources to bargain within the organisation and individual efforts, including the activation of social networks, to move to better paying

organisations. Obviously, both avenues are the least promising when individual and group specific resources are low and dependence on organisational conditions is most pronounced then.

National regulations can to some extent settle the risks that go along with increased inequality by limiting unfair inequality and protecting the most vulnerable workers. The results of this thesis underpin that this can be achieved indirectly by strengthening collective bargaining and market competition, as apparently, these are the most influential factors in providing fairness in the labour market. Further, this can be achieved by statutory interventions into wage setting. The general equal treatment act implemented in 2006 seems to have improved the legal possibilities to conquer unequal treatment, but still has some weaknesses (Antidiskriminierungsstelle des Bundes, 2016). Ultimately, the average wage gaps by gender and nationality remained almost unchanged since then. The introduction of the general minimum wage in 2015 can be expected to have greater impact, both on the overall distribution of gross wages and the wage gaps by gender and nationality.

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1 Establishment Heterogeneity, Rent Sharing, and the Rise of Wage Inequality in Germany

Clemens Ohlert

Abstract*

This study examines the role wage dispersion across establishments has played in recent increases in total wage inequality in Germany and compares it to inequality changes at the individual level. It is queried whether the contribution of establishment heterogeneity to the rise of wage inequality stems from changes of institutional settings or from structures such as establishment size and the composition of the workforce. Regression-based decompositions of variance are applied to German linked employer-employee panel data for the years 2000 to 2010. Results show that the rise in wage inequality in Germany to a great extent is associated to rising wage variance across establishments, implying that establishment specific wage premiums have grown. By further decomposing across firm components of wage inequality, it is found that changes in across establishment wage inequality related to collective bargaining, worker co-determination and internal labour markets together account for about 3 percent of the rise in total inequality. Inequality changes related to establishments' skill and occupational composition account for about 11 percent and establishment size alone accounts for about 18 percent of the rise in total inequality.

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* In the published journal article, the abstract is structured into: Purpose, Methodology, Findings and Originality.

1.1 Introduction

Wage inequality has increased over the last two decades in Germany as well as in most other advanced economies (Gernandt and Pfeiffer, 2007; Dustmann et al., 2009; Giesecke and Verwiebe, 2009; OECD, 2011). Consequently, there has been much debate whether this rise in wage inequality can be explained by changes in supply and demand for high and low-skilled workers, as economic explanations related to technological change and globalisation imply (Acemoglu, 2002; Machin, 2008), or whether it can be explained by changes in labour market structures and institutions, as stipulated by theories of rent sharing (Sørensen, 2000; Morgan and Cha, 2007; Weeden and Grusky, 2014). Previous research has shown that both strands contribute to the explanation of the rise in wage inequality (Morris and Western, 1999; Groß, 2012; Gruetter and Lalive, 2004). However, existing studies have so far concentrated either on changes of inequality across skill groups and occupations or on institutions at the macro level. Although many have argued that the firm-level is of particular importance in understanding mechanisms of wage determination (Baron and Bielby, 1984; Gruetter and Lalive, 2004), analyses at this level have still received too little attention.

Existing research on firm heterogeneity has ascertained that there is considerable and persistent variation in wages across firms for equally skilled workers (Groschen, 1991b; Barth, 1994; Abowd et al., 1999). These findings suggest that firm-specific factors affect wages and that while they are independent from workers' productivity they are related to firms' productivity and to processes of rent sharing among workers and employers. Recent findings in Germany (Groß, 2012; Card et al., 2013) and in the U.S. (Barth et al., 2014) offer a new perspective on the trend of increasing wage inequality and state that large parts of the rise in total wage inequality are associated to increasing establishment heterogeneity. These studies have pointed out the to date unresolved issues of the sources of increasing establishment heterogeneity and their distinct contributions to the rise of total wage inequality.

This paper contributes to resolving those issues by evaluating the role of structures and institutions at the establishment-level in the increase in total wage inequality in Germany. As Card et al. (2013, p. 1011) note: "To explain a rise in workplace heterogeneity, however, requires either a widening of productivity differences over time or a rise in dispersion of the share of the rent that workers capture at different firms." Accordingly, I focus on two main sources of variation across establishments: institutions that affect workers' bargaining power and structures presumably related to employers' productivity. The concept of rents by Sørensen, 1996, 2000) is applied as it distinguishes different forms of rents and puts forward

propositions about their development over time. Rents are defined as the deviation of actual wages from wages that would be paid under the condition of perfect competition and comprise rents resulting from collective bargaining as well as worker “composite rents” resulting from the coincidence of firm specific skills and internal labour markets. Thus, ideally, it is possible to separate inequality generated by supply and demand factors from inequality stemming from structural and institutional differentiation. According to Sørensen (2000), on the one hand worker rents are declining over time because of workers’ weakened bargaining power and the decreasing of importance of firm specific skills and on the other hand total wage inequality is increasing because of increasing returns to general skills. However, different versions of efficiency wages may give rise to increasing wage premiums at the firm or establishment level, in particular if employers are willing to pay wages above the market wage to attract workers or to elicit effort (Groshe, 1991a). This article thus compares changes in variance components of wages at the individual and at the establishment-level.

For the empirical analysis, linked employer-employee panel data from the Institute for Employment Research is used (LIAB). Different from the study by Card et al. (2013), these data allow considering a large set of establishment characteristics as determinants for changes in total wage inequality. In analogy to Card et al. (2013) I divide the data into time period subsamples (2000 to 2005 and 2005 to 2010) in order to control for unobserved worker heterogeneity in panel wage regressions including fixed worker effects. Applying decompositions of variance based on these wage regressions (Fields, 2003), wage inequality in both periods is decomposed into variance associated to observed establishment characteristics, observed individual characteristics, unobserved time invariant individual factors and remaining residual variance. Again similar to Card et al. (2013), I calculate changes in variance components over time, relative to the change in total variance of wages. Going beyond the reference study, the establishment variance component is further broken down into the inequality contributions of selected establishment characteristics. Establishments’ coverage by collective bargaining agreements, works councils and internal labour markets are used to measure differences in workers’ abilities to capture rents at different establishments. A comparison of variance decompositions based on cross-sectional and panel data underlines the advantages of using panel data for inequality decompositions.

Main findings are that about 33 per cent of the recent rise in wage inequality is accounted for by changes in the distribution and remuneration of observed establishment structures. Part

of the rise in wage inequality is accounted for by greater wage differences across establishments covered by different bargaining regimes, establishments with and without co-determination by works councils and establishments with more or less marked internal employment strategies (together three percent). However, the establishment characteristics contributing most to the rise in wage inequality are establishment size (eighteen percent) and the composition of establishments' workforces with respect to human capital and occupational groups (together eleven percent). These establishment structures are presumably linked to productivity differences across establishments.

The remainder of the paper is structured as follows. Section two provides theoretical considerations on the contributions of firm heterogeneity to the rise in wage inequality. Section three describes the data and section four presents the econometric model and decomposition method. Results are presented in section four and section five concludes.

1.2 Theoretical considerations

Classic economic explanations for rising wage inequality argue that particularly along with technological changes and globalisation, the demand for (high-) skilled labour has increased (Acemoglu, 2002; Machin, 2008). Hence, these theories explain greater inequality between skill groups defined for instance by levels of education and experience. With the assumption that remaining within group inequality reflects the distribution of unobserved individual qualifications they can also explain inequalities within skill groups. Either way, they first and foremost predict a rise of inequality across differently skilled workers, but not across equally skilled workers working for different firms.

However, several theories suggest that wage dispersion across firms may contribute to change in total wage inequality. Bargaining models imply that the variation of wages across firms is rising if employers differ increasingly in their ability to generate rents in product markets and share these rents at a constant rate, or if establishments' workforces differ increasingly in their bargaining power (Card et al., 2013). The latter is reflected by collective bargaining agreements and by firm co-determination by works councils. Further, theory on internal labour markets (Doeringer and Piore, 1971), insider-outsider theory and efficiency wage theory state alternative mechanisms leading to firm specific wages deviating from the marginal product of labour, and thus worker rents (Lindbeck and Snower, 1987). Since costs of labour turnover are central to these approaches, variation in labour turnover across establishments can be used to measure associated worker rents.

Although the share of firms covered by collective bargaining agreements has declined in recent decades (Kohaut and Schnabel, 2003), collective bargaining agreements still are of great importance in Germany. Collective bargaining agreements are known to induce higher wages and compressed wage structures. Therefore, their declining importance can be expected to affect the extent of wage variation both in and across establishments. Wage inequality between establishments may have risen over time since many establishments have opted out of collective bargaining agreements in order to save wage costs (Card et al., 2013). However, since the decline of collective bargaining agreements reflects a general decline of the unions' bargaining power it is likely to go coincide with a decrease of the wage premiums achieved through collective bargaining. Likewise, Sørensen (2000) argues that workers' ability to achieve rents from collective bargaining declines over time. In summary, it is not clear a priori whether the decline of collective bargaining agreements has led to a rise of wage inequality between establishments, while it is likely to have facilitated greater inequality across individuals in the same establishment.

A similar process has taken place with regard to firm co-determination by works councils as the spread of this institution has also declined recently in Germany. Although works councils cannot directly influence wage bargaining, they influence wage setting through participation in hiring, laying-off and promotion decisions. It is a well-established finding that firms with a works council pay higher wages than firms without a works council (Hübler and Jirjahn, 2003; Jirjahn, 2009). Further, works councils monitor compliance with legal and moral norms and therefore have equalizing effects on wage inequality in firms. Accordingly, a decrease in the number of works councils may contribute to growth of total wage inequality by increasing wage inequality across and in establishments.

Referring to the literature on internal labour markets (Doeringer and Piore, 1971) the degree of openness respectively closure towards the external labour market is an important institution at the firm level that impacts the level and the disparity of remunerations. As an incentive for workers' effort and commitment to the firm, firms establish closed positions particularly if workers obtain firm specific skills. As a main characteristic, closed positions are permanent and thus cannot be terminated easily by employers and there are limited numbers of vacancies and candidates for closed positions. As a consequence it is expected that workers in internal labour markets have greater wage bargaining power than workers in establishments open to the external labour market (Sørensen, 1983, 1996; Lindbeck and Snower, 1987).

Firms may use temporary employment as a reaction to needs for flexibility arising from international competition and uncertainty with regard to shocks on product and financial markets. Although, regulations of temporary employment in Germany have been loosened in the 1990s and 2000s, firms' usage of these employment forms is not widespread, making up about 6 percent of total dependent employment (Giesecke, 2009). However, there is great variation in the usage of permanent and temporary forms of employment across establishments. Over time this variation may have contributed to a rise of wage dispersion across establishments, as the conditions may have become more competitive at open positions, while closed positions are protected against wage adjustments. However, (Sørensen, 2000) states that wage effects of internal labour markets will decrease over time, as the importance of firm specific skills in the production process declines. Further he expects a closer connection between wages and workers' general skills, which are equally important in internal and external labour markets. Additionally, it has to be considered that a possibly increasing part of wage effects of internal labour markets may stem from sorting of highly productive workers into firms offering stable employment (Abowd and Kramarz, 1998; Cornelißen and Hübler, 2011).

Alternative to these explanations that focus on institutional settings at the firm level, a rise of firm wage premiums may be related to an increasingly unequal distribution of productivity. Differences in firms' productivity may stem from a number of causes, such as differences in the use of technology, management practices or firms' power on product markets (Barth, 1994; Gruetter and Lalive, 2004). While the underlying notion is that highly productive firms are capable of paying wage premiums above the market wage, it is less clear why they should do so (Rycx and Tojerow, 2007). Some studies on this topic have considered correlations of profits, innovations or measures of competitive pressure with wages to test whether firms share product market rents with their workers (Margolis and Savanes, 2001 for an overview). Results from this literature indicate that more profitable firms do pay higher wages (*ibid.*), which has been interpreted to reflect rent sharing. Other studies have interpreted "unexplained" sector and firm wage differentials with different versions of efficiency wages, stating that higher wages help to attract productive workers or to elicit workers' effort (Krueger and Summers, 1988). Also, wage differentials that compensate workers for differences in non-pecuniary working conditions have to be kept in mind when interpreting results on wage differentials across firms (Rosen, 1987).

1.3 Data description

For the empirical analyses, linked employer-employee panel data from the Institute for Employment Research for the years 2000 to 2010 is used (Alda et al., 2005). These data are obtained by merging survey data on employers from the IAB Establishment Panel with data on employees working in these establishments, coming from the IAB-employment statistic.

The IAB Establishment Panel is an annual survey of German establishments that covers information on a variety of establishment structures and human resource practices. The sample unit is the establishment, which refers to a firm's head office or a local subsidiary.¹ The survey sample is based on the employment statistics as of 30 June of each year and covers all establishments with at least one employee contributing to social security. The sample is random and stratified by industry, region and establishment size.

The IAB-employment statistic covers all persons who were employed for at least one day since 1975 and who have contributed to social security with the exceptions of civil servants and the self-employed. The data include information on employees' education, occupation, sex, age, nationality, industry and daily gross earnings. There is, however, a restriction on the information provided in the dataset and it concerns high wages. Wage rates exceeding the upper earnings limit for social insurance contributions ("Beitragsbemessungsgrenze") are not reported in full, and instead of real earnings only the threshold is reported. This problem is approached by applying an imputation strategy specifically developed for these data (Gartner, 2005) in which wages above the threshold are imputed based on tobit estimations for each year of the data.² For comparability reasons the analyses conducted here were restricted to full-time employees in West Germany, ages 20 to 60. Jobs with earnings below 400 euros per month were excluded since these are unlikely to be full time jobs; trainees and interns were also excluded from the sample.

¹ The applied data includes information on establishments. Therefore, statements on the methodology and results refer to establishments. The term "firm" is used, however, in the context of theory or literature referring to firms.

² The imputation procedure is based on a tobit model (Gartner, 2005). The specification includes 6 educational degrees, age (simple, squared and cubic), tenure, 10 occupational groups, a gender dummy, a dummy for German or non-German nationality, 11 firm size classes, 9 sector dummies and state dummies.

Table 1: Summary statistics of wage data

	Cross- section 2000	Cross- section 2010	Interval 1 (2000-2005)	Interval 2 (2005-2010)
Mean log wages	4.755	4.802	4.781	4.805
Change in means over time		0,047		0,024
Total variance of log wages	0.133	0.192	0.145	0.182
Change in variance over time		0,059		0,037
Number of firm-year observations	5,425	5,569	36,242	36,000
Number of persons	894,822	623,084	2,136,696	1,813,477
Number of person-year-observations	894,822	623,084	5,559,493	4,940,377

Source: LIAB 2000-2010; own calculations; wages are gross real daily wages

Table 1 shows a summary of sample sizes as well as summary statistics on the distribution of real log daily wages. It first reveals that over time mean wages in Germany have risen, whether comparing the years 2000 and 2010 or comparing the average of time interval 1 (2000 to 2005) to time interval 2 (2005 to 2010). More importantly, variance in wages has increased over time. Between the years 2000 and 2010 the rise in variance amounts to 0.059, which is a relative increase of about 44 percent. Comparing the averages of the two consecutive time periods, the increase appears more moderate, amounting to 0.037, which is a relative increase of about 26 percent.

The factors considered to explain this rise in wage variance can be categorized into establishment variables reflecting institutions that affect workers' bargaining power, establishment structures that are closely linked to establishments' productivity, other control variables at the establishment-level and individual factors of wage determination.

Table 2 gives a complete description of the considered establishment variables as well as changes in these variables over time. Establishments' status regarding industrial relations was captured by dummy variables, indicating coverage by a collective bargaining contract at the sector level or at the establishment level. Further, a dummy variable indicating the existence of a works council is used. Table 2 shows that establishments' coverage by collective bargaining agreements has decreased considerably between 2000 and 2010 and that the presence of works councils has clearly decreased, too.

The degree to which establishments maintain an internal or external human resource strategy is measured by two indicators: the share of fixed term positions in an establishment and an establishment's churning rate (CR). The churning rate describes that part of labour

turnover, which occurs independent from changes in the number of jobs in a given period of time in an establishment (in the present case the first six months of the respective year) and is therefore a measure of the openness to the external labour market. It is calculated as follows: $CR = (H + S - |H - S|/L)$, where H is the number of hires, S the number of exiting employees and L the average number of jobs in the establishment (Lengfeld and Ohlert, 2015; Davis et al., 2006). Table 2 shows that between the years 2000 and 2010 the average share of fixed term employment in establishments has increased from three to five percent. The average churning rate has decreased, i.e. that employee turnover net of job creation or destruction has decreased, which indicates an increase of overall job stability in establishments. Combined, these findings may reflect a rising divergence in the job stability of permanent and temporary workers.

In a next step, workers wage claims at the establishment-level were measured by the share of women and non-German workers as well as by the shares of different skill groups and by the share of white-collar workers in an establishment. Further, variables were included that are intended to control for differences in establishments' productivity. These variables are establishment size as measured by the number of full time employees, revenue situation as a dummy reflecting a rather good or rather bad situation and a dummy indicating a rather good or bad condition of technological equipment (see description of variables in table A2). Based on the sector classification of the IAB Establishment Panel, nine broadly aggregated sectors were included to control for changes in the sector distribution (see appendix table A3 and Fischer et al., 2008, p. 39). Over time, average establishment size has decreased slightly (see table 2). As could be expected, the manufacturing sector has become smaller over time, while the service sector has grown. The average shares of employees with a university degree as well as white-collar workers in establishments have slightly increased. The average share of women has increased, while the share of non-German employees in establishments has remained stable.

The following explanatory variables are considered at the individual level in order to capture differences in worker productivity: four different educational levels (no vocational degree, intermediate schooling and vocational training, higher schooling and vocational training and university degree), experience in the labour market measured by a cubic term of age and tenure in the establishment as well as dummy variables for white-collar versus blue-collar workers, women and men and German and non-German workers (based on citizenship).

Table 2: Description of firm samples

	2000		2010		Interval 1		Interval 2	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Churning rate	0.07	0.19	0.05	0.20	0.06	0.18	0.05	0.19
Share fixed-term	0.03	0.08	0.05	0.11	0.04	0.09	0.05	0.11
Industry	0.35	0.48	0.28	0.45	0.31	0.46	0.28	0.45
Hotels and restaurants	0.03	0.17	0.03	0.17	0.03	0.17	0.03	0.16
Trade	0.19	0.39	0.18	0.39	0.18	0.38	0.18	0.39
Finance	0.05	0.21	0.04	0.20	0.05	0.21	0.04	0.21
Construction	0.10	0.30	0.09	0.28	0.10	0.30	0.09	0.29
Agriculture	0.03	0.16	0.04	0.20	0.04	0.19	0.04	0.20
Health care	0.05	0.23	0.09	0.29	0.07	0.25	0.08	0.27
Other services	0.20	0.40	0.23	0.42	0.21	0.41	0.23	0.42
Public service	0.01	0.11	0.02	0.12	0.02	0.14	0.02	0.14
Share vocational training	0.73	0.26	0.73	0.28	0.73	0.26	0.73	0.27
Share abitur and vocational training	0.05	0.11	0.06	0.14	0.05	0.12	0.06	0.13
Share university degree	0.06	0.14	0.08	0.17	0.07	0.16	0.08	0.17
Mean age	39.66	5.36	41.71	6.20	40.13	5.40	41.29	5.79
Share white collar	0.51	0.38	0.52	0.40	0.53	0.38	0.52	0.39
Share women	0.38	0.32	0.40	0.34	0.39	0.33	0.40	0.33
Share foreign employees	0.06	0.13	0.05	0.13	0.06	0.12	0.06	0.12
Revenue situation	0.72	0.45	0.68	0.47	0.69	0.46	0.70	0.46
State of technology	0.39	0.49	0.35	0.48	0.32	0.47	0.39	0.49
Sector level collective bargaining	0.59	0.49	0.45	0.50	0.56	0.50	0.50	0.50
Firm level collective bargaining	0.07	0.25	0.06	0.24	0.06	0.24	0.07	0.25
Work council	0.43	0.49	0.32	0.47	0.39	0.49	0.35	0.48
Establishment size (log)	3.80	1.79	3.48	1.70	3.68	1.77	3.62	1.74
Number of firms	5,425		5,569		36,242		36,000	

Source: LIAB 2000-2010; own calculations

1.4 Econometric model and decomposition method

This section discusses the decomposition of changes in the variance of log wages into components associated to specific characteristics of workers and establishments. As an intermediary step, variance in wages is decomposed at two points in time as well as within two time periods.

The method applied is a regression-based decomposition of variance based on Fields (2003). It has the general advantages is that it is flexible regarding the use of different inequality measures as well as regarding the number and the kind of explanatory factors in

log-linear OLS wage regressions. Compared to the approach by (DiNardo et al., 1996) it has the advantage that it is not sensitive to the ordering of factors in the decomposition, while the (DiNardo et al., 1996) approach allows to estimate the effects of different components on the entire wage distribution without relying on a particular functional form. In the Fields (2003) method, the quality of inequality decompositions relies to great extent on the specification of the underlying wage regression. This can be an advantage since potential problems can be addressed by formulating an adequate specification (Cowell and Fiorio, 2011). In the present case, the econometric model is enriched substantially by estimating panel wage regressions instead of cross-sectional wage regressions. Since fixed effects panel estimations are equivalent to conventional OLS estimations including sets of dummy variables, the decomposition method by Fields can be easily applied to panel data. This allows addressing the potential selection of workers into high and low wage establishments and the resulting bias in the estimation of establishment wage effects (Fortin et al., 2011). Combining regression based inequality decompositions with panel estimations building on (Abowd et al., 1999; Card et al., 2013) provides a new contribution to the literature on firm wage effects. The decomposition is also applied to cross-sectional data to display the change in wage inequality over the longest possible time span in the sample (2000 to 2010) and to highlight differences resulting from the use of panel data rather than cross-sectional data.

The Fields method starts with an income generating function, estimated at two points in time or, as in the present case, in two time periods (t_1 and t_2):

$$(1) \quad y_{ijt} = \alpha + x_{ijt}\beta + \theta_i + \varepsilon_{ijt} \quad \text{with} \quad E(\varepsilon_{ijt}|x_{ijt}, \theta_i)$$

where y denotes log wages of individuals i in establishment j in year t , α is a global constant, θ_i is a set of individual fixed effects representing time invariant heterogeneity across workers, x is a set of k explanatory variables including covariates at the individual and at the establishment level as described in the previous section. Note that establishment characteristics are constant for workers in a given establishment and year. Accordingly, β are economy wide returns to individual characteristics as well as to establishment characteristics and ε_{ijt} is the error term, which is assumed to be uncorrelated with the individual effects θ_i and with the worker and establishment characteristics x_{ijt} . The Fields method goes on to calculate the share of the variance of log wages that is attributable to each of the k explanatory factors within a given time interval. These relative inequality weights “ s_k ” are estimated by:

$$(2) \quad s_k = \frac{\widehat{\beta}_k \text{cov}(x_k, \ln y)}{\sigma^2(y)}$$

Where β_k is the regression coefficient of the k -th explanatory factor, $\text{cov}(x_k, \ln y)$ is the covariance between the k -th factor and the dependent variable and $\sigma^2(y)$ is the total variance of log wages. Usually inequality weights (s_j) are positive. However, a negative value results if respective coefficients of a multivariate regression and a simple regression have opposite signs (Fields, 2004, p. 11). Fields showed that, in a conventional OLS regression, the sum of all relative inequality weights and residual variance add up to the total variance of the dependent variable. For the case of the fixed effects panel estimation the variance of the individual fixed effects θ_i and once their covariance with $x_{ijt}\beta$ need to be considered in addition.³ According to formula (2), changes in inequality weights over time can be owed to changes in the covariance of dependent and independent variables or can be owed to changes in the corresponding regression coefficient.

The contribution of the k -th factor to the change in total wage inequality over time Π_k , results from the changes in absolute variance components relative to the change in total variance of log wages over time (Fields, 2003):

$$(3) \quad \Pi_k(\text{Var}(y)) = [s_{k,t2} * \text{Var}(y)_{t2} - s_{k,t1} * \text{Var}(y)_{t1}] / [\text{Var}(y)_{t2} - \text{Var}(y)_{t1}]$$

1.5 Results

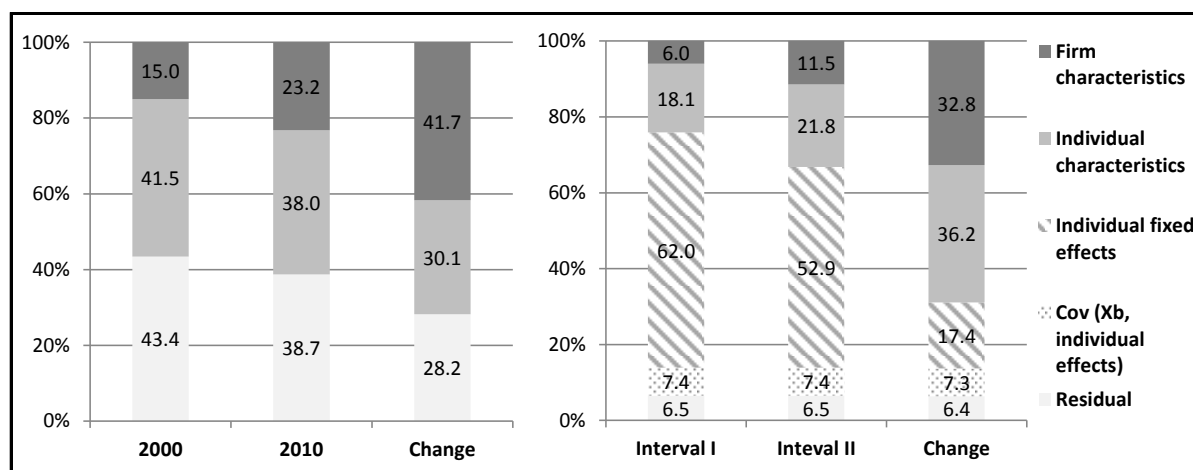
Figure 1 gives an overview on the performed decompositions of variance in wages and its change over time. Factors contributing to inequality are grouped into the aggregate of observed establishment characteristics, the aggregate of observed individual characteristics and residual factors.

Within cross sections (left panel of Figure 1) observed establishment and individual characteristics together can explain about 57 percent in 2000 and about 61 percent in 2010 of the total variation in log wages (R^2). About 15 to 23 percent are explained by the aggregate of observed establishment characteristics, about 40 percent are explained by the aggregate of explanatory variables at the individual level and about 40 percent of variance remain unexplained. The importance of these three components is quite different regarding changes over time. The largest part of the increase in total wage inequality stems from the aggregate of

³ Based on Shorrocks (1982), half the value of all the interaction terms involving factor k is assigned to that factor.

establishment characteristics (about 42 percent), while the sum of observed individual characteristics accounts for 30 percent of the increase and another 28 percent are associated to residual variation.

Figure 1: Overview of decompositions of variance in log wages (percentages of total variance)



Source: LIAB 2000-2010, own calculations

Results differ substantially when decompositions are carried out for two time intervals (right panel of Figure 1). Here, the variance of individual fixed effects appears as an additional component accounting for large fractions of variation in both time intervals (more than 50 percent). This variance component is, however, almost stable over time, while it accounts for only 17 percent of the rise in total wage inequality between the two intervals. Having controlled for these unobserved individual heterogeneities, the contributions of observed individual and establishment characteristics to total variance within the two periods are much smaller than in the cross-sectional results. Now, the aggregate of individual characteristics accounts for roughly 20 percent within each time period and the aggregate of establishment characteristics accounts for 6 percent of total variance in period one and for about 12 percent in period two. And yet, both components have become more important over time. The sum of individual characteristics is associated to about 36 percent of inequality increases, while the total contribution of establishment characteristics amounts to about 33 percent.

Table 3 presents a detailed decomposition of changes in wage inequality based on cross-sectional data for the years 2000 and 2010. Among the individual characteristics the largest fractions of the increase in wage inequality are associated to increasing dispersion across educational degrees, occupational positions (measured as white-collar vs. blue-collar) and

labour market experience. These findings seem to confirm a trend towards rising returns to human capital and thus support theories of a rising demand for qualification. The likewise substantial increase in residual variation may also be interpreted as supporting these theories under the assumption that residual variation reflects unobserved skills and abilities. However, the increase of residual variation may also reflect the rising importance of other unobserved individual attributes such as social networks or social background.

Further, the results in Table 3 show how structures and institutions at the establishment level have contributed to increasing wage inequality. Change in the distribution of collective bargaining regimes across establishments only has a small impact on overall wage inequality. About one percent of inequality increase is associated to establishments' declining coverage of collective bargaining agreements. However, the decline of establishment level works councils contributed substantially to the increase in wage inequality (about 8 percent). The share of fixed-term employment and the churning rate in establishments were applied as indicators of establishments' openness to the external labour market. Changes in these measures together are associated to about 4 percent of the increase in overall wage inequality. Segregation of foreign workers across establishments does neither explain substantial wage variation within cross-sections nor does it contribute to the rise of wage variation. However, segregation of women across establishments is relevant. About 3 percent of the total increase in wage inequality is accounted for by increasing inequality with respect to the share of women in establishments.

Additionally, substantial parts of the rise of inequality are associated to changes related in the wage differentials across small and large establishments (about 10 percent), changes in the sectoral structure (about 6 percent) and changes with regard to the concentration of human capital in establishments. The increase in these components of variance may reflect increasing heterogeneity of establishments' productivity in connection with trends of specialisation and diverse usage of technology.

Table 4 displays the total variances and a detailed decomposition of variances in wages based on fixed effects panel estimations in two periods. Compared to the cross-sectional decomposition these results are based on more precise estimates of the effects of establishment characteristics on wages. Thus, remaining wage inequality associated to establishment structures potentially reflects dispersion of rents captured by workers at different establishments.

Table 3: Detailed decomposition of the rise in wage inequality using cross-sectional data

	2000		2010		Change from 2000 to 2010	
	Var. Component	Share of total	Var. Component	Share of total	Var. Component	Share of total
Total variance of log wages	0,133	100,0	0,192	100,0	0,059	100,0
Components of variance:						
Residual	0,058	43,4	0,075	38,7	0,017	28,2
Individual education	0,017	12,9	0,025	13,1	0,008	13,5
White collar	0,018	13,8	0,025	12,9	0,006	10,9
Experience	0,010	7,8	0,014	7,0	0,003	5,2
Women	0,009	6,9	0,009	4,8	0,000	0,3
Foreign employees	0,000	0,1	0,000	0,2	0,000	0,2
Sum of individual characteristics	0,055	41,5	0,073	38,0	0,018	30,1
Churning rate	0,002	1,2	0,003	1,4	0,001	1,7
Share fixed-term	0,000	0,0	0,001	0,7	0,001	2,3
Sector dummies (9)	0,002	1,7	0,006	3,1	0,004	6,2
Education groups in firm	0,006	4,6	0,009	4,7	0,003	4,8
Mean age in firm	0,000	0,3	0,001	0,4	0,000	0,6
Share white collar	0,000	0,3	0,003	1,6	0,003	4,7
Share women in firm	0,002	1,5	0,004	2,1	0,002	3,4
Share foreign employees	-0,001	-0,4	-0,001	-0,4	0,000	-0,3
Revenue situation/technology	0,000	0,2	0,000	-0,1	0,000	-0,7
Collective bargaining	0,000	0,2	0,001	0,5	0,001	1,1
Work council	0,002	1,3	0,006	3,3	0,005	7,8
Establishment size (log)	0,006	4,2	0,012	6,0	0,006	10,1
Sum of establishment characteristics	0,020	15,0	0,045	23,2	0,025	41,7

Source: LIAB 2000, 2010; own calculations

Total variance of wages has risen from time interval 1 (2000-2005) to time interval 2 (2005-2010) by .037, which is roughly an increase of 25 percent. As mentioned above, the variance of fixed worker effects accounts for a large fraction of total variation within both time intervals but is almost stable over time. Having controlled for these unobserved individual heterogeneities, the contributions of observed individual and establishment characteristics to total variance within the two periods are much smaller compared to the cross-sectional results.⁴ However, both components have become more important over time. The sum of individual characteristics is associated to about 36 percent of inequality increase, while the total contribution of establishment characteristics amounts to about 33 percent.

⁴ Since gender is strictly time invariant in the data, this part of individual heterogeneity is picked up by the individual fixed effects in the estimations for the periods 2000 to 2005 and 2005 to 2010.

Table 4 further confirms an increase in inequality across workers in establishments. However, the control of unobserved individual heterogeneity by the inclusion of worker fixed effects shows that at the individual level, increasing inequality stems almost exclusively from changes in the remuneration of education and experience. This finding generally supports theories of rising demand for qualification.

With regard to indicators of workers bargaining power results differ from the cross-sectional results. Similar to the cross-sectional results, changes in establishments' collective bargaining status barely affect wage inequality, while changes related to works councils contribute to inequality increases. Changes in establishments' openness towards the external labour market contribute positively to the rise of inequality. However, the aggregate contribution of fixed contracting and the churning rate is small, amounting to only 0.5 percent of total inequality increase. The share of women and foreigners in establishments does not contribute autonomously to wage inequality in the analysed periods or the rise of inequality over time.

Regarding the inequality contributions of other establishment characteristics, results also differ considerably from the decomposition based on cross-sectional data. It can distinctly be seen that the most important establishment level determinants for the rise in total wage inequality are establishment size (about 18 percent) and establishments' composition with respect to education (7 percent) and occupational positions in the workforce (5 percent). Presumably, these components of variance reflect increasing heterogeneity of establishments' productivity in connection with trends of specialisation and diverse usage of technology.

The differences in the results based on cross-sections and time intervals point to sorting of workers into the considered establishment structures. Overall, the contribution of the aggregate of observed establishment structures to the rise in wage inequality is smaller once unobserved individual heterogeneities are controlled for. It is, however, still substantial and amounts to almost one third of the increase. Particularly, the contributions of both the share of fixed term employment and the share of works councils to wage inequality increases differ substantially between the two versions of the decomposition. This indicates that there is sorting of "high wage workers" into establishments with high shares of permanent positions as well as into establishments with works councils.

Table 4: Detailed decomposition of the rise in wage inequality using panel data

	Interval 1 (2000-2005)		Interval 2 (2005-2010)		Change from interval 1 to 2	
	Var. Component	Share of total	Var. Component	Share of total	Var. Component	Share of total
Total variance of log wages	0,145	100,0	0,182	100,0	0,037	100,0
Components of variance:						
Individual fixed effects	0,090	62,0	0,096	52,9	0,006	17,4
Cov (Xb, individual effects)	0,011	7,4	0,013	7,4	0,003	7,3
Residual	0,009	6,5	0,012	6,5	0,002	6,4
Education	0,009	6,2	0,017	9,4	0,008	21,9
White collar	0,004	2,7	0,004	2,2	0,000	0,2
Experience	0,013	9,2	0,019	10,2	0,005	14,1
Women*	0,000	0,0	0,000	0,0	0,000	0,0
Foreign employees	0,000	0,0	0,000	0,0	0,000	0,0
Sum of individual characteristics	0,026	18,1	0,040	21,8	0,013	36,2
Churning rate	0,000	0,0	0,000	0,1	0,000	0,3
Share fixed-term	0,000	-0,1	0,000	0,0	0,000	0,2
Sector dummies (9)	0,001	0,6	0,002	1,2	0,001	3,6
Shares of education groups	0,003	1,7	0,005	2,7	0,002	6,6
Mean age in firm	-0,001	-0,4	-0,001	-0,6	0,000	-1,3
Share white collar	0,000	-0,2	0,002	0,8	0,002	4,7
Share women in firm	0,000	0,1	0,000	0,0	0,000	-0,1
Share foreign employees	0,000	0,0	0,000	-0,2	0,000	-0,9
Revenue situation/technology	0,000	0,1	0,000	0,0	0,000	-0,2
Collective bargaining	0,000	0,0	0,000	0,0	0,000	-0,1
Work council	0,000	0,3	0,001	0,7	0,001	2,3
Firm size (log)	0,006	3,8	0,012	6,6	0,007	17,7
Sum of establishment characteristics	0,009	6,0	0,021	11,5	0,012	32,8

Source: LIAB 2000-2010; own calculations

* The dummy for gender is dropped due to the inclusion of individual fixed effects.

1.6 Conclusions

In the past two decades, there has been a substantial increase of wage inequality in Germany. Part of the literature has examined the extent to which this increase can be explained by changes in supply and demand for labour or by changes in institutions (Dustmann et al., 2009). Both explanation strands operate at different levels, such as the labour market as a whole, firms, occupations and individuals. The recent, striking finding of

substantial increases in wage dispersion across firms, has drawn attention to processes of wage determination at the firm level (Card et al., 2013; Barth et al., 2014; Groß, 2012). In order to learn more about this phenomenon, this study dealt with the sources of rising variation in wages across establishments and their contribution to changes in total wage inequality.

If one agrees that wage inequality across differently skilled workers primarily reflects remuneration of labour productivity and that wage inequality across firms for equally skilled workers reflects deviations from market wages, the analysis of variance components at both levels allows to evaluate the importance of competitive and rent-based explanations for the rise of wage inequality (Morgan and Cha, 2007). The method applied in this paper combines regression-based decomposition of inequality (Fields, 2003) with fixed effects panel estimations within two time periods of German linked employer-employee data. Changes in wage inequality are thereby decomposed into changes in variance components associated to observed establishment characteristics, observed individual characteristics, unobserved time invariant individual factors and remaining residual variance.

Results have, on the one hand, confirmed that the returns to individual endowments with human capital have risen. This finding is in line with theories predicting a rise in the demand for skilled workers and suggests that part of the rise in inequality is generated by market mechanisms. However, results also have shown that changes in the distribution and remuneration of observed establishment characteristics can explain up to one third of the recent increase in wage inequality. This confirms the increasing importance of across establishment wage variation found in other studies (see above). It strongly suggests changes in processes of rent sharing between employers and workers and underlines the need to further query its sources.

Results have further shown that variation in direct measures of bargaining power of workers at different establishments contributes to the explanation of rising wage inequality. However, this contribution appears to be rather small, once the composition of establishments' workforces with respect to observed and unobserved worker characteristics is controlled for. Wage differentiation across establishments with and without works councils accounts for 2.3 percent of the increase of total wage inequality, while there is no increase in wage dispersion across establishments covered and not covered by collective bargaining agreements. Wage inequality across establishments with different degrees of openness towards the external labour market (as measured by establishment level worker fluctuation)

has increased by 0.5 percent. Hence, overall increases in the dispersion of workers' bargaining power at different establishments make up only a small share of the increase in total wage inequality. The decline in establishments' coverage by collective bargaining agreements and works councils over time may in fact have had a greater impact on wage inequality by facilitating the closer alignment of general skills and wages within establishments that is typically ascribed to the operation of market forces.

In comparison, the increase in distributive effects associated to establishment structures such as establishment size and workforce composition are larger. Inequality changes related to establishments' skill and occupational composition (after having controlled for these factors at the individual level) account for about 11 percent and establishment size alone accounts for about 18 percent of the rise in total wage inequality. Since both the composition of workforce and establishment size are presumably linked to dispersion of productivity across establishments, results suggest that the rise of wage inequality is tied to an increasing concentration of resources among establishments. These findings are consistent with findings of vast productivity differences across firms and establishments (Foster et al., 2008) and indicate that increasing dispersion in product market rents may be an important source of increasing establishment wage premiums. The sources of productivity differences across establishments have not been analysed in detail in this study. These may have its cause in differences in the use of technology, management practices or from firms' power on product and labour markets (Barth, 1994; Gruetter and Lalive, 2004).

From the point of view taken in this article, wage inequality across establishments among equally skilled workers reflects the outcomes of rent sharing processes between workers and employers. The increasing divergence in these outcomes is related both to changing effects of institutions and structures at the establishment level. Findings suggest that there are inequality increases between labour income and corporate profits, too. Hence, observing changes in wage dispersion across and within establishments provides substantive insights into changes in the relations between more and less powerful actors in modern economies.

Appendix

Table A1: Regression results

	2000		2010		Interval I		Interval II	
	Coeff.	p-value	Coeff.	p-value	Coeff.	p-value	Coeff.	p-value
Vocational training	0.100	0.000	0.087	0.000	0.041	0.000	0.035	0.000
Abitur and vocational training	0.149	0.000	0.160	0.000	0.056	0.000	0.099	0.000
University degree	0.370	0.000	0.389	0.000	0.170	0.000	0.255	0.000
White collar	0.249	0.000	0.278	0.000	0.049	0.000	0.045	0.000
Age	0.033	0.000	0.039	0.000	0.050	0.000	0.058	0.000
Age-squared	0.000	0.000	0.000	0.000	0.000	0.000	-0.001	0.000
Tenure	0.005	0.000	0.004	0.000	0.001	0.000	0.003	0.000
Woman	-0.218	0.000	-0.214	0.000	-	-	-	-
Foreign employee	-0.013	0.000	-0.031	0.000	0.002	0.131	0.002	0.098
Churning rate	-0.242	0.000	-0.225	0.000	-0.006	0.000	-0.016	0.000
Share fixed-term	-0.012	0.009	-0.168	0.000	0.025	0.000	0.006	0.004
Manufacturing (reference)								
Hotels and restaurants	-0.162	0.000	-0.193	0.000	-0.013	0.059	-0.099	0.000
Trade	-0.069	0.000	-0.086	0.000	-0.030	0.000	-0.027	0.000
Finance	0.022	0.000	-0.083	0.000	-0.042	0.000	0.002	0.728
Construction	0.004	0.037	-0.030	0.000	0.003	0.378	0.007	0.000
Agriculture	-0.063	0.000	0.011	0.000	0.013	0.002	-0.040	0.000
Health care	-0.058	0.000	-0.104	0.000	-0.055	0.000	-0.072	0.000
Services	-0.078	0.000	-0.140	0.000	-0.062	0.000	-0.052	0.000
Public service	-0.046	0.000	-0.109	0.000	-0.034	0.000	-0.048	0.000
Share vocational training	0.064	0.000	0.132	0.000	-0.073	0.000	0.161	0.000
Share abitur and vocational training	0.234	0.000	0.302	0.000	0.181	0.000	0.169	0.000
Share university degree	0.411	0.000	0.368	0.000	0.058	0.000	0.254	0.000
Mean age	0.003	0.000	0.004	0.000	-0.004	0.000	-0.006	0.000
Share white collar	0.018	0.000	0.112	0.000	-0.010	0.000	0.050	0.000
Share women	-0.184	0.000	-0.249	0.000	-0.008	0.041	-0.002	0.578
Share foreign employees	0.211	0.000	0.204	0.000	0.021	0.000	0.146	0.000
Revenue situation	0.006	0.000	0.004	0.000	0.002	0.000	0.003	0.000
State of technology	0.018	0.000	0.021	0.000	0.009	0.000	0.005	0.000
Sector level collective bargaining	0.019	0.000	0.047	0.000	0.005	0.000	0.002	0.007
Firm level collective bargaining	0.046	0.000	0.010	0.000	0.001	0.158	0.000	0.525
Work council	0.077	0.000	0.129	0.000	0.015	0.000	0.031	0.000
Establishment size (log)	0.030	0.000	0.031	0.000	0.024	0.000	0.038	0.000
Constant	3.307	0.000	2.985	0.000	3.511	0.000	3.057	0.000
Adj. R-squared	0.566		0.613		0.894		0.898	
Number of observations	894,822		623,084		5,559,493		4,940,377	

Source: LIAB 2000-2010; own calculations

Table A2: Variables

Establishment level		Individual level	
Variable name	Remarks	Variable name	Remarks
Manufacturing	Sector dummy (reference)	No Vocational training	Worker has no vocational degree (reference)
Hotels and restaurants	Sector dummy	Vocational training	Worker has vocational degree
Trade	Sector dummy	Abitur and vocational training	Worker has A-levels and vocational degree
Finance	Sector dummy	University degree	Worker has university degree
Construction	Sector dummy	White collar	Dummy for white collar vs. blue collar worker
Agriculture and mining	Sector dummy	Age	Age in years
Health care	Sector dummy	Age-squared	Age in years squared
Services	Sector dummy	Tenure	Years in establishment
Public service	Sector dummy	Woman	Gender dummy
Share no vocational training or university degree	Share of qualification level in establishment (reference)	Foreign employee	Dummy foreign citizenship
Share vocational training	Share of qualification level in establishment		
Share vocational training and Abitur	Share of qualification level in establishment		
Share university degree	Share of qualification level in establishment		
Mean age	Mean age of workers in establishment		
Share white collar	Share of white collar workers in firm		
Share women	Share of women in establishment		
Share foreign	Share of foreign employees in establishment		
State of technology	Dummy: yes if establishment's technology is 1 or 2 on ordinal index from 1 (state of the art) to 5 (outdated)		
Revenue situation	Dummy: yes if revenue situation is 1 or 2 on ordinal index from 1 (very good) to 5 (bad)		
No collective bargaining	Dummy: establishment not covered by collective bargaining agreement (reference)		
Sectoral collective bargaining	Dummy: establishment covered by sector-level collective bargaining agreement		
Establishment collective bargaining	Dummy: establishment covered by establishment-level collective bargaining agreement		
Works council	Dummy: establishment has works council		
Log establishment size	Log number of workers per establishment		
Churning rate	Establishment's churning rate		
Share fixed term employment	Share of fixed term contracts in establishment		

Table A3: Sector classification and two digit components

Sectors	Sub-sectors	Two digit codes (NACE Rev. 1.1)
Manufacturing	Manufacture of food products	15-16,
	Manufacture of commodities	17-19, 21-22, 36
	Manufacture of durables	20, 23-27, 37
	Manufacture of investment and consumer goods	28-35
Hotels and restaurants	Hotels and restaurants	55
Trade	Wholesale and retail trade	50-52
Finance	Financial and insurance services	65-67
Construction	Construction	45
Agriculture and mining	Agriculture, hunting and forestry, fishing,	01, 02, 05
	Mining, electricity, energy, and water	10-14, 40, 41
Health care	Health and social work	85
Services	Transport and warehousing	60-64
	Real estate, renting and business activities	70-74
	Other services	90, 92-93
Public service	Public administration and defense, social security	75
	Education	80

Based on Fischer et al. (2008, p.39)

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2 Do Internal Labour Markets Protect the Unskilled From Low Payment?

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Abstract*

Up to date, it remains an unresolved issue how firms shape inequality in interaction with mechanisms of stratification at the individual and occupational-level. Accordingly, we ask whether workers of different occupational classes are affected to different degrees by between-firm wage inequality. In light of the recent rise of overall wage inequality, answers to this question can contribute to a better understanding of the role firms play in this development. We argue and empirically test the new hypothesis that between-firm wage effects of internal labour markets are larger for unskilled than for qualified workers. Matched employer-employee data from official German labour market statistics are used to estimate firm specific wage components, which are then regressed on structural characteristics of firms. Between-firm wage effects of internal labour markets are largest among unskilled workers and strongly pronounced among qualified manual workers. Effects are clearly smaller among classes of qualified and high-qualified non-manual workers but have risen sharply for the latter class from 2005 to 2010. Hence, the most disadvantaged workers in the labour market are also most contingent upon employers' increasingly heterogeneous policies of recruitment and remuneration.

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* In the published journal article, the abstract is structured into: Purpose, Methodology, Findings, Originality and Social Implications.

2.1 Introduction

In the last 20 years, many OECD-countries have experienced a considerable rise in income inequality, which can be traced back to societal trends such as technological change, economic globalization and the 2007/2008 global financial and economic crisis (e.g. OECD, 2011; Giesecke and Verwiebe, 2009). As a consequence, particularly the unskilled workers are increasingly confronted with precarious wages, non-standard work contracts and job insecurity (Blossfeld et al., 2006a, b; Kalleberg et al., 2000; Gebel and Giesecke, 2009; Muffels, 2008). When evaluating these trends from a labour market and social policy perspective, there may be good reasons to establish social mechanisms protecting these most vulnerable workers from further losing material life chances. Rather than investigating political institutions or collective action strategies to avoid vulnerability, as is common in other studies, in this article we focus on a social entity located at the very centre of the labour market: the firm.

As recent studies have shown, the impact of firm heterogeneity on wage inequality is large and continues to grow (Card et al., 2013; Barth et al., 2014). This finding suggests that processes of rent creation and rent sharing at the firm-level lead to deviations from market wages. Hence, mechanisms of inclusion and exclusion into high and low wage firms have become an important dimension of income inequality. Against this background, firm internal labour markets are highly relevant institutions since they potentially protect workers against job and wage insecurity. Typically, internal labour markets provide higher wages, more stable employment and better career opportunities compared to external market conditions (Doeringer and Piore, 1971). Thus, inclusion into internal labour markets might be of particular value for the most vulnerable workers.

Modern theory on internal labour markets states that incumbents of “closed positions” can achieve rents from the fact that they have the capability to exclude others from those positions, even if the labour productivity of those positions is not closely connected to the wage paid (Sørensen, 1983, 1996). This argument particularly holds true for the case of Germany where employment protection is considered to be relatively strict, and job stability is relatively high (Venn, 2009). However, firms may employ at least parts of their workforce under a temporary work contract, which in turn means that they are to some degree “open” to the external labour market. It can be expected that in the absence of any institutional closure at the firm level, the risk of being low paid becomes most prevalent for the unskilled workers since they are easiest to replace. In this paper, we therefore examine 1) to what extent the

wages of workers of different occupational classes are affected by heterogeneity across firms, 2) whether the wages of the unskilled unlike the wages of medium and high skilled employees depend to a greater extent on being employed in a firm with an internal labour market, and 3) whether these circumstances have changed over time.

In order to explore these questions, we analyse German employer-employee data for the years 2005 and 2010. Next to wage information and an extensive set of other variables, these data sets include the firms' churning rate. Churning rates measure the firm-level worker turnover net of changes in the number of jobs and we apply this indicator to assess a firms' openness respectively closure towards the external market. The main advantage of this indicator is that it is independent of employment growth or decline and thus is an objective measure of openness and closure of the entire firm. Consequently it is likely that it reflects fundamental human resource management decisions. To identify the wage effects of internal employment systems, in our statistical analysis we apply a two-step estimation strategy. First, fixed firm wage effects are estimated while controlling for employees' individual characteristics within firms. Second, the relation between the obtained firm wage effects and the firm-specific churning rate is estimated, while other relevant firm characteristics such as size and collective bargaining status are controlled for. By referring to the class concept proposed by Erikson and Goldthorpe (1992), we compare wage effects for five occupational classes.

Our findings clearly show that individual wages are determined to a greater extent by firm heterogeneity within the lower skilled classes than within the intermediate and highly qualified classes. The positive wage effects of internal labour markets are largest among unskilled manual and non-manual occupations and somewhat smaller for qualified manual occupations. Additionally, the wage effects of internal labour markets are distinctly smaller within qualified service, clerical and high-skill occupations. Within the class of high skilled occupations, however, they sharply increase over time.

In the following, the theoretical reasons for wage inequality across firms within different occupational groups will be reviewed focussing on the role of internal labour markets (section 2). Section 3 demonstrates the methodology and section 4 presents our results. We conclude with a brief summary of the findings and a discussion of its implications for worker's vulnerability (section 5).

2.2 Organisations and wage inequality

Wage inequality can occur both between and within firms. Between-firm inequality refers to cases in which workers with equal individual characteristics receive unequal remunerations due to their attachment to different firms. This phenomenon has been called “horizontal inequality” (Lengfeld, 2010), emphasizing the distinction from inequalities at the individual level. In contrast, “vertical inequality” refers to unequal wages within firms, which stems from heterogeneous worker characteristics (e.g. individual’s human capital, gender or nationality) and the allocation of workers to positions within the same firm (ibid.). In the following we will focus on wage inequality across firms, i.e. horizontal inequality.

Wage inequality across firms and internal labour markets

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

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

monopolization (Sørensen, 1983, 1996; see also Lindbeck-Snower, 1988 arguing from a different theoretical perspective).

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

Empirical evidence suggests that closed firms pay higher wages than firms which fill vacancies predominately by recruiting from the external labour market (e.g. Alexander, 1974; Kalleberg and Van Buren, 1996; Lengfeld, 2010). Studies considering wage variation with respect to unobserved individual characteristics imply that part of this positive relation may be due to selection of “high wage workers” into internal labour markets (Abowd and Kramarz 1998; Cornelißen and Hübler, 2011). These results do not, however, allow for differentiation between occupational classes. In fact, research comparing the wage effects of internal labour markets within different occupational classes is rare. Although previous studies have shown that firm wage differentials are of greater importance for wage determination among blue collar workers than among white collar workers (Davis and Haltiwanger, 1991; Bronars and Famulari, 1997; Stephan, 2001), these differences have not been explored in detail. Instead, it has been emphasized that firms paying above average wages tend to do so for all occupational groups, which is in line with sorting of equally skilled employees into firms (Kremer, 1993). Lane et al. (2007), however, assert that positive correlations of firm wage effects are lowest between occupational groups that are furthest apart in the hierarchy. This result points to differences in firm wage effects that are due to occupation-specific tasks and associated problems of monitoring workers’ productivity (Groshen, 1991b, 882).

Wage inequality across firms within occupational classes

Given that firm internal labour markets play at least some role in determining wage inequality, we raise the question of whether different workers are exposed to this kind of inequality to different degrees. Thus, we focus on across-firm wage effects of internal versus external employment strategies. Workers are categorised into five classes, according to the level of skills required and similarities of tasks performed (see section 3.2 for more details). With reference to Goldthorpe (2000) these occupational classes are assumed to differ systematically not only with respect to general skills but also with respect to the specificity of skills and the feasibility of monitoring by the firm.

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

First, although the typical notion of unskilled work is that of external market relations (Goldthorpe, 2000), wages may deviate substantially from that rationale because of requirements at the firm level. From a firm perspective, loss of unskilled workers is usually less costly compared to more qualified workers since the skills required are rather basic and general. Furthermore, unskilled workers' performance often is easily observable, facilitating a close connection of wages to productivity. Accordingly, unskilled workers are more likely to be particularly affected by the combination of unstable employment and low wages. Nevertheless, training on the job and internal opportunities for promotion are important means for the wage attainment of less skilled workers. This situation is reflected by the often found empirical result of high returns to tenure in blue collar jobs, while returns to skills and experience are higher in white collar jobs (Kramarz et al., 1996, 376). Therefore, payment of less skilled workers may be substantially higher if the firm has reason to retain workers and thus close positions off, caused by an arbitrary strategic decision or by external factors such as

scarce labour supply. In contrast, high skilled workers receive wage premiums that aim at maintaining a long-term employment relationship because of their occupational position (Goldthorpe, 2000). They are thus more likely to be protected against market volatilities even if their employer provides low job stability. Accordingly, high skilled workers are less contingent on firms' employment policies.

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

A third argument comes from human capital theory. Wage inequality, e.g. between firms, is assumed to be the result of employee skills that may be unobservable for the researcher. Thus, wage differentials between firms may stem from a sorting of workers into firms based on workers' informal (statistically unobserved) qualifications. Given that job security is desired by workers and internal firms make greater effort in recruitment, highly productive workers may sort into firms with an internal labour market (see also Cornelißen and Hübler, 2011). If this selection is most pronounced among the unskilled, across-firm wage effects of firms' internal labour markets would be particularly large for this class. Since unskilled workers do not possess occupational degrees, their capability to access internal labour markets might highly rely on informal qualifications.

To sum up, relative wage gains from employment in firms using internal labour market strategies are expected to be more pronounced for less qualified occupational classes. Workers belonging to these classes are also more likely to forfeit substantial wage gains when employment stability and opportunities of promotions are not present in the respective firm. In contrast, intermediate and highly qualified workers largely enhance their chances of wage attainment through greater amounts of human capital, greater specificity of skills and greater difficulty of monitoring. Accordingly, for these classes, attaining higher wages is less tied to the firm's recruitment policy. Thus, we formulate the following hypothesis:

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

2.3 Data, variables, and methods

Data

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

The data are obtained by merging information on employers from the IAB Establishment Panel with information on all regular employees working in these establishments from the employment statistic of the German Federal Labour Services (see Alda et al. 2005 for an overview). The IAB Establishment Panel is an annual survey of German establishments that covers information on establishment structures and human resource decisions.¹ The sample is based on the employment statistics as of 30 June of a year. The sample is random and stratified by industry and firm size. Since the calculation of a firm's specific wage component requires a minimum of two employees per firm, firms with less than one employee are excluded from the sample. Our data set is thus a representative sample of German establishments which employ at least two employees eligible for social security.

The IAB Employment Panel statistic covers all persons who were employed for at least one day since 1975 and contributed to social security with the exceptions of civil servants ("Beamte") and the self-employed. The data include information on employees' education,

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

occupation, sex, age, nationality, industry and daily gross earnings. However, the data does not include earnings above the assessment ceiling or “Beitragsbemessungsgrenze”. If the wage rate exceeds a certain amount, social security contributions are capped. In these cases the threshold is reported instead of real earnings. This problem is approached by applying an imputation strategy that has been developed specifically for these data (Gartner, Rässler 2005). For comparability, the analysis was restricted to full-time employees in the private sector in West Germany, ages 20 to 60. We excluded jobs with earnings below 400 euros per month because these are unlikely to be full time jobs. Furthermore, trainees and interns were excluded from the sample.

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

Variables

The degree to which firms maintain an internal or external human resource strategy is measured by the firms’ churning rate (CR). The churning rate describes the part of labour turnover that occurs independently of changes in the number of jobs in a given period of time within a firm (in our data the first six month of the respective year). It is a measure of the openness to the external labour market. It is calculated as follows: $CR = (H + S - |H - S|) / L$, where H is the number of hires, S the number of leaving employees and L the average number of jobs in the firm (Davis et al., 2006).

As an indicator for the presence of internal labour markets, the churning rate focuses upon labour turnover between the firm and the external labour market. Other features of internal labour markets may coincide with a low churning rate, such as hierarchy levels, career paths or training of employees, but are not directly measured by it. So by using the churning rate as a main indicator, we are not able to differentiate between particular reasons for the replacement of employees. However, our crucial point here is that if a closed position becomes vacant, employers are able to re-adjust wages to the current market wage and thereby cut wage premiums that may have evolved over time. The adjustment for expansion or downsizing of firms’ workforces ensures that the indicator is, to some extent, independent of the firm’s economic situation. Particularly in times of market downturn, labour churning

may be applied as a strategy for cost reduction and is therefore less likely to reflect voluntary notices of terminations.

In our regression models, we control for other establishment characteristics relevant for a firm's wage level. These include establishment size, existence of a collective bargaining agreement, existence of a works council and condition of technical equipment. Furthermore, the composition of a firm's workforce was controlled for its share of women and foreigners as well as its share of different skill groups within the establishment (see appendix for descriptive statistics).

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

Methods

To calculate wage effects of internal labour markets, we apply wage regressions in two steps. First, a Mincer-type wage regression is run at the individual level, adding fixed firm effects to the specification. Second, the relation between the obtained firm wage effects and the firm-specific churning rate is estimated at the firm level. This approach has been frequently applied in research on wage effects of firm structures (e.g. Kramarz et al., 1996; Stephan, 2001; Lane et al. 2007). Being more specific, we estimate effects of the churning rate on wages and then run separate regressions for each occupational group for 2005 and 2010.

In the first step of our analysis, we calculate firm specific wage components, while individual characteristics of individuals within firms are controlled for. The variance of wage levels across firms could be illustrated preliminarily by calculating the distribution of mean wages of each establishment in the sample. However, differences in establishments' mean wages may arise not only from differences in organisational structures but also if employees are sorted into establishments according to their qualifications. Since we are interested in the

wage effects of organisational structures, the firm's wage levels are adjusted for effects of the composition of the workforce, as far as observed. We accomplish this by estimating an OLS wage regression including fixed effects for each firm (ψ_i), as well as individual variables reflecting human capital, gender and nationality (x_i) (see equation 1, with individuals i and firms j).² Human capital is measured in terms of educational degree, labour market experience (age in years, simple and quadratic) and years of tenure in the current firm. Hence, the coefficients of the firm dummies can be interpreted as the wage level of each firm, controlled for observed characteristics of the employees. This firm-specific constant may also be referred to as the base wage of a firm. Since the data provide only limited information on individuals and unobserved characteristics cannot be controlled for in the cross-sectional setting, the obtained firm wage differentials may still reflect sorting of individuals into firms to some degree. This problem is mitigated by including the shares of educational degrees at the firm level in the second step of the analysis, since unobserved abilities are presumably correlated with formal qualifications.

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

$$(1) \quad \ln y_{ij} = \psi_j + \beta x_i + \mu_{ij}$$

$$(2) \quad \psi_j = \alpha + \delta CR_j + \lambda z_j + \varepsilon_j$$

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

2.4 Results

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

Table 1: Distribution of daily gross wages by occupational group

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

Source: LIAB 2005, 2010; own calculations.

Table 2: Decomposition of variance in wages

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

Source: LIAB 2005, 2010; own calculations.

Decomposition of variance of wages

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

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

³ Detailed results are available on request.

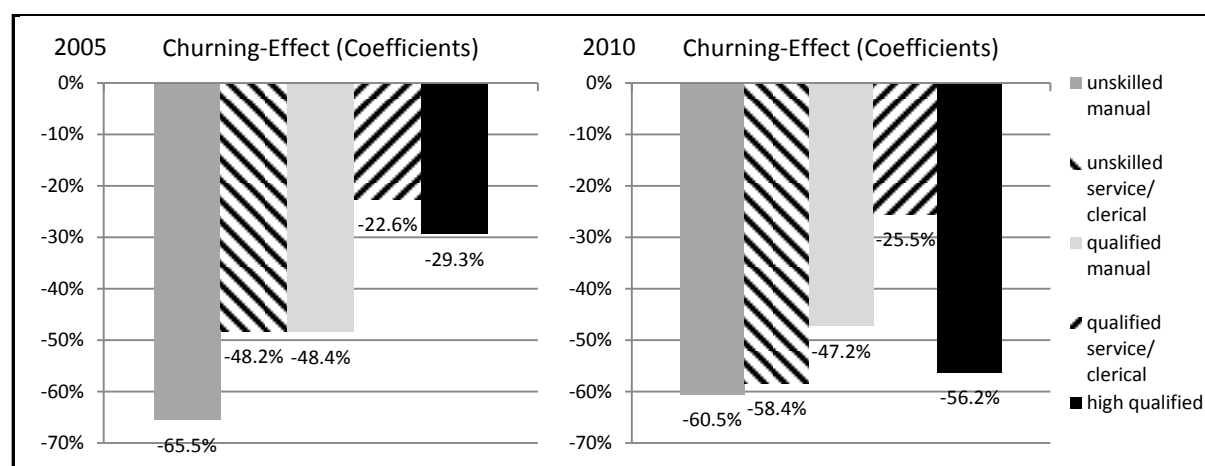
In sum, results show that firm attachment matters particularly for wage determination within the unskilled and manual occupational classes. Although similar results were shown by previous studies (Davis and Haltiwanger 1991; Stephan, 2001; Lane et al., 2007) it goes beyond these studies by further disaggregating occupations using a theoretically elaborated concept of social classes. So it is shown that the most vulnerable workers particularly are contingent on inclusion into well-paying firms. Furthermore, it becomes obvious that vertical dispersion of wages within firms is limited for unskilled and qualified manual occupations.⁴ This finding supports the notion that for them, wages are closely linked to general skills, and that their career ladders are shorter than those of higher qualified non-manual occupations (see Goldthorpe, 2000; Groshen, 1991b, 876). Lastly, the apparent rise of between-firm wage inequality indicates that over time, the overall importance of firm specific wage setting has increased. However, assertions about the underlying causes cannot be made at this point of analysis.

Wage Effects of Internal Labour Markets

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

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

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



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

All coefficients are significant at the .001 level.

Table 3 shows multivariate results on the impact of the churning rate on wages at the firm level in the year 2005. We control for firms' structural characteristics that potentially affect wages, including firm size (in logs), sector, collective bargaining status, assessments of technical equipment and business situation as well as the proportion of the workforce of qualified employees, women and foreign employees. Once control variables are added to the model, wage effects of the churning rate decrease. Nevertheless, in 2005 effects are clearly largest within unskilled occupational classes and also within the class of qualified manual workers – the classes that earn the lowest average wages (see table 1). While for unskilled manual workers an increase in a firm's churning rate by 100pp is associated with a decrease in wages by 34pp, the related effects amount to 10pp among qualified non-manual employees and are insignificant among the group of high qualified employees. This finding supports our main hypothesis that the wage effects of internal employment systems are larger within less qualified occupational groups. Particularly for the least skilled workers, this kind of differentiation may decide, to a certain degree, between acceptable and precarious pay.

Table 3: Determinants of firm-wage effects 2005

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

Source: LIAB 2005; own calculations. Firm samples are described in the appendix.

Additionally, eight sector dummies are included. See appendix for descriptive statistics.

* p<0.05; ** p<0.01; *** p<0.001

In 2010, after the outbreak of the financial crisis in Europe, findings partially differ (Table 4). Similar to 2005, the existence of an open or closed employment system makes a greater difference for remuneration among the unskilled and manual workers than among qualified service or clerical ones. However, in 2010 the respective wage effects are somewhat smaller among workers in manual occupations (both unskilled and qualified) and much larger among highly qualified workers compared to 2005. Interestingly, the wage effects of internal labour markets are almost unchanged for unskilled and intermediate skilled occupational groups performing non-manual tasks, and the total effect of firms' degree of closure on wages has slightly increased.

Table 4: Determinants of firm-wage effects 2010

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

Source: LIAB 2010; own calculations. Firm samples are described in the appendix.

Additionally, eight sector dummies are included. See appendix for descriptive statistics

* p<0.05; ** p<0.01; *** p<0.001

These changes over time can be considered from the perspectives of rent creation and rent destruction (Weeden and Grusky, 2014). Accordingly, workers in manual occupations seem to have lost power to benefit from closure at the firm level over time. On the one hand, this is good news, because it means that segregation within these occupational groups into “internal high wage firms” and “external low wage firms” has not increased. On the other hand, findings indicate that for low wage earners an important mechanism has lost power to protect them from low payment. For high skilled workers, in contrast, the wage gap between internal and external firms has even increased.

Taken both findings together, in the aftermath of the economic crisis German firms seem to increasingly use labour churning as a measure of cost reduction not only for the low skilled workers, but also for highly qualified personnel. However, since we analysed only two points in time we cannot state with certainty whether this change is an impact of the crisis, or if it is related to the broader development of rising wage inequality in the period under review. In

any event, it entails that the capability to receive rents from closure at the firm level have increased only for high skilled workers. In sum, our findings support the hypothesis that the degree of openness or closure of an employment system plays a significant role in determining wages particularly among less skilled workers. This also implies that firm internal labour markets decrease inequality between occupational classes by protecting the less qualified from reduced wages.

2.5 Conclusions

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

Before we present our final conclusion, limitations, strengths and remaining questions regarding this study will be discussed. Economic and sociological literature offer competing theoretical explanations for wage differentials between firms that are more or less open to the external labour market. The most prominent ones are rents of social closure, different forms of efficiency wages and sorting of heterogeneous individuals into the respective institutional settings. We aimed to differentiate between the rent based approach and the sorting argument by estimating wage effects of firm-level closure, controlling for worker sorting into firms with regard to observed individual human capital endowments in cross-sectional regressions. It is a limitation that this approach does not allow to control for sorting due to unobserved individual characteristics. It is however an advantage that changes between two points in time, the years 2005 and 2010, can be displayed. More importantly, our methodological design allows exposing differences in the impact of a firms' structure on life chances of different occupational classes. With reference to the class scheme by Erikson and Goldthorpe (1992, see also Goldthorpe 2000), we have argued that "asset specificity" and "possibilities of

monitoring” are important mechanisms of wage determination. Although these mechanisms are not directly measurable, they can be ascribed to occupational classes. Our findings support the notion that occupational groups who typically exhibit low asset specificity and easily observable productivity, are subject to wage variation across firms to a greater degree, in particular to variation across internal and external oriented firms.

Having pointed out both the strengths and limitations of our analysis we now turn our attention to questions that remain. A first question concerns the sorting patterns of individuals into firms. Recent studies have begun to analyse the sorting of individuals into high and low wage firms (Abowd, Kramarz, Margolis, 1999; Andrews, Upward, Schank, 2008) as well as the sorting into firms with stable and unstable employment (Cornelißen and Hübler, 2011). Our study indicates that these sorting patterns might differ substantially for different occupational groups of workers. Therefore, future research should explore the mechanisms of sorting and matching and its implications for wage inequality within and across different groups of individuals.

Secondly, one can ask for the causes of rising between-firm wage inequality over time and how this trend contributes to overall wage inequality. In general, our findings on rising firm heterogeneity point to increasing variety in employers’ capabilities to generate rents as well as to differences in firms’ workforces to participate in these rents. This may reflect an increase of power of market actors and a decrease of competition. Recent work by Weeden and Grusky (2014) suggests that various institutions give limits to labour mobility and thus cause market failure, even in liberal market economies. Although they have not specifically considered institutions at the firm level, our results fit quite well into their story of rising wage inequality through rent destruction at the bottom and rent creation at the top of the wage distribution. Future research should pursue these avenues.

A third question is how wage inequality at the firm level has developed in different countries, and what can be learned from that for labour market and social policy. As far as it concerns the comparison between the U.S. as a liberal market economy and Germany as a coordinated market economy (Hall and Soskice, 2001), increasing workplace heterogeneity accounts for a large share of the total rise of wage inequality in both countries (Card et al., 2013; Barth et al., 2014). However, weak statutory labour market regulation, a firm-level collective bargaining system and a liberal welfare state, as present in the U.S., may facilitate even greater scope for diversification at the organisational level (Lengfeld, 2010, 222ff). In addition, segmentation into core and peripheral workforces is more pronounced in liberal

market economies (Atkinson 1987). Therefore, we suppose that employers' personnel policies have a greater impact on wages in liberal than in coordinated market economies. Moreover, differences in organisational wage effects across occupational classes may be larger.

As we have highlighted, wage differentiation at the firm level is particularly intense and potentially precarious for the most vulnerable workers. Since collective bargaining coverage has steadily declined in Germany, it is of great interest to explore other mechanisms of protection of the most vulnerable workers. Educational investments in workers human capital and aftermarket redistribution by taxes are usually adduced as panacea for reducing inequality generated by market forces. However, as Weeden and Grusky (2014) suggest, it may be more effective to tackle inequality generating institutions. Regarding firms' usage of open and closed positions, this would mean to reduce labour market division into permanent and temporary employment. This division has emerged in Germany since protection by law is relatively strict for permanent positions but has been liberated for temporary employment in the last fifteen years.

To put it in a nutshell, unskilled workers are highly vulnerable in terms of non-standard employment relations and low wage levels. At the same time, the risk of low payment is most closely tied to the exclusion from firm internal labour markets for this group. In this regard, the most disadvantaged in the labour market are most contingent upon employers' increasingly heterogeneous policies of employment and remuneration. In contrast, more qualified workers, particularly in non-manual occupations, receive higher wages which are less contingent on attachment to specific employers. Accordingly, firm internal labour markets can particularly improve the situation of unskilled workers. However, they do not provide a comprehensive protection against low payment but rather lead to segmentation between firms that are rather open or closed towards the external labour market. As a consequence, the risks of unstable employment and precarious wages cumulate for unskilled workers who are excluded from firm internal labour markets. Further, this segmentation seems to have expanded recently from typical low wage occupations to higher skilled occupations, while for workers in intermediate non-manual positions, conditions have not changed over time. Accordingly, future research may explore the mechanisms of inclusion and exclusion from internal labour markets in greater detail as well as labour market policies suitable to achieve a comprehensive protection of vulnerable workers.

Appendix

Table A.1: Standard deviations of wage components (from fixed effects wage regressions)

2005	Total	Unskilled manual	Unskilled service/ clerical	Qualified manual	Qualified service/ clerical	High qualified
Log wage	0.47	0.31	0.48	0.28	0.50	0.53
Firm wage effect	0.19	0.17	0.28	0.16	0.22	0.22
Observed individual component	0.25	0.12	0.17	0.12	0.24	0.29
Residual	0.31	0.20	0.30	0.17	0.34	0.33
Number of observations	1,348,122	291,082	172,772	208,529	326,514	346,157
Number of establishments	6,351	2,511	3,661	3,293	4,615	3,487

2010	Total	Unskilled manual	Unskilled service/ clerical	Qualified manual	Qualified service/ clerical	High qualified
Log wage	0.51	0.36	0.51	0.33	0.53	0.56
Firm wage effect	0.23	0.22	0.30	0.20	0.24	0.25
Observed individual component	0.25	0.12	0.19	0.12	0.25	0.28
Residual	0.32	0.21	0.30	0.20	0.36	0.35
Number of observations	869,776	192,424	102,232	140,896	200,523	230,824
Number of establishments	5,512	2,033	2,952	2,639	3,810	2,772

Source: LIAB 2005, 2010; own calculations.

Table A.2: Description of firm samples 2005 and 2010

Variable name	Remarks	2005		2010	
		Number of firms = 5768		Number of firms = 4907	
		Mean	Std. dev.	Mean	Std. dev.
Production	Sector dummy (reference)				
Gastronomy	Sector dummy	0.03	0.16	0.00	0.00
Trade	Sector dummy	0.18	0.38	0.18	0.38
Finance	Sector dummy	0.05	0.22	0.05	0.21
Construction	Sector dummy	0.10	0.30	0.08	0.28
Agriculture and mining	Sector dummy	0.04	0.21	0.04	0.19
Health care	Sector dummy	0.07	0.26	0.10	0.30
Other services	Sector dummy	0.22	0.41	0.23	0.42
Share no vocational training or university degree	Share of qualification level in firm (reference)				
Share vocational training	Share of qualification level in firm	0.73	0.25	0.73	0.25
Share vocational training and A-levels	Share of qualification level in firm	0.05	0.11	0.06	0.12
Share university degree	Share of qualification level in firm	0.08	0.16	0.08	0.15
Mean age	Mean age of workers in firm	40.86	4.63	42.02	5.09
Share women	Share of women in firm	0.38	0.30	0.40	0.32
Share foreign	Share of foreign employees in firm		0.11	0.05	0.11
New technical equipment	Dummy: yes if firm's technology is 1 or 2 on ordinal index from 1 (state of the art) to 5 (outdated)	0.69	0.46	0.69	0.46
Good revenue situation	Dummy: yes if revenue situation is 1 or 2 on ordinal index from 1 (very good) to 5 (bad)	0.33	0.47	0.35	0.48
No collective bargaining	Dummy: firm not covered by collective bargaining agreement (reference)				
Sectoral collective bargaining	Dummy: firm covered by sector-level collective bargaining agreement	0.56	0.50	0.48	0.50
Firm collective bargaining	Dummy: firm covered by firm-level collective bargaining agreement	0.07	0.26	0.06	0.25
Works council	Dummy: firm has works council	0.41	0.49	0.36	0.48
Firm size	Number of workers per firm	261.31	1229.91	206.53	1227.29
Log firm size	Log number of workers per firm	3.90	1.69	3.74	1.62
Churning rate	Firm's churning rate	0.04	0.11	0.05	0.13
Labour turnover rate	Firm's labour turnover rate	0.09	0.17	0.10	0.18
Training in firm	Employer provided training	0.73	0.44	0.71	0.45

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

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3 Competition, Collective Bargaining, and Immigrant Wage Gaps Within German Establishments

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Abstract

Using linked employer-employee panel data for the period from 2000 to 2010, we estimate the effects of competitive pressure and collective bargaining agreements on establishment-specific wage gaps between German and non-German workers. Observed wage differentials within establishments are to a great extent explained by differences in human capital between the two groups. The remaining unexplained wage gap varies substantially across establishments and has increased over time. Controlling for establishment fixed effects, we find that non-German workers face significantly lower wage gaps in establishments covered by collective bargaining agreements, but that no effect from works councils is evident. Using Herfindahl-indices, as well as a subjective assessment of establishments' competitive pressure, we observe that competitive pressure on both product and labour markets reduces unexplained wage gaps by nationality. These effects appear to be larger among establishments not covered by collective bargaining agreements.

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3.1 Introduction

Immigrants make up a sizeable population in Germany and, on average, they receive lower wages compared to natives in the labour market. The total wage gap between German and non-German workers amounts to about fifteen percent (Lang, 2005; Dustmann et al., 2010; Lehmer and Ludsteck, 2011), which is to a great extent explainable by differences in human capital endowments. The remaining (unexplained) wage gap potentially reflects discrimination in the labour market, according to the most widespread approach to measure discrimination, (Oaxaca, 1973). Although the relatively small unexplained wage gap of about five percent (Lang, 2005; Dustmann et al., 2010) suggests that wage discrimination against immigrants is not a prevailing practice in Germany, there is evidence pointing to the presence of segregation and wage discrimination against immigrants. The literature comprises studies that report perceived discrimination by immigrants (Forstenlechner and AlWaqfi, 2010; Antidiskriminierungsstelle des Bundes, 2016a; OECD, 2012), experimental studies that find discrimination in the hiring process (Kaas and Manger, 2011), and econometric studies that show much higher unexplained wage gaps for specific groups of immigrants (Lehmer and Ludsteck, 2011) and quantify different types of wage discrimination (Hirsch and Jahn, 2015; Bartolucci, 2014) and segregation (Glitz, 2014).

The theory of discrimination by Becker (1971) considers employer preferences for different groups of workers with equal productivities as a source of discrimination. Discriminatory behaviour is costly for employers and employers must have some power on product markets in order to afford wage discrimination. Accordingly, product market competition should limit the scope for wage discrimination. Wage discrimination against immigrants can also result from limited competition within labour markets if only a few employers demand labour and if the labour supply of immigrants is less responsive to wages than that of natives (Cain, 1987). Since mobility costs are a reasonable barrier to wage-induced worker mobility, the local availability of competing employers can be expected to reduce monopsonistic wage discrimination (Manning, 2003b). Collective bargaining agreements and works councils usually limit unequal treatment by implementing compliance with norms of equity. Further, collective bargaining redistributes economic rents to workers and therefore reduces employers' scope for preference-based discrimination in the sense of Becker. The limiting effects of competition on discrimination are particularly important in the absence of collective bargaining agreements, and vice versa. We therefore investigate the effects of competition and collective bargaining as well as their interaction on unexplained

wage gaps between German and non-German workers within West German establishments. Unlike other studies, we use linked employer-employee panel data to obtain establishment-specific unexplained wage gaps and focus on testing the implications of discrimination theory regarding competition on product and labour markets, as well as collective bargaining agreements. Exploiting the panel structure of the data, we control for observed and unobserved heterogeneities at the establishment level.

More and more studies have recently considered workplace heterogeneity in the analysis of wage inequality (e.g., Card et al., 2013; Barth et al., 2014). With regard to wage differentials by nationality, race, and ethnicity, several studies decompose the respective wage gap into its within- and between-firm components (Carrington and Troske, 1998; Aydemir and Skuterud, 2008; Aeberhardt and Pouget, 2010) and find that the wage gaps primarily stem from inequality within firms and to a lesser extent from sorting or segregation into high- and low-wage firms. Bartolucci (2014) used information on firm-level productivity and within-firm variation of the native-immigrant composition over time in order to obtain a measure of wage discrimination in Germany (based on Hellerstein et al., 1999). The resulting discrimination parameter is large, indicating that immigrants receive 13 percent lower wages than native workers despite equal productivity in the same firm. While the subsequent finding that firms with higher profits discriminate more speaks against a taste-based discrimination model, previous studies found support for Becker's theory by showing that more intensive competition reduces wage differentials by race (Peoples and Talley, 2001) and gender (Black and Strahan, 2001; Hellerstein et al., 2002; Heinze and Wolf, 2010).

Hirsch and Jahn (2015) present evidence for the monopsony argument (Manning, 2003a). They estimated differential labour supply elasticities of immigrants and natives to the firm and thereby showed that monopsonistic wage setting by employers would almost entirely account for the unexplained wage gap of about three to six percent. Thus, employers may actually profit from discrimination. However, a clear separation of the different discrimination theories remains difficult. In fact, discriminatory preferences against immigrants are in line with monopsonistic discrimination if they impede job offers to immigrants and thus increase search frictions for this group. A general concern regarding the analysis of monopsonistic discrimination is that the underlying sources of differential labour supply elasticities might have a more direct impact on wages than monopsony power (Cain, 1987, p. 719). Directly using variation in the "thinness" of regional labour markets (Manning, 2003b) can circumvent

this problem and thus provides an alternative approach to assess the relevance of monopsonistic wage setting to immigrant wage gaps.

We thus contribute to the literature in several ways. We test the implications of different discrimination theories regarding the effects of establishments' competitive pressure on product and labour markets as well as the effects of establishments' coverage by collective bargaining agreements on immigrant wage gaps. The interaction of both effects is of particular interest since the collective bargaining effect should be especially strong if competition in product markets is weak. Investigating these hypotheses not only provides an indirect test of the presence of wage discrimination, as it allows drawing inferences about the type of discrimination at work, but also offers insights regarding the mechanisms that act to reduce wage discrimination in practice.

The remainder of the paper is organized as follows: Section 2 provides theoretical arguments for effects of competition and collective bargaining on wage discrimination. The econometric approach is expounded on in Section 3. Section 4 describes the data and descriptive statistics. Empirical results are presented in Section 5, and Section 6 concludes the findings.

3.2 Discrimination theory and its implications for employers

Wage discrimination is defined as a difference in wages between two groups of workers with equal productivities due to personal characteristics unrelated to productivity (Arrow, 1973). Theories of discrimination suggest that competitive pressure can reduce the scope of wage discrimination. Further, it can be inferred that wage discrimination within establishments is reduced by collective bargaining agreements and works councils.

According to Becker (1971), wage discrimination arises if employers have preferences for members of one group over those of another despite equal labour productivities. Discriminating employers then act as if hiring foreign workers will not only impose wage costs but also an additional disutility to the firm. As a result, firms with stronger discriminatory preferences against immigrants will tend to hire relatively more natives and relatively fewer immigrants. Further, discriminating firms pay wages above the marginal revenue product to natives and wages below the marginal revenue product to immigrants. This non-optimal allocation of labour causes costs and thus reduces profits of discriminating employers (Becker, 1971). Therefore, a negative correlation between measures of employers' tastes for discrimination, such as the share of the majority group or the unexplained wage

differential within firms, and profits is expected (Hellerstein et al., 2002). Becker goes on to argue that discrimination is likely to occur only if employers receive rents due to power in product markets and that discriminating employers face disadvantages in competitive markets and are eventually driven out of the market. We therefore test the hypothesis that the unexplained wage gap between German and non-German workers is lower in more competitive markets and that an increase of competitive pressure on a firm reduces the wage gap.

An alternative interpretation of employer discrimination is that it does not reflect tastes but perceptions of reality under imperfect information (Phelps, 1972; Arrow, 1973). In this model, employers use an easily observable characteristic such as skin colour to assess workers' productivity based on beliefs or statistics about the productivity of this specific group. This assessment is erroneous because beliefs about immigrants' average productivity may be wrong and because individual productivity is heterogeneous and does not necessarily correspond to the average in the statistics. Hence, this mechanism may lead to a wage differential unrelated to productivity. Interestingly, for the analysis at the establishment level, this theory of statistical discrimination supposes that employers learn about workers' real productivity by incurring costs and time.

The valuation of non-productive worker characteristics can also result from imperfect competition in labour markets. In this case, discrimination may persist even in competitive product markets (Berson, 2016). Employers with monopsony power over labour markets can set wages below workers' marginal revenue product if workers do not react perfectly elastic to wages regarding their labour supply and hence stay at the firm (Robinson, 1933; Cain, 1987). Accordingly, wage discrimination against immigrants may occur if the labour supply of immigrants is less elastic than that of natives. This may be the case for several reasons. Immigrants on average have fewer resources that are necessary to change jobs. First of all, changing one's job often involves relocating or commuting, which is costly. Immigrants may have less social capital and social networks that are limited to ethnic communities and therefore are less likely to receive job offers. If segregation of immigrants by occupation, sector, or region exists, fewer potential employers are available. Given that immigrants experience some job mobility, local market structure plays a role too (Berson, 2016). Monopsonistic discrimination is unlikely if many competing employers are in close proximity to workers. We therefore test the effects of employment concentration among employers in regional labour markets on the German/non-German wage gap.

Since discrimination is illegal, according to the German General Equal Treatment Act of 2006, and regarded as unfair, collective bargaining agreements and works councils can be expected to promote equality regardless of the causes of discrimination. Unions usually pursue the policy of equal pay for equal work in collective bargaining. Therefore, inequality is typically lesser among workers covered by collective bargaining agreements (Freeman, 1980; Freeman and Medoff, 1984; Fitzenberger and Kohn, 2005). Elvira and Saporta (2001) have argued that collective wage agreements reduce the arbitrariness of wage rates through bureaucratic formalisation, thereby reducing discrimination. Further, collective bargaining as well as firm-level co-determination by works councils may directly pursue the aim of reducing inequality between immigrants and natives as well as between men and women. While collective bargaining agreements standardize wage rates particularly within occupational groups and within establishments (Freeman, 1980), German works councils participate comprehensively in firms' decision-making with regard to hiring, promotions, and layoffs. Works councils often act as equalizing agents by monitoring compliance with corporate or legal principles aimed at achieving equal opportunities and avoiding discrimination (Baron and Bielby, 1984). Accordingly, we test the hypothesis that collective bargaining agreements and works councils are negatively related to unexplained wage gaps between German and non-German workers. Collective bargaining agreements additionally enable workers to participate in economic rents and thus potentially reduce firm profits. Hence, collective bargaining agreements are expected to particularly limit preference-based discrimination if competition in product markets is absent. We thus test if the inequality-reducing effect of collective bargaining agreements is more pronounced in concentrated markets than in competitive markets.

3.3 Data and description of the sample

The impact of firm characteristics and institutional framework on wage inequality within firms or establishments can be best evaluated with data including linked information on employers and employees. Thus, we use a combined employer-employee panel data set (LIAB) of the Institute for Employment Research (IAB) comprising the IAB Establishment Panel and the IAB Employment Statistics of the German Federal Employment Services. Both data sets contain a unique establishment identifier that allows matching.

The IAB Establishment Panel is an annual survey of German establishments that 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 industry, firm size class, and region. The sample unit is the establishment, which is officially defined as the firm's head office or a local branch office of a firm with several headquarters.¹ The surveyed establishments are selected from the register of all German establishments that employ at least one employee covered by social security. The LIAB dataset is thus a representative sample of German establishments employing at least one employee eligible for social security. The establishments covered by the survey are interviewed annually regarding 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 Statistics of the German Federal Services is an administrative panel dataset of all employees paying social security contributions in Germany (Bender Stefan et al., 2000). These data cover all persons 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 and self-employed individuals are not covered by this sample. Overall, the Employment Statistics Register comprises about 80 percent of all West German employees. Employers are obliged to report information for all employed contributors at the beginning and end of their employment periods. In addition, an annual report for every employee is compulsory at the end of each year. This report contains information on employees' occupation, occupational status, qualification, sex, age, nationality, industry, and size of establishment. The available information on daily gross earnings refers to employment spells reported to the Federal Employment Service by employers. If the wage rate exceeds the upper earnings limit ("Beitragsbemessungsgrenze"), the daily social security threshold is reported instead. Hence, the daily wage rate is censored from above and truncated from below. This problem is approached by applying an imputation strategy specifically developed for these data (Gartner, 2005) in which wages above the threshold are imputed based on tobit estimations for each year of the data.²

¹ Note, however, that the terms *firm* and *establishment* are used interchangeably in this paper.

² The imputation procedure is based on a tobit model applying the ado-file "imputw" by Gartner (2005). The specification includes 6 educational degrees, age (simple, squared, and cubic), tenure, 10 occupational groups, a gender dummy, a dummy for German or non-German nationality, 11 firm size classes, 9 sector dummies, and state dummies.

Table 1: Description of person samples

	Germans		Non-Germans	
	Mean	Std. Dev.	Mean	Std. Dev.
Daily wages (in €)	128.96	61.33	110.64	46.16
Log daily wages	4.76	0.46	4.63	0.41
No vocational degree	0.13	0.34	0.45	0.50
Vocational training	0.65	0.48	0.42	0.49
Abitur and vocational training	0.07	0.25	0.03	0.17
University degree	0.16	0.36	0.10	0.30
Share of white-collar workers	0.51	0.50	0.22	0.41
Age (in years)	41.70	9.78	40.68	10.50
Tenure in the establishment (in years)	12.25	8.89	11.29	8.90
Share of women	0.30	0.46	0.25	0.43
Observations	7,492,635		742,853	

Source: LIAB 2000-2010; own calculations

In our analysis of within-establishment wage gaps, we consider only establishments employing at least 10 German and non-German workers, respectively, in order to ensure a minimum of statistical robustness of the estimated wage gaps. Further, the sample is restricted to West German establishments³ in the private sector⁴ that participated in the IAB Establishment Panel in at least one year from 2000 to 2010. Since migration background is not available in the data, workers are distinguished by their nationality.⁵ 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.

³ Eastern German establishments are not considered in the analysis because both the wage levels as well as the wage setting processes are still very different from those in West Germany. A separate analysis for Eastern Germany is not possible, due to the small percentage of non-German employees, such that the number of firms with the required number of non-German employees – at least 10 – is too small to derive reliable results.

⁴ The wage gap in the public sector is usually significantly lower than in private firms (Melly (2005). Also, competition is unlikely to have effects on pay schemes in the public sector.

⁵ The term *immigrant* usually refers to persons who migrated themselves or whose parents migrated (migration background). In most empirical studies, information on migration background or ethnicity is not available and individuals' citizenship is reported instead. The analysis by Aldashev et al. (2007) suggests that using citizenship as a proxy for ethnicity may, if any, lead to an underestimation of wage discrepancies between immigrants and natives.

Table 2: Description of establishment sample

	Mean	Std. Dev.	Observations
HHI sectors and states (revenue)	0.18	0.18	9,095
HHI detailed sectors (revenue)	0.19	0.20	9,071
Share of exports in total revenue	29.05	28.70	7,060
Strong competitive pressure (establishments subjective assessment, 1998 to 2010)	0.51	0.50	1,982
HHI sectors and states (employment)	0.10	0.09	9,095
HHI sectors and regional labour markets (employment)	0.30	0.24	9,083
Collective bargaining	0.86	0.34	9,095
Works council	0.91	0.29	9,095
Establishment size	1.15	2.59	9,095
Average wage per worker	28.15	9.52	9,095
Share of women	0.34	0.25	9,095
Share of non-German workers	0.11	0.09	9,095
Share of qualified workers	0.68	0.23	9,095

Source: LIAB 2000-2010; own calculations

Table 1 shows the characteristics of workers considered to determine wages within establishments. The average gross daily wage of West German full-time workers amounts to approximately 129 Euros, while non-German workers earn about 111 Euros, on average. Compared to Germans, non-German workers more often have no (acknowledged) occupational degree and a lower tenure within the establishment, on average. Further, non-German workers tend to be slightly younger, and comprise a clearly lower share of white-collar positions and a somewhat lower share of women.

Workers of non-German citizenship make up about nine percent of our sample. This is comparable to the share of foreign workers in the total population of workers subject to social security contributions in the period under consideration (Statistisches Bundesamt, 2011, p. 92). The largest groups of non-Germans in the sample are people from Turkey (about three percent) and other Southern European countries that had recruitment agreements with Germany in the 1960s. Further foreign populations of considerable size in Germany are from France, Austria, Poland, and the Netherlands.

The variables considered at the establishment level comprise dummy variables indicating the establishments' coverage by a collective bargaining agreement and the presence of a works council at an establishment (see Table 2).

Several measures of competition are applied. Herfindahl-Hirschman indices (HHI) are calculated based on revenue and employment information from the full sample of the IAB Establishment Panel. Revenue (R) at establishments (j) is used to measure concentration of establishments' shares on product markets (Formula 1). Similarly, employment (E) at establishments (j) is used to measure concentration of establishments' shares on labour markets (Formula 2). The HHI is calculated in each combination of different classifications of sectors and regions (s,r). Thirteen aggregated sectors (see Table 4) and the 16 federal states of Germany are used to construct a baseline delimitation of markets. Alternatively, a more detailed sectoral classification (NACE, Rev. 1.1) is applied to consider finer fragmentations of product markets. A classification of 141 regional labour markets is applied to measure labour market concentration within reasonable commuting areas (Kosfeld and Werner, 2012). Given that the establishment panel sample is disproportionate regarding establishment size, market concentration is overestimated. However, this circumstance should apply similarly to sectors, regions, and years. In general, delimitations of markets by sectoral and regional variation are clearly an approximation. Thus, robustness is checked by applying different delimitations. Additionally, establishments' share of exports in revenue is used as a measure of their exposure to international competition and establishments' self-assessment of competitive pressure on product markets (on a four-point scale) is used to further test robustness of domestic competition effects. Hence, a dummy variable was constructed indicating perceptions of "strong competitive pressure" as opposed to "medium," "minor," and "no pressure." This item is, however, only available for the years 2008-2010.

$$(1) \quad HHI (Revenue)_{sr} = \sum_{j=1}^{n_{sr}} (R_{jsr} / \sum_{j=1}^{n_{sr}} R_{jsr})^2$$

$$(2) \quad HHI (Employment)_{sr} = \sum_{j=1}^{n_{sr}} (E_{jsr} / \sum_{j=1}^{n_{sr}} E_{jsr})^2$$

Defining firms' relevant markets is a difficult but important task, "... on which distressingly little work has been done" (Card et al., 2016, p. 35). The study by Manning and Petrongolo (2011) makes a valuable attempt to scrutinize the effective size of local labour markets. Like other existing studies (e.g., Dolton et al., 2015), we address the problem by applying and comparing different delimitations of markets. Both aggregated concentration measures such as the HHI and information based on self-assessments have their specific

problems and advantages. Self-assessment survey items have the general problem that individual perceptions may be inconsistent with the objective situation. While self-assessments might better fit the situation of a specific firm, the view of the surveyed person may differ from that of decision-makers at the firm. In comparison, aggregate measures of market concentration reveal the average intensity of market competition and not the specific competitive pressure to the firm. A further problem of these measures is that their correlation to wages might reflect things other than the effect of competitive pressure (Hirsch et al., 2014). In particular, productivity differences across firms should be controlled for. To accommodate these effects, we include establishment size, the composition of qualified and unqualified workers within establishments, establishments' mean wage, and establishment fixed effects in our models.

3.4 Methodology

We apply a two-step procedure, which, in its general form, has been applied frequently in the context of heterogeneous within-firm wage differentials (Kramarz et al., 1996; Leonard and van Audenrode, 1996; Heinze and Wolf, 2010). First, wage gaps between German and non-German workers are estimated within each firm as a measure of wage discrimination. Secondly, the resulting unexplained wage gaps are regressed on measures of competitive pressure and co-determination at the establishment level. Compared to a single-equation multi-level model, this method is more flexible in the sense that the heterogeneity of wage setting processes between firms is fully taken into account.

We apply the decomposition method of Oaxaca (1973) and Blinder (1973) to differentiate the observed wage gap between German and non-German employees within an establishment into a part explained by differences in the human capital endowments between the two groups and a residual or unexplained part. The absolute wage gap within an establishment is defined simply by the difference of mean log earnings of German and non-German workers within each establishment and year. It is obtained by a wage regression including only a dummy variable indicating foreign citizenship (γ in equation 3) within each establishment observation in the sample. Only establishments with at least 10 German and non-German workers, respectively, were considered.

$$(3) \quad \ln w_i = \alpha + \gamma N_i + \mu_i$$

In order to decompose the wage gap into a part caused by differences in human capital endowment and a part caused by differing remunerations to human capital by nationality, these remunerations need to be estimated for (at least) one of the two groups. We use an extended Mincer equation among German workers, including dummy variables for the education level, employees' labour market experience (age and age squared), job tenure within the establishment, and dummy variables indicating employees' sex and blue- or white-collar position (X_{it}^{ger} in equation 4).⁶ Again, this regression is run within each establishment in each year.

$$(4) \quad \ln w_i^{ger} = \alpha + \beta_i^{ger} X_i^{ger} + \varepsilon_i^{ger}$$

The establishment-specific unexplained wage gap is then obtained by Oaxaca-Blinder decomposition (Oaxaca, 1973; Blinder, 1973) (5):

$$(5) \quad Gap^{unexp} = Gap^{obs} - \hat{\beta}^{ger} (\overline{X_{it}^{ger}} - \overline{X_{it}^{for}})$$

Several potentially relevant individual characteristics, such as language skills and the degree of integration/assimilation, are not observed in the data. Therefore, the obtained unexplained wage gap can be viewed as an upper bound of wage discrimination or a measure of potential discrimination.⁷

In the second step of the analysis, the unexplained establishment- and year-specific wage gaps (Gap_{jt}^{unexp}) are used as a dependent variable to analyse the relationship with competition and institutions of worker codetermination (equation 6). Establishments' exposure to competitive pressure (C_{jt}) is captured by the concentration of revenue in different delimitations of product markets by sector and region. Additionally, the establishments' export quota is used to measure firms' exposition to international competition. For the years 2008 to 2010, a self-assessment of competitive pressure to the establishment is available. The institutional framework (I_{jt}) is accommodated by dummy variables on the existence of a collective wage agreement and a works council. Further, we control for the average wage

⁶ Given the limited information available at the individual level, we include distinctions of blue- and white-collar positions and gender to get closer to the concept of equal pay for equal work.

⁷ Additionally, some of the observed differences 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. In order to correct for this selection, we would have to estimate employment probabilities (Datta Gupta (1993)). Due to the lack of information about the household context and individual background, it is difficult to implement this procedure, which requires convincing exclusion restrictions.

level within the firm, an establishment's share of female employees, the share of non-German and qualified employees, and year dummies (Z_{jt}).

As an alternative to OLS models, we include fixed establishment effects α_j in order to analyse the effects of changes within establishments over time. Accordingly, all unobserved time-invariant heterogeneity on the establishment level is controlled for and the coefficients of the variables of interest are more likely to reflect causal relations. It also mitigates the problem that the HHI may capture things other than competition/market concentration.

$$(6) \quad Gap_{jt}^{unexp} = \alpha_j + \beta C_{jt} + \rho I_{jt} + \delta Z_{jt} + \varepsilon_{jt}$$

3.5 Results

Wage gaps within establishments

The total wage gap between German and non-German workers within establishments amounts to 11.1 percent, on average. Oaxaca-Blinder decomposition shows that this wage gap is to a great extent caused by differences in education, work experience (age and tenure in the establishment), and the share of blue- or white-collar workers between these two groups. On average, a wage differential of 0.9 percent remains unexplained. These values are smaller than in the majority of other studies because we considered only relatively large establishments with more than ten workers in each group. Also, we included more than the typical Mincer covariates in the decomposition of the wage gap, extending it by occupational status (blue- or white-collar) and gender.⁸ Overall, our results confirm the finding from other studies that the unexplained wage gap by nationality is, on average, modest in Germany (Licht and Steiner, 1994; Lang, 2005; Lehmer and Ludsteck, 2011; Hirsch and Jahn, 2015).

In a previous version of this paper, we assessed the importance of immigrant sorting into lower-paying firms (Beblo et al., 2012). We found a disparity of about 5 percentage points between the absolute wage gap in the labour market and the average absolute wage gap within establishments, indicating a selection of non-German workers into low-wage firms due to differences in education. No such selection was found once differences in human capital between the two groups were controlled for. Hence, discrimination in the hiring process did not become apparent in the data.

⁸ Omitting occupational status yields an average unexplained wage differential that is about one percentage point larger.

Table 3: Description of wage gaps over time

	Observed wage gap			Unexplained wage gap			Observations
	Mean	Std. dev	Coefficient of variation	Mean	Std. dev	Coefficient of variation	
2000	0.126	0.115	0.914	0.005	0.084	15.585	942
2001	0.122	0.114	0.935	0.004	0.086	21.051	1,012
2002	0.122	0.121	0.999	0.010	0.091	9.216	1,005
2003	0.115	0.115	1.002	0.007	0.084	11.541	835
2004	0.106	0.128	1.216	0.006	0.085	15.258	882
2005	0.110	0.129	1.170	0.011	0.090	8.232	894
2006	0.103	0.142	1.376	0.008	0.092	10.978	818
2007	0.102	0.133	1.303	0.009	0.092	9.827	709
2008	0.101	0.138	1.361	0.013	0.091	7.216	731
2009	0.103	0.137	1.324	0.018	0.092	5.238	687
2010	0.100	0.134	1.335	0.017	0.096	5.791	580
Total	0.111	0.127	1.145	0.009	0.089	9.606	9,095

Source: LIAB 2000-2010; own calculations

Table 4: Wage gaps by sector

	Unexplained wage gap			Observations
	Mean	Std. dev	Coefficient of variation	
Agriculture	-0.003	0.108	-33.244	27
Mining, energy	0.039	0.085	2.156	116
Manufacturing	0.001	0.062	97.577	5,136
Construction	0.039	0.073	1.859	245
Trade, repair	0.026	0.104	4.002	581
Logistics	0.018	0.073	4.169	313
Hotels and restaurants	0.058	0.096	1.662	57
Information, communication	0.081	0.137	1.704	32
Finance, insurance	0.048	0.109	2.286	323
Services (business)	0.037	0.123	3.311	584
Education	0.082	0.145	1.766	162
Health care, social work	-0.016	0.118	-7.515	1,191
Other services	0.027	0.116	4.321	328

Source: LIAB 2000-2010; own calculations

While the total wage gap within establishments decreased slightly over the years under review (see Table 1), the residual wage gap increased in that period. This implies that the differences in education and work experience between the two groups became smaller, whereas differences in the remuneration of these factors between Germans and non-Germans remained unchanged. Although the distribution of the unexplained wage gap across establishments is less dispersed than the distribution of the total wage gap, its variation is

substantial. The unexplained wage gaps range from about 90 percent lower wages for non-German workers to about 45 percent higher wages compared to German workers depending on the specific establishment.

Substantial sectoral differences were also apparent in within-establishment wage gaps between German and non-German workers. While the average unexplained wage gap is close to zero in manufacturing, it is particularly large in education, hotels, and restaurants, as well as the information and communication sector. These sectoral differences might be due to the importance of language skills and/or contact with customers. However, as we will explore next, these differences are likely to stem from differences in sectoral coverage by collective bargaining agreements as well as sectoral intensity of competition.

The estimation of the wage gaps is based on wage regressions among German workers within establishments. The estimated coefficients of individual wage determinants, on average, leads to the expected results: employees with higher educational degrees and more experience receive higher wages, while the marginal returns to experience are diminishing (Table 2). Further, it becomes apparent that substantial variation exists in returns to individual characteristics across establishments. Establishments differ particularly in their remuneration to firm-specific human capital measured by tenure in the establishment. All within-establishment coefficients are, for the most part, significantly different from zero at the five percent level.

Table 5: Description of wage regressions within establishments

	Mean of coeff. estimates	Mean of t- values	Share of coeff. at 5%- significance level	Coefficient of variation
No vocational degree		reference		
Vocational training	0.10	2.73	0.58	1.05
Abitur and vocational training	0.18	2.46	0.54	1.03
University degree	0.39	7.30	0.88	0.50
White-collar	0.27	9.19	0.91	0.48
Age	0.04	4.28	0.74	0.70
Age squared	0.00	-3.73	0.69	-0.75
Tenure	0.01	3.89	0.71	2.32
Women	-0.21	-6.95	0.92	-0.55
Constant	3.61	22.73	0.99	0.16
Observations		9,095		

Source: LIAB 2000-2010; own calculations

Analysis of establishment heterogeneity

Table 6 shows the full set of results for the establishment-level regressions, including the HHI, which measures the concentration of revenue for each combination of aggregated sectors and states. The effects of alternative indicators of market competition are presented in section 5.3.

The HHI is positively related to the wage gap of foreign workers in all displayed specifications: A greater concentration of revenue in a market coincides with higher wage gaps within firms. When establishment-specific unobserved heterogeneity is controlled for by including establishment fixed effects, the effect of market concentration is much smaller but still significant. These findings can be interpreted as evidence of a negative effect of competition on unexplained wage gaps.

The effect of collective bargaining on the unexplained non-German wage gap is not significant in an OLS regression including control variables. It is, however, negative and highly significant in the establishment fixed effects specification. It can be inferred from this model that exiting a collective bargaining agreement increases the unexplained wage gap by 1.3 percentage points. This indicates that the wage gap is almost zero on average in establishments that are subject to collective bargaining, which offers strong evidence for the notion that collective bargaining reduces unexplained wage gaps and, hence, possibly wage discrimination as well. This effect remains robust when other measures of competition are considered (section 5.3). Works councils do not have a significant impact on this dimension of wage inequality within establishments in any of the regressions. The interaction of the presence of collective bargaining and the HHI shows that the effect of competition is smaller in the presence of collective bargaining. This difference in the effects of competition is not significant. However, the result is consistent with the finding that establishments covered by collective bargaining agreements have less discretion to adjust wages to changes in competitive pressure, or to conduct wage discrimination in the first place.⁹

⁹ See Hirsch *et al.* (2014) for a similar result regarding gender wage differentials.

Table 6: Establishment characteristics and the German/non-German wage gap

Variable	Bivariate	OLS	Establishment fixed effects	Establishment fixed effects with interaction
HHI sectors and states (revenue)	0.074***	0.072***	0.015*	0.033*
Interaction HHI and collective bargaining	-	-	-	-0.20
Collective bargaining	-	-0.001	-0.013***	-0.010*
Works council	-	-0.005	-0.006	-0.006
Establishment size	-	-0.000	-0.003	-0.003
Establishment size squared	-	0.000	0.000	0.000
Average wage per worker in establishment	-	-0.000	-0.000**	-0.0004***
Share of women in the establishment	-	-0.018*	0.011	0.011
Share of non-German workers in the establishment	-	-0.031	0.141***	0.142***
Share of qualified workers in the establishment	-	0.020**	0.012	0.012
Constant	-0.004**	0.011	0.006	0.003
Observations	9095	9095	9095	9095
R ² -adjusted	0.022	0.027	-	-
R ² within/between	-	-	0.0094/0.0002	0.0097/0.0002

* p<0.05; ** p<0.01; *** p<0.001

Year dummies are included additionally

HHI is obtained from the full sample of the IAB-Establishment Panel

Source: LIAB 2000-2010; own calculations

Interestingly, there is no significant relationship between the share of foreign workers and the unexplained wage gap of foreign workers within establishments in the OLS model. A negative relationship would be expected based on discrimination theory since discriminating employers hire fewer immigrants and hire them at lower wages when they do hire non-Germans. It turns out that a negative relationship is found using the between estimator, i.e., a comparison of establishments within several cross-sections of data.

An increase of non-German workers over time, as analysed in the fixed effects model, has a highly significant increasing effect on the unexplained wage gap between German and non-German workers. This finding could be due to newly hired foreign workers facing more pronounced disadvantages, which would be in line with statistical discrimination theory.

Further inquiry of the progression of immigrant wage gaps within the workplace over time would be desirable but is beyond the scope of this article.

In addition, the small but significant negative effect of an establishment's average wage level per worker shows that well-paying firms have more equitable wage systems. The corresponding coefficient from a fixed effects model shows that an increase in an establishment's wage level reduces the immigrant wage gap. Firms with a higher share of qualified workers among their workforce have larger unexplained wage differentials than those with fewer qualified workers. However, a change in the share of qualified workers does not affect the wage gap.

Alternative competition measures

A comparison of the effects of different indicators of competition overall support the finding that unexplained nationality wage gaps are smaller in establishments facing more intense competition (Table 7). However, only some of the models that control for unobserved heterogeneity by establishment fixed effects document significant effects of a change in competitive pressure over time.

All measures indicate a positive relationship between market concentration and the establishments' unexplained wage gaps in bivariate regressions. The results are similar when controls of observed establishment characteristics are added in an OLS model. Compared to our main model that includes revenue concentration within aggregated sectors and states (section 5.2), a change in concentration over time does not have a significant effect when markets are delimited by detailed sectors. This means that either regional aspects at the state level matter for employer power in product markets or that the classification of about 300 sectors (NACE) is too detailed to measure market concentration based on an establishment sample. Although the interaction with collective bargaining is not significant, the finding from the main model is reproduced that market concentration has a noteworthy positive effect only when collective bargaining is absent.

The effect of establishments' share of exports, as a measure of international competition, on the unexplained wage gap is very small. Nevertheless, the results point in the same direction as the models that include measures of domestic competition. The coefficient estimate of the establishments' self-assessment confirms a negative relationship between competition and unexplained nationality wage gaps, but is only significant in the bivariate model and clearly lacks a sufficient number of cases for further scrutiny. The self-assessment,

however, has the advantage of directly assessing competitive pressure at the establishment level. Therefore, it provides an important test of the aggregated competition measures' validity. Holding other establishment characteristics constant, the effect of competition on product markets simply appears to be small.

The concentration of employment within labour markets is positively related to the size of the unexplained wage gap in all models considered. A significantly positive impact of employment concentration within sectors and states on the unexplained wage gap is evident, both in the OLS model and in the fixed effects model. Similar effects are confirmed if employment concentration is measured within regional labour markets. Hence, these findings are in line with the theory of monopsonistic discrimination.

The interactions of the effects of competition on labour markets are not statistically significant. Within regional labour markets, the interaction shows that the effect of market structure is smaller in the presence of collective bargaining. However, the effect is particularly large among establishments covered by collective bargaining agreements if concentration of labour markets is measured at the state level.

The results show that the effects of different measures of competition are similar in direction but that there is considerable variation in size. This highlights the importance of good indicators of market structures and their relevance to single establishments. By using Herfindahl indices as our main indicator, we followed a traditional approach and applied it to linked employer-employee data, with the hope of stimulating further research in this area. Improvements could be achieved by constructing concentration measures from complete census data. Also, in the future, the analysis of establishments' self-assessment of competitive pressure will be available over a longer time span. In the analysis of monopsony power of employers, the estimation of differential labour supply elasticities of groups in the labour market provides an alternative approach to identify the relationship between market structure and wage discrimination. Applying this approach, Hirsch and Jahn (2015) found that monopsonistic wage discrimination can explain almost the entire observed unexplained wage gap.

Table 7: Effects of alternative competition measures

	Bivariate	OLS	Establish- ment fixed effects	Establish- ment fixed effects with interaction	Obser- vations
Competition on Product Markets					
HHI detailed sectors (revenue)	0.047***	0.048***	0.001	0.012	9,093
Interaction with collective bargaining	-	-	-	-0.012	9,093
Share of exports in total revenue	-0.0003***	-0.0003***	-0.0001	-0.0002	7,060
Interaction with collective bargaining	-	-	-	0.0002	7,060
Strong competitive pressure (establishments subjective assesment, 1998 to 2010)	-0.009*	-0.007	-0.004	0.003	1,986
Interaction with collective bargaining	-	-	-	-0.008	1,986
Competition on Labour Markets					
HHI sectors and states (employment)	0.114***	0.104***	0.030*	-0.003	9,137
Interaction with collective bargaining	-	-	-	0.038	9,137
HHI sectors and regional labour markets (employment)	0.015***	0.008	0.015*	0.025	9,125
Interaction with collective bargaining	-	-	-	-0.011	9,125

* p<0.05; ** p<0.01; *** p<0.001

Other covariates are the same as in the main model (section 5.2)

Source: LIAB 2000-2010; own calculations

Regarding the measurement of wage discrimination, we applied Oaxaca-Blinder decompositions into explained and unexplained wage differentials between immigrants and natives at the establishment level. A disadvantage of this approach is that unobserved attributes related to worker productivity cannot be considered. For instance, immigrants' difficulty with German language fluency could economically justify wage differences that

cannot be discerned as discrimination. The approach by Hellerstein et al. (1999), which Bartolucci (2014) recently applied to Germany, is an improvement in this regard. However, in terms of the relationship between establishment wage gaps and competition, the suggested importance of unobserved individual factors does not appear reasonable. It is unclear why language skills or social integration should be valued more in less competitive markets for economic reasons.

Taken together, our evidence does suggest that competition, in both product and labour markets, limits unexplained wage gaps between German and non-German workers at the establishment level. While it is clearly documented that unexplained wage gaps are smaller in establishments facing stronger competition, a causal effect based on a change in competitive pressure, derived from the estimation with establishment fixed effects, is of weaker statistical significance.

3.6 Conclusions

This study provides an analysis of the wage differentials between German and non-German workers within establishments. We investigate the impact of competition, collective bargaining, and its interaction. The analysis is based on linked employer-employee panel data, which combines information on all employees in observed establishments of the IAB Establishment Panel.

The average total wage gap between German and non-German workers within establishments has decreased slightly over time, from about 12 percent in 2000 to about 10 percent in 2010. These wage gaps are to a great extent caused by differences in education and work experience between German and non-German employees. The resulting unexplained wage gap amounts to only about one percent, on average, but has increased over time and varies substantially across establishments. The methodology of the study at hand acknowledges that remunerations in the labour market do not only vary by individual characteristics but also between firms and establishments. It is inferred from discrimination theory that this variance can be explained to some extent by establishments' market situation and institutional framework. Our results clearly indicate that non-German workers face significantly lower wage discrepancies in establishments covered by collective bargaining agreements, but we find no effect of works councils on unexplained wage gaps by nationality. While our research design is better suited to analyse competition on product markets, results suggest that competition in both product and labour markets reduces unexplained wage gaps

within establishments. A clear separation of these two forms of discrimination remains difficult, however. Theoretically, the presence of taste-based discrimination reduces the number of employers available to immigrants and therefore potentially leads to monopsonistic discrimination (Berson, 2016).

Other recent empirical studies conclude that nearly the entire unexplained immigrant wage gap can be explained by monopsonistic wage setting (Hirsch and Jahn, 2015). Bartolucci (2014) points to a significantly negative correlation of firm profits with a firm-specific discrimination parameter and interprets this as evidence against discrimination based on taste. Complementary to these earlier findings, our results confirm one of the main implications of taste-based discrimination – the limiting effect of competition on product markets. This effect is larger among establishments not covered by collective bargaining agreements.

Our results add to previous research that points to the presence of discrimination against immigrants in Germany. The clear finding of a limiting effect of collective bargaining on unexplained wage gaps suggests that disadvantages experienced by immigrants in Germany would be less significant today if collective bargaining coverage had not eroded. Under the present circumstances, consideration of national regulations that seek to foster wage equality and fair treatment is warranted. The General Equal Treatment Act from 2006 prohibits discrimination due to race, ethnicity, gender, religion, ideology, disability, age or sexual identity. A recent evaluation of this act concluded that some revisions are advisable; e.g., expanded time limits to sue for discrimination and the ability for associations to file lawsuits in the name of those affected (Antidiskriminierungsstelle des Bundes, 2016b). Further, an act designed to strengthen collective bargaining came into force in August 2014. Its main component was the introduction of a general minimum wage in January 2015, which may help to prevent unfair treatment of immigrants, particularly those at the lower end of the wage distribution. Our results place emphasis on the importance of competitive markets for wage equality. Hence, the investigation of market concentration by competition authorities can, alongside its other purposes, be regarded as a measure to support fairness in the labour market.

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4 Gender and Nationality Pay Gaps in Light of Organisational Theories

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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 organizational 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 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.

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4.1 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 percent lower wage rates than men on average (Statistisches Bundesamt, 2010; Heinze and Wolf, 2010) and immigrants receive about 15 percent less than German natives (Beblo et al., 2012; Granato and Kalter, 2001; Constant and Massey, 2005). 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 (Beblo and Wolf, 2002; Beblo et al., 2009). 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 (McCall, 2006; Longhi and Platt, 2008). And finally, even if the idea that organizations 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 (Abowd et al., 1999; Addison et al., 2010; Heinze and Wolf, 2010; Beblo et al., 2011, 2012). 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 organizational theories, in particular the resource dependency and the neoinstitutional theory.

Our paper is structured as follows: Section 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 organizational 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 Section 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 percent) 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 Section 6 and Section 7 provides concluding remarks.

4.2 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, 1971), 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 likeliness of discrimination is reduced under strong market competition (Arrow, 1973; Cain, 1987). 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, 1987). 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) (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.

4.3 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

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).

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 (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 (European Commission, 2005). In the meanwhile, there exist many empirical studies pointing at specific benefits of equal opportunity programs and diversity strategies (Ely and Thomas, 2001; Richard, 2000; Armstrong 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).

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 dependency theory and the business case analysis of equal opportunity programs and diversity management. The core argument of the resource dependence theory by Pfeffer and

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.

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 varied 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 (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 patronization. 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 (Zuckerman, 1999; Singh et al., 1986).

DiMaggio and Powell (1983) used these arguments to rationalize 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 The missing reliance on the effectiveness of managerial actions is a crucial antagonism to the resource dependency theory, supposing that the organizational 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).

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 dependency 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. 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 formalized 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 dependency 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 dependency 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., 2010). 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

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.

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 constituents 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 dependency 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/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.

4.4 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 (Bender Stefan et al., 2000). This data covers all the people who were employed for at least one day since 1975. Social security

⁶ Note however that, though we try to minimize confusion, the terms firm and establishment are used as synonyms in this paper.

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 percent 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 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 A1 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.

Table 1: Average human capital endowment and sector attachment by gender and nationality

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

Source: LIAB 2004, own calculation

4.5 Measuring and analyzing pay gaps at the establishment level

In analogy to Heinze and Wolf (2010) and Beblo et al. (2011, 2012), 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:

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

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 Section 4 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. By estimating the following equation for each firm, we can directly derive the wage differential between different groups of employees:

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

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 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:

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

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 equations (3), we can calculate Gap_j^{unexp} :

$$(4) \quad Gap_j^{unexp} = Gap_j^{obs} - (\hat{\beta}_j^1 \bar{X}_{ij}^1 - \hat{\beta}_j^1 \bar{X}_{ij}^2)$$

Where \bar{X}_{ij} 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} 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.

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

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 Section 3, our analysis allows new insights into the nature and sources of gender and nationality wage gaps within establishments.

4.6 Estimation results

In our sample of establishments, the average within-firm wage differential observed between German and non-German employees amounts to 12 percent (measured by Gap_j^{obs} in equation (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., 2012). 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 percent on average (measured by Gap_j^{unexp} in equation (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 of the distribution shows that the quarter of firms with the largest residual nationality wage gap pays about 6 to 21 percent lower wages to non-German than to German employees. Note, however, that more than a quarter of all establishments remunerate

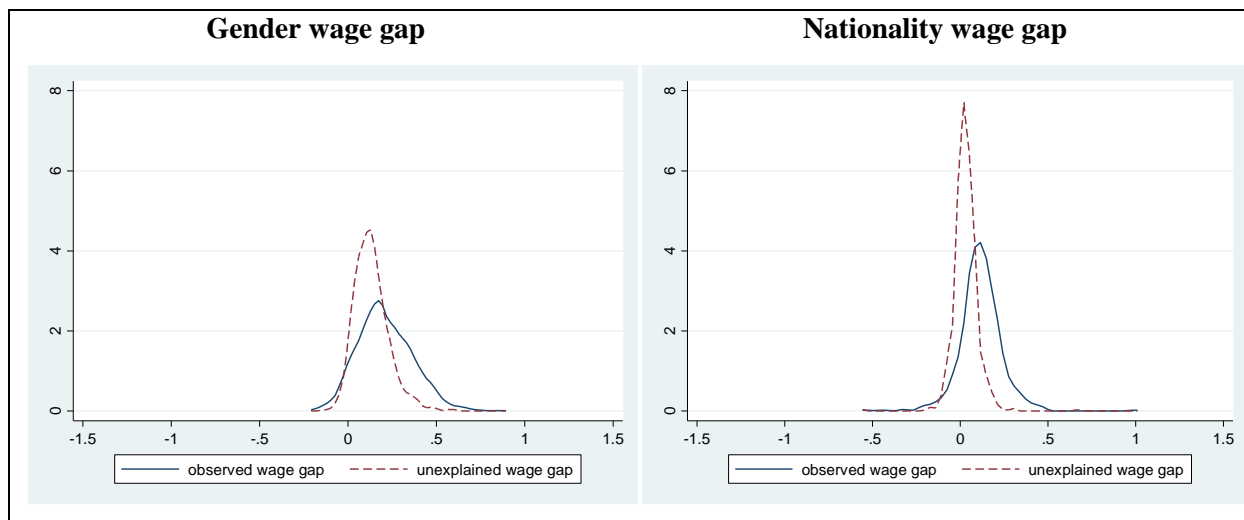
their non-German employees at a higher rate than their German colleagues, at a given level of education and work experience. These pay schemes become plausible, if the expected benefits from equal treatment outweigh the saved labour costs due to discrimination.

The average observed within-firm wage gap between female and male employees amounts to 21 percent.⁷ Again, the observed gender wage gaps within establishments are much larger than the residual ones, which take 13 percent 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 percent 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 percent 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 equation (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. 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.

⁷ Deviations between this result and the overall gender pay gap of 23 percent reported by the German Federal Statistical Office Statistisches Bundesamt (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 at a selection of women into low paying firms Heinze and Wolf (2010).

Figure 1: Distribution of gender and nationality pay gaps within establishments



Source: Own calculations of within-establishment wage gaps based on the LIAB 2004.

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 percent highest gender pay gaps) as well as a nationality pay gap in the highest quartile (among the 25 percent highest nationality wage gaps) are coded 1. Based on the probit estimation results, we will characterize 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.

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 dependency 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.

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.

Table 2: Determinants of the nationality and gender pay gaps within establishments

	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	0.0016	0.0168	-0.0198	0.0131	-0.4045	0.4454
H2	Problems due to quitting of qualified employees	-0.0178	0.0117	0.014	0.0091	0.1971	0.2735
H2	Problems with recruitment of qualified employees	0.0241***	0.0074	-0.0073	0.0058	0.1018	0.1779
H3	Innovative Firm	-0.0271**	0.0092	-0.0073	0.0072	-0.5216**	0.2096
H3	Research and Development	0.0038	0.0085	-0.0004	0.0066	-0.0260	0.2087
H4	Collective bargaining agreement	-0.0429***	0.0126	-0.0092	0.0098	0.0655	0.2751
H5	Works council	-0.0237	0.0170	0.0169	0.0132	-0.2091	0.3536
H6	Measures to enhance gender equality	-0.0094	0.0073	0.0028	0.0057	-0.1140	0.1763
H7	Foreign ownership	-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	-0.0285	0.0163	0.0222*	0.0127	-0.0797	0.3244
H9	Sector: gastronomy	-0.0847	0.0881	0.1173*	0.0686	-	-
H9	Sector: health care	-0.1358***	0.0175	-0.0515***	0.0137	-1.4377***	0.4477
H9	Sector: other services	-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 R ²)	

Note: 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.

The symbol ** indicates statistical significance at the 5%-level, * indicates statistical significance 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.

Source: LIAB 2004, own calculations.

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 rationalized 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

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.

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.

4.7 Conclusions 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 which 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 dependency 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.

Appendix

Tab. A1: Employees by nationality (proportion in %)

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

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

Source: LIAB 2004, own calculations.

Table A2: Description of the estimation sample

Variable	Comment	Min.	Max.	Mean	Std. Dev.
Observed gender wage gap	See Section 5 equation 1 (in %)	-0.17	0.86	0.2111	0.1543
Unexplained gender wage gap	See Section 5 equation 4 (in %)	-0.13	0.59	0.1320	0.0970
Observed nationality wage gap	See Section 5 equation 1 (in %)	-0.53	0.99	0.1165	0.1197
Unexplained nationality wage gap	See Section 5 equation 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
Work 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
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

continued...

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
Niedersachsen	0	1	0.0917	0.2889
Bremen	0	1	- ^a	- ^a
Nordrhein-Westfalen	0	1	0.1223	0.3279
Hessen	0	1	0.1942	0.3959
Baden-Württemberg	0	1	0.1728	0.3783
Bayern	0	1	- ^a	- ^a
Berlin	0	1	0.0749	0.2635
Observations			654	

Note: a Means and standard deviations not published due to secrecy obligations.

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Appendix

Summary

This thesis empirically investigates the effects of organisational heterogeneity on wage inequality in Germany. In four chapters, different dimensions of wage inequality are focused. A large linked employer-employee panel data set (LIAB), provided by the Institute for Employment Research, is applied to simultaneously analyse organisational and individual factors in the determination of wages.

In *chapter one* the sources of rising wage heterogeneity across firms and their contribution to the rise of overall wage inequality in the years 2000 to 2010 are examined. The results show that changes in the wage effects of observed firm characteristics can explain one third of the increase in wage inequality in that period. Firm specific variation in the degree of workers bargaining power drawn from institutions of social closure does contribute to this explanation. However, the contribution of these institutions, measured by collective bargaining agreements, works councils and job stability is rather small. In comparison, the increase in the distributive effects associated to firm size and the skill composition of firms' workforces are larger in magnitude. This finding suggests that more productive firms pay higher wages and thereby share economic rents to some extent with workers. The findings also confirm that individual returns to qualification have risen over time, which is in line with the hypothesis of skill biased technological change.

In *chapter two* we analyse if firm internal labour markets have differential wage effects by occupational class. Our findings indicate that for low qualified classes with manual and non-manual tasks individual wages are determined to a greater extent by firms than for medium and high qualified classes. The positive wage effects of internal labour markets are largest for unskilled manual and non-manual workers, but are also strongly pronounced for qualified manual workers. The wage effects of internal labour markets are clearly smaller for medium and high qualified non-manual workers. For high qualified workers, the wage effect of internal labour markets is sharply higher in the year 2010 than in 2005. Internal Labour markets do not provide comprehensive protection against low wages but lead to a segmentation of the labour market – particularly among unskilled workers.

In *chapter three* we analyse the effects of competition on product and labour markets as well as of collective bargaining agreements on within-establishment wage gaps between

immigrants and natives. The average total wage gap between German and Non-German workers within establishments has decreased from about twelve percent in the year 2000 to about ten percent in 2010. The total wage gap is to a great extent caused by differential endowments with human capital between the two groups. The remaining unexplained wage gap amounts to only about one percent on average but has increased over time and varies substantially across establishments. Our results show that non-German workers face significantly lower wage discrepancies in establishments covered by collective bargaining agreements, but that there is no effect of works councils. We find that competition both on product and labour markets reduces unexplained wage gaps by nationality within establishments. This implies that both employers' preferences and power to set wages are dispositive for discrimination against immigrants.

In *chapter four*, we analyse how organisations' environments influence wage gaps by gender and nationality within firms. Consistent with neo-institutional theory, we find that 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. We further find that establishments in need of (highly) qualified employees and/or those who face staffing problems exhibit more wage equality.

Overall it can be concluded that organisations' influence on individual wages has increased in the period from 2000 to 2010, implying that it matters more and more for a given worker, where she or he is employed. Against the background of imperfectly competitive markets and a decline of firms' coverage by collective bargaining agreements, the organisation-specific distribution of economic rents has great influence on wage levels as well as on wage inequality by class, gender and nationality.

Zusammenfassung

Diese Arbeit untersucht die Wirkungen von heterogenen Arbeitsorganisationen auf die Lohnungleichheit in Deutschland. In vier Kapiteln werden unterschiedliche Dimensionen von Lohnungleichheit fokussiert. Es wird ein großer linked employer-employee Datensatz (LIAB) des Instituts für Arbeitsmarkt- und Berufsforschung verwendet, um Untersuchungen über Lohneffekte auf der Ebene von Organisationen und Individuen vornehmen zu können.

In *Kapitel eins* werden die Ursachen der steigenden Lohnungleichheit zwischen Firmen und deren Beitrag zum Anstieg der gesamten Lohnungleichheit im Zeitraum 2000 bis 2010 untersucht. Die Ergebnisse zeigen, dass Veränderungen der Lohneffekte von beobachteten Firmenmerkmalen ein Drittel des Anstiegs der Lohnungleichheit der letzten zehn Jahre erklären können. Firmenspezifische Variation in der Verhandlungsmacht von Arbeitnehmern, die sich aus Institutionen sozialer Schließung ergibt, trägt zu dieser Erklärung bei. Allerdings ist der Erklärungsbeitrag dieser Institutionen, gemessen durch die Existenz von Tarifbindung, Betriebsräten und betrieblicher Beschäftigungsstabilität eher gering. Im Vergleich ist der Erklärungsbeitrag der Betriebsgröße sowie der qualifikatorischen Zusammensetzung von Betrieben größer. Dieser Befund legt nahe, dass produktivere Betriebe höhere Löhne zahlen und somit ökonomische Renten teilweise an Beschäftigte weitergeben. Die Befunde bestätigten darüber hinaus, dass die individuellen Erträge auf Qualifikation zugenommen haben, was die Hypothese eines qualifikationsverzerrten technologischen Fortschritts unterstützt.

In *Kapitel zwei* wird untersucht, ob firmeninterne Arbeitsmärkte unterschiedliche Lohnwirkungen je nach Berufsklasse haben. Unsere Befunde weisen darauf hin, dass individuelle Löhne in geringqualifizierten Berufsklassen mit manuellen und nicht-manuellen Tätigkeiten in größerem Ausmaß durch Firmen determiniert sind als in Berufsklassen mittlerer und hoher Qualifikation. Die positiven Lohneffekte interner Arbeitsmärkte sind für geringqualifizierte manuelle und nicht-manuelle Beschäftigte am größten, sind aber auch für Beschäftigte mittlerer Qualifikation mit manuellen Tätigkeiten stark ausgeprägt. Die Lohneffekte interner Arbeitsmärkte sind für mittel- und hochqualifizierte Beschäftigte mit nicht-manuellen Tätigkeiten deutlich kleiner. Für Hochqualifizierte ist der Lohneffekt interner Arbeitsmärkte im Jahr 2010 deutlich höher als im Jahr 2005. Interne Arbeitsmärkte bieten somit keinen umfassenden Schutz gegen Niedriglöhne sondern führen zu einer Segmentierung des Arbeitsmarktes – insbesondere unter geringqualifizierten Beschäftigten.

In *Kapitel drei* werden die Effekte von Wettbewerb sowie von betrieblicher Tarifbindung auf die Lohnlücke zwischen Zuwanderern und Einheimischen innerhalb von Betrieben untersucht. Die durchschnittliche absolute Lohnlücke zwischen deutschen und nicht-deutschen Beschäftigten innerhalb von Betrieben ging von rund zwölf Prozent im Jahr 2000 auf rund zehn Prozent im Jahr 2010 zurück. Die absolute Lohnlücke ergibt sich größtenteils durch Unterschiede in der Humankapitalausstattung zwischen den beiden Gruppen. Die verbleibende unerklärte Lohnlücke beträgt im Durchschnitt nur ein Prozent, ist über die Zeit aber angestiegen und variiert erheblich zwischen Betrieben. Unsere Ergebnisse zeigen, dass die Lohnbenachteiligung nicht-deutscher Arbeitnehmer in tarifgebundenen Betrieben erheblich geringer ist, aber dass die Existenz von Betriebsräten keine Auswirkung darauf hat. Weiterhin finden wir, dass Wettbewerb sowohl auf Produkt- und Arbeitsmärkten die Lohnlücke nach Nationalität innerhalb von Betrieben reduziert. Demnach sind sowohl Präferenzen als auch Lohnsetzungsmacht von Arbeitgebern bedingend für die Benachteiligung von Zuwanderern.

In *Kapitel vier* wird untersucht wie das Umfeld von Organisationen die Lohnlücken nach Geschlecht und Nationalität beeinflusst. Übereinstimmend mit neoinstitutioneller Theorie finden wir, dass die Lohnlücken in großen Betrieben und jenen mit Tarifbindung kleiner sind und dass die Lohnlücken erheblich zwischen Branchen variieren. Im Einklang mit dem Ressourcenabhängigkeitsansatz sind die Lohnlücken in innovativen und ausländischen Betrieben sowie in Betrieben mit einem hohen Anteil nicht-deutscher Beschäftigter kleiner. Darüber hinaus zeigt sich, dass Betriebe mit aktuellem Bedarf an (qualifizierten) Arbeitskräften und jene, die Probleme bei der Stellenbesetzung haben, mehr Entgeltgleichheit aufweisen.

Insgesamt lässt sich schlussfolgern, dass der Einfluss von Organisationen auf individuelle Löhne im Zeitraum der Jahre 2000 bis 2010 zugenommen hat. Dies impliziert, dass es für eine gegebene Arbeitnehmer/in einen größeren Unterschied macht, wo sie oder er beschäftigt ist. Vor dem Hintergrund von unvollständigem Marktwettbewerb und rückläufiger Tarifbindung hat die organisationsspezifische Verteilung ökonomischer Renten großen Einfluss auf Lohnniveaus sowie auf Lohnungleichheit nach Klasse, Geschlecht und Herkunft.

