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Sorting within and across establishments: The immigrant-native wage differential in Germany

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Articles on labour market issues

Sorting within and across establishments

The immigrant-native wage differential in Germany

Mario Bossler

Sorting Within and Across Establishments: The Immigrant-Native Wage Differential in Germany

Mario Bossler (IAB)

Mit der Reihe „IAB-Discussion Paper“ will das Forschungsinstitut der Bundesagentur für Arbeit den Dialog mit der externen Wissenschaft intensivieren. Durch die rasche Verbreitung von Forschungsergebnissen über das Internet soll noch vor Drucklegung Kritik angeregt und Qualität gesichert werden.

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Abstract

Using new and unique linked employer-employee data from Germany, I examine the extent to which immigrants sort into worse-paying establishments and worse job positions within establishments. The results demonstrate that recent immigrants are particularly likely to work at low-paying workplaces. Similarly, when examining job positions within establishments, I find that immigrants are employed in lower hierarchical positions. Both the non-random sorting across establishments and the hierarchical sorting within establishments explain much of the immigrant-native wage differential. Policy measures designed to address the wage differential should therefore address immigrants' access to well-paying workplaces and job positions. With respect to career development, immigrant participation in performance assessments is low, and immigrants feel disadvantaged in personnel decisions, which in turn might be relevant channels that explain immigrants' under-representation in well-paid positions.

Zusammenfassung

Unter Verwendung des neuen Linked Personnel Panels (LPP) untersuche ich das Ausmaß der Beschäftigung von Migranten in schlecht bezahlenden Betrieben und Jobs. Die Ergebnisse zeigen, dass insbesondere kürzlich migrierte Personen in schlechter bezahlenden Betrieben arbeiten. In Bezug auf die Job-Hierarchie zeigt sich, dass Migranten in niedrigeren Positionen beschäftigt sind. Lohnregressionen ergeben den Befund, dass die negative Selektion in schlechter bezahlte Jobs und zu schlechter bezahlenden Arbeitgebern einen großen Anteil des Lohnunterschieds zwischen Migranten und Deutschen erklärt. Politikmaßnahmen sollten daher an beiden Dimensionen ansetzen, um eine bessere Integration zu gewährleisten. Vertiefende Analysen hinsichtlich der Personalführung zeigen, dass Migranten seltener an einem Beurteilungsgespräch teilnehmen und sich bei Personalentscheidungen benachteiligt fühlen. Diese Befunde können somit einen relevanten Erklärungsansatz für die niedrige Repräsentation in hohen Positionen darstellen.

JEL classification: J31, J61, R71

Keywords: Sorting, immigrant wage differential, hierarchical job positions

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1 Introduction

In Germany, fair employee compensation regardless of national origin is a public goal. This goal has been legislatively enshrined in the anti-discrimination law (“Antidiskriminierungsgesetz”), which requires individuals to be treated equally regardless of race, national origin, or other demographic characteristics. However, numerous research projects have identified a substantial and stable immigrant-native wage gap in host country labor markets (for Germany, see among others Aldashev/Gernandt/Thomsen (2008)). Many of these studies interpret these findings to represent a lack of labor market integration or – even worse – discrimination. Little research examines the employer-specific role of the immigrant-native wage differential, despite evidence that demonstrates that establishment heterogeneity explains a substantial amount of wage dispersion (Groshen (1991); Card/Heining/Kline (2013)).

I examine whether immigrants work for worse-paying employers and sort into lower hierarchical job positions. In a second step, I analyze whether the sorting patterns that are observed help to explain the immigrant-native wage differential. To measure the extent of non-random sorting and its contribution to the wage differential, I apply standard regression methods to new and unique German linked employer-employee data. The results indicate that sorting across establishments explains a large portion of the wage differential for recent immigrants only. Sorting into lower hierarchical job positions within establishments is severe for all immigrants and accounts for a large portion of the unexplained wage difference within establishments.

Two recent studies investigate the integration of immigrants using German administrative linked employer-employee data (Beblo/Ohlert/Wolf (2012); Glitz (forthcoming)). Glitz (forthcoming) adopts a sociological perspective and finds severe and persistent segregation patterns among immigrants at both the regional and workplace levels. Beblo/Ohlert/Wolf (2012) estimate a wage differential for foreigners and obtain a low unexplained differential of about 5% both within and across establishments. While these studies provide powerful insights using administrative data, their major shortcoming is the use of citizenship to proxy for immigration status because German administrative data do not contain detailed information on migration status.¹ Furthermore, the administrative data lack detailed individual characteristics and do not contain sufficiently detailed information regarding hierarchical job positions, years since migration, or participation in personnel strategies.

I contribute to the literature by examining the within- and across-establishment wage differentials for different subgroups using the number of years since migration and by considering the sorting pattern of immigrants in the within-establishment job position hierarchy. Furthermore, I examine whether immigrants are disadvantaged in basic human resource strategies that might in turn explain the resulting segregation into lower-level positions.

The data source used in this study is the German Linked Personnel Panel (LPP), which is a joint establishment and personnel panel study. The LPP consists of both an establishment

¹ This lack of information leads to biased results when immigrants self-select into German citizenship (selection bias).

survey and an individual survey of a random sample of employees who work for participating employers. To obtain the magnitude of non-random sorting across establishments, I use the two-step procedure proposed by Aydemir/Skuterud (2008). In the first step, I estimate a simple mincerian type of wage equation with an establishment-specific wage component. The extent of non-random sorting can be identified in the second step by using the establishment-specific wage component as the dependent variable in a regression on migration status and other individual covariates. With respect to wages, this procedure identifies the establishments in which immigrants work.

Studying the sorting patterns of immigrants is ultimately an empirical exercise, but theoretical channels might explain the finding that immigrants work at worse paying establishments. Aydemir/Skuterud (2008) suggest that less effective job search or the employers' recruiting behavior could explain the observed sorting pattern. Less effective job search might be caused by a lack of knowledge about labor market institutions and potential employers. However, over time, immigrants learn about the host countries' labor market and sort to better employers. Similarly, the employers' trust in immigrant workers might also increase with the latter's domestic labor market experience. Thus, search- and recruiting-specific theoretical explanations for negative sorting of immigrants are largely reduced for immigrants with substantial experience in the host-country labor market.

The theoretical channels regarding sorting into hierarchical job positions are not clear a priori. After controlling for differences in job tenure I am not aware of any theoretical mechanism. However, the results in section 6 indicate that immigrants are disadvantaged in personnel assessments and decisions, which in turn might explain why immigrants are observed in lower hierarchical positions.

The article proceeds as follows. Section 2 summarizes the related literature on the immigrant-native wage differential. Section 3 presents the linked data set and the sample used for analysis. Section 4 presents the results on immigrants' sorting across establishments, and section 5 presents the results on immigrants' sorting into the within-establishment job hierarchy. In section 6, I provide evidence regarding immigrants' participation in personnel policies. Section 8 concludes.

2 Literature review

Human capital determines wages (Becker (1993)). Because immigrants are typically characterized by worse human capital endowments, some share of the average wage differential is explained simply by these differences. In his article in the Handbook of Labor Economics, Cain (1986) suggests that wage differentials conditional on human capital characteristics can be regarded as discrimination. As suggested by Becker (1957), the theoretical explanation for such differences might be discrimination by taste. Empirical studies addressing the question of discrimination mostly employ decomposition methods such as those proposed by Blinder (1973) and Oaxaca (1973).² In contrast, studies on is-

² For Germany, see among others Aldashev/Gernandt/Thomsen (2008).

sues such as wage assimilation or sorting, in which discrimination is not the primary focus, consider standard wage regressions (e.g. Pendakur/Woodcock (2010)).

For Germany, the average unconditional wage differential between immigrants and natives is about 18 %, whereas the wage differential declines to 13 % when it is conditional on human-capital-determining covariates (Aldashev/Gernandt/Thomsen (2008)). Specific sub-group analyses include, for example, Licht/Steiner (1994), who investigate the wage differential for permanent and temporary immigrants separately and find substantial unconditional wage differences for both groups. Schmidt (1997), who also differentiates by type of immigrant, does not observe a wage differential for German guest workers (“Gastarbeiter”) and post-World War II ethnic German migrants after controlling for both characteristics related to human capital and occupational choice.

Another stream of research examines immigrants’ wage assimilation patterns. Initially immigrants face a substantial gap in earnings. However, immigrants assimilate to the wage level of native workers during the course of gaining experience in the host-country labor market. The theory of assimilation is empirically motivated and was proposed by Chiswick (1978), who finds an assimilation profile of immigrant wages in the years after migration. The evidence for wage assimilation in Germany is mixed. Lehmer/Ludsteck (forthcoming) find strong and significant wage improvements for immigrants in Germany. In contrast, Licht/Steiner (1994), Schmidt (1997), and Zibrowius (2012) all find flat experience-wage profiles for immigrants in Germany and thus reject the assimilation hypothesis.

Most economic research from the past two decades has concentrated on discovering specific and mostly unobserved human capital characteristics that might influence both the average wage differential and wage assimilation. Prominent among those characteristics are immigrants’ language proficiency (Aldashev/Gernandt/Thomsen (2009); Dustmann (1994); Dustmann/Soest (2002); Kossoudji (1988); Shields/Price (2002)) and the location of schooling (Bratsberg/Ragan Jr. (2002)). Both proficiency in the host-country language and host-country schooling seem to be important factors in determining immigrant wages, but these factors are omitted in the present article.

Reviewing the sorting literature, prominent explanatory dimensions for the determination of immigrant wages include occupational choice (Hansen/Wahlberg/Faisal (2010)) and segregation by industry. Sorting into worse-paying occupations and industries can account for a substantial fraction of the wage differential. More closely related to the present analysis is the literature on sorting into establishments. Until recently, sorting into establishments did not play a large role. The analysis requires individual data that are linked to establishment information. For Germany, two recent studies by Beblo/Ohlert/Wolf (2012) and Glitz (forthcoming) investigate integration among immigrants using administrative employment data in conjunction with firm-level information. Beblo/Ohlert/Wolf (2012) use the LIAB, which links individual social security data to the IAB Establishment Panel and examine establishment-level heterogeneities. Most importantly, they observe less of a wage gap in establishments participating in a collective bargaining agreement. Glitz (forthcoming) examines the segregation patterns of foreigners and finds severe and persistent segregation

across establishments and regions.³

Among studies on other countries, Pendakur/Woodcock (2010) study Canada and demonstrate that a substantial share of the wage differential among first-generation immigrants is explained by sorting into worse-paying firms. Moreover, the large wage differential among first-generation visible minorities is about 50 % lower within firms than it is nationwide. The authors also present wage differentials based on quantile regressions to demonstrate immigrants' lack of access to high-paying jobs. Similarly and also for Canada, Aydemir/Skuterud (2008) demonstrate that the wage differential is largely explained by the non-random sorting of immigrants across employers. Consistent with these findings from Canada, Barth/Bratsberg/Raaum (2012) study Norwegian data and find that about 40 % of the immigrant wage differential can be explained by sorting into low-paying establishments. By contrast Carrington/Troske (1998) study the Black-White wage gap in the US and do not find strong segregation patterns. For the US, they conclude that the wage gap is primarily a within firm phenomena.

3 Data

3.1 The Linked Personnel Panel

The primary data source in this article is the German Linked Personnel Panel (LPP). The LPP is a new linked individual- and establishment-level data set, in which both the establishment and the individual information is collected from surveys. The surveys of the LPP are developed jointly by the Center for European Economic Research (ZEW), the University of Cologne, and the Institute for Employment Research (IAB). The establishment-level interviews are conducted face-to-face⁴, whereas employees are surveyed in computer-assisted telephone interviews⁵. Establishments are jointly interviewed with the IAB Establishment Panel (EP), which is the largest and most comprehensive annual establishment survey in Germany. The establishments in the LPP are a sub-sample of establishments with more than 50 employees and both interviews are conducted in succession. This design ensures high quality data in the first wave, and the participation rate of establishments is 76 %.⁶ A unique establishment identifier allows for a perfect link between the two establishment surveys; together, these surveys comprise a rich establishment-level data set.

The LPP employee survey consists of independent individual interviews from a random sample of employees of establishments participating in the LPP employer survey. Using a unique establishment identifier, 82 % of the individual interviews can be linked to the establishment data.

³ For international studies on workplace segregation see Aslund/Skans (2010); Carrington/Troske (1998).

⁴ The interviews are conducted by TNS Infratest Sozialforschung, which is the largest German institute for the collection of social and political research data.

⁵ The employee survey is conducted by the Institute for Applied Social Sciences (infas).

⁶ Selectivity analyses have also been conducted. At the establishment level, no variable except the share of females is significant, such that the female share in observed establishments is somewhat below the population average.

The establishment sample consists of establishments in Germany with more than 50 employees and is representative for a rough industry classification (5 categories) and regional distinction (4 categories). It omits the public sector and establishments in mining or agriculture. Overall, the LPP contains 7,505 employee observations that are linked to 861 establishments. The employee survey, which is the core of the analysis, includes employment- and individual-specific characteristics. Employment-specific characteristics include gross monthly wage, working hours, and information about job positions. Individual-specific characteristics include variables related to education, such as the highest post-secondary degree completed and basic individual information with respect to age, gender, family status, and detailed variables on the individual's migration background. From the German Employment Register, I add administrative information on individual labor market experience and job tenure. From the administrative employment register I extract both variables to the date of October 30th⁷ using the procedure developed by Eberle/Schmucker/Seth (2013).⁸

3.2 Sample restrictions

The 2012/2013 cross-section of the LPP employee survey is the sample used in the analysis for the present study. Establishments were interviewed between July and September 2012, and employees were independently interviewed between November 2012 and February 2013. I restrict the sample to plants in West Germany because immigrants are selectively under-represented in the East. The share of immigrants in the East German workforce is much lower than that in the West German workforce (Niebuhr/Stiller (2006)). Because wages are also substantially lower in the East, those observations would structurally bias the estimates. Furthermore, I restrict the analysis sample to working age employees⁹, which permit the link to establishment information and administrative data sources.

[Table 1 about here]

Table 1 provides an initial impression of the sample size and immigrant representation. In total, the data set consists of 7,505 individuals employed at 861 establishments. After restricting the sample to West German establishments, the number of establishment observations falls to 573. For the linked analysis sample of working age employees a sample size of 563 establishments and 4,136 employees remains.

First-generation immigration status is defined by the personal migration experience of the respondent, i.e., the immigrant's place of birth. The empirical results of the article also include estimates for the group of second-generation immigrants, which is defined by having at least one first-generation migrant parent. Furthermore, I make use of the immigrant's year of migration and divide the group of immigrants into recent immigrants with fewer than 20 years since migration and non-recent migrants with at least 20 years of host country experience. I divide the sample at 20 years since migration because most of the assimilation

⁷ This is the start of the interviewing period.

⁸ I also employ the gross daily wage information from the administrative employment data to impute missing information on gross wages in the survey, which should reduce selection bias due to survey non-response.

⁹ I define working age employees to be at least 20 years but no more than 60 years old.

literature observes an assimilation path for the first 20 years after migration (Borjas (1985); LaLonde/Topel (1992)). Moreover, the sample size does not allow me to precisely estimate an exact assimilation path for immigrants.

The fraction of immigrants in the analysis sample is 11.5 %, of which 27.4 % are recent immigrants and 72.6 % are non-recent immigrants. The general representation is comparable to the German Mikrozenus, in which 11.4 % of employees are first-generation immigrants (Mikrozenus, 2010, own calculation). Because the data contain only a sample of employees, I only observe immigrants in 252 of the 563 establishments. However, as I show in the robustness checks (section 7), this limitation does not affect the results.

Although the basic structure of the data is identical to that in the Canadian Workplace and Employee Survey used by Aydemir/Skuterud (2008) and Pendakur/Woodcock (2010), the sample size is smaller. In a robustness check, I estimate the establishment-level wage effect using administrative data on the entire workforce of observed establishments. Thus, I use the full administrative data sample as a learning data set to estimate the establishment-level wage component, which is hypothesized to explain a non-random sorting pattern.

4 Sorting across establishments

In the first research question of the paper, I investigate which employers employ immigrants. In particular, I analyze whether immigrants sort randomly into establishments or whether the data reveal a non-random sorting pattern for immigrants with respect to establishment-level wages.

I follow the basic sorting approach proposed by Aydemir/Skuterud (2008), who use a two-step procedure to identify the extent of sorting. In the first stage, the establishment-level wage effect is estimated, which is hypothesized to explain the sorting pattern. In the second stage, this establishment-level wage effect is the dependent variable in a regression on a group identifier (migration status) and individual covariates. Controlling for individual covariates allows to identify the extent of sorting that is conditional on individual characteristics that may co-determine the sorting pattern (Pendakur/Woodcock (2010)).

A standard mincerian type of wage equation with establishment level fixed effects is estimated to obtain the wage level for each establishment, denoted by ϕ_j :

$$\ln(wage)_i = \phi_j + imm_i * \delta + x'_i * \beta + u_i \quad (1)$$

In the second stage of the two-step procedure, I use the establishment-level fixed effect ϕ_j as the dependent variable in a regression on migration status imm_i and individual covariates x_i .

$$\phi_j = imm_i * \tilde{\delta} + x'_i * \tilde{\beta} + e_i \quad (2)$$

$\tilde{\delta}$ is the coefficient of the immigrant identifier and indicates the establishments for which immigrants work and thus addresses the sorting hypotheses. I estimate the two steps by OLS and present bootstrapped standard errors, which allow for an establishment-level error correlation.

[Table 2 about here]

The results of the two-step procedure are reported in Table 2. We observe substantial negative sorting for recent migrants, whereas non-recent immigrants with substantial host-country experience are unaffected by sorting into worse-paying establishments. This result is robust to estimating establishment-level wage effects using the entire sample of employees included in the administrative data (column 2).¹⁰

Although sorting into worse-paying establishments does not play a role for non-recent immigrants, it seems highly relevant in determining recent immigrants' wages. Estimating the immigrant wage differential from simple wage equations can provide further insights to the question: how important is sorting for unexplained wage differences?

[Table 3 about here]

Table 3 presents the observed wage differentials from simple OLS regressions, in which alternate specifications control for individual characteristics and non-random sorting into industries and establishments; thus, the estimates differ in interpretation. The first column presents the unconditional wage gap faced by immigrant workers across the population of establishments, which is 33.5% for recent immigrants and 11.6% for non-recent immigrants. In all further specifications I control for individual-specific covariates including the highest post-secondary degree, part-time employment, family status, gender, as well as labor market experience, job tenure, and its squares. Furthermore, I try to capture all gender differences by full interaction of the gender dummy with all other controls. Conditional on these covariates the unexplained wage differential declines to 18.4% for recent immigrants and 5.3% for non-recent immigrants.

By adding dummy variables from a 2-digit industry classification (38 categories) and establishment level fixed effects as covariates in two separate specifications, I obtain the wage differential within industries and within establishments, respectively. Column 3 of Table 3 includes industry controls, and the immigrant wage differentials remain the same size. Non-recent immigrants still face a modest unexplained wage differential, whereas the difference remains about 17% for recent immigrants. Thus, we do not observe any negative sorting across industries. The results of the within-establishment wage differential are presented in column 4 and indicate that the negative sorting into worse-paying establishments

¹⁰ When estimating the wage equation (first-stage) using administrative data, I use the log daily wage as dependent variable in a regression on education (6 categories), German citizenship indicator, a dummy for white collar, and an establishment specific wage effect. Since I do not observe working time, the sample is restricted to male workers in their primary employment. Furthermore, I restrict the sample to West Germany and daily wages of at least 5 Euro.

explains about 9 % of the immigrant-native wage differential for recent immigrants, whereas the non-recent immigrants' wage differential is unaffected by sorting.

5 Sorting in the within-establishment hierarchy

After controlling for sorting into worse-paying establishments, we still observe a substantial immigrant-native wage gap within establishments. Moreover, the gap within establishments seems to be substantial for both recent and earlier immigrants.

To shed light on the sources of the within-establishment wage gap, I consider non-random sorting in the job hierarchy. In the first step, I analyze whether immigrants work in worse positions and, in the second, whether this fact explains a substantial fraction of the wage differential. I exploit a detailed job position variable that accounts for 5 ordinal categories among the group of blue-collar workers. Additionally, I employ information on leader positions that also represent the within-establishment hierarchy.

The variables defining the within-establishment hierarchy are dependent variables in regressions on the individual's migration background and covariates. The regressions directly indicate whether immigrants work in worse positions compared with natives. The first dependent variable represents an ordinal ranking of job positions among blue-collar workers. The variable orders blue-collar workers from low to high job positions using the following categories: unskilled, semiskilled, skilled, foreman, and master positions. The second dependent variable is an indicator of a leader position. Finally, the third dependent variable captures the number of workers under a leader's supervision, which automatically takes the value zero if an employee is not in a leader position. Whereas I estimate a linear specification when using the ordinal job position variable for the blue-collar workers, I employ a binary probit for the indicator of a leader position and a tobit specification for the number of workers that are supervised by a leader.

[Table 4 about here]

Table 4 presents the marginal effect for the immigrants' representation in the establishment hierarchy with respect to job position and leader positions. The first three columns present results without controlling for establishment-level heterogeneity, and columns 4-6 control for establishment-level heterogeneity by adding establishment-level averages of the explanatory variables as covariates, i.e., these specifications include a full set of Mundlak terms. The estimated coefficients can therefore be interpreted as deviations from the establishment-level mean, which provides the desired within-establishment transformation.

The results in column 1 indicate that the likelihood of being in a leader position is about 13 % lower for an immigrant than for a similar native employee. Regarding the responsibilities of leaders, native leaders are responsible for about 24 more workers than immigrants who are leaders. Column 3 shows that for the sample of blue-collar workers, immigrants occupy

worse job positions. All these results are of similar size after controlling for establishment-level heterogeneity. Therefore, I conclude that immigrants occupy lower hierarchical job positions.

[Table 5 about here]

To test whether the observed non-random sorting into the within-establishment job hierarchy reduces the substantial within-establishment wage gap, I include the job position and leader positions as controls in the wage equation. The wage differentials presented in Table 5 are estimates from linear specifications with establishment-level fixed effects. Column 1 replicates the baseline within-establishment wage differential from Table 3. Column 2 controls for job positions using blue- and white-collar status and the within-blue-collar job position ranking. The remaining wage differential of 5.7 % for recent immigrants is about 4 percentage points lower than the baseline. Column 3 controls for whether an employee occupies a leader position and the number of workers under the leader's responsibility. The wage differential of recent immigrants again decreases to about 6.6 %. After jointly controlling for job positions and leader positions, the immigrant wage differential declines to 3.3 % (column four). I observe a similar reduction for the non-recent immigrants' wage differential, which declines to 2.5 %. Ultimately, I conclude that differences in hierarchical job positions explain more than half of the unexplained wage differential within establishments.

6 Participation in HR activities and perceived career development

Having observed a severe negative sorting of immigrants into worse-paid job positions within establishments, I examine whether immigrants are given the same opportunities in their individual career development. Equal participation in employers' human resource activities is necessary for equal development opportunities and is thus important for obtaining higher job positions. To examine career development opportunities by migration status, I first analyze whether immigrants have the same probability of receiving an annual performance appraisal and, second, whether immigrants have the same subjectively perceived development opportunities as their native German colleagues. Jirjahn/Poutsma (2013) report evidence that the employers' use of performance appraisals fosters employee career development. Both participation in appraisal assessments and subjectively perceived development opportunities should thus capture differences in the employees career development within establishments. For Germany, Grund/Sliwka (2009) study participation in appraisal assessments by individual characteristics but do not report results for the group of immigrants.

I use an indicator of participation in an appraisal assessment within the last 12 months as the dependent variable. The first two columns of Table 6 report the marginal effects from a probit specification in which migration background and individual characteristics

are included as covariates. Again, I report the effects with and without controlling for establishment-level heterogeneity. Whereas column 1 presents results from the simple specification across establishments, I control for the establishment-level averages of the explanatory variables in column 2. The results indicate that the probability of receiving an annual appraisal assessment is 15.9 percentage points lower for recent immigrants and 9.4 percentage points lower for immigrants with substantial experience in the host country. When controlling for establishment heterogeneity, the effects decline somewhat but remain statistically significant.

[Table 6 about here]

I also analyze whether immigrants report lower subjectively perceived development opportunities. In the empirical specification, I use a variable capturing the individual's attitude toward present development prospects. In the survey, individuals respond to the following statement:

"In the present establishment, I have been disadvantaged in a personnel decision, e.g., in promotions, pay raise, assessments, further training, within the last two years."

Employees had to respond on a 5-point scale, where "fully agree" corresponds to the lowest value, 1, and "fully disagree" takes the highest value, 5.

Subjectively perceived development opportunity is the dependent variable in linear regressions on migration status and individual covariates. Column 3 presents the partial effects across establishments, which indicate that the group of recent migrants feels particularly disadvantaged by their present employers. Again, when controlling for establishment heterogeneities in column 4, the effects are reduced but remain significant and sizable for recent migrants. The results demonstrate that immigrants report worse chances in their perceived career development compared with their German colleagues. These disadvantages indicate a policy dimension that should be addressed if policy measures seek to shift immigrants into better-paid jobs.

7 Robustness checks

7.1 Fixed effects are local average treatment effects

In this section, I ensure that the results are not driven by the fact that I observe immigrants in only about 50 % of the establishments. Estimating a specification with establishment level fixed effects yields local average treatment effects within establishments (Angrist/Pischke (2009)). Namely, it estimates the effect only for those establishments for which I observe at least one immigrant. Thus, the sorting pattern may uncover an effect that is specific to these establishments in which immigrants are observed instead of revealing the true sorting pattern.

I address this issue by estimating all regressions for the sample of establishments that contain at least one immigrant observation. This estimation ensures that both the across-establishment estimates (without fixed effects) and the within-establishment estimates (with fixed effects) are local estimates for this group of establishments.

The regression results are presented in Appendix A. Table A1 again shows a severe sorting pattern for recent immigrants, which explains about 10 log points of the wage differential (Table A2). We observe immigrants in lower hierarchical positions (Table A3), which again almost entirely explains the within-establishment wage differential from Table A4. Table A5 presents immigrants' participation in appraisal assessments and their subjectively perceived development compared with native colleagues. Both across and within establishments, the results indicate that disadvantages in participation in personnel strategies might be a reason for immigrants' sorting into worse positions.

7.2 Male-female differences

It is well established in labor economics that female employees face a substantial wage differential (among others, see the survey article by Weichselbaumer/Winter-Ebmer (2005)). To ensure that the estimates are not driven by gender differences, I re-estimate all regressions using male observations only.

Appendix B presents the regression estimates. The sample restriction to male observations substantially reduces the sample size and thus the precision of the estimates. However, the point estimates are unaffected.

8 Conclusion

I study in which establishments immigrants work and in which hierarchical job positions immigrants work within establishments. The results indicate that immigrants – and particularly those immigrants who immigrated to Germany recently – are substantially segregated into worse-paying establishments. The data do not reveal any negative sorting for non-recent migrants with experience in the host country of 20 years or more. When estimating the immigrant-native wage differential, sorting into establishments reduces the unexplained gap of recent migrants from about 18% across establishments to less than 10% within establishments.

The within-establishment wage differential remains substantial but can be explained by non-random sorting into worse positions in the hierarchy. Immigrants occupy lower hierarchical positions with respect to leader positions and are represented in lower job positions among blue-collar workers. Estimating the within-establishment wage differential while controlling for hierarchical job positions reduces the unexplained difference by as much as half, which indicates a lack of representation in high positions is a driving factor of the unexplained wage difference.

Further results reveal that the lack of representation in high positions is accompanied by worse career development opportunities. Immigrants are less likely to participate in annual

appraisal assessments than their native colleagues. Furthermore, when examining subjectively perceived career development, immigrants report being discriminated against by their current employers.

Overall, the immigrant-native wage differential is almost fully explained by horizontal segregation across establishments and vertical segregation within establishments. This explanation does not demonstrate an absence of discrimination against immigrants in the German labor market but reveals that the unexplained wage differential is almost fully determined by sorting into establishments and job positions. Policy measures should therefore target these two dimensions of sorting. However, it remains unresolved whether the observed horizontal and vertical sorting is caused by the immigrants' search behavior, the firms' recruitment, or within-firm career development opportunities. The initial evidence suggests that immigrants are disadvantaged in their within-firm career development. Future research should address this finding and assess whether the lack of participation in HR strategies can causally explain the sorting patterns, i.e., whether HR strategies are the crucial factor and the appropriate policy dimension to achieve full integration of immigrants within the German labor market.

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Tables

Table 1: The Linked Personnel Panel by Migration Status

Statistic	Establishments	Employers	
		all	immigrants (1st gen.)
Total LPP sample:			
N	861	7,505	711
West German establishments:			
N	573	5,867	680
West German establishments and working age employees who allow to link the data (analysis sample):			
N	563	4,136	474
Fraction			11.5 %

Working age employees are at least 20 years old but not older than 60.
Data source: LPP employee survey 2013.

Table 2: Immigrant sorting in establishments

Source of dep. var.	LPP employees	LPP admin
Dep. var.	ϕ_j	ϕ_j
	(1)	(2)
immigrant	-0.090***	-0.065**
(ysm<20yrs.)	(0.026)	(0.029)
immigrant	0.016	0.017
(ysm≥20yrs.)	(0.014)	(0.015)
immigrant	0.005	0.011
(second gen.)	(0.014)	(0.015)
Observations	4,136	4,079
Clusters	563	554

Notes: Results estimates from a two step procedure. Asterisks report significance levels (1 % ***, 5 % **, 10 % *). Bootstrapped cluster robust standard errors in parentheses (cluster=establishment), where the entire two step procedure is estimated in every bootstrap iteration. All regressions include individual controls. Individual controls are the gender, experience, experience squared, tenure, tenure squared, 5 categories of the highest post graduation degree, a part-time indicator and the family status. All individual characteristics are fully interacted with a gender dummy.

Data source: LPP 2013 employee survey and LPP admin data.

Table 3: Immigrant wage differential and establishment heterogeneity

Dep. var.	Ln(wage)			
	(1)	(2)	(3)	(4)
immigrant	-0.335***	-0.184***	-0.174***	-0.094***
(ysm<20yrs.)	(0.035)	(0.033)	(0.029)	(0.025)
immigrant	-0.116***	-0.053***	-0.064***	-0.069***
(ysm≥20yrs.)	(0.021)	(0.019)	(0.018)	(0.017)
immigrant	-0.030	0.006	-0.002	0.001
(second gen.)	(0.023)	(0.018)	(0.017)	(0.016)
<i>Controls:</i>				
Indiv. controls	no	yes	yes	yes
Industry effects	no	no	yes	yes
Establ. effects	no	no	no	yes
Observations	4,136	4,136	4,136	4,136
Clusters	563	563	563	563

Notes: OLS and establishment level fixed effect regressions. Cluster robust standard errors in parentheses (cluster=establishment). Asterisks report significance levels (1 % ***, 5 % **, 10 % *). Individual controls are the gender, experience, experience squared, tenure, tenure squared, 5 categories of the highest post graduation degree, a part-time indicator and the family status. All individual characteristics are fully interacted with a gender dummy. Industry effects are estimated based on a 2-digit industry identifier included in the EP.

Data source: LPP 2013 employee survey.

Table 4: Immigrant sorting in job positions

Dep. var.	Across establishments			Within establishments		
	Leader (1)	Responsi- bility (2)	job position (3)	Leader (4)	Responsi- bility (5)	job position (6)
immigrant (ysm<20yrs.)	-0.133*** (0.049)	-24.510*** (8.370)	-0.542*** (0.134)	-0.182*** (0.052)	-32.460*** (8.997)	-0.549*** (0.154)
immigrant (ysm≥20yrs.)	-0.089*** (0.029)	-16.718*** (4.742)	-0.240*** (0.060)	-0.105*** (0.031)	-21.871*** (6.170)	-0.260*** (0.069)
immigrant (second gen.)	-0.010 (0.024)	-2.390 (4.252)	-0.104 (0.066)	-0.009 (0.026)	-3.800 (4.782)	-0.107 (0.076)
Establ. effects	no	no	no	yes	yes	yes
Observations	4,131	4,136	1,536	4,131	4,136	1,536
Clusters	563	563	387	563	563	387

Notes: Marginal effects. Columns 1 and 4 are probit, columns 2 and 5 tobit and columns 3 and 6 OLS specifications. Columns 4, 5, and 6 report effects from correlated random effects specifications. Cluster robust standard errors in parentheses (cluster=establishment). Asterisks report significance levels (1% ***, 5% **, 10% *). All regressions include individual controls. Individual controls are the gender, experience, experience squared, tenure, tenure squared, 5 categories of the highest post graduation degree, a part-time indicator and the family status. All individual characteristics are fully interacted with a gender dummy.

Data source: LPP 2013 employee survey.

Table 5: Immigrant wage differential and the job position within establishments

Dep. var.	Ln(wage)			
	(1)	(2)	(3)	(4)
immigrant (ysm<20yrs.)	-0.094*** (0.025)	-0.057** (0.024)	-0.066*** (0.024)	-0.037 (0.023)
immigrant (ysm≥20yrs.)	-0.069*** (0.017)	-0.038** (0.016)	-0.050*** (0.017)	-0.025 (0.016)
immigrant (second gen.)	0.001 (0.016)	0.007 (0.016)	0.005 (0.016)	0.011 (0.015)
<i>Controls:</i>				
Job position	no	yes	no	yes
Leading position	no	non	yes	yes
Observations	4,136	4,136	4,136	4,136
Clusters	563	563	563	563

Notes: Establishment level fixed effect regressions. Cluster robust standard errors in parentheses (cluster=establishment). Asterisks report significance levels (1% ***, 5% **, 10% *). All regressions include individual controls. Individual controls are the gender, experience, experience squared, tenure, tenure squared, 5 categories of the highest post graduation degree, a part-time indicator and the family status. All individual characteristics are fully interacted with a gender dummy.

Data source: LPP 2013 employee survey.

Table 6: Career development of immigrants

Dep. var.	appraisal assessment participation		subjectively perceived development	
	across establishments	within establishments	across establishments	within establishments
	(1)	(2)	(3)	(4)
immigrant (ysm<20yrs.)	-0.159*** (0.045)	-0.108** (0.048)	-0.467*** (0.135)	-0.329** (0.138)
immigrant (ysm≥20yrs.)	-0.094*** (0.029)	-0.058** (0.027)	-0.128* (0.074)	-0.095 (0.080)
immigrant (second gen.)	-0.059** (0.027)	-0.041* (0.024)	-0.042 (0.067)	0.015 (0.076)
Observations	4,132	4,132	4,088	4,088
Clusters	563	563	562	562

Notes: Marginal effects. Columns 1 and 2 are probit, columns 3 and 4 are OLS specifications. Columns 2 and 4 are correlated random effects specifications with control for establishment level heterogeneity. Cluster robust standard errors in parentheses (cluster=establishment). Asterisks report significance levels (1% ***, 5% **, 10% *). All regressions include individual controls. Individual controls are the gender, experience, experience squared, tenure, tenure squared, 5 categories of the highest post graduation degree, a part-time indicator and the family status. All individual characteristics are fully interacted with a gender dummy.

Data source: LPP 2013 employee survey.

A Appendix: Reduced sample

In this appendix, I replicate all regressions using a sample of establishments for which I observe at least one 1st generation immigrant. This ensures variation in the major explanatory variable, across and within establishments.

Table A1: Immigrant sorting in establishments (reduced sample)

Source of dep. var.	EP employees	LPP admin
Dep. var.	ϕ_j	ϕ_j
	(1)	(2)
immigrant (ysm<20yrs.)	-0.104*** (0.026)	-0.071** (0.028)
immigrant (ysm≥20yrs.)	-0.002 (0.013)	0.008 (0.014)
immigrant (second gen.)	0.008 (0.019)	0.015 (0.022)
Observations	2,428	2,414
Clusters	252	250

Notes: Results estimates from a two step procedure. Asterisks report significance levels (1% ***, 5% **, 10% *). Bootstrapped cluster robust standard errors in parentheses (cluster=establishment), where the entire two step procedure is estimated in every bootstrap iteration. All regressions include individual controls. Individual controls are the gender, experience, experience squared, tenure, tenure squared, 5 categories of the highest post graduation degree, a part-time indicator and the family status. All individual characteristics are fully interacted with a gender dummy.

Data source: LPP 2013 employee survey (establishments with at least one immigrant employees only) and LPP admin data.

Table A2: Immigrant wage differential and establishment heterogeneity (reduced sample)

Dep. var.	Ln(wage)			
	(1)	(2)	(3)	(4)
immigrant (ysm<20yrs.)	-0.362*** (0.036)	-0.193*** (0.034)	-0.166*** (0.031)	-0.089*** (0.026)
immigrant (ysm≥20yrs.)	-0.142*** (0.022)	-0.071*** (0.019)	-0.070*** (0.017)	-0.069*** (0.017)
immigrant (second gen.)	-0.022 (0.032)	0.015 (0.025)	-0.007 (0.021)	0.007 (0.020)
<i>Controls:</i>				
Indiv. controls	no	yes	yes	yes
Industry effects	no	no	yes	yes
Establ. effects	no	no	no	yes
Observations	2,428	2,428	2,428	2,428
Clusters	252	252	252	252

Notes: OLS and establishment level fixed effect regressions. Cluster robust standard errors in parentheses (cluster=establishment). Asterisks report significance levels (1% ***, 5% **, 10% *). Individual controls are the gender, experience, experience squared, tenure, tenure squared, 5 categories of the highest post graduation degree, a part-time indicator and the family status. All individual characteristics are fully interacted with a gender dummy. Industry effects are estimated based on a 2-digit industry identifier included in the EP.

Data source: LPP 2013 employee survey, establishments with at least one immigrant employees only.

Table A3: Immigrant sorting in job positions (reduced sample)

Dep. var.	Across establishments			Within establishments		
	Leader	Responsi- bility	job position	Leader	Responsi- bility	job position
	(1)	(2)	(3)	(4)	(5)	(6)
immigrant (ysm<20yrs.)	-0.124** (0.050)	-28.236*** (1.841)	-0.580*** (0.142)	-0.160*** (0.053)	-33.909*** (1.796)	-0.550*** (0.165)
immigrant (ysm≥20yrs.)	-0.086*** (0.030)	-19.293*** (1.252)	-0.265*** (0.064)	-0.098*** (0.031)	-22.945*** (1.275)	-0.281*** (0.072)
immigrant (second gen.)	0.040 (0.032)	4.500*** (0.983)	-0.081 (0.093)	0.030 (0.034)	2.873*** (0.971)	-0.125 (0.105)
Establ. effects	no	no	no	yes	yes	yes
Observations	2,395	2,428	999	2,395	2,428	999
Clusters	252	252	201	252	252	201

Notes: Marginal effects. Columns 1 and 4 are probit, columns 2 and 5 tobit and columns 3 and 6 OLS specifications. Columns 4, 5, and 6 report effects from correlated random effects specifications. Cluster robust standard errors in parentheses (cluster=establishment). Asterisks report significance levels (1% ***, 5% **, 10% *). All regressions include individual controls. Individual controls are the gender, experience, experience squared, tenure, tenure squared, 5 categories of the highest post graduation degree, a part-time indicator and the family status. All individual characteristics are fully interacted with a gender dummy.

Data source: LPP 2013 employee survey, establishments with at least one immigrant employees only.

Table A4: Immigrant wage differential and the job position within establishments (reduced sample)

Dep. var.	Ln(wage)			
	(1)	(2)	(3)	(4)
immigrant (ysm<20yrs.)	-0.089*** (0.026)	-0.055** (0.025)	-0.065*** (0.024)	-0.038 (0.023)
immigrant (ysm≥20yrs.)	-0.069*** (0.017)	-0.040** (0.016)	-0.053*** (0.017)	-0.029* (0.016)
immigrant (second gen.)	0.007 (0.020)	0.011 (0.019)	0.004 (0.020)	0.008 (0.019)
<i>Controls:</i>				
Job position	no	yes	no	yes
Leading position	no	non	yes	yes
Observations	2,428	2,428	2,428	2,428
Clusters	252	252	252	252

Notes: Establishment level fixed effect regressions. Cluster robust standard errors in parentheses (cluster=establishment). Asterisks report significance levels (1% ***, 5% **, 10% *). All regressions include individual controls. Individual controls are the gender, experience, experience squared, tenure, tenure squared, 5 categories of the highest post graduation degree, a part-time indicator and the family status. All individual characteristics are fully interacted with a gender dummy.

Data source: LPP 2013 employee survey, establishments with at least one immigrant employees only.

Table A5: Career development of immigrants (reduced sample)

Dep. var.	appraisal assessment participation		subjectively perceived development	
	across establishments	within establishments	across establishments	within establishments
	(1)	(2)	(3)	(4)
immigrant (ysm<20yrs.)	-0.184*** (0.045)	-0.093* (0.048)	-0.477*** (0.140)	-0.295** (0.141)
immigrant (ysm≥20yrs.)	-0.111*** (0.028)	-0.060** (0.026)	-0.146* (0.079)	-0.096 (0.083)
immigrant (second gen.)	-0.072** (0.034)	-0.034 (0.031)	-0.043 (0.093)	0.087 (0.106)
Observations	2,425	2,425	2,400	2,400
Clusters	252	252	251	251

Notes: Marginal effects. Columns 1 and 2 are probit, columns 3 and 4 are OLS specifications. Columns 2 and 4 are correlated random effects specifications with control for establishment level heterogeneity. Cluster robust standard errors in parentheses (cluster=establishment). Asterisks report significance levels (1% ***, 5% **, 10% *). All regressions include individual controls. Individual controls are the gender, experience, experience squared, tenure, tenure squared, 5 categories of the highest post graduation degree, a part-time indicator and the family status. All individual characteristics are fully interacted with a gender dummy.

Data source: LPP 2013 employee survey, establishments with at least one immigrant employees only.

B Appendix: Men only

In this appendix, I replicate the regressions for a sample of male employees only. This ensures that the results are not driven by male-female differences.

Table B1: Immigrant sorting in establishments (men only)

Source of dep. var.	EP employees	LPP admin
Dep. var.	ϕ_j	ϕ_j
	(1)	(2)
immigrant (ysm<20yrs.)	-0.077** (0.031)	-0.049 (0.031)
immigrant (ysm≥20yrs.)	0.026* (0.015)	0.031* (0.016)
immigrant (second gen.)	0.003 (0.015)	0.018 (0.015)
Observations	3,087	3,049
Clusters	510	502

Notes: Results estimates from a two step procedure. Asterisks report significance levels (1% ***, 5% **, 10% *). Bootstrapped cluster robust standard errors in parentheses (cluster=establishment), where the entire two step procedure is estimated in every bootstrap iteration. All regressions include individual controls. Individual controls are the gender, experience, experience squared, tenure, tenure squared, 5 categories of the highest post graduation degree, a part-time indicator and the family status.

Data source: LPP 2013 employee survey (men employees only) and LPP admin data.

Table B2: Immigrant wage differential and establishment heterogeneity (men only)

Dep. var.	Ln(wage)			
	(1)	(2)	(3)	(4)
immigrant (ysm<20yrs.)	-0.364*** (0.039)	-0.176*** (0.037)	-0.175*** (0.034)	-0.099*** (0.030)
immigrant (ysm≥20yrs.)	-0.119*** (0.023)	-0.041* (0.022)	-0.061*** (0.021)	-0.067*** (0.020)
immigrant (second gen.)	-0.027 (0.027)	0.001 (0.020)	-0.009 (0.019)	-0.002 (0.020)
<i>Controls:</i>				
Indiv. controls	no	yes	yes	yes
Industry effects	no	no	yes	yes
Establ. effects	no	no	no	yes
Observations	3,087	3,087	3,087	3,087
Clusters	510	510	510	510

Notes: OLS and establishment level fixed effect regressions. Cluster robust standard errors in parentheses (cluster=establishment). Asterisks report significance levels (1% ***, 5% **, 10% *). Individual controls are the gender, experience, experience squared, tenure, tenure squared, 5 categories of the highest post graduation degree, a part-time indicator and the family status. Industry effects are estimated based on a 2-digit industry identifier included in the EP.

Data source: LPP 2013 employee survey, men employees only.

Table B3: Immigrant sorting in job positions (men only)

Dep. var.	Across establishments			Within establishments		
	Leader (1)	Respon- sibility (2)	job position (3)	Leader (4)	Respon- sibility (5)	job position (6)
immigrant (ysm<20yrs.)	-0.118** (0.059)	-18.426** (8.231)	-0.571*** (0.150)	-0.190*** (0.063)	-28.987*** (8.918)	-0.565*** (0.175)
immigrant (ysm≥20yrs.)	-0.100*** (0.035)	-15.960*** (4.877)	-0.236*** (0.065)	-0.109*** (0.038)	-17.923*** (5.677)	-0.259*** (0.076)
immigrant (second gen.)	-0.031 (0.030)	-5.425 (4.693)	-0.110 (0.074)	-0.013 (0.033)	-4.535 (5.277)	-0.106 (0.083)
Establ. effects	no	no	no	yes	yes	yes
Observations	3,087	3,087	1,327	3,087	3,087	1,327
Clusters	510	510	350	510	510	350

Notes: Marginal effects. Columns 1 and 4 are probit, columns 2 and 5 tobit and columns 3 and 6 OLS specifications. Columns 4, 5, and 6 report effects from correlated random effects specifications. Cluster robust standard errors in parentheses (cluster=establishment). Asterisks report significance levels (1% ***, 5% **, 10% *). All regressions include individual controls. Individual controls are the gender, experience, experience squared, tenure, tenure squared, 5 categories of the highest post graduation degree, a part-time indicator and the family status.

Data source: LPP 2013 employee survey, men employees only.

Table B4: Immigrant wage differential and the job position within establishments (men only)

Dep. var.	Ln(wage)			
	(1)	(2)	(3)	(4)
immigrant (ysm<20yrs.)	-0.099*** (0.030)	-0.055* (0.029)	-0.067** (0.029)	-0.034 (0.027)
immigrant (ysm≥20yrs.)	-0.067*** (0.020)	-0.038** (0.019)	-0.048** (0.020)	-0.026 (0.019)
immigrant (second gen.)	-0.002 (0.020)	0.005 (0.019)	0.006 (0.020)	0.011 (0.019)
<i>Controls:</i>				
Job position	no	yes	no	yes
Leading position	no	non	yes	yes
Observations	3,087	3,087	3,087	3,087
Clusters	510	510	510	510

Notes: Establishment level fixed effect regressions. Cluster robust standard errors in parentheses (cluster=establishment). Asterisks report significance levels (1% ***, 5% **, 10% *). All regressions include individual controls. Individual controls are the gender, experience, experience squared, tenure, tenure squared, 5 categories of the highest post graduation degree, a part-time indicator and the family status.

Data source: LPP 2013 employee survey, men employees only.

Table B5: Career development of immigrants (men only)

Dep. var.	appraisal assessment participation		subjectively perceived development	
	across establishments	within establishments	across establishments	within establishments
	(1)	(2)	(3)	(4)
immigrant (ysm<20yrs.)	-0.136*** (0.051)	-0.096* (0.051)	-0.566*** (0.163)	-0.415** (0.169)
immigrant (ysm≥20yrs.)	-0.091*** (0.034)	-0.058* (0.033)	-0.113 (0.088)	-0.080 (0.096)
immigrant (second gen.)	-0.099*** (0.031)	-0.063** (0.029)	-0.100 (0.081)	-0.014 (0.091)
Observations	3,085	3,074	3,057	3,057
Clusters	509	509	510	510

Notes: Marginal effects. Columns 1 and 2 are probit, columns 3 and 4 are OLS specifications. Columns 2 and 4 are correlated random effects specifications with control for establishment level heterogeneity. Cluster robust standard errors in parentheses (cluster=establishment). Asterisks report significance levels (1% ***, 5% **, 10% *). All regressions include individual controls. Individual controls are the gender, experience, experience squared, tenure, tenure squared, 5 categories of the highest post graduation degree, a part-time indicator and the family status.

Data source: LPP 2013 employee survey, men employees only.

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