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**Working Paper**

## Wages of migrant and native employees in Germany: New light on an old issue

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# IAB-DISCUSSION PAPER

Articles on labour market issues

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## **10|2019** Wages of migrant and native employees in Germany: new light on an old issue

Stephan Brunow, Oskar Jost

# Wages of migrant and native employees in Germany: new light on an old issue

Stephan Brunow (University of Applied Labour Studies),  
Oskar Jost (IAB Regional Research Network),

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

The German workforce is expected to decline in future and labour-oriented immigration should counteract labour shortages. Fair wages in Germany set incentives for foreigners to immigrate there. Therefore this paper aims to shed new light on the decomposition of the wage gap between foreign and native full-time employees. Using the Mincerian wage equation and the threefold Oaxaca-Blinder decomposition reveals that the wage gap is mostly explained by observable characteristics (endowments), especially location, labour market experience and firm characteristics. Productivity differences can be disregarded with the exception of labour market experience, as foreigners have much flatter experience profiles than native workers. This effect holds for several specifications and potential selectivity and vanishes for foreigners that have resided in Germany for at least ten years and naturalised foreigners. Our results lead to the conclusion that “discrimination” is negligible from an economic point of view and foreigners receive equal pay.

## Zusammenfassung

Voraussichtlich wird die Zahl der in Deutschland beschäftigten Arbeitskräfte zukünftig und demografisch bedingt sinken. Um Fachkräfteengpässen entgegenzuwirken, rückt eine arbeitsmarktgesteuerte Zuwanderung in den Vordergrund. Eine faire und adäquate Entlohnung der zugewanderten Arbeitskräfte setzt die notwendigen Anreize für eine Einwanderung. Das vorliegende Papier analysiert daher das Lohngefälle zwischen ausländischen und einheimischen Vollzeitbeschäftigten. Die Ergebnisse der dreiteiligen Oaxaca-Blinder-Zerlegung auf Basis einer Mincer-Lohnleichung zeigen, dass das Lohngefälle zum Großteil durch beobachtbare Unterschiede in der Ausstattung erklärt werden. Insbesondere Arbeitsmarktregion, Arbeitserfahrung und Firmenmerkmale tragen dazu bei. Unterschiede in der Produktivität können vernachlässigt werden mit der Ausnahme der Arbeitsmarkterfahrung. Hier zeigen sich flachere Erfahrungsprofile der ausländischen Beschäftigten. Die Ergebnisse sind robust und zeigen sich für verschiedene Modellspezifikationen, die u.a. die Selektivität der ausländischen Beschäftigten berücksichtigen. Etwaige Produktivitätsnachteile verschwinden für Ausländer, die mehr als zehn Jahre in den Daten beobachtet oder eingebürgert werden. Unsere Ergebnisse führen zu dem Schluss, dass Lohnunterschiede aus ökonomischer Sicht vernachlässigbar sind und vollzeitbeschäftigte Ausländer im Durchschnitt fair entlohnt werden.

## JEL-Classification

J31, J60, R23

## Keywords

Migrant pay gap, Mincer wage equation, inequality, Oaxaca-Blinder decomposition

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# 1 Introduction

Germany is not regarded as a traditional immigration country like Australia, Canada and the US although it has a long history of immigration. In per capita terms Germany has had higher immigration rates than the US since the Second World War according to Schmidt/Zimmermann (1992). This is due to the large inflow of low-skilled guest workers from Italy, Greece and Turkey during the period of the German Economic Miracle from 1955 onwards. The trend of low-skilled immigration to Germany continued in the 1990s with the influx of ethnic German immigrants and refugees, and persisted until the global financial crisis in 2008/2009. The crisis led to a significant increase in more skilled labour inflow from Greece, Italy, Portugal and Spain because of the high unemployment rates in those countries. Due to the good economic conditions in Germany labour demand is still increasing today, which is why German policy aims to attract workers from abroad.

A related aspect is the economic integration of immigrants, as measured by two crucial factors: unemployment and wages in the host country. Regarding wages, prior experience in Germany has led to the assumption that immigrants earn less than native workers because on average they still have lower education levels. Politicians often take this up in heated discussions. In this paper, we take one aspect of this debate and analyse the immigrant wage gap. In doing so, we consider several important issues that are usually neglected or disregarded. We use extensive data on employees in Germany who are in full-time employment subject to social security contributions. By focusing on this group with its close labour market proximity, we can make statements regarding the recruitment of skilled workers from abroad who also exhibit good labour market proximity. In analysing this, we aim to discover whether these skilled workers from abroad have to reckon with disadvantages in comparison to domestic workers.

Only few studies examine the wage gap structure in such detail and most of the literature therefore suffers from omitted-variable bias. We estimate a Mincerian wage equation, employ the threefold Oaxaca-Blinder decomposition, underpin the findings using the quantile decomposition according to Chernozhukov/Fernández-Val/Melly (2013) and perform substantive robustness tests. Our results yield new evidence on an old issue: first, our results reinforce previous suggestive evidence obtained by Dustmann/Glitz (2011) or Barrett/McGuinness/O'Brien (2012) that low-skilled migrants earn higher wages than comparable Germans. Second, our results show that the absolute majority of the wage gap is explained by observable factors: mainly due to differences in the location, the individual's labour market experience in Germany and firm characteristics. Third, the effect of differences in coefficients, and thus in productivity, is negligible from an economic point of view, as is shown by the threefold decomposition. Therefore, employers pay migrants and Germans equally for the same labour market characteristics. However, our results also indicate that returns to labour market experience on the German labour market are lower for migrants than for native workers (Schmidt 1997, Zibrowius 2012).

The paper is structured as follows. Section 2 provides a literature review. Section 3 discusses the estimation method and the indicated issues. The data, the variables employed and a descriptive analysis are presented in Section 4. Section 5 reports and discusses the results of the Oaxaca-Blinder decomposition and, finally, section 6 concludes.



## 2 Literature review

For Germany, empirical evidence shows a notable entry pay gap between migrants and Germans of up to 56.6 percent (Lehmer/Ludsteck 2011, 2015). Dustmann/Glitz (2011) regard this pay gap as particularly high compared to other countries with large migration inflows over the last decades. However, there is a consensus in the literature that wage differentials do not exclusively imply economic discrimination. On the one hand, migrants may have lower reservation wages (Nanos/Schluter 2014) and may therefore be more likely to accept job offers with relatively low wages. On the other hand, differences in occupational choice, qualification structure (Hofer et al. 2017; Aldashev/Gernandt/Thomsen 2012), individual experience (Chiswick 1978) or search frictions (Hirsch/Jahn 2015) may constitute alternative explanations of wage differentials. Moreover, there is substantial debate surrounding the forced selection or self-selection of foreigners into specific occupations and tasks resulting in lower wages (Aydemir/Skuterud 2008; Bosseler 2014) but also explained by language barriers (Barrett/McGuinness/O'Brien 2012; Chiswick/Miller 2002, 2003; Himmler/Jäckle 2017).

In contrast, Ottaviano/Peri (2005) assume that migrants broaden the human capital basis of an economy despite their language deficits by providing knowledge specific to their country of origin. Studies that focus on this transferability of knowledge reveal that such a channel is modest. It is either rather weak and depends on the country of origin (Coulombe/Grenier/Nadeau 2014) or simply does not exist (Blackaby et al. 2002). According to Basilio/Bauer/Kramer (2017), the influence of human capital transferability on the whole can be disregarded for Germany. However, there is clear consensus regarding the assimilation of migrants as indicated by Chiswick (1978): in the long run migrants acquire knowledge specific to their country of destination, such as skills in the language spoken there. Thus, the wage gap declines over time (Lehmer/Ludsteck 2011, 2015; Hofer et al. 2017).

The brief literature review has shown that wage differences between migrants and domestic workers are to be expected. In order to be able to analyse these differences in more depth, it is necessary to consider various causes, such as selectivity and comparability to obtain precise estimates.

## 3 Estimation issues and strategy

To analyse the wage differential we build on the Mincerian wage equation as a theoretical workhorse. We employ the threefold decomposition according to Oaxaca (1973), Blinder (1973) and Jones/Kelley (1984) (hereafter OB decomposition), which divides the wage differential into three parts: first, an explained part consisting of differences in endowments; second, an unexplained part, consisting of differences in coefficients and, third, an interaction term. The unexplained part is often referred to as discrimination, although it contains all unobservable factors. As the coefficient effect indicates differences in the slopes of the estimated wage equations for the two groups, we relate this to productivity differentials according to the Mincerian wage equation. If no significant differences in the coefficients can be observed, we conclude that foreigners possess the same productivity levels as native workers.

The choice of the reference group – typically randomly selected Germans – might not be appropriate. Bergmann (1971), Oaxaca/Ransom (1994, 1999) and Elder/Goddeeris/Haider (2010) show that native employees may earn higher wages than their marginal product due to selection and the crowding-out that increases the discrimination element of the decomposition.

In this vein, Lehmer/Ludsteck (2015) determine their reference group in firms employing both migrants and native workers. On the one hand, this takes firm-specific effects into account. On the other hand, such an approach does not take into consideration potential discrimination within the firm. Ideally, the reference group should thus consist of individuals that are neither preferred nor discriminated by employers.

We take this issue as the starting point for our paper and consider two German comparison groups in order to overcome the problem of potentially biased reference groups: Germans who work in solely German firms (Group 1) and those who work in firms also employing foreigners (Group 2). Group 3 refers to the foreigners. Germans working in solely German firms are neither preferred nor discriminated as we expect no systematic favouring within the firm for this group. It consists of Germans working for employers who had not employed any foreigners since 2010. The second reference group consists of Germans who work in firms with migrants, serving as an orthodox reference group. As mentioned earlier, this reference group is potentially biased as it could be positively discriminated (preferred) within the firm. This orthodox group serves as a comparison to our novel approach. Furthermore, with the aid of the available employment biographies we identify naturalised foreigners (Germans who were previously registered as foreigners) and exclude them from our data, as this could result in potentially biased estimates. This group is considered later in our robustness checks.

We pursue two strategies to take firm-specific effects into consideration. First, we control for firm covariates related to firm productivity differentials. Second, we use the Card/Heining/Kline (2013) firm-specific effects. These effects take into account the establishment-specific wage premiums that are not explained by the employees' endowment levels, such as collective agreements or management style.

Additionally, we demonstrate that the path dependency of the Oaxaca-Blinder decomposition does not influence the economic interpretation of our results. Finally, and most importantly, we carefully consider the potential (forced) selectivity of foreigners into poorly paid jobs, which is often treated rather superficially in existing literature. Several robustness checks are performed, such as selectivity into occupations or task levels. In addition, we examine typical and untypical occupations as comparison groups (Ludsteck 2014). Furthermore, we compare foreigners that exhibit high upward mobility during their employment periods in Germany, which is a group of migrants that potentially escape forced selection or discrimination.

## 4 Data source, variables and descriptive analysis

We use a special sample of the Integrated Employment Biographies (IEB) provided by the Institute for Employment Research (IAB). The IEB covers about 92 percent of the entire German labour force, excluding civil servants, the self-employed and trainees. Our data basis comprises a ten percent sample of all foreign employees in Germany (group 3). It also includes a ten percent sample of German employees working in “German-only” firms (group 1) and an oversampled group of about 20 percent of German employees (group 2) working in mixed firms.<sup>1</sup> For our purpose, we examine a cross-section of individuals in employment covered by social security as of 15 September 2015. In contrast to previous studies we do not limit our sample to men only, in order to better represent the German labour force.

Although unobserved individual heterogeneity could be better controlled for in a panel setting, most of the variables of interest here would be collinear with the individual effect or provide little within-variation and are therefore difficult or impossible to identify. We therefore use the workers’ employment histories to construct measures related to individual heterogeneity. Another disadvantage of a panel structure is that changes in productivity due to technological progress would affect the coefficient effect in the OB decomposition, thereby resulting in an unclear picture of wage differentials: technological progress cannot be separated from “discrimination” if there is a bias in labour demand that is driven by technological change.

We derive measures at higher levels of aggregation, such as the firm level, industry and region, via a unique identifier. We restrict our sample to employees working full-time on the reference day, as we have no information on working hours.<sup>2</sup> Considering only full-time employees has some important implications that are worth discussing. Migrants that work full-time tend to be better integrated and are therefore potentially less likely to be crowded into specific tasks, occupations and part-time employment. Their language skills might be better and we thus assume that migrants working full-time are better off compared to part-time workers. Therefore, our analysis looks at the most relevant migrant target group from the perspective of policy aimed at attracting workers from abroad.

Moreover, we only examine observations with valid information on nationality. Since most second-generation migrants in Germany are likely to be registered as Germans, our approach is limited to primary first-generation migrants. However, this limitation does not conflict with our research question as we focus on migrants who did not pass through the German school system. As a result, these migrants not only have a certain “handicap” in terms of knowledge and human capital specific to Germany, but are also confronted with language barriers. In this context, our approach enables us to identify potential deviations in the coefficient effect, which can help to determine crucial explanations of wage differentials between the groups. On the basis of the employment histories, we excluded all individuals who entered Germany as foreigners and subsequently acquired

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<sup>1</sup> For robustness checks we also weight cases with the share of foreigners in a comparison with group 2 to address a potential oversampling of Germans employed in larger firms.

<sup>2</sup> Part-time workers account for about 26 % of all workers in all three groups; there is therefore no specific bias in the sample in this respect. We add part-time workers in several robustness checks.

German citizenship. This group of naturalised employees is later used as another comparison group in the robustness section, since this group seems to perform particularly well on the labour market.

Finally, we apply two important data correction methods. The first relates to the imputation of the education variable as suggested by Fitzenberger/Osikominu/Völter (2005) to correct for implausible and missing information. Building on that, we only use observations with valid information on education attainment. The second correction is suggested by Card/Heining/Kline (2013) and imputes wages above a truncation value equivalent to the upper earnings limit for social security contributions. This limit is typically exceeded by highly skilled individuals; we therefore perform a robustness check on a subsample excluding the highly skilled employees.

Based on the entire employment biographies, we construct several measures to capture individual characteristics, which are presented in Table 1.

**Table 1: Individual characteristics**

Variable	Description
<b>Personal characteristics (INDIVID)</b>	
Gender	Indicator of gender (1=female, 0=male)
Age	Categorical variable representing the individual's age, consisting of five groups: 16-24 years old, 25-34 years old, 35-44 years old, 45-54 years old, 55-64 years old
<b>Educational attainment and vocational training (EDUC)</b>	
School qualification <sup>1)</sup>	Categorical variable of highest school qualification, consisting of three groups: no school qualification, intermediate school-leaving certificate and upper secondary school-leaving certificate (Abitur / higher education entrance qualification)
Vocational qualification <sup>1)</sup>	Categorical variable of highest vocational qualification, consisting of three groups: no vocational qualification, vocational qualification and university degree
<b>Labour market experience (Exp)</b>	
Observed time in data	Categorical variable indicating four quantiles of the distribution of years observed in the data
Share of time in data not employed	Categorical variable representing the share of time observed in which a worker was not in employment: <5%, >5% and <10%, >10% and <25% and >25% and <75%
Ln mean duration	Log of no. of years working per firm
Ln firm duration	Log of years working in current firm
<b>Selectivity-related variables on location, industry and occupation</b>	
Regions (LM-REGION)	Categorical variable encompassing 141 labour market regions in Germany.
Occupation (OCC)	Categorical variable encompassing 50 occupations according to the occupational classification system KldB 2010 (related to ISCO-08)
Task level (TASK)	Categorical variable representing three different task levels of the job. It consists of three groups: auxiliary activity (helper), trained/ professional assistant, and specialist/ expert
Industry (IND)	Categorical variable encompassing 96 distinct industries at the 2-digit level according to the German classification scheme WZ 2008 (NACE Rev. 2.)
Supervisor	Dummy variable indicating if an employee is a supervisor

1) A correction procedure was applied for both variables (Fitzenberger/Osikominu/Völter 2005).

Source: Own illustration.

Differences in firm performance lead to wage differentials that are not related to individual characteristics. Furthermore, there might be unobserved selectivity of workers into different firms such that firm and individual characteristics are interrelated. Not controlling for firm characteristics then yields biased results. Table 2 lists the firm characteristics.

**Table 2: Firm characteristics**

Variable	Description
<b>Key firm variables (FIRM)</b>	
Firm size	Categorical variable representing the number of employees and consisting of four groups: 1–9 employees, 10–49 employees, 50–249 employees and above 250
Females	Proportion of females employed in the firm
Youth	Proportion of employees under 35 years of age
Human capital intensity	Two variables capturing the human capital intensity of the firm: first, the proportion of professional assistants employed and second, the proportion of specialists/experts employed, each as a share of total employment in the firm
<b>Characteristics for robustness checks</b>	
Card-Heining-Kline effects	Firm-specific effects defined by Card/Heining/Kline (2013) that capture all unobserved characteristics. These data are available for 2009 and therefore lead to a reduction of case numbers.
Proportion of foreigners	The proportion of foreigners employed in the firm aims to control for firms having previous experience of employing foreigners. In addition, it controls for segregated ethnic communities that exhibit lower productivity levels on average.

Source: Own illustration.

Table 3 provides a descriptive overview of the gross wage distribution between the groups. Germans in solely German firms earn lower wages than migrants. Conversely, Germans in mixed firms earn much higher wages than migrants or Germans in solely German firms do. This picture does not change if we differentiate the employees according to their task levels. These descriptive findings constitute our starting point for subsequent analyses since they partially contradict other studies for the German labour market.

**Table 3: Distribution of daily gross median wages for full-time employees (in Euro)**

Gross daily wage in Euro	Solely German firm		Mixed firm	
	Germans		Germans	Migrants
<b>Total</b>	<b>83.68</b>		<b>121.45</b>	<b>89.23</b>
<b>Task levels</b>				
Auxiliary (helper)	63.43		79.28	67.36
Trained/professional	78.26		109.32	87.94
Specialist/expert	116.63		172.49	149.75

Source: Own calculation based on IEB V12.01.

## 4.1 Oaxaca-Blinder decomposition

For our decomposition purpose, we start by estimating the Mincerian wage equation for each group separately and testing the validity of the ordinary least squares (OLS) results. This is necessary because the OB decomposition builds on linear models. We use normalised coefficients for categorical variables according to Yun (2005): the results can be interpreted as deviations from the mean. We carry out our analysis from the perspective of Germans, which is a matter of choice and does not affect the results. For a better interpretation, the following tables report the estimates in exponential form.

**Table 4: Oaxaca-Blinder decomposition for mean wages with both German groups**

	Solely-German firms			Mixed firms		
	(1)	(2)	(3)	(4)	(5)	(6)
Difference	1.076*** (0.006)	1.076*** (0.006)	1.076*** (0.006)	0.734*** (0.003)	0.734*** (0.003)	0.734*** (0.003)
Endowments	1.037*** (0.007)	1.043*** (0.007)	1.061*** (0.007)	0.742*** (0.003)	0.747*** (0.003)	0.766*** (0.003)
Coefficients	0.992** (0.004)	0.991** (0.004)	0.983*** (0.004)	0.976*** (0.002)	0.970*** (0.002)	0.947*** (0.002)
Interaction	1.046*** (0.007)	1.041*** (0.007)	1.032*** (0.007)	1.013*** (0.002)	1.013*** (0.002)	1.012*** (0.002)
Task FE	yes	no	no	yes	no	no
Occupation FE	yes	yes	no	yes	yes	no
Total no. of obs.	438,528			1,521,318		
No. foreigners	142,305			142,305		
No. Germans	296,223			1,379,013		

Note: Only full-time workers with valid information on educational attainment and vocational qualifications are considered.  
\* 10%, \*\* 5%, \*\*\* 1%, cluster robust s. e. at firm level in ().

Source: Own calculation based on IEB.

Table 5 presents the decomposition for the wage differential between foreigners and Germans working in solely German firms (columns 1 to 3) and Germans in mixed firms (columns 4 to 6). Our main model including all variables listed in Table 1 and Table 2 (without the variables for the robustness checks) is reported in columns 1 and 4. In the other columns we omit the task level and occupational fixed effects, respectively. This approach takes into account a potential glass ceiling and workers being forced into specific tasks and occupations as the between-task and occupation variation potentially increases. Since the omission does not lead to any substantial change in the basic direction of our results, we consider only models 1 and 4 in the following. Nonetheless, we examine the impact of potential crowding and selection on our results in the robustness chapter.

Focusing on the results of our first decomposition (columns 1 to 3) reveals that migrants earn a 7.9 percent higher wage than Germans in solely German firms do. Differences in endowments explain 3.7 percent (about half) of the wage differential in our main model. Accordingly, Germans who work in solely German establishments would have 3.9 percent higher wages if they possessed the same endowments as migrants (evaluated in terms of German productivity levels). Furthermore, even though the coefficient effect, which relates to productivity differentials, indicates significant differences of 0.8 percent (column 1), the economic extent of this effect in monetary terms is negligible. Thus, Germans in solely German firms earn wages that would be 0.8 percent lower if they exhibited the same productivity levels as migrants (evaluated in terms of the currently observed endowment levels of Germans). Finally, the interaction term represents a simultaneous effect of differences in endowment and coefficients. These findings reveal an unexplained wage differential of 4 percent (equivalent to Euro 3.30 per day) to the disadvantage of Germans in our main model. If we omit task levels and occupations (column 3), this deficit for Germans in solely German firms decreases to 1.5 percent, leading to a wage disadvantage of Euro 1.30 per day.

Our second decomposition (columns 4 to 6) shows a much larger wage gap of about 26.6 percent between migrants and Germans in mixed firms. Adjusting the German endowment levels in our

main model (column 4) to the level of migrants would lead to a wage decrease of 25.8 percent for Germans. As a result, given their level of productivity, Germans would earn 0.8 percent higher wages than migrants if they possessed the same endowment levels. This result also illustrates the unexplained wage premium for Germans that arises due to differences in coefficients. This rises to 2.7 percent if we omit the task level and occupations (column 6). This increase can be traced back to growing differences in the coefficient effect, which indicates disadvantages for migrants amounting to between Euro 0.72 and Euro 1.61 of gross daily income.

## 4.2 Detailed analyses of endowment and coefficients

To gain a deeper insight we disentangle the overall effects in Table 5 and group individual characteristics according to the variable groups listed in Table 1 and Table 2. Because of the large data set, statistical significance does not necessarily imply economic relevance. We therefore express the wage differential measured in Euros and are then confronted with the path dependency in the OB decomposition (Fortin/Lemieux/Firpo 2011): the size of each effect varies across different orderings. Since there is no satisfactory solution for this issue, we compute the change in daily gross wages for each of the 40,320 possible combinations and attach the distributional information to Table 5.

Starting with the endowment effect, our first decomposition (column 1) reveals that differences in labour market regions are particularly important for explaining wage differentials. According to this, Germans in solely German firms would earn 9.5 percent higher wages if they exhibited the same distribution across labour market regions as migrants, holding all other variables constant. This implies on average a Euro 7.88 higher gross daily wage (Euro 236.40 per month). Depending on the ordering when computing the effect, it may vary between Euro 6.88 and Euro 8.99 of gross wage per day. Approximately the same wage differential applies for the variable group of firm characteristics. According to this, migrants tend to work in firms that are more productive, as is shown by Brunow/Nijkamp (2018).

However, our results reveal large disadvantages for foreigners in terms of labour market experience. If Germans possessed the same level of labour market experience as migrants, they would earn about 9.3 percent lower wages. This result is mainly due to the younger age structure of migrants. In addition, the most recent migrant cohorts resulting from the EU's eastward expansion have little labour market experience in Germany.

Regarding the industry, occupation and task levels, we also see differences in endowment levels: compared to Germans in solely German firms, migrants tend to work in industries and occupations with lower average wages. Remarkably, no significant differences can be observed between the groups with regard to education levels. The wage gap between these groups cannot therefore be explained by differences in education.

The coefficient effect for the first decomposition reveals hardly any important differences in productivity between the groups, apart from experience. The results show that the productivity differential associated with experience is about -5 percent, which is offset by unobserved factors captured by the constant. Therefore, if Germans in solely German firms were adjusted to the productivity returns associated with the experience of foreigners, they would suffer a wage loss of

about 5 percent. However, this deficit is neutralised by unobserved heterogeneity (constant), which favours migrants.

**Table 5: Detailed decomposition of the effects**

Decomposition	Solely-German firms				Mixed firms			
	(1)	Wage gap in Euro			(2)	Wage gap in Euro		
		Min	Mean (s.d.)	Max		Min	Mean (sd)	Max
<b>Endowments</b>								
RAM	1.095*** (0.002)	6.88	7.88 (0.46)	8.99	1.015*** (0.001)	1.38	1.63 (0.18)	1.91
IND	0.977*** (0.002)	-2.38	-2.02 (0.14)	-1.71	0.967*** (0.002)	-4.22	-3.64 (0.35)	-3.11
OCC	0.984*** (0.001)	-1.64	-1.39 (0.10)	-1.17	0.959*** (0.001)	-5.26	-4.56 (0.43)	-3.92
TASK	0.977*** (0.001)	-2.36	-2.00 (0.14)	-1.69	0.959*** (0.001)	-5.18	-4.49 (0.42)	-3.86
INDIVID	1.018*** (0.001)	1.29	1.54 (0.10)	1.82	1.004*** (0.000)	0.36	0.43 (0.05)	0.51
EDUC	0.999 (0.001)	-0.13	-0.11 (0.01)	-0.09	0.974*** (0.001)	-3.33	-2.87 (0.28)	-2.45
EXP	0.907*** (0.002)	-9.63	-8.47 (0.57)	-7.42	0.901*** (0.001)	-12.59	-11.23 (0.78)	-9.97
FIRM	1.093*** (0.005)	6.78	7.77 (0.46)	8.87	0.933*** (0.002)	-8.60	-7.56 (0.63)	-6.59
<b>Coefficients</b>								
RAM	0.996** (0.002)	-0.38	-0.37 (0.01)	-0.35	0.978*** (0.002)	-2.34	-2.09 (0.11)	-1.87
IND	0.998 (0.006)	-0.15	-0.15 (0.00)	-0.14	0.994 (0.004)	-0.63	-0.55 (0.03)	-0.49
OCC	1.005* (0.003)	0.43	0.45 (0.01)	0.47	1.009*** (0.003)	0.71	0.80 (0.04)	0.91
TASK	0.998 (0.008)	-0.16	-0.15 (0.00)	-0.14	0.979*** (0.007)	-2.17	-1.94 (0.11)	-1.73
INDIVID	0.999 (0.001)	0.05	0.05 (0.00)	0.06	0.995*** (0.001)	0.45	0.51 (0.03)	0.57
EDUC	1.008** (0.003)	0.68	0.71 (0.02)	0.74	1.005** (0.002)	0.39	0.45 (0.02)	0.50
EXP	0.951*** (0.004)	-4.46	-4.38 (0.04)	-4.31	0.931*** (0.003)	-7.27	-6.66 (0.34)	-6.09
FIRM	0.987 (0.010)	1.13	1.17 (0.03)	1.21	1.115*** (0.013)	9.49	10.18 (0.44)	10.91
Constant	1.051***		4.41		0.980		-1.90	

Note: \* 10%, \*\* 5%, \*\*\* 1%, cluster robust s. e. at firm level in ().

Source: Own calculation based on IEB.

In our second decomposition addressing foreigners and Germans in mixed firms (column 2 in Table 5) we see some deviations from our previous findings. Considering the endowment effects, a substantial overlap in the labour market regions follows and therefore the location effect (RAM) becomes much smaller. The differences in industry, task levels and occupations, individual and



educational characteristics and experience show no new insights or deviations, although the effects are slightly larger. Nevertheless, differences in characteristics related to firm productivity (FIRM) explain wage differences. Although the sampling method ensures that Germans and foreigners working for the same employer are included, a skewed distribution of firm characteristics still results. These differences are not due to productivity differences, which are taken into account by the coefficient effect and are evaluated in the next section.

With regard to differences in productivity that are significant in economic terms, only firm characteristics are relevant: Differences in coefficients lead to a wage increase of about 11.5 percent to the advantage of foreigners. This again indicates that foreigners are typically employed in more productive firms. Regarding differences in experience, the coefficients show the same picture as in the first decomposition. Accordingly, migrants exhibit flatter experience curves compared to Germans. This phenomenon of flat experience curves was already found and discussed by Bosseler (2014), Schmidt (1997) and Zibrowius (2012).

## 5 Discussion and robustness

Our findings yield insights into employers' strategies: they pay the same wage to either Germans or foreigners for the same job. Almost the whole wage gap is explained by individual and firm characteristics, i. e. endowments. However, this does not mean that foreigners are treated equally. The evidence suggests that foreigners have flatter experience curves, indicating that productivity does not increase to the same extent for foreigners relative to both groups of Germans. Because most of the findings do not depend on the German comparison group, our results show clearly that potential advantages or disadvantages of each comparison group do not alter the general picture. In contrast to existing literature, our evidence suggests that – depending on the comparison group – especially the endowment effects differ in size and lead to a more or less pronounced, unexplained “discrimination” factor.

Although the effect seems less significant, foreigners working full-time can nonetheless be forced into low-productivity occupations or lower-level tasks and may be overqualified for their work. In the following section, we focus on these kinds of selectivity. Selectivity into regions is less important because the decomposition shows that migrants are not disadvantaged by their location; i. e. it is explained by endowments.

### 5.1 Wage assimilation due to German labour market experience

The debate between Chiswick (1978) and Borjas (1987, 1991) addresses the long-run assimilation. For Germany, Lehmer/Ludsteck (2015) demonstrate strong and significant wage improvements for foreigners over time, whereas Licht/Steiner (1994), Schmidt (1997) and Zibrowius (2012) find flat experience wage profiles, like we do. According to the Mincerian wage equation, identifying the slopes is more appropriate if there is a large overlap in observables between the groups. We therefore use a matching approach following Blackwell et al. (2009) to reduce a potential imbalance in

observables for the following variables: the age and experience structure, gender, educational attainment and location. Occupations and tasks are not examined as we aim to investigate the variance in these variables.

Appendix A shows the results and reveals smaller differences in wages and productivity differentials. Most importantly, the difference between the experience coefficients decreases to a negligible extent in economic terms for both comparison groups. We therefore conclude that previous findings of differences in productivity are the result of identifying the effects, i. e. slopes, driven by different sample distributions and not due to discrimination.

Furthermore, consistent with the findings obtained by Basilio/Bauer/Kramer (2017) and Blackaby et al. (2002), our results indicate that on average the potential labour market experience gained by foreigners abroad is negligible. Otherwise we would expect higher productivity of migrants than German peers, which is not the case.

## 5.2 Different immigration cohorts and age groups

As selectivity into specific occupations could arise due to different immigration dates, we split the decompositions into two groups: employees who are observed in our data for less and more than ten years, respectively (Appendix B). The estimations include all variables as before and show a decreasing difference in almost all coefficients for workers observed for more than ten years. This also substantiates the previous check on assimilation. The differences in productivity for the young cohort are comparable with our previous findings though slightly smaller.

As before, the endowment effect explains most of the wage gap for both groups. To take into consideration potential language barriers or lack of country-specific knowledge, we split our groups into five age categories, each covering ten years. In addition to examining workers with more and less than ten years of observation in the data, this approach is better able to capture the selectivity into specific occupations of different immigration waves and their educational level. The overall picture does not change (see Appendix C). Both decompositions show on average flatter experience curves for migrants than for Germans, which are already found in our main model Table 4.

## 5.3 Selectivity into tasks and occupations

We place a special focus on selectivity into tasks and occupations, since migrants may work in jobs for which they are overqualified due to language barriers or other sources of crowding. If migrants are pushed into low-productivity occupations and tasks, we expect pronounced differences in coefficients because their productivity profile should generate additional benefits. However, our decompositions Table 4 which exclude task-related and occupational information, show that most of the wage gap is still explained by endowments rather than by productivity or coefficient differentials. Furthermore, there is hardly any change in the estimates of the variables if tasks and occupations are omitted. This indicates not only that there is no variable bias, but also that on average migrants do not have a steeper productivity profile. The main explanations for the wage differentials thus remain distinct endowments, especially in labour market experience, and firm characteristics.

In addition, following Ludsteck (2014), we compare the outcomes of a decomposition for occupations with large and small proportions of migrants. Larger deviations would indicate a certain selectivity into occupations. In spite of the previous robustness check, we split the decompositions for workers according to whether they have been observed for more or less than ten years. The results are provided in Appendix D and show deviations from our previous outcomes. The wage differential compared to Germans in solely German firms increases for foreigners if occupations with a small share of foreigners are examined. Whereas the coefficient effects for experience show similar results, productivity among foreigners is now evaluated slightly better in the occupation fixed effects. Thus, foreigners yield higher returns than Germans on average in these occupations. This is not surprising, as foreigners are not “usually” employed in these occupations and therefore provide some unobserved specificity, as suggested Ottaviano/Peri (2004). Moreover, endowments explain 51 percent of the differential. For mixed firms the results are similar to our previous findings, as almost the whole wage differential for occupations with large and small proportions of migrants is explained to a slight disadvantage for foreigners. As regards productivity, the coefficient effect remains the same as in the main decomposition, in particular with regard to labour market experience. We therefore conclude that even if the issue of selectivity into tasks and occupations is present, our decomposition results on productivity differences are barely affected and the picture does not change substantially.

In addition to the proven methods addressing selectivity, we have constructed two special groups of foreign “upgraders”. These are foreigners that experience a wage growth beyond the 75th (overachiever) and 90th (super-overachiever) percentile of the wage growth distribution during the course of their employment biography. We assume that they are no longer affected by “negative” selection, as they have escaped this issue. The results indicate no different picture for this special group, either. We therefore conclude again that the selectivity issue is not too serious for our decomposition.

## 5.4 Education

A potential bias in the results might occur when there are significant productivity differentials between educational groups, especially with respect to experience. Such between-educational-group variations are only controlled for by linear indicator effects. We therefore split the sample into three groups: no vocational qualification, vocational qualification, and university degree holders. With respect to data quality, high-skilled workers typically earn more than the upper earnings limit for social security contributions and may therefore be a poor comparison group, especially when the wage imputation method predicts less valid wages. The results are shown in Appendix E and confirm the previous evidence. Nonetheless, flatter experience curves are observed for foreigners, in particular for the group of individuals with no vocational qualifications, and smaller differences are found for high-skilled workers, as expected.

## 5.5 Gender

As our results include males and females, differences between the two groups with regard to gender diversity e. g. differences in occupational choice, can be expected. This diversity may lead to biased results when the between-gender variation dominates. We therefore split the sample and

look at the two groups separately. The results can be seen in Appendix F. Again, the picture remains unchanged: regional selectivity, labour market experience and firm characteristics are the main determinants of the wage differential. The same applies for the coefficient effect for labour market experience. Thus, the overall picture of our decompositions is confirmed here. Women and men are treated quite equally.

## 5.6 Individual-specific and firm-specific effects

So far we have reduced the omitted variable bias of uncontrolled unobserved individual heterogeneity by including observable factors that are constructed on the basis of the entire employment history. Because this does not solve the problem entirely, we estimate an individual fixed-effects model using each individual's full employment history and taking into account regional, industrial and occupational indicators, indicators of full-time employment covered by social-security, age and educational attainment and vocational qualifications. The control variables take into account individual changes during the life course. We then absorb the fixed effect from this regression, which captures all time-constant unobserved individual heterogeneity, such as language skills, and add it to the OB decomposition (Appendix H). Again, the overall conclusion and the direction of effects remain unchanged, although the coefficient effect of experience decreases slightly. Therefore, the potential omitted-variable bias is small and controlling for unobserved heterogeneity does not alter the results.

Another factor contributing to wage differentials is uncontrolled unobserved firm heterogeneity driven, for example, by different management styles or collective bargaining agreements. The inclusion of Card/Heining/Kline (2013) firm-specific effects controls for unobserved firm characteristics (Appendix H).<sup>3</sup> Because data are only available until 2009, we face a restricted data set consisting of mature firms. However, including the firm-specific effects leads to more pronounced endowment effects and shows that unobserved firm characteristics explain the wage differential even better. The overall picture is confirmed once again. The same applies if we decompose the wage differential within firms: the results remain unchanged. Alternatively, we add the average firm wage as a direct measure of firm productivity, which raises endogeneity issues. However, there is little change in the results.

## 5.7 Naturalisation of foreigners

Naturalised foreigners usually exhibit a closer proximity to the labour market and longer presence in the country. In the following we compare this group with our two groups of German employees in Appendix I. The results underpin our findings that foreign workers who have been in the country longer and have been naturalised experience no significant disadvantages compared to native workers. A decomposition of foreigners and naturalised foreigners reveals that almost 100 percent of the wage differential is explained by endowments, and the results of the coefficient effect show the same pattern as a comparison of foreigners with natives. In spite of the integration debate, naturalised foreigners and native workers are treated equally in terms of wages. A potential disadvantage in terms of productivity disappears.

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<sup>3</sup> Considering West Germany only leads to similar results.

## 5.8 Different nationalities of foreigners

Legal access to the German labour market for foreigners differs according to their country of origin. Especially EU citizens have free access to the German labour market, while specific regulations exist for non-EU citizens, which depend on the skill level and in some cases require an employer to obtain permission for the worker to enter Germany for the purpose of taking up employment. We therefore split the sample into subgroups (EU15; EU8 new member states; GIPS: Greece, Italy, Portugal and Spain; the countries of former Yugoslavia together with Bulgaria and Romania; Turkey; all other countries) and compare these groups with the two German comparison groups. The results do not diverge from our previous findings (Appendix J) and thus, with few exceptions and slightly different magnitudes of effects, the overall picture remains unchanged.

## 5.9 Quantile decomposition

To expand our decomposition results to cover the entire distribution with a special focus on the margins of the distribution, we use the quantile decomposition according to Chernozhukov/Fernández-Val/Melly (2013). The results for the quantile decomposition are provided in Appendix G<sup>4</sup> and confirm our previous picture. However, Germans in solely German firms earn a slightly higher wage than foreigners in the first 6 deciles (difference is in log wage). At the same time, the results show that adjusting migrants' characteristics to the level of employees in solely German firms would in most cases have a negative effect (endowment effect). Migrants would thus have a slightly lower wage with the same characteristics, which is also indicated by our results in Table 4. Regarding the second decomposition, our results show that migrants in the three lowest deciles would earn higher wages if they possessed the same characteristics. This confirms the findings obtained by other authors, such as Barrett/McGuinness/O'Brien (2012) or Dustmann/Glitz (2011).

# 6 Conclusion

Because Germany's population is expected to shrink, and its labour force along with it, the immigration of especially skilled labour is needed in order to offset the negative consequences of population decline. Since fair wages set an incentive for immigration, our paper explores the wage gap between foreigners with good labour market proximity and native workers in Germany. Although the topic is not new, we shed new light on the wage gap with our approach.

Using a threefold Oaxaca-Blinder decomposition, we find evidence that most of the wage gap can be explained by observable characteristics, i.e. location, firm characteristics and labour market experience in Germany. Productivity differentials, which relate to differences in the coefficients of the Mincerian wage equation, are negligible in economic terms, with the exception of labour market experience. Employers seem to honour experience gained by foreigners less than that of German workers. We see this as evidence of firms being unable to fully recognize and observe foreigners' true productivity, even after controlling for the time employed by the current employer. A sub-

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<sup>4</sup> Unfortunately, due to computational constraints we cannot provide standard errors, as the bootstrapping for our estimations and data would take too long.

sample of “upgrader foreigners”, who have overcome possible discrimination and forced selectivity and been promoted to better paid jobs, still shows flatter experience curves. However, we also find evidence of this effect decreasing in various specifications where foreigners and Germans become more “equal”, and disappearing entirely for foreigners with a longer history on the German labour market (> 10 years), when they then have the same returns to productivity as their German counterparts working in firms that also employ foreigners.

This leads us to the conclusion that on average foreigners with good labour market proximity are paid fair wages equal to those earned by their German colleagues. Entering the labour market we see some average evaluation of foreigners that converge with the German wage structure at least after ten years of experience. Because equal, fair wages set incentives for immigration decision of workers abroad, we conclude therefore that our results are particularly important for recruitment of workers abroad. Furthermore, our results show that selection of foreign workers hardly changes our estimates, but do exist. In order to exploit the full labour market potential of foreign workers in Germany, political action is needed to reduce this kind of selection. One possibility is the recognition of existing educational and vocational qualifications in order to achieve better and immediate integration into the labour market. This would also reduce selection into specific less-paid occupations and tasks.

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# Appendix

## Appendix A: Matching approach and wage gap

	Solely German firms	Mixed firms
<b>overall</b>		
Wage Foreigners	89.954*** (0.943)	92.144*** (0.478)
Wage Germans	85.586*** (0.111)	110.164*** (0.682)
difference	1.051*** (0.011)	0.836*** (0.003)
endowments	1.026*** (0.009)	0.860*** (0.004)
coefficients	0.962*** (0.008)	0.986*** (0.002)
interaction	1.065*** (0.010)	0.987*** (0.003)
<b>endowments</b>		
RAM	1.013*** (0.002)	1.002*** (0.001)
IND	0.975*** (0.003)	0.980*** (0.002)
OCC	0.986*** (0.002)	0.970*** (0.001)
TASK	0.989*** (0.002)	0.970*** (0.001)
INDIVID	1.000 (0.002)	1.000 (0.000)
EDUC	1.000 (0.001)	0.992*** (0.001)
EXP	0.978*** (0.002)	0.990*** (0.001)
FIRM	1.089*** (0.005)	0.948*** (0.003)
<b>coefficients</b>		
RAM	0.996 (0.004)	0.987*** (0.003)
IND	0.998 (0.007)	0.994 (0.005)
OCC	0.997 (0.006)	1.011*** (0.004)
TASK	0.962 (0.025)	0.987 (0.009)
INDIVID	0.992** (0.003)	0.988*** (0.001)
EDUC	0.990 (0.013)	0.995 (0.004)
EXP	0.979* (0.012)	0.980*** (0.003)
FIRM	0.939* (0.031)	1.115*** (0.018)

	Solely German firms	Mixed firms
_cons	1.118*** (0.048)	0.937*** (0.018)
<b>interaction</b>		
RAM	0.999 (0.003)	0.999*** (0.000)
IND	1.015*** (0.006)	0.999 (0.001)
OCC	1.002 (0.004)	0.998 (0.001)
TASK	0.996* (0.002)	1.006*** (0.001)
INDIVID	1.000 (0.001)	1.000 (0.000)
EDUC	1.000 (0.001)	1.001* (0.001)
EXP	1.001 (0.002)	1.002*** (0.000)
FIRM	1.051*** (0.008)	0.983*** (0.003)
<b>N</b>		
N	429,176	1,516,352
No. foreigners	137,191	141,362
No. Germans	291,985	1,374,990
No. of firms	262,384	124,647

Note: All wages are measured in Euro and are computed as the exponential of the mean of log (wages); \* 0.1, \*\* 0.05, \*\*\* 0.01; cluster robust s. e. at firm level in (), threefold Oaxaca-Blinder decomposition.

Source: Own calculation based on IEB.

## Appendix B: Observation period smaller/larger than 10 years

	Solely German firms		Mixed firms	
	<10 years	>= 10 years	<10 years	>= 10 years
<b>overall</b>				
Wage Foreigners	83.163*** (0.428)	99.482*** (0.578)	83.163*** (0.428)	99.482*** (0.578)
Wage Germans	73.819*** (0.133)	88.088*** (0.127)	100.559*** (0.586)	132.156*** (0.838)
difference	1.127*** (0.006)	1.129*** (0.007)	0.827*** (0.004)	0.753*** (0.003)
endowments	1.088*** (0.008)	1.097*** (0.008)	0.855*** (0.004)	0.780*** (0.003)
coefficients	0.990** (0.004)	0.976*** (0.006)	1.013*** (0.003)	0.977*** (0.002)
interaction	1.046*** (0.009)	1.055*** (0.009)	0.955*** (0.003)	0.988*** (0.002)
<b>endowments</b>				
RAM	1.064*** (0.002)	1.105*** (0.002)	1.006*** (0.001)	1.021*** (0.001)
IND	0.985*** (0.003)	0.979*** (0.002)	0.968*** (0.002)	0.975*** (0.002)
OCC	1.001 (0.003)	0.973*** (0.001)	0.985*** (0.001)	0.944*** (0.001)
TASK	0.985*** (0.002)	0.974*** (0.001)	0.976*** (0.001)	0.953*** (0.001)
INDIVID	1.025*** (0.003)	1.022*** (0.001)	1.060*** (0.002)	1.009*** (0.000)
EDUC	1.016*** (0.002)	0.977*** (0.001)	0.986*** (0.001)	0.953*** (0.001)
EXP	0.940*** (0.003)	0.973*** (0.001)	0.926*** (0.002)	0.962*** (0.001)
FIRM	1.077*** (0.005)	1.101*** (0.006)	0.944*** (0.002)	0.940*** (0.002)
<b>coefficients</b>				
RAM	0.997 (0.002)	0.997 (0.004)	0.982*** (0.003)	0.994 (0.004)
IND	0.984* (0.008)	1.008 (0.006)	0.975*** (0.007)	1.003 (0.005)
OCC	1.010** (0.005)	1.005 (0.004)	1.016*** (0.005)	1.009*** (0.003)
TASK	0.961** (0.015)	1.007 (0.009)	0.969** (0.013)	0.981** (0.008)
INDIVID	0.971*** (0.005)	0.955** (0.019)	1.042*** (0.004)	0.944*** (0.018)
EDUC	0.996 (0.007)	1.003 (0.004)	1.002 (0.004)	1.003 (0.003)
EXP	0.950*** (0.006)	1.050*** (0.003)	0.918*** (0.004)	1.004 (0.003)
FIRM	0.985 (0.016)	0.992 (0.012)	1.120*** (0.020)	1.106*** (0.015)
_cons	1.148*** (0.029)	0.962 (0.025)	1.000 (0.023)	0.940** (0.025)

	Solely German firms		Mixed firms	
	<10 years	>= 10 years	<10 years	>= 10 years
<b>interaction</b>				
RAM	0.988*** (0.003)	1.002 (0.005)	1.000 (0.001)	0.999 (0.001)
IND	1.009** (0.004)	1.024*** (0.003)	0.998 (0.002)	0.998 (0.001)
OCC	0.977*** (0.003)	0.985*** (0.002)	0.980*** (0.002)	0.999 (0.002)
TASK	1.006** (0.003)	1.000 (0.001)	1.003** (0.001)	1.006*** (0.002)
INDIVID	1.010*** (0.003)	0.997*** (0.001)	0.972*** (0.002)	0.999** (0.000)
EDUC	1.001 (0.002)	0.996** (0.002)	1.002** (0.001)	1.000 (0.001)
EXP	1.012*** (0.003)	1.004*** (0.001)	1.033*** (0.002)	1.003*** (0.001)
FIRM	1.044*** (0.006)	1.046*** (0.006)	0.968*** (0.002)	0.984*** (0.002)
<b>N</b>				
N	114,826	323,702	335,645	1,185,673
No. foreigners	62,910	79,395	62,910	79,395
No. Germans	51,916	244,307	272,735	1,106,278
No. of firms	86,451	207,140	78,474	103,050

Note: All wages are measured in Euro and are computed as the exponential of the mean of  $\log(\text{wages})$ ; \* 0.1, \*\* 0.05, \*\*\* 0.01; cluster robust s. e. at firm level in (), threefold Oaxaca-Blinder decomposition.

Source: Own calculation based on IEB.

## Appendix C I: Age groups; comparison with solely German firms and mixed firms

Comparison with solely German firms

	16–24 years	25–34 years	35–44 years	45–54 years	55–64 years
<b>overall</b>					
Wage Foreigners	65.027*** (0.344)	89.887*** (0.483)	96.454*** (0.633)	94.306*** (0.562)	95.670*** (0.570)
Wage Germans	66.923*** (0.159)	78.088*** (0.127)	86.727*** (0.183)	91.805*** (0.189)	89.958*** (0.249)
difference	0.972*** (0.006)	1.151*** (0.006)	1.112*** (0.008)	1.027*** (0.006)	1.063*** (0.007)
endowments	0.929*** (0.010)	1.124*** (0.009)	1.090*** (0.012)	1.000 (0.009)	1.017* (0.010)
coefficients	0.987* (0.008)	1.009 (0.005)	1.002 (0.006)	0.986** (0.007)	1.007 (0.011)
interaction	1.060*** (0.014)	1.015* (0.009)	1.019 (0.012)	1.042*** (0.011)	1.039*** (0.014)
<b>endowments</b>					
RAM	1.048*** (0.003)	1.087*** (0.002)	1.099*** (0.003)	1.090*** (0.003)	1.120*** (0.005)
IND	0.964*** (0.006)	0.985*** (0.002)	0.987*** (0.003)	0.968*** (0.003)	0.961*** (0.003)
OCC	1.000 (0.005)	1.006*** (0.002)	0.984*** (0.002)	0.964*** (0.002)	0.958*** (0.003)
TASK	0.976*** (0.005)	0.995*** (0.001)	0.978*** (0.002)	0.969*** (0.002)	0.963*** (0.003)
INDIVID	1.001*** (0.000)	1.008*** (0.000)	1.016*** (0.001)	1.024*** (0.001)	1.018*** (0.001)
EDUC	0.981*** (0.002)	1.028*** (0.002)	1.004* (0.002)	0.975*** (0.003)	0.971*** (0.003)
EXP	0.903*** (0.005)	0.937*** (0.003)	0.936*** (0.007)	0.926*** (0.004)	0.948*** (0.003)
FIRM	1.061*** (0.008)	1.081*** (0.006)	1.093*** (0.007)	1.097*** (0.007)	1.091*** (0.007)
<b>coefficients</b>					
RAM	1.003 (0.004)	1.005 (0.003)	0.994* (0.003)	0.984*** (0.004)	1.001 (0.006)
IND	1.020* (0.011)	0.997 (0.007)	1.001 (0.006)	1.003 (0.008)	1.000 (0.009)
OCC	0.998 (0.013)	0.999 (0.004)	1.003 (0.005)	1.012** (0.006)	1.009 (0.007)
TASK	1.002 (0.047)	1.018 (0.015)	1.010 (0.014)	1.025* (0.015)	0.996 (0.021)
INDIVID	1.002** (0.001)	0.997*** (0.001)	0.989*** (0.001)	0.991*** (0.001)	0.996*** (0.001)
EDUC	0.993 (0.017)	1.004 (0.006)	0.994 (0.007)	0.992 (0.006)	1.017** (0.008)
EXP	0.952*** (0.011)	1.006 (0.006)	1.010 (0.017)	0.945*** (0.014)	0.913*** (0.018)
FIRM	1.008 (0.029)	0.970* (0.016)	0.977 (0.016)	1.020 (0.017)	1.032 (0.024)
_cons	1.011 (0.060)	1.015 (0.025)	1.024 (0.029)	1.015 (0.029)	1.049 (0.041)

	16–24 years	25–34 years	35–44 years	45–54 years	55–64 years
<b>interaction</b>					
RAM	0.992 (0.005)	0.981*** (0.004)	0.985*** (0.004)	1.000 (0.005)	0.980** (0.009)
IND	1.013 (0.008)	1.013*** (0.003)	1.014*** (0.004)	1.020*** (0.004)	1.035*** (0.006)
OCC	0.987* (0.008)	0.994** (0.003)	0.984*** (0.003)	0.979*** (0.004)	0.981*** (0.005)
TASK	1.016** (0.007)	1.002 (0.002)	1.002 (0.002)	1.000 (0.003)	1.002 (0.004)
INDIVID	1.002** (0.001)	0.998*** (0.000)	0.996*** (0.001)	0.993*** (0.001)	0.997*** (0.001)
EDUC	1.001 (0.003)	0.994*** (0.002)	0.998 (0.002)	1.000 (0.003)	0.999 (0.004)
EXP	1.027*** (0.007)	0.986*** (0.004)	0.997 (0.007)	1.021*** (0.004)	1.019*** (0.003)
FIRM	1.022** (0.010)	1.047*** (0.007)	1.045*** (0.008)	1.029*** (0.007)	1.028*** (0.009)
<b>N</b>					
N	26,440	105,620	107,365	128,739	70,364
No. foreigners	8,253	37,941	43,758	36,010	16,343
No. Germans	18,187	67,679	63,607	92,729	54,021
No. of firms	24,287	84,666	84,660	97,890	56,027

Note: All wages are measured in Euro and are computed as the exponential of the mean of log(wages); \* 0.1, \*\* 0.05, \*\*\* 0.01; cluster robust s. e. at firm level in (), threefold Oaxaca-Blinder decomposition.

Source: Own calculation based on IEB.

## Appendix C II: Age groups; comparison with solely German firms and mixed firms

Comparison with mixed firms

	16–24 years	25–34 years	35–44 years	45–54 years	55–64 years
<b>overall</b>					
Wage Foreigners	65.027*** (0.344)	89.887*** (0.483)	96.454*** (0.633)	94.306*** (0.562)	95.670*** (0.570)
Wage Germans	81.680*** (0.395)	109.197*** (0.654)	133.901*** (0.966)	140.239*** (0.918)	132.930*** (0.784)
difference	0.796*** (0.004)	0.823*** (0.004)	0.720*** (0.003)	0.672*** (0.003)	0.720*** (0.004)
endowments	0.782*** (0.004)	0.824*** (0.004)	0.753*** (0.004)	0.701*** (0.003)	0.736*** (0.004)
coefficients	0.986*** (0.005)	1.001 (0.003)	0.987*** (0.003)	0.974*** (0.003)	0.980*** (0.005)
interaction	1.033*** (0.006)	0.997 (0.004)	0.969*** (0.003)	0.985*** (0.004)	0.997 (0.005)
<b>endowments</b>					
RAM	1.008*** (0.001)	1.013*** (0.001)	1.013*** (0.001)	1.014*** (0.001)	1.024*** (0.001)
IND	0.963*** (0.002)	0.972*** (0.002)	0.966*** (0.002)	0.957*** (0.002)	0.971*** (0.002)
OCC	0.991*** (0.002)	0.990*** (0.001)	0.954*** (0.001)	0.932*** (0.001)	0.929*** (0.002)
TASK	0.984*** (0.001)	0.983*** (0.001)	0.957*** (0.001)	0.942*** (0.001)	0.947*** (0.001)
INDIVID	1.001*** (0.000)	1.004*** (0.000)	1.003*** (0.000)	1.007*** (0.001)	1.006*** (0.001)
EDUC	0.981*** (0.001)	1.003*** (0.001)	0.969*** (0.001)	0.952*** (0.001)	0.956*** (0.001)
EXP	0.898*** (0.003)	0.906*** (0.002)	0.932*** (0.002)	0.930*** (0.002)	0.944*** (0.002)
FIRM	0.937*** (0.003)	0.942*** (0.002)	0.931*** (0.002)	0.923*** (0.002)	0.926*** (0.002)
<b>coefficients</b>					
RAM	0.993 (0.006)	0.986*** (0.004)	0.982*** (0.004)	0.975*** (0.004)	0.982*** (0.005)
IND	0.980** (0.009)	0.988*** (0.004)	0.990** (0.005)	1.005 (0.007)	1.019** (0.008)
OCC	0.995 (0.011)	1.008* (0.004)	1.015*** (0.005)	1.016*** (0.006)	1.006 (0.007)
TASK	0.974 (0.044)	1.014 (0.014)	0.992 (0.011)	0.982 (0.013)	0.981 (0.019)
INDIVID	1.003*** (0.001)	1.001 (0.001)	1.000 (0.001)	0.997** (0.001)	0.996** (0.002)
EDUC	1.013 (0.012)	1.013*** (0.004)	1.003 (0.004)	0.993** (0.003)	1.002 (0.004)
EXP	0.938*** (0.008)	0.947*** (0.005)	0.986** (0.006)	0.982** (0.008)	0.973* (0.016)
FIRM	1.058*** (0.023)	1.074*** (0.019)	1.101*** (0.017)	1.112*** (0.018)	1.116*** (0.023)
_cons	1.037 (0.054)	0.975 (0.023)	0.926*** (0.019)	0.922*** (0.022)	0.915*** (0.031)

	16–24 years	25–34 years	35–44 years	45–54 years	55–64 years
<b>interaction</b>					
RAM	0.998 (0.002)	0.998*** (0.001)	0.998* (0.001)	1.001 (0.001)	0.995*** (0.002)
IND	1.009** (0.004)	1.000 (0.002)	0.999 (0.002)	1.000 (0.003)	0.992*** (0.003)
OCC	0.993* (0.004)	0.994*** (0.002)	0.993*** (0.003)	0.992** (0.003)	1.004 (0.005)
TASK	1.010*** (0.003)	1.002* (0.001)	1.002 (0.002)	1.008*** (0.003)	1.006* (0.004)
INDIVID	1.002*** (0.001)	1.000 (0.000)	1.000 (0.000)	0.999** (0.000)	0.999** (0.000)
EDUC	1.001 (0.002)	0.995*** (0.001)	1.000 (0.001)	1.003* (0.002)	1.009*** (0.002)
EXP	1.040*** (0.004)	1.025*** (0.003)	0.996* (0.002)	0.999 (0.002)	1.005* (0.003)
FIRM	0.980*** (0.004)	0.984*** (0.002)	0.980*** (0.002)	0.981*** (0.003)	0.987*** (0.003)
<b>N</b>					
N	89,383	386,225	348,192	469,696	227,822
No. foreigners	8,253	37,941	43,758	36,010	16,343
No. Germans	81,130	348,284	304,434	433,686	211,479
No. of firms	35,858	74,558	70,211	71,509	49,682

Note: All wages are measured in Euro and are computed as the exponential of the mean of log(wages); \* 0.1, \*\* 0.05, \*\*\* 0.01; cluster robust s. e. at firm level in (), threefold Oaxaca-Blinder decomposition.

Source: Own calculation based on IEB.



## Appendix D: Low and high employment growth of foreigners within occupations

	Solely German firms		Mixed firms	
	High growth	Low growth	High growth	Low growth
<b>overall</b>				
Wage Foreigners	79.682*** (0.539)	99.927*** (0.664)	79.682*** (0.539)	99.927*** (0.664)
Wage Germans	77.998*** (0.205)	88.195*** (0.185)	107.591*** (1.291)	121.343*** (0.566)
difference	1.022*** (0.007)	1.133*** (0.008)	0.741*** (0.005)	0.824*** (0.005)
endowments	1.001 (0.012)	1.068*** (0.009)	0.746*** (0.005)	0.836*** (0.005)
coefficients	0.987** (0.005)	0.968*** (0.008)	0.977*** (0.003)	0.979*** (0.003)
interaction	1.034*** (0.012)	1.097*** (0.012)	1.016*** (0.003)	1.006 (0.004)
<b>endowments</b>				
RAM	1.052*** (0.002)	1.128*** (0.004)	1.008*** (0.001)	1.033*** (0.002)
IND	0.970*** (0.003)	0.971*** (0.004)	0.968*** (0.002)	0.988*** (0.002)
OCC	1.006** (0.003)	0.962*** (0.003)	0.978*** (0.002)	0.954*** (0.002)
TASK	0.975*** (0.002)	0.972*** (0.001)	0.956*** (0.002)	0.973*** (0.001)
INDIVID	1.009*** (0.001)	1.039*** (0.001)	1.003*** (0.000)	1.017*** (0.001)
EDUC	0.990*** (0.002)	0.977*** (0.002)	0.974*** (0.001)	0.970*** (0.001)
EXP	0.902*** (0.004)	0.951*** (0.002)	0.903*** (0.002)	0.937*** (0.002)
FIRM	1.110*** (0.010)	1.081*** (0.006)	0.927*** (0.002)	0.956*** (0.002)
<b>coefficients</b>				
RAM	0.993* (0.004)	0.986*** (0.005)	0.976*** (0.004)	0.995 (0.005)
IND	1.013* (0.007)	1.004 (0.008)	0.996 (0.004)	1.011* (0.007)
OCC	0.988 (0.011)	1.017** (0.008)	0.989* (0.006)	1.019*** (0.008)
TASK	0.990 (0.019)	0.970 (0.022)	0.994 (0.015)	0.956** (0.021)
INDIVID	0.993*** (0.002)	0.997 (0.002)	0.997* (0.001)	0.999 (0.002)
EDUC	1.014** (0.006)	1.009 (0.007)	1.013*** (0.003)	0.997 (0.004)
EXP	0.961*** (0.007)	0.959*** (0.007)	0.938*** (0.004)	0.948*** (0.007)
FIRM	0.980 (0.015)	0.969 (0.019)	1.134*** (0.012)	1.061*** (0.023)
_cons	1.059* (0.032)	1.060* (0.035)	0.951** (0.021)	0.998 (0.031)

	Solely German firms		Mixed firms	
	High growth	Low growth	High growth	Low growth
<b>interaction</b>				
RAM	0.990*** (0.003)	1.000 (0.008)	1.000 (0.001)	0.995** (0.002)
IND	1.017*** (0.005)	1.050*** (0.007)	0.998 (0.002)	0.998 (0.003)
OCC	0.981*** (0.004)	0.975*** (0.006)	0.985*** (0.002)	1.002 (0.003)
TASK	1.006*** (0.002)	1.001 (0.002)	1.007*** (0.002)	1.004** (0.002)
INDIVID	1.000 (0.001)	1.000 (0.002)	1.002*** (0.000)	1.003*** (0.001)
EDUC	0.999 (0.002)	0.998 (0.002)	1.006*** (0.001)	1.005*** (0.001)
EXP	1.026*** (0.005)	1.010*** (0.002)	1.027*** (0.002)	1.013*** (0.002)
FIRM	1.015 (0.009)	1.062*** (0.008)	0.990*** (0.002)	0.986*** (0.003)
<b>N</b>				
N	103,803	130,606	377,115	362,221
No. foreigners	61,626	26,646	61,626	26,646
No. Germans	42,177	103,960	315,489	335,575
No. of firms	69,508	85,057	66,847	45,278

Note: All wages are measured in Euro and are computed as the exponential of the mean of  $\log(\text{wages})$ ; \* 0.1, \*\* 0.05, \*\*\* 0.01; cluster robust s. e. at firm level in (), threefold Oaxaca-Blinder decomposition.

Source: Own calculation based on IEB.

## Appendix E I: Separation by skill groups

Excluding individuals with university degree

	Solely German firms	Mixed firms
<b>overall</b>		
Wage Foreigners	82.848*** (0.394)	82.848*** (0.394)
Wage Germans	80.633*** (0.100)	111.536*** (0.595)
difference	1.027*** (0.005)	0.743*** (0.003)
endowments	1.003 (0.006)	0.754*** (0.003)
coefficients	0.997 (0.004)	0.972*** (0.002)
interaction	1.027*** (0.007)	1.014*** (0.002)
<b>endowments</b>		
RAM	1.097*** (0.002)	1.020*** (0.001)
IND	0.972*** (0.002)	0.963*** (0.002)
OCC	0.973*** (0.001)	0.956*** (0.001)
TASK	0.968*** (0.001)	0.959*** (0.001)
INDIVID	1.020*** (0.001)	1.010*** (0.000)
EDUC	0.977*** (0.001)	0.979*** (0.001)
EXP	0.920*** (0.002)	0.908*** (0.002)
FIRM	1.090*** (0.005)	0.932*** (0.002)
<b>coefficients</b>		
RAM	0.997 (0.002)	0.979*** (0.002)
IND	1.003 (0.006)	0.992* (0.005)
OCC	0.999 (0.004)	1.005 (0.003)
TASK	1.004 (0.010)	0.997 (0.009)
INDIVID	0.994*** (0.001)	0.991*** (0.001)
EDUC	1.000 (0.003)	1.004 (0.002)
EXP	0.960*** (0.004)	0.934*** (0.003)
FIRM	1.001 (0.010)	1.114*** (0.013)
_cons	1.040** (0.017)	0.965** (0.015)

	Solely German firms	Mixed firms
<b>interaction</b>		
RAM	0.986*** (0.003)	0.997*** (0.001)
IND	1.015*** (0.003)	1.001 (0.001)
OCC	0.988*** (0.002)	1.001 (0.002)
TASK	1.003** (0.002)	1.009*** (0.001)
INDIVID	0.997*** (0.000)	1.001*** (0.000)
EDUC	1.000 (0.001)	1.000 (0.001)
EXP	1.016*** (0.002)	1.022*** (0.002)
FIRM	1.022*** (0.005)	0.983*** (0.002)
<b>N</b>		
N	379,830	1,204,802
No. foreigners	117,183	117,183
No. Germans	262,647	1,087,619
No. of firms	240,051	117,263

Note: All wages are measured in Euro and are computed as the exponential of the mean of log(wages); \* 0.1, \*\* 0.05, \*\*\* 0.01; cluster robust s. e. at firm level in (), threefold Oaxaca-Blinder decomposition.

Source: Own calculation based on IEB.

## Appendix E II: Separation by skill groups

Skill groups including university degree

	Solely German firms			Mixed firms		
	No apprenticeship	With apprenticeship	University degree	No apprenticeship	With apprenticeship	University degree
<b>overall</b>						
Wage Foreigners	75.333*** (0.362)	88.094*** (0.479)	149.116*** (1.157)	75.333*** (0.362)	88.094*** (0.479)	149.116*** -1.157
Wage Germans	69.449*** (0.252)	81.453*** (0.103)	133.858*** (0.450)	89.479*** (0.636)	114.949*** (0.611)	192.745*** -1.318
difference	1.085*** (0.007)	1.082*** (0.006)	1.114*** (0.009)	0.842*** (0.005)	0.766*** (0.003)	0.774*** (0.004)
endowments	1.011 (0.014)	1.071*** (0.007)	1.033*** (0.012)	0.845*** (0.005)	0.789*** (0.003)	0.771*** (0.004)
coefficients	0.981*** (0.006)	1.003 (0.004)	0.961*** (0.009)	0.980*** (0.003)	0.976*** (0.002)	0.988** (0.005)
interaction	1.094*** (0.015)	1.007 (0.007)	1.122*** (0.016)	1.017*** (0.003)	0.996** (0.002)	1.015*** (0.005)
<b>endowments</b>						
RAM	1.044*** (0.005)	1.099*** (0.002)	1.090*** (0.004)	1.013*** (0.001)	1.019*** (0.001)	1.003** (0.001)
IND	0.977*** (0.006)	0.976*** (0.002)	0.994 (0.004)	0.972*** (0.002)	0.967*** (0.002)	0.984*** (0.002)
OCC	0.984*** (0.004)	0.978*** (0.001)	1.004 (0.003)	0.976*** (0.002)	0.963*** (0.001)	0.995*** (0.001)
TASK	0.965*** (0.004)	0.979*** (0.001)	0.991*** (0.002)	0.974*** (0.002)	0.968*** (0.001)	0.979*** (0.001)
INDIVID	1.004 (0.003)	1.020*** (0.001)	1.001 (0.003)	1.017*** (0.001)	1.007*** (0.000)	0.961*** (0.001)
EDUC	0.990*** (0.001)	1.001*** (0.000)	1.004*** (0.001)	0.990*** (0.001)	0.999*** (0.000)	0.999*** (0.000)
EXP_FIRM	0.957*** (0.003)	0.936*** (0.002)	0.876*** (0.005)	0.945*** (0.002)	0.919*** (0.001)	0.889*** (0.003)
FIRM	1.098*** (0.012)	1.091*** (0.005)	1.089*** (0.009)	0.948*** (0.003)	0.929*** (0.002)	0.941*** (0.002)
<b>coefficients</b>						
RAM	0.995 (0.004)	1.000 (0.002)	0.991 (0.006)	0.992* (0.005)	0.982*** (0.003)	0.988** (0.006)
IND	1.003 (0.010)	0.999 (0.006)	0.957*** (0.011)	0.995 (0.008)	0.992* (0.005)	1.004 (0.008)
OCC	0.993 (0.009)	0.999 (0.004)	1.038*** (0.014)	1.011 (0.008)	1.004 (0.004)	1.070*** (0.013)
TASK	1.037 (0.031)	1.004 (0.011)	0.973 (0.022)	1.011 (0.020)	0.995 (0.010)	0.917*** (0.015)
INDIVID	0.995** (0.002)	0.995*** (0.001)	1.016** (0.007)	1.000 (0.001)	0.992*** (0.001)	0.984*** (0.005)
EDUC	1.000 (0.005)	1.007* (0.004)	1.020 (0.073)	1.006*** (0.002)	1.011*** (0.004)	0.984 (0.017)
EXP_FIRM	0.914*** (0.007)	0.999 (0.005)	0.944*** (0.009)	0.916*** (0.005)	0.966*** (0.003)	0.963*** (0.007)
FIRM	0.989 (0.020)	1.006 (0.012)	0.948 (0.040)	1.114*** (0.013)	1.110*** (0.015)	1.166*** (0.037)

	Solely German firms			Mixed firms		
	No apprenticeship	With apprenticeship	University degree	No apprenticeship	With apprenticeship	University degree
_cons	1.062 (0.043)	0.995 (0.018)	1.082 (0.092)	0.947** (0.026)	0.932*** (0.017)	0.933* (0.036)
<b>interaction</b>						
RAM	1.007 (0.006)	0.986*** (0.003)	0.989* (0.006)	0.999 (0.001)	0.996*** (0.001)	1.000 (0.001)
IND	1.005 (0.006)	1.020*** (0.003)	1.047*** (0.006)	1.002 (0.002)	1.001 (0.001)	0.997 (0.002)
OCC	0.987** (0.005)	0.990*** (0.002)	1.002 (0.004)	1.001 (0.002)	0.999 (0.001)	0.990*** (0.002)
TASK	1.013*** (0.004)	0.999 (0.001)	0.999 (0.002)	1.010*** (0.002)	1.004*** (0.001)	0.999 (0.002)
INDIVID	1.007** (0.003)	0.997*** (0.001)	0.966*** (0.004)	0.997*** (0.001)	1.003*** (0.000)	1.002 (0.002)
EDUC	1.004*** (0.001)	0.999** (0.000)	0.999 (0.001)	1.004*** (0.001)	1.000 (0.000)	1.000* (0.000)
EXP_FIRM	1.032*** (0.003)	0.997 (0.002)	1.050*** (0.008)	1.023*** (0.002)	1.006*** (0.001)	1.036*** (0.005)
FIRM	1.037*** (0.012)	1.020*** (0.005)	1.068*** (0.012)	0.982*** (0.002)	0.986*** (0.002)	0.991*** (0.003)
<b>N</b>						
N	62,635	317,195	58,698	176,840	1,027,962	316,516
No. foreigners	45,971	71,212	25,122	45,971	71,212	25,122
No. Germans	16,664	245,983	33,576	130,869	956,750	291,394
No. of firms	44,001	211,042	40,799	54,427	105,534	39,701

Note: All wages are measured in Euro and are computed as the exponential of the mean of  $\log(\text{wages})$ ; \* 0.1, \*\* 0.05, \*\*\* 0.01; cluster robust s. e. at firm level in (), threefold Oaxaca-Blinder decomposition.

Source: Own calculation based on IEB.

## Appendix F: Decomposition separated by gender

	Solely German firms		Mixed firms	
	male	female	male	female
<b>overall</b>				
Wage Foreigners	95.521*** (0.546)	82.760*** (0.402)	95.521*** (0.546)	82.760*** (0.402)
Wage Germans	91.736*** (0.133)	75.118*** (0.151)	134.378*** (0.919)	106.859*** (0.435)
difference	1.041*** (0.006)	1.102*** (0.006)	0.711*** (0.003)	0.774*** (0.003)
endowments	1.030*** (0.008)	1.008 (0.008)	0.719*** (0.003)	0.778*** (0.003)
coefficients	0.986*** (0.004)	0.998 (0.007)	0.974*** (0.002)	0.987*** (0.003)
interaction	1.025*** (0.008)	1.094*** (0.010)	1.015*** (0.002)	1.009*** (0.003)
<b>endowments</b>				
RAM	1.119*** (0.002)	1.061*** (0.002)	1.013*** (0.001)	1.020*** (0.001)
IND	0.976*** (0.002)	0.976*** (0.003)	0.963*** (0.002)	0.976*** (0.001)
OCC	0.984*** (0.001)	0.989*** (0.002)	0.957*** (0.001)	0.970*** (0.001)
TASK	0.982*** (0.001)	0.973*** (0.002)	0.954*** (0.001)	0.971*** (0.001)
INDIVID	1.002*** (0.000)	1.003*** (0.001)	0.998*** (0.000)	0.998*** (0.000)
EDUC	0.994*** (0.001)	1.011*** (0.002)	0.966*** (0.001)	0.998** (0.001)
EXP	0.906*** (0.003)	0.901*** (0.003)	0.894*** (0.002)	0.910*** (0.002)
FIRM	1.082*** (0.006)	1.108*** (0.006)	0.936*** (0.002)	0.915*** (0.002)
<b>coefficients</b>				
RAM	1.006*** (0.002)	0.984*** (0.004)	0.979*** (0.003)	0.975*** (0.004)
IND	0.996 (0.006)	1.017* (0.009)	1.004 (0.005)	1.009 (0.008)
OCC	0.997 (0.004)	1.017*** (0.006)	1.017*** (0.004)	0.998 (0.006)
TASK	0.984* (0.009)	1.040** (0.016)	0.978*** (0.008)	1.001 (0.013)
INDIVID	1.003*** (0.001)	1.010*** (0.001)	0.995*** (0.001)	0.999 (0.001)
EDUC	1.008** (0.004)	0.992 (0.009)	1.003 (0.002)	1.009* (0.005)
EXP	0.940*** (0.005)	0.956*** (0.005)	0.924*** (0.003)	0.933*** (0.004)
FIRM	1.003 (0.010)	0.927*** (0.018)	1.133*** (0.014)	1.028* (0.017)
_cons	1.052*** (0.017)	1.063** (0.029)	0.954*** (0.015)	1.038 (0.025)

	Solely German firms		Mixed firms	
	male	female	male	female
<b>interaction</b>				
RAM	0.969*** (0.003)	1.004 (0.005)	0.998*** (0.001)	0.996*** (0.001)
IND	1.017*** (0.003)	1.022*** (0.004)	1.000 (0.002)	0.993*** (0.002)
OCC	0.994*** (0.002)	0.974*** (0.003)	0.997 (0.002)	0.995*** (0.002)
TASK	0.996*** (0.001)	1.013*** (0.003)	1.003** (0.002)	1.009*** (0.001)
INDIVID	1.002*** (0.000)	0.997*** (0.001)	1.005*** (0.000)	1.002*** (0.001)
EDUC	0.998 (0.001)	0.996* (0.002)	1.002** (0.001)	0.997*** (0.001)
EXP	1.031*** (0.003)	1.025*** (0.004)	1.032*** (0.002)	1.026*** (0.002)
FIRM	1.019*** (0.006)	1.062*** (0.007)	0.978*** (0.002)	0.992*** (0.002)
<b>N</b>				
N	294,186	144,342	1,057,476	463,842
No. foreigners	104,021	38,284	104,021	38,284
No. Germans	190,165	106,058	953,455	425,558
No. of firms	183,758	109,613	103,234	74,196

Note: All wages are measured in Euro and are computed as the exponential of the mean of  $\log(\text{wages})$ ; \* 0.1, \*\* 0.05, \*\*\* 0.01; cluster robust s. e. at firm level in (), threefold Oaxaca-Blinder decomposition.

Source: Own calculation based on IEB.



## Appendix G: Quantile decomposition

	Solely German firms	Mixed firms
<b>Difference in log wage</b>		
Percentile		
0.1	-.056437	.432765
0.2	-.063866	.434190
0.3	-.067311	.443005
0.4	-.063332	.446360
0.5	-.049759	.440499
0.6	-.025935	.425121
0.7	.008703	.401626
0.8	.052735	.374127
0.9	.096103	.357766
<b>endowments</b>		
0.1	.003281	.536740
0.2	-.028646	.492530
0.3	-.048751	.473872
0.4	-.055473	.456636
0.5	-.049036	.434757
0.6	-.028463	.407398
0.7	.006905	.376492
0.8	.052932	.347824
0.9	.084487	.331218
<b>coefficients</b>		
0.1	-.059718	-.103974
0.2	-.035220	-.058340
0.3	-.018560	-.030867
0.4	-.007859	-.010277
0.5	-.000724	.005741
0.6	.002528	.017724
0.7	.001797	.025134
0.8	-.000197	.026303
0.9	.011616	.026548
<b>N</b>		
N reference	252,272	1,021,307
N counterf.	467,735	252,272

Note: All wages are measured in Euro and are computed as the exponential of the mean of  $\log(\text{wages})$ ; \* 0.1, \*\* 0.05, \*\*\* 0.01; cluster robust s. e. at firm level in (), threefold Oaxaca-Blinder decomposition.

Source: Own calculation based on IEB.

**Appendix H: Decomposition with CHK-firm-specific effects and individual-specific effects**

	CHK-firm-specific effects		Individual-specific effects	
	Solely German firms	Mixed firms	Solely German firms	Mixed firms
<b>overall</b>				
Wage Foreigners	97.200*** (0.562)	97.200*** (0.562)	96.618*** (0.551)	96.618*** (0.551)
Wage Germans	95.415*** (0.165)	129.936*** (0.849)	86.075*** (0.116)	127.641*** (0.799)
difference	1.019*** (0.006)	0.748*** (0.003)	1.122*** (0.007)	0.757*** (0.003)
endowments	0.962*** (0.010)	0.747*** (0.003)	1.058*** (0.007)	0.757*** (0.003)
coefficients	0.977*** (0.003)	0.973*** (0.002)	1.008** (0.004)	0.989*** (0.002)
interaction	1.083*** (0.011)	1.028*** (0.002)	1.052*** (0.007)	1.011*** (0.002)
<b>endowments</b>				
RAM	1.027*** (0.001)	1.006*** (0.001)	1.093*** (0.002)	1.015*** (0.001)
IND	0.985*** (0.002)	0.989*** (0.001)	0.983*** (0.002)	0.971*** (0.002)
OCC	0.972*** (0.002)	0.958*** (0.001)	0.990*** (0.001)	0.964*** (0.001)
TASK	0.977*** (0.002)	0.957*** (0.001)	0.983*** (0.001)	0.965*** (0.001)
INDIVID	1.005*** (0.000)	0.996*** (0.000)	1.018*** (0.001)	1.002*** (0.000)
EDUC	0.998 (0.001)	0.973*** (0.001)	1.002* (0.001)	0.979*** (0.001)
EXP	0.920*** (0.002)	0.919*** (0.001)	0.921*** (0.002)	0.908*** (0.002)
FIRM	1.085*** (0.010)	0.922*** (0.002)	1.091*** (0.005)	0.939*** (0.001)
<b>coefficients</b>				
RAM	1.006 (0.006)	0.997 (0.005)	0.997 (0.002)	0.979*** (0.003)
IND	1.005 (0.006)	0.999 (0.004)	0.999 (0.005)	0.997 (0.003)
OCC	1.002 (0.003)	1.009*** (0.003)	1.004 (0.003)	1.007** (0.003)
TASK	0.991 (0.009)	0.990 (0.007)	0.996 (0.008)	0.979*** (0.007)
INDIVID	0.981*** (0.001)	1.004*** (0.001)	1.005*** (0.001)	0.995*** (0.001)
EDUC	1.002 (0.004)	1.000 (0.002)	1.006 (0.004)	1.005** (0.003)
EXP	0.943*** (0.005)	0.928*** (0.003)	0.969*** (0.004)	0.941*** (0.003)
FIRM	1.033** (0.014)	0.964*** (0.011)	0.976** (0.010)	1.094*** (0.013)
_cons	1.017 (0.020)	1.089*** (0.016)	1.067*** (0.017)	0.997 (0.015)

	CHK-firm-specific effects		Individual-specific effects	
	Solely German firms	Mixed firms	Solely German firms	Mixed firms
<b>interaction</b>				
RAM	0.989*** (0.002)	0.999*** (0.001)	0.986*** (0.003)	0.997*** (0.001)
IND	1.024*** (0.003)	0.995*** (0.001)	1.021*** (0.003)	0.998 (0.001)
OCC	0.990*** (0.002)	0.997** (0.001)	0.986*** (0.002)	0.998 (0.001)
TASK	1.002 (0.002)	1.003** (0.001)	1.004*** (0.001)	1.005*** (0.001)
INDIVID	0.995*** (0.001)	1.004*** (0.000)	0.995*** (0.001)	1.003*** (0.000)
EDUC	0.999 (0.001)	1.004*** (0.001)	0.997** (0.001)	1.000 (0.001)
EXP	1.028*** (0.002)	1.028*** (0.001)	1.019*** (0.002)	1.024*** (0.002)
FIRM	1.055*** (0.010)	1.000 (0.001)	1.039*** (0.005)	0.987*** (0.002)
<b>N</b>				
N	235,458	1,284,412	366,031	1,308,469
No. foreigners	111,748	111,748	102,019	102,019
No. Germans	123,710	1,172,664	264,012	1,206,450
No. of firms	137,999	87,496	231,210	112,653

Note: All wages are measured in Euro and are computed as the exponential of the mean of  $\log(\text{wages})$ ; \* 0.1, \*\* 0.05, \*\*\* 0.01; cluster robust s. e. at firm level in (), threefold Oaxaca-Blinder decomposition.

Source: Own calculation based on IEB.

## Appendix I: Naturalized foreigners

	Solely German firms	Mixed firms	Foreigners vs. naturalized irrespective of firm type
<b>overall</b>			
Wage Foreigners	106.576*** (0.540)	106.576*** (0.540)	91.906*** (0.476)
Wage Germans	85.401*** (0.111)	125.203*** (0.777)	106.576*** (0.540)
difference	1.248*** (0.007)	0.851*** (0.002)	0.862*** (0.003)
endowments	1.177*** (0.009)	0.865*** (0.002)	0.864*** (0.003)
coefficients	0.984*** (0.003)	0.997** (0.001)	0.980*** (0.002)
interaction	1.078*** (0.008)	0.987*** (0.001)	1.018*** (0.002)
<b>endowments</b>			
RAM	1.085*** (0.001)	1.005*** (0.001)	1.008*** (0.001)
IND	0.998 (0.002)	0.981*** (0.001)	0.981*** (0.001)
OCC	0.991*** (0.001)	0.968*** (0.001)	0.990*** (0.001)
TASK	0.988*** (0.001)	0.972*** (0.001)	0.988*** (0.001)
INDIVID	1.006*** (0.001)	1.012*** (0.001)	1.008*** (0.001)
EDUC	0.992*** (0.001)	0.967*** (0.001)	1.004*** (0.001)
EXP	0.994*** (0.001)	0.984*** (0.001)	0.921*** (0.002)
FIRM	1.119*** (0.007)	0.969*** (0.001)	0.959*** (0.001)
<b>coefficients</b>			
RAM	0.997 (0.002)	0.991*** (0.002)	0.986*** (0.003)
IND	1001 (0.005)	0.998 (0.003)	0.999 (0.005)
OCC	0.999 (0.002)	1002 (0.002)	1004 (0.003)
TASK	1010 (0.006)	0.990** (0.005)	0.992 (0.008)
INDIVID	0.995*** (0.001)	0.991*** (0.001)	1.004** (0.002)
EDUC	1.006* (0.003)	1003 (0.002)	1003 (0.002)
EXP	0.989** (0.004)	0.970*** (0.003)	0.959*** (0.004)
FIRM	0.936*** (0.010)	1.072*** (0.011)	1.038*** (0.008)
_cons	1.055*** (0.014)	0.983 (0.012)	0.997 (0.014)

	Solely German firms	Mixed firms	Foreigners vs. naturalized irrespective of firm type
<b>interaction</b>			
RAM	1.000 (0.003)	1.001*** (0.000)	1.000 (0.001)
IND	1.014*** (0.003)	0.999* (0.001)	1001 (0.001)
OCC	0.990*** (0.001)	0.999** (0.001)	1000 (0.001)
TASK	0.999 (0.001)	1000 (0.001)	1.002*** (0.000)
INDIVID	1.002*** (0.001)	0.989*** (0.001)	0.999 (0.001)
EDUC	0.999** (0.001)	1.004*** (0.001)	1000 (0.001)
EXP	1.003*** (0.001)	1.006*** (0.001)	1.017*** (0.002)
FIRM	1.070*** (0.007)	0.990*** (0.001)	0.999 (0.001)
<b>N</b>			
N	485,944	1,568,734	332,026
No. foreigners	189,721	189,721	142,305
No. Germans	296,223	1,379,013	189,721
No. of firms	251,371	128,623	109,499

Note: All wages are measured in Euro and are computed as the exponential of the mean of  $\log(\text{wages})$ ; \* 0.1, \*\* 0.05, \*\*\* 0.01; cluster robust s. e. at firm level in (), threefold Oaxaca-Blinder decomposition.

Source: Own calculation based on IEB.

## Appendix J I: Immigration groups and solely German firms respectively mixed firms

Immigration groups and solely German firms

	Turkey	Bulgaria, Romania, former Yugoslavia	Greece, Italy, Portugal, Spain	EU 15	EU 8 NMS	Remaining world
<b>overall</b>						
Wage Foreigners	90.579*** (0.699)	81.779*** (0.527)	96.266*** (0.682)	108.270*** (0.738)	74.587*** (0.382)	92.680*** (0.540)
Wage Germans	85.401*** (0.111)	85.401*** (0.111)	85.401*** (0.111)	85.401*** (0.111)	85.401*** (0.111)	85.401*** (0.111)
difference	1.061*** (0.008)	0.958*** (0.006)	1.127*** (0.008)	1.268*** (0.009)	0.873*** (0.005)	1.085*** (0.006)
endowments	1.039*** (0.008)	0.920*** (0.007)	1.089*** (0.008)	1.178*** (0.008)	0.850*** (0.006)	1.070*** (0.007)
coefficients	0.924*** (0.011)	1.026*** (0.009)	1.039*** (0.010)	1.038*** (0.009)	1.000 (0.008)	0.962*** (0.007)
interaction	1.105*** (0.015)	1.014 (0.010)	0.996 (0.011)	1.037*** (0.011)	1.028*** (0.010)	1.054*** (0.009)
<b>endowments</b>						
RAM	1.099*** (0.002)	1.104*** (0.002)	1.107*** (0.002)	1.102*** (0.002)	1.068*** (0.002)	1.093*** (0.002)
IND	0.980*** (0.003)	0.961*** (0.002)	0.981*** (0.002)	0.992*** (0.002)	0.957*** (0.002)	0.979*** (0.002)
OCC	0.963*** (0.002)	0.979*** (0.002)	0.982*** (0.001)	0.997** (0.001)	0.972*** (0.002)	0.998 (0.001)
TASK	0.959*** (0.001)	0.965*** (0.001)	0.978*** (0.001)	0.996*** (0.001)	0.961*** (0.002)	0.986*** (0.001)
INDIVID	1.036*** (0.001)	1.011*** (0.001)	1.019*** (0.001)	1.017*** (0.001)	1.009*** (0.001)	1.013*** (0.001)
EDUC	0.949*** (0.001)	0.991*** (0.001)	0.986*** (0.001)	1.014*** (0.001)	1.004*** (0.001)	1.030*** (0.002)
EXP	0.960*** (0.002)	0.853*** (0.003)	0.948*** (0.002)	0.952*** (0.002)	0.822*** (0.004)	0.888*** (0.002)
FIRM	1.107*** (0.006)	1.073*** (0.004)	1.096*** (0.005)	1.106*** (0.006)	1.069*** (0.004)	1.097*** (0.005)
<b>coefficients</b>						
RAM	0.985** (0.008)	1.001 (0.005)	1.008 (0.005)	1.006 (0.005)	0.997 (0.003)	0.997 (0.004)
IND	1.005 (0.006)	1.024*** (0.009)	1.001 (0.006)	0.992 (0.006)	1.014* (0.008)	0.992 (0.007)
OCC	1.004 (0.007)	0.992 (0.006)	1.005 (0.004)	1.000 (0.004)	1.000 (0.007)	1.013*** (0.004)
TASK	0.972 (0.018)	1.069*** (0.022)	1.001 (0.015)	1.012 (0.011)	0.989 (0.022)	0.997 (0.015)
INDIVID	0.993*** (0.002)	0.993*** (0.002)	1.002 (0.002)	1.011*** (0.002)	0.992*** (0.002)	1.005** (0.002)
EDUC	1.001 (0.005)	1.016*** (0.006)	1.009* (0.005)	1.012*** (0.004)	0.994 (0.006)	1.012** (0.005)
EXP	0.977*** (0.007)	0.957*** (0.005)	0.945*** (0.005)	0.936*** (0.005)	0.922*** (0.006)	0.952*** (0.005)
FIRM	1.004 (0.016)	0.969* (0.016)	0.975 (0.015)	0.971** (0.014)	0.987 (0.016)	0.985 (0.015)
_cons	0.982 (0.028)	1.009 (0.030)	1.098*** (0.026)	1.104*** (0.023)	1.113*** (0.035)	1010 (0.024)

	Turkey	Bulgaria, Romania, former Yugoslavia	Greece, Italy, Portugal, Spain	EU 15	EU 8 NMS	Remaining world
<b>interaction</b>						
RAM	0.987 (0.011)	0.962*** (0.006)	0.953*** (0.008)	0.976*** (0.007)	0.979*** (0.003)	0.990** (0.005)
IND	1.027*** (0.005)	1.021*** (0.004)	1.016*** (0.004)	1.016*** (0.003)	1.021*** (0.005)	1.014*** (0.003)
OCC	1.008 (0.005)	0.992** (0.004)	0.986*** (0.003)	0.988*** (0.002)	0.978*** (0.005)	0.984*** (0.003)
TASK	1.009*** (0.003)	1.004 (0.003)	1.001 (0.002)	1.005*** (0.001)	1.007** (0.004)	1.006*** (0.002)
INDIVID	0.995*** (0.001)	1.004** (0.002)	0.996*** (0.001)	0.999 (0.001)	1.000 (0.001)	1.002** (0.001)
EDUC	1.002 (0.003)	1.000 (0.002)	0.997* (0.002)	0.994*** (0.002)	1.002 (0.001)	0.986*** (0.003)
EXP	1.011*** (0.001)	1.023*** (0.005)	1.018*** (0.002)	1.028*** (0.002)	1.050*** (0.007)	1.027*** (0.003)
FIRM	1.064*** (0.008)	1.010* (0.006)	1.030*** (0.006)	1.032*** (0.006)	0.992 (0.006)	1.046*** (0.006)
<b>N</b>						
N	325,256	314,654	322,373	336,538	315,202	326,972
No. foreigners	29,033	18,431	26,150	40,315	18,979	30,749
No. Germans	296,223	296,223	296,223	296,223	296,223	296,223
No. of firms	209,113	206,189	210,248	217,954	205,874	213,713

Note: All wages are measured in Euro and are computed as the exponential of the mean of log(wages); \* 0.1, \*\* 0.05, \*\*\* 0.01; cluster robust s. e. at firm level in (), threefold Oaxaca-Blinder decomposition.

Source: Own calculation based on IEB.

## Appendix J II: Immigration groups and solely German firms respectively mixed firms

Immigration groups and mixed firms

	Turkey	Bulgaria, Romania, former Yugoslavia	Greece, Italy, Portugal, Spain	EU 15	EU 8 NMS	Remaining world
<b>overall</b>						
Wage Foreigners	90.579*** (0.699)	81.779*** (0.527)	96.266*** (0.682)	108.270*** (0.738)	74.587*** (0.382)	92.680*** (0.540)
Wage Germans	125.203*** (0.777)	125.203*** (0.777)	125.203*** (0.777)	125.203*** (0.777)	125.203*** (0.777)	125.203*** (0.777)
difference	0.723*** (0.005)	0.653*** (0.004)	0.769*** (0.004)	0.865*** (0.004)	0.596*** (0.004)	0.740*** (0.004)
endowments	0.750*** (0.005)	0.642*** (0.004)	0.785*** (0.004)	0.859*** (0.003)	0.588*** (0.004)	0.768*** (0.004)
coefficients	0.929*** (0.005)	0.952*** (0.005)	0.982*** (0.004)	1.006* (0.003)	0.934*** (0.006)	0.960*** (0.004)
interaction	1.039*** (0.005)	1.068*** (0.006)	0.997 (0.003)	1.001 (0.003)	1.085*** (0.007)	1004 (0.004)
<b>endowments</b>						
RAM	1.019*** (0.001)	1.024*** (0.001)	1.028*** (0.001)	1.023*** (0.001)	0.989*** (0.001)	1.014*** (0.001)
IND	0.981*** (0.002)	0.951*** (0.002)	0.975*** (0.002)	0.983*** (0.001)	0.940*** (0.003)	0.962*** (0.002)
OCC	0.929*** (0.002)	0.954*** (0.002)	0.956*** (0.001)	0.975*** (0.001)	0.946*** (0.002)	0.976*** (0.001)
TASK	0.938*** (0.001)	0.945*** (0.001)	0.960*** (0.001)	0.981*** (0.001)	0.940*** (0.001)	0.971*** (0.001)
INDIVID	1.021*** (0.001)	0.990*** (0.001)	1.008*** (0.001)	1.008*** (0.001)	0.990*** (0.001)	1.002** (0.001)
EDUC	0.925*** (0.001)	0.966*** (0.001)	0.961*** (0.001)	0.989*** (0.001)	0.980*** (0.001)	1.004*** (0.001)
EXP	0.955*** (0.002)	0.844*** (0.003)	0.940*** (0.002)	0.945*** (0.001)	0.814*** (0.003)	0.885*** (0.002)
FIRM	0.954*** (0.002)	0.905*** (0.002)	0.937*** (0.002)	0.948*** (0.001)	0.901*** (0.003)	0.934*** (0.002)
<b>coefficients</b>						
RAM	0.965*** (0.006)	0.961*** (0.005)	0.963*** (0.005)	0.984*** (0.006)	0.970*** (0.004)	0.983*** (0.004)
IND	0.994 (0.005)	1.014* (0.008)	0.994 (0.005)	0.986*** (0.004)	1.014** (0.007)	0.992 (0.006)
OCC	1.011 (0.007)	1.002 (0.007)	1.005 (0.005)	1.000 (0.004)	1.006 (0.008)	1.012*** (0.004)
TASK	0.948*** (0.018)	1.045** (0.022)	0.983 (0.015)	0.996 (0.010)	0.967 (0.022)	0.978 (0.014)
INDIVID	0.989*** (0.002)	0.989*** (0.002)	0.997 (0.002)	1.004** (0.002)	0.987*** (0.002)	1000 (0.002)
EDUC	0.999 (0.004)	1.008 (0.005)	1.007** (0.004)	1.011*** (0.003)	0.988** (0.005)	1005 (0.004)
EXP	0.956*** (0.006)	0.934*** (0.005)	0.928*** (0.005)	0.921*** (0.004)	0.899*** (0.005)	0.931*** (0.005)
FIRM	1.166*** (0.019)	1.066*** (0.019)	1.089*** (0.018)	1.083*** (0.017)	1.073*** (0.019)	1.129*** (0.019)
_cons	0.916*** (0.026)	0.941** (0.028)	1.023 (0.025)	1.029 (0.021)	1.038 (0.033)	0.941*** (0.022)



	Turkey	Bulgaria, Romania, former Yugoslavia	Greece, Italy, Portugal, Spain	EU 15	EU 8 NMS	Remaining world
<b>interaction</b>						
RAM	1.000 (0.003)	0.995** (0.002)	0.990*** (0.002)	0.992*** (0.001)	1.002 (0.002)	0.996*** (0.001)
IND	1.000 (0.003)	1.005 (0.003)	0.994*** (0.002)	0.995*** (0.001)	1.003 (0.005)	0.996** (0.002)
OCC	1.025*** (0.005)	0.995 (0.004)	1.000 (0.003)	0.999 (0.001)	0.987** (0.005)	0.996* (0.002)
TASK	1.022*** (0.004)	1.012*** (0.003)	1.002 (0.002)	1.001 (0.001)	1.017*** (0.004)	1.006*** (0.001)
INDIVID	1.002 (0.001)	1.018*** (0.001)	1.000 (0.000)	1.002*** (0.000)	1.012*** (0.001)	1.006*** (0.001)
EDUC	1.007* (0.004)	1.011*** (0.001)	1.001 (0.002)	0.997*** (0.001)	1.009*** (0.001)	0.995*** (0.002)
EXP	1.011*** (0.001)	1.032*** (0.004)	1.020*** (0.001)	1.026*** (0.001)	1.060*** (0.007)	1.026*** (0.003)
FIRM	0.974*** (0.003)	0.998 (0.004)	0.989*** (0.002)	0.990*** (0.002)	0.993 (0.005)	0.983*** (0.002)
<b>N</b>						
N	1,408,046	1,397,444	1,405,163	1,419,328	1,397,992	1,409,762
No. foreigners	29,033	18,431	26,150	40,315	18,979	30,749
No. Germans	1,379,013	1,379,013	1,379,013	1,379,013	1,379,013	1,379,013
No. of firms	107,646	107,446	107,918	109,271	107,383	108,573

Note: All wages are measured in Euro and are computed as the exponential of the mean of  $\log(\text{wages})$ ; \* 0.1, \*\* 0.05, \*\*\* 0.01; cluster robust s. e. at firm level in (), threefold Oaxaca-Blinder decomposition.

Source: Own calculation based on IEB.

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