The Immigrant Wage Gap in Germany*

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Abstract

Immigrants consist of foreigners and naturalized immigrants. Based on data from GSOEP, we decompose the wage gap between each of these two groups and natives in Germany. To consider unequal sets of variables in the estimation, we provide an extension of the Oaxaca-Blinder decomposition technique. The results show a substantial gap in earnings for both immigrants' groups compared to natives mainly driven by "price effects". Discarding immigrants who completed education abroad reduces much of the immigrants' wage gap. Hence, educational attainment in Germany is an important component of economic integration of immigrants and degrees obtained abroad are valued less.

Keywords: Immigration, wage gap, decomposition, educational attainment, Germany, GSOEP
JEL Classification: J61, J31, J15

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1 Introduction

Immigrant-native wage differentials exist in many countries. For example, Adsera and Chiswick (2007) show that differences in earnings of immigrants relative to natives of the same gender vary widely across countries, e.g. from about 19% (8%) for men (women) in Germany to 67% (62%) in Sweden. In a study for the Netherlands, Kee (1995) reports observed wage differences between native Dutch males and Antilleans (11.8%), Surinamese (22.9%), Turks (36.9%), and Moroccans (42.9%). Starting with Chiswick (1978) the initial differences in earnings at time of migration and the possible convergence of immigrants' earnings have been studied for various countries; comprehensive overviews are provided by Borjas (1994) and Altonji and Blank (1999). It is important to analyze the wage gap in detail to be able to identify whether the differentials are due to differences in human capital endowment that could be mitigated by training, schooling, etc., or due to unobserved influences comprising cultural identity or ethnic discrimination.

For Germany, earnings' differentials have been analyzed in a number of studies. In an early paper for the year 1989 based on register data of the Institute of Employment Research (Institut für Arbeitsmarkt und Berufsforschung), Velling (1995) analyzes the immigrant-native wage gap in Germany considering immigrants with a foreign citizenship. His results show that much of the observable difference in earnings could be attributed to differences in human capital. Differences in wages have also been analyzed based on data from the German Socio-Economic Panel (GSOEP), for example by Riphahn (2003), Constant and Massey (2005), Lang (2005), or Peters (2008). Similar to Velling (1995), Riphahn (2003), Constant and Massey (2005) and Peters (2008) consider only foreigners as the immigrant population. The results of Constant and Massey (2005) show that much of the differential could be attributed to initial occupational segmentation, but there is also a significant ethnic discrimination in the process of occupational attainment. Moreover, by using longitudinal information they establish a convergence in immigrants' earnings after 23 years of residence in Germany. Peters (2008) decomposes the immigrant-native wage gap using quantile regression techniques. In contrast to the earlier studies, his results show an increase in the native-immigrant wage gap mainly due to coefficient effects. In the study of Lang (2005), the difference between wages and the wage potential of immigrants is analyzed. He uses a wider definition of the immigrant population than the other studies covering ethnic Germans as well. However, he pools the different groups of immigrants in the analysis although differences between ethnic Germans and foreigners may exist. In addition, naturalized immigrants are contained in the group of natives. His results show that convergence in earnings is achieved after 17 years of residence.

Except Lang (2005), the studies for Germany take account of foreigners only; such approximation is reasonable if immigrants have a high probability to keep the citizenship of their home

country, or, put it in other words, naturalization is not very likely. However, the immigrant population in Germany is characterized by an increasing share of naturalized immigrant (almost 10% of the population living in Germany, Statistisches Bundesamt, 2007). Therefore regarding only foreigners as immigrants could lead to biased estimates since a substantial share of immigrants are considered as Germans.

The study at hand extends the knowledge about the immigrant-wage gap in Germany in two important directions: First, we explicitly distinguish foreigners and naturalized immigrants in the analysis. Therefore, we provide the first empirical evidence on the immigrant-native wage differential for the latter group. The results are important as they provide information on the relative economic position of this group, i.e. whether the naturalized immigrants are more similar to foreigners or to native Germans. Second, a possible reason for an immigrant-native wage gap could be the imperfect international transferability of human capital and a less successful job matching of the immigrants, see Blackaby, Leslie, Murphy, and O'Leary (2002), Constant and Massey (2005) or Chiswick and Miller (2009) among others.[1] For that reasons, even formally equivalently qualified workers may earn less than natives. If part of the wage gap is determined by the imperfect transferability of human capital, one could expect a reduction of the differential when considering immigrants who completed education in Germany. To evaluate the extent of this cause, we estimate a separate decomposition regarding only persons who completed education in Germany.

To analyze the wage differential we apply a variant of the Oaxaca-Blinder-decomposition. As time of residence is important for convergence of immigrants' earnings it should be considered in the estimation. For the decomposition, however, this results in unequal sets of covariates for immigrants and natives since natives' time of residence is equal to age and hence it could neither be regarded in the estimation of the earnings' equation nor in the decomposition for this group. To deal with this issue, we therefore provide a methodological extension of the decomposition to account for unequal numbers of regressors and the necessary correction of the decomposition variance-covariance matrix in this paper.

By explicitly regarding two immigrant groups (foreigners and naturalized immigrants), our estimates clearly establish the existence of an immigrant-native wage gap independently of citizenship. The gap is of similar size for both groups, but a bit more pronounced for naturalized immigrants. It persists despite similarity in other characteristics like age, employment type, economic sector, place of residence or formal education. This finding has two important implications: Naturalization is not necessarily related to assimilation and economic integration of immigrants. With regard to the economic situation, naturalized immigrants are more similar to

[1] For example Blackaby, Leslie, Murphy, and O'Leary (2002) report rates of return ranging from 0.028 for years of schooling abroad to 0.052 for schooling in the UK for black males.

foreigners than to native Germans. The results of the estimations of the immigrant-wage gap considering persons with an educational attainment in Germany show a strong reduction of the wage gap. This indicates that imperfect transferability of human capital plays an important role in explaining the immigrant wage gap. From a methodological perspective, the small difference in the results for both immigrant groups could be viewed to partly support the usage of citizenship to approximate immigration that is common in the empirical literature for Germany so far. However, the accuracy of this proxy is limited: On the one hand, the reference group (i.e. Germans) contains the group of naturalized immigrants as well. On the other hand, the ongoing demographic change will make a frequent re-calibration of the proxy necessary.

The paper is organized as follows: The next section describes the situation of immigration to Germany that motivates the distinction of foreigners and naturalized immigrants when analyzing the immigrant-native wage gap. Section 3 provides details on the GSOEP data used for the empirical analysis. The econometric methodology with the extension of the decomposition is introduced in section 4. The results of the empirical analysis are presented in section 5. Finally, the last section summarizes the findings.

2 Immigration to Germany

Since the Second World War until recently, Germany experienced continuing immigration that could be characterized by four movements according to Dustmann and van Soest (2002). Whereas the first of these movements between 1945 and 1960 was characterized by the after-war's effects with a strong East-West migration of native Germans, the second movement was economically motivated. Starting in the mid 1950s, Germany experienced a strong boom of the economy associated with a shortage of low-skilled labor. For this reason, in contrast to traditional immigration countries, like the US or Australia, Germany adopted a rather ad-hoc immigration policy that centered predominantly on recruitment of temporary workers (Bauer, Cobb-Clark, Hildebrand, and Sinning, 2007). The main inflow of immigrants arrived from Southern European countries, Turkey, and North Africa.

At the turning point of the economic development in the early 1970s earmarked by the oil-price shock in 1973, Germany's government stopped actively recruiting foreign workers. Although Germany's immigration policy was initially considered as temporary, a substantial share of the immigrants decided to stay permanently (Schmidt and Zimmermann, 1992). The third movement starting after 1973 is characterized by family immigration and family reunification (as well as asylum migration). Due to quite strict laws on naturalization until 2000, most of the immigrants did not receive German citizenship. Over the years, the number of foreigners living

in Germany has been constantly increasing from 686.000 in 1961 to 2.7 million in 1970, 5.6 million in 1990, reaching 7.3 million in 2006 (Bundesamt für Migration und Flüchtlinge, 2008). In 2000, a new naturalization law was passed in Germany which relaxed barriers to naturalization. From 2000 to 2006 more than 1 million foreigners became German citizens.

The fourth movement was caused by the changes in the political situation of Europe in the late 1980s that resulted in a strong increase of immigrants to Germany, namely refugees and ethnic Germans from Eastern European countries. Whereas refugees had only limited access to the labor market, ethnic Germans received German citizenship at the time or shortly after immigration to Germany. From 1990 to 2006 about 2.5 million ethnic Germans immigrated, with the peak in the early 1990s and sharply decreasing afterwards.[2]

Associated with the movements, the fraction of immigrants' descendants who were born in Germany has also increased over the last decades and affected the share of naturalized immigrants in particular. In 2005, one fifth of the population had an immigration background, i.e. they had immigrated to Germany themselves or were descendants of former immigrants. But, less than half of these people possessed foreign citizenship (about 47%, Statistisches Bundesamt, 2007). It becomes obvious that immigration is an important issue for Germany. Schmidt and Zimmermann (1992) have shown that Germany experienced more immigration per capita than the US in almost all years after the Second World War. However, in particular the rising share of naturalized immigrants should be regarded when analyzing issues of immigration. Given the present situation, approximation of an immigration background by citizenship seems to be quite imprecise.

3 Data and Descriptives

For the empirical analysis, we use the 2005 wave of the GSOEP data. Started in 1984, GSOEP is a representative longitudinal study of almost 12,000 private households with more than 21,000 persons in Germany.[3] The comprehensive set of socio-demographic variables included in GSOEP allows to identify whether the person herself or one of her parents immigrated to Germany (immigration background). To identify these persons, we use information on citizenship, country of origin and year of immigration to Germany of the person. In addition, we are able to identify the parents of an individual if they have participated in any of the waves since 1984. In these cases, we merge parental data with those of the individual.

We define three groups considered in the analysis as follows: First, *foreigners* are all persons

[2]The rules for the admission of ethnic Germans were tightened after that peak; in 2007 only 5,792 persons arrived (Bundesamt für Migration und Flüchtlinge, 2008)

[3]See Haisken-DeNew and Frick (2005) and Wagner, Frick, and Schupp (2007) for a detailed description.

who possess a non-German citizenship in 2005. Second, *naturalized immigrants* are naturalized former foreigners or ethnic Germans and their dependents (who are naturalized by law). Finally, the remaining persons are defined as *native Germans*.

For homogeneity reasons, we impose some restrictions on our sample. We exclude second-generation immigrants, i.e. descendants of immigrants who were born in Germany.[4] The study is limited to West Germany because the number of immigrants in East Germany is very small. In addition, only employed persons aged 15 to 65 who report a wage are considered. The outcome variable (gross hourly wages) is obtained for all workers including the self-employed by dividing the gross wages in the month prior to the interview by the reported working hours of the last week that are extrapolated to monthly hours.

Table 1: Means of selected characteristics

	Males			**Females**		
	Natives	Foreigners	Naturalized	Natives	Foreigners	Naturalized
Hourly wage	16.23	14.72	14.01	12.76	10.51	11.04
Age	41.98	43.16	41.48	41.16	43.03	41.79
Time of residence	–	27.34	21.36	–	26.06	21.80
Part-time work	0.04	0.07	0.06	0.42	0.42	0.42
Self-employed	0.09	0.06	0.05	0.06	0.03	0.02
Education						
Low	0.12	0.35	0.18	0.14	0.52	0.27
Medium	0.63	0.45	0.48	0.65	0.27	0.41
High	0.25	0.20	0.34	0.20	0.20	0.32
Out of which completed in Germany	–	0.71	0.74	–	0.55	0.76
Economic Sectors						
Agriculture	0.02	0.03	0.03	0.01	0.00	0.00
Industry	0.32	0.54	0.58	0.14	0.30	0.19
Transportation	0.08	0.08	0.07	0.05	0.03	0.06
Construction	0.09	0.08	0.05	0.01	0.01	0.01
Trading services	0.27	0.22	0.19	0.37	0.40	0.36
Social services and health	0.22	0.06	0.08	0.42	0.26	0.38
Region[a]						
North	0.20	0.13	0.21	0.21	0.11	0.20
Center	0.34	0.29	0.42	0.33	0.26	0.40
South	0.46	0.57	0.37	0.45	0.62	0.40
No. of obs	3,035	300	260	2,810	231	252

[a] *North* contains the Federal Laender of Schleswig-Holstein, Hamburg, Lower-Saxony, Bremen, and Berlin. *Center* are the Federal Laender North Rhine-Westphalia, Rhineland-Palatinate, and Saarland. *South* comprises Hessen, Bavaria, and Baden-Wuerttemberg.

The final sample contains 3,035 (2,810) native German males (females), 300 (231) male (female) foreigners and 260 (252) naturalized male (female) immigrants. Table 1 provides some descriptive statistics by gender. Starting with the gross hourly wage, natives earn on average

[4] One could argue that second-generation immigrants could be systematically different from the first generation. First, they are younger. Second, being born in Germany, they may be more familiar with the language, cultural values, etc. However, due to a small number of observations it is difficult to conduct a separate analysis for this group.

more than both immigrant groups irrespective of gender. With respect to variables expected to affect the wage, time of residence may affect individual's wage due to assimilation effects (see e.g. Constant and Massey, 2005, or Lang, 2005). Immigrants who reside in the destination country long enough may have a better command of the language and may be more accustomed to the country which in turn can affect productivity (see e.g. Chiswick and Miller, 2007 and Aldashev, Gernandt, and Thomsen, 2009). The descriptives show that the time of residence of foreigners is longer on average than of naturalized immigrants. The main reason may be that the latter group encompasses ethnic Germans who mainly arrived in the late 1980s to early 1990s.

Education is considered in three levels. People without a formal professional training are regarded as low-skilled, persons with professional training are medium-skilled, and those with college or university degree are the high-skilled. The raw descriptives show that the share of low-educated is clearly higher in both immigrant groups. In contrast, the largest share of formally high-skilled could be observed in the group of naturalized immigrants. The majority of the immigrants in the sample completed their education in Germany (between 55, female foreigners, and 76 percent, naturalized females). Naturalized immigrants have the largest shares of persons with German education. Given the skills' composition of the two immigrants' groups, one would expect foreigners to be paid less on average than naturalized immigrants. However, taking a look at the average hourly wage for males shows that this is not the case.

4 Methodology

To quantify underlying causes of the wage differences between the natives and each of the two immigrants' groups, we apply a variant of the Blinder (1973)-Oaxaca (1973)-decomposition technique suggested by Daymont and Andrisani (1984). The basic idea is that differences in wages could be explained by differences in characteristics (endowments) and by different returns to characteristics (coefficients) of groups. Daymont and Andrisani (1984) augment the decomposition equation by an interaction term capturing the perception of past discrimination (threefold-decomposition). Considering two arbitrary groups N and I (with N denoting natives and I denoting the immigrant group of interest respectively), the individual wage equation for each group is

$$Y_{ij} = X_{ij}\beta_j + \varepsilon_{ij}, \;\; j = N, I, \tag{1}$$

where Y_{ij} is the log hourly wage of individual i of group j, X_{ij} is a vector of individual characteristics, β_j is the vector of the corresponding coefficients for group j and ε_{ij} is the residual.

The threefold decomposition is then

$$\overline{\mathbf{Y}}^N - \overline{\mathbf{Y}}^I = (\overline{\mathbf{X}}^N - \overline{\mathbf{X}}^I)\boldsymbol{\beta}^I + \overline{\mathbf{X}}^I(\boldsymbol{\beta}^N - \boldsymbol{\beta}^I) + (\overline{\mathbf{X}}^N - \overline{\mathbf{X}}^I)(\boldsymbol{\beta}^N - \boldsymbol{\beta}^I), \tag{2}$$

where the 'bar' denotes the sample averages. The first term on the right hand side captures differences in wages due to characteristics (*endowment effect*), the second term are differences in the coefficients (*price effect*). The last term is the *interaction effect*, i.e. a positive interaction effect implies that the returns of the natives (N) tend to be greater for those characteristics for which the natives haves higher means and vice versa.

For the estimation of the earnings' regressions, we consider the effects of age, age squared, three skill levels, dummy variables for industry, dummy variables for part-time and self-employment and regional dummy variables. Moreover, interactions between the skill levels and age (and age squared) are considered. Since we use cross-section data for the analysis, we have to consider possible effects of the dynamics of immigration over time. If this is not regarded, estimated effects may misguide interpretation. To mitigate the problem, cohort effects could be considered, as discussed by Borjas (1985; 1994). Therefore, we distinguish four birth cohorts in the analyses: born before 1950, 1950-59, 1960-69, and after 1970. In addition, we include time of residence (and its square) in the wage equations of foreigners and naturalized immigrants. For naturalized immigrants and foreigners time of residence in Germany is a potentially important factor affecting wages as it might proxy assimilation and integration of immigrants (Chiswick, 1978, advocated the Immigrant Assimilation Hypothesis).[5]

For native Germans time of residence is indistinguishable from age and therefore does not enter the wage regression. Due to this, the wage equation of natives contains fewer covariates. This entails a tricky part about the decomposition of the wage gap between natives and immigrants as the sets of covariates for the groups are unequal. One could in principle disregard the time of residence variable guaranteing that the wage regression for each group contains the same set of variables. In fact, the total wage gap is thereby unaffected. However, excluding this variable leads to an omitted variable bias, which affects the coefficients in the wage regression. As a result the decomposition of the total wage gap into price and endowment components would be biased. This will give misleading conclusions as to whether the differential is caused by differences in the endowment composition or remuneration. Blackaby, Leslie, Murphy, and O'Leary (2002) for example analyze the wage gap between ethnic groups/races. They pool foreign and native whites together thereby guaranteeing that the arrival year is not always equal the birth year within the group. However, this approach would not work if one of the interest groups are German born natives and the other groups are foreigners or naturalized immigrants who were born outside of Germany. In this case, the problem of unequal set of covariates remains. To

[5]In an early study, Licht and Steiner (1994) test this hypothesis for Germany distinguishing foreigners who stay temporarily and permanently in Germany. Their results tend to reject the assimilation hypothesis. However, one could expect naturalization to be more correlated with assimilation than the decision to stay permanently. On the other hand, later studies like Blackaby, Leslie, Murphy, and O'Leary (2002) report that the year of arrival contributes substantially to the wage gap between the whites and ethnic minorities in the UK.

address the problem adequately, we modify the Oaxaca-Blinder decomposition as follows.

Let the wage equation of the native Germans (reference group) be

$$\mathbf{Y}^N = \boldsymbol{\beta}_0^N + \mathbf{X}^N \boldsymbol{\beta}^N + \boldsymbol{\varepsilon}^N, \tag{3}$$

where $\boldsymbol{\beta}_0$ denotes the coefficient of the constant and $\mathbf{X}$ is the matrix of the covariates considered in the estimation. For each of the two immigrant groups, the corresponding wage equation is given by:

$$\mathbf{Y}^I = \boldsymbol{\beta}_0^I + \mathbf{X}^I \boldsymbol{\beta}^I + \mathbf{Z}\boldsymbol{\gamma} + \boldsymbol{\varepsilon}^I, \tag{4}$$

with $\mathbf{Z}$ denoting time of residence and its square and $\boldsymbol{\gamma}$ as the corresponding vector of coefficients. If we estimate equation 4 we obtain $E(\boldsymbol{Y}^I|\boldsymbol{X}^I) = \hat{\boldsymbol{\beta}_0^I} + \boldsymbol{X}^I\hat{\boldsymbol{\beta}^I} + \boldsymbol{Z}\hat{\boldsymbol{\gamma}}$. Given the estimated coefficient vector $\hat{\boldsymbol{\beta}}^I$, we reestimate

$$\mathbf{Y}^I = \boldsymbol{\delta}_0 + \mathbf{X}^I \boldsymbol{\beta}^I + \boldsymbol{\zeta}, \text{ s.t. } \boldsymbol{\beta}^I = \hat{\boldsymbol{\beta}}^I. \tag{5}$$

Since

$$E(\mathbf{Y}^I) = \hat{\boldsymbol{\beta}}_0^I + \overline{\mathbf{X}}^I \hat{\boldsymbol{\beta}}^I + \overline{\mathbf{Z}}\hat{\boldsymbol{\gamma}} = \hat{\boldsymbol{\delta}}_0 + \overline{\mathbf{X}}^I \hat{\boldsymbol{\beta}}^I, \tag{6}$$

the constant term $\boldsymbol{\delta}_0$ in equation 5 captures the effect of *average* time of residence (and its square) on wages. As a result, in the decomposition the endowment effect would capture the differences in the covariates excluding time of residence and time of residence (squared), and the average effects of these variables are included in the price effect.

To summarize, the decomposition procedure applied comprises the following steps. First, we regress wages of foreigners or naturalized immigrants on the set of covariates $\boldsymbol{X}$ and $\boldsymbol{Z}$. This produces the estimates of the coefficients $\boldsymbol{\beta}^I$, $\boldsymbol{\gamma}$, and the constant term $\boldsymbol{\beta}_0^I$. In the second step, a constrained regression of wages on $\boldsymbol{X}$ only is estimated, with the vector $\boldsymbol{\beta}^I$ restricted to the values obtained in step one (as in equation 5). The new constant term in the constrained regression is then $\boldsymbol{\delta}_0$. It should be noted that since $\boldsymbol{\beta}^I$ was imposed as a constraint, the variance-covariance matrix of $\boldsymbol{\beta}^I$ is zero by definition. Hence, to make meaningful inferences one has to modify the variance-covariance matrix of the coefficient vector.

The variance-covariance matrix of the coefficient vector of the equation $\boldsymbol{Y} = \boldsymbol{\beta}_0 + \boldsymbol{X}\boldsymbol{\beta} + \boldsymbol{Z}\boldsymbol{\gamma} + \boldsymbol{\epsilon}$ (suppressing the superscript I to save notation) is of the form:

$$\begin{pmatrix} \operatorname{var}(\gamma) & & & & \\ \operatorname{cov}(\gamma,\beta_i) & \operatorname{var}(\beta_i) & & & \\ \vdots & \vdots & \ddots & & \\ \operatorname{cov}(\gamma,\beta_k) & \operatorname{cov}(\beta_i,\beta_k) & \cdots & \operatorname{var}(\beta_k) & \\ \operatorname{cov}(\gamma,\beta_0) & \operatorname{cov}(\beta_i,\beta_0) & \cdots & \operatorname{cov}(\beta_k,\beta_0) & \operatorname{var}(\beta_0) \end{pmatrix} \tag{7}$$

The variance-covariance matrix of the coefficient vector of the equation $\boldsymbol{Y} = \boldsymbol{\delta}_0 + \boldsymbol{X}\boldsymbol{\beta} + \boldsymbol{\zeta}$ is very similar. In fact, all elements except for the first and last rows and columns are identical. Thus, we need to trim the first row and column, i.e. coefficients corresponding to a variable which enters only the equation for immigrants. The last row and column, i.e. elements corresponding to the constant term have to be changed. Knowing that $\hat{\boldsymbol{\delta}_0} = \bar{\boldsymbol{Z}}\hat{\boldsymbol{\gamma}} + \hat{\boldsymbol{\beta}}_0$ we could calculate the variance and covariance terms corresponding to $\boldsymbol{\delta}_0$. For example:

$$\text{var}(\boldsymbol{\delta}_0) = \bar{\boldsymbol{Z}}^2\text{var}(\boldsymbol{\gamma}) + \text{var}(\boldsymbol{\beta}_0) + 2\bar{\boldsymbol{Z}}\text{cov}(\boldsymbol{\gamma}, \boldsymbol{\beta}_0), \tag{8}$$

and

$$\text{cov}(\boldsymbol{\delta}_0, \beta_i) = \text{cov}(\boldsymbol{\beta}_0, \beta_i) + \bar{\boldsymbol{Z}}\text{cov}(\boldsymbol{\gamma}, \beta_i). \tag{9}$$

These can be calculated from the elements of the first and last rows and columns of the original variance-covariance matrix. Having constructed the variance-covariance matrix of the coefficient vector one could estimate standard errors of the decomposition terms in a straightforward way (see e.g. Jann, 2008, for further details).

5 Empirical Findings

In this section, we will first analyze the immigrant wage gap in Germany distinguishing foreigners and naturalized immigrants as the two immigrant groups. However, as mentioned above, differences with respect to the place where education is obtained may play a role. Therefore, in a second step we will decompose the gap for persons with education in Germany only.

The results of the decomposition of the wage gap between the two immigrant groups and the natives are given in the upper panel of Table 2. The corresponding coefficient estimates of the underlying wage equations are in line with expectations and are not discussed here (see Table A.1 in appendix A). It becomes obvious that the predicted wage gap between foreigners and natives is quite substantial with 9.1% (men) and 18.7% (women). About one third of the gap (32%) for men can be explained by differences in endowments, but the estimate is statistically insignificant. Differences in endowments do not explain the wage gap of foreign women either; here, the price effect accounts for about 90% of the gap. The wage differential between natives and immigrants is mainly driven by price effects. However, this price effect should not necessarily be dubbed 'discriminatory'. The price effect of the wage gap could well stem from the differences in unobserved characteristics.

The results for naturalized immigrants differ somewhat from the results for foreigners. Again, the wage gap with respect to native Germans is substantial with 11.2% (men) and 12.0% (women). Thus, naturalized male immigrants are even worse off than foreign men. Again,

Table 2: Decomposition of log real gross hourly wages[a]. Reference group - native Germans.

	Foreigners		**Naturalized Immigrants**	
	Males	Females	Males	Females
Full Sample				
Predicted difference	0.091***	0.187***	0.112***	0.120***
Endowment effect	0.029	0.017	-0.040	0.017
	(32%)	(10%)	(-36%)	(14%)
Price effect	0.112***	0.154***	0.169***	0.143***
	(123%)	(87%)	(151%)	(119%)
Interaction effect	-0.051	0.007	-0.017	-0.040
	(-56%)	(4%)	(-15%)	(-33%)
Education in Germany				
Predicted difference	0.022	0.124*	0.088*	0.096*
Endowment effect	0.030	0.058	-0.029	0.033
	(136%)	(47%)	(-32%)	(34%)
Price effect	0.054	0.110*	0.094	0.071
	(243%)	(89%)	(107%)	(74%)
Interaction effect	-0.062*	-0.044	0.022	-0.008
	(-280%)	(-35%)	(25%)	(-8%)

Stars denote significance on the 1%-level(***), 5%-level(**), and 10%-level(*).

[a] Covariates considered in the estimation are: age, age squared, three skill levels, dummy variables for industry, dummy variables for part-time and self-employment, regional dummy variables, terms for the interaction between skill levels and age (and age squared). Birth cohorts are considered: born before 1950, 1950-59, 1960-69, and after 1970. Time of residence (and its square) are considered for the immigrant groups only. See text for details.

differences in endowments do not contribute significantly to the wage gap of naturalized male immigrants. For women we observe a different picture. Here the wage gap between naturalized immigrants and natives is smaller than between foreigners and natives. Similar to the wage gap between foreigners and natives, price effects are important for the naturalized immigrants independently of gender. In the latter group, the price effect of the gap is even larger.

The low endowment effect remains stable irrespective of which wave we used (we have also redone the same analysis using the waves 2002, 2003, and 2004). This is different to the results obtained by Kee (1995) for the Netherlands. He establishes a discrimination share of 35% for the wage gap between native Dutch and migrants from the Antilles and 15% for migrants from Turkey while the gap is nearly completely explained by differences in endowments for Surinamese and Moroccans. In contrast to that and similar to our findings, Blackaby, Leslie, Murphy, and O'Leary (2002) found for the UK that the wage gap between the whites and ethnic minorities is mostly driven by the price effect. A similar result is established by Peters (2008) for Germany. His comprehensive decomposition analysis does not reveal any significant endowment effect either. The low endowment effect may still look somewhat surprising given clear differences in certain characteristics like for example education level which are plain to see from Table 1. It implies that if immigrants are disadvantaged in certain characteristics (like education) than they should have an advantage in other characteristics; for example, immigrants

are more concentrated in South of Germany, where wages are on average higher. So in the end these effects are balanced out causing a low endowment effect. Following this logic, if we had only education level as a regressor in the wage equation we should get a larger endowment effect because of the differences in education between the groups. We did this exercise and obtained larger and statistically significant endowment effects as expected.

From the results presented so far it becomes obvious that immigrants are paid less than natives for observationally equivalent characteristics irrespective of citizenship. Some important implications of these findings should be emphasized. First, evidence for the expected economic integration of naturalized immigrants could not be established from the data. On the contrary, the results tend to show a larger wage gap for naturalized immigrant males compared to that of foreign men. Consequently, analyzing the native-immigrant wage gap based on citizenship alone leads to an underestimation of the true gap. In that case, the average wage of the reference group (native Germans) would be downward biased, because it is the mean of native Germans' and naturalized immigrants' wages, where the latter group makes up about 10% of the population living in Germany.

Besides discrimination, a further reason for differences in the valuation of endowments may be that observationally equivalent educational degrees attained in different countries are not necessarily comparable.[6] Even if contents of education are comparable, skills acquired may be not applicable in the destination country for different reasons, e.g. a lack of demand or differences in technology. Thus, immigrants may be less able than natives to transfer their human capital (measured by the degree obtained) into good jobs or that the value of human capital differs with regard to educational attainment in Germany or abroad. For example, Chiswick and Miller (2009) note an imperfect transferability of skills acquired on the job through formal schooling in the country of origin and that the earnings increments (in an human capital-earnings-function) associated with pre-immigration labor market experience are only very modest for the US. To analyze the value of educational attainment we redo the analysis regarding only persons who completed their education in Germany. The share of immigrants who completed their education in Germany is more than 70% (except for foreign females with about 55%), see Table 1. The results of the decomposition are presented in the lower panel of Table 2.[7]

It becomes clear that the wage gap shrinks significantly for foreigners[8] compared to the results of the full sample. The earnings' differential for foreign males is reduced by about 7 percentage points from 9.1% down to 2.2%. The predicted wage gap for naturalized immigrants drops, too, if one considers persons with educational attainment in Germany only. In this

[6] Blackaby, Leslie, Murphy, and O'Leary (2002) report substantial differences between rates of return to schooling in the UK and abroad.

[7] Corresponding coefficient estimates of the underlying wage equations are given in Table A.2 in appendix A.

[8] The wage gap is always considered with respect to the reference group, the native German population.

group, the negative (but insignificant) endowment effect for males should be noted which means that naturalized immigrants have more favorable labor market characteristics than the reference group.[9] Hence, one would expect that they earn higher wages than the reference group. However, their worse wage position implies that the more favorable characteristics are overcrowded by price effects. It indicates that this group would have earned more than the natives had the remuneration been the same.

6 Conclusion

The paper analyzes the wage differentials between native Germans and two immigrant groups: foreigners and naturalized immigrants. To gain more insight into the native-immigrant wage gap we perform the Oaxaca-Blinder decomposition of the wage differential into three effects: endowment, price, and interaction effect. The underlying wage regression for the reference group (native Germans) contains fewer regressors than for the comparison groups. Namely, time of residence being an important factor affecting wages of the immigrant population is indistinguishable from age for the native German population. Therefore, we modify the decomposition technique to account for unequal regressor sets and respective variance-covariance adjustment.

Our decomposition results show that there is a considerable wage gap between immigrants and natives in Germany. Much of the gap is due to the fact that immigrants are paid less than natives for observationally equivalent characteristics. Relative wages of foreigners and naturalized immigrants (with respect to native Germans) do not differ much. Thus, citizenship alone does not necessarily guarantee economic integration. However, discarding persons who completed education abroad reduces the wage gap for immigrants. Educational attainment in Germany is thus an important component of economic integration and degrees obtained abroad are valued less in the German labor market.

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[9]This may be explained by characteristics of ethnic Germans who are usually formally high-skilled.

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A Appendix

Table A.1: Wage equation: estimation results for full sample

	Males			Females		
	Natives	Foreigners	Naturalized	Natives	Foreigners	Naturalized
Time of residence	–	0.0275***	-0.0030	–	0.0036	0.0147*
Time of residence (squared)	–	-0.0003**	0.0002	–	0.0001	-0.0002
Age	0.1256***	0.1024***	0.1361***	0.1136***	0.0285	0.1070***
Age (squared)	-0.0012***	-0.0011***	-0.0016***	-0.0011***	-0.0001	-0.0011**
Birth Cohort (Ref. Before 1950)						
1950-1959	0.0309	-0.1422	-0.0284	0.0267	0.1381	0.0133
1960-1969	0.1115*	-0.1309	0.0565	0.1073	0.3552	0.1553
1970 or later	0.1387*	-0.0001	0.1025	0.1894**	0.3962	0.4508
Education (Ref. Low)						
Medium	1.5808***	0.7940	1.7407**	1.3798***	-0.1249	0.2006
High	0.8131**	3.4027**	1.1158	0.9495**	1.1338	1.5778
Medium*Age	-0.0649***	-0.0300	-0.0866**	-0.0528***	0.0237	-0.0087
High*Age	-0.0210	-0.1410**	-0.0638	-0.0241	-0.0392	-0.0654
Medium*Age(squared)	0.0007***	0.0003	0.0011**	0.0006***	-0.0004	0.0002
High*Age(squared)	0.0003	0.0015**	0.0009	0.0003	0.0004	0.0007
Economic Sector (Ref. Industry)						
Transportation	-0.1123***	-0.2333***	-0.2395***	-0.0786*	0.0437	0.0496
Construction	-0.1072***	-0.1006	-0.1443	-0.0822	-0.4004	-0.0890
Trading Services	-0.0964***	-0.2763***	-0.1258**	-0.1803***	-0.1466**	-0.0788
Social services and health	-0.0711***	0.1018	-0.1770*	-0.0126	0.0396	0.0689
Region[a](Ref. South)						
North	-0.0509***	0.0239	-0.1132*	-0.0582***	-0.2452***	-0.0969
Center	-0.0097	0.0069	-0.0869*	-0.0254	-0.0508	-0.0249
Part-time work	-0.1210***	-0.2679***	-0.1703	-0.0878**	-0.1591***	-0.1022*
Self-employed	-0.1477***	0.2982***	0.0944	-0.2070***	-0.1416	-0.3050*
Constant	-0.5311***	-0.0642	-0.2811	-0.3648	0.7768	-0.6763
No. of obs.	2,717	259	230	2,534	197	236

Significance is indicated as follows: *** denoting the 1%, ** the 5% and * the 10% level.

[a] *North* contains the Federal States of Schleswig-Holstein, Hamburg, Lower-Saxony, Bremen, and Berlin. *Center* are the Federal Laender North Rhine-Westphalia, Rhineland-Palatinate, and Saarland. *South* comprises Hesse, Bavaria, and Baden-Wuerttemberg.

Table A.2: Wage equation: sample with education in Germany

	Males		**Females**	
	Foreigners	Naturalized	Foreigners	Naturalized
Time of residence	0.0446***	-0.0044	0.0270*	0.0277**
Time of residence (squared)	-0.0006***	0.0002	-0.0004*	-0.0004**
Age	0.0337	0.1753***	0.0261	0.1075**
Age (squared)	-0.0004	-0.0021***	0.0000	-0.0011*
Birth Cohort (Ref. Before 1950)				
1950-1959	-0.3255**	-0.1149	-0.1158	-0.0446
1960-1969	-0.3893*	-0.0523	-0.0550	0.0012
1970 or later	-0.4025	-0.0727	0.0204	0.2728
Education (Ref. Low)				
Medium	-0.6944	2.7346***	-0.9191	0.1834
High	1.6411	0.3790	0.5019	2.1110
Medium*Age	0.0441	-0.1372**	0.0693	-0.0065
High*Age	-0.0542	-0.0284	-0.0118	-0.0799
Medium*Age(squared)	-0.0006	0.0017**	-0.0010	0.0002
High*Age(squared)	0.0006	0.0006	0.0001	0.0009
Economic Sector (Ref. Industry)				
Transportation	-0.2635**	-0.2696***	0.0545	0.0674
Construction	-0.1069	-0.0904	-0.1117	-0.1034
Trading Services	-0.2356***	-0.0934	-0.0331	-0.0360
Social services and health	0.0246	-0.2873**	0.2726**	0.0705
Region[a](Ref. South)				
North	0.0077	-0.0781	-0.2158*	-0.0972
Center	-0.0397	-0.0689	-0.0509	0.0625
Part-time work	0.3644***	0.0719	0.1236	-0.3865**
Self-employed	-0.2289	-0.0580	-0.1556*	-0.0630
Constant	1.5612	-0.8490	0.8615	-0.7056
No. of obs.	160	156	97	171

Significance is indicated as follows: *** denoting the 1%, ** the 5% and * the 10% level.
[a] *North* contains the Federal States of Schleswig-Holstein, Hamburg, Lower-Saxony, Bremen, and Berlin. *Center* are the Federal Laender North Rhine-Westphalia, Rhineland-Palatinate, and Saarland. *South* comprises Hessen, Bavaria, and Baden-Wuerttemberg.