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## Wage Assimilation of Immigrants: Which Factors Close the Gap? – Evidence from Germany

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# **Wage Assimilation of Immigrants: Which Factors Close the Gap? – Evidence from Germany**

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## **Abstract**

Using longitudinal employment register data this study analyzes the development of outcomes of male foreign workers from all important sending countries across time. Cohort analyses on persons entering the German labour market between 1995 and 2000 show significant differences in the assimilation processes between nationalities. We find that immigrants starting with higher entry wages experience greater wage growth in subsequent years. A good deal of the wage growth observed for the most successful nationalities can, however, be explained by selectivity effects. In contrast, observed characteristics as tenure, transitions to larger establishments and successful searches for better paying industries play a more important role for nationalities showing moderate adjustment.

**Keywords:** assimilation, immigration, foreigner-native wage gap.

**JEL classification:** J61, J31, J15.

# 1 Introduction

The integration of foreign workers into labour markets of host countries is a major concern in (immigration) policy as their contribution to the national economy of the host country depends directly on their success on the labor market. Since the seminal contribution of Chiswick (1978) for the US, it is widely recognized in the empirical literature<sup>1</sup> that foreigners earn typically less than natives when entering the labour market of the host country and catch up at least to some extent with the wages of natives in later working life.

From a theoretical point of view, several explanations for the existence of entry wage gaps as well as for wage assimilation can be offered and roughly be classified into three areas:<sup>2</sup> Firstly, there might be differences in (observed and unobserved) endowments of immigrants and natives. Secondly, endowments of immigrants might be rewarded differently than that of natives and thirdly, sample-selection issues might be important when measuring the wage growth of foreigners.

Regarding the first point, Chiswick (1978) argues that human capital is culturally specific, which means that migration implies a temporary devaluation of human capital (see also Friedberg, 2000 or Chiswick and Miller, 2007). With time spent in the host country, however, immigrants acquire language skills, accumulate other general human capital, and become acquainted with the host country's labour market. The observation that earnings of immigrants even exceed the earnings of comparable natives after ten to fifteen years after migration leads Chiswick (1978, p. 901) to the conclusion that "immigrants to the United States have more innate ability or motivation relevant to the labor market than native-born persons." Borjas (1987) objects that this conclusion is only valid if the income distribution in the host country is more dispersed than in the home country. Workers in the upper tail of the home countries' wage distribution who expect to keep this position in the host countries' wage distribution should then select themselves into the group of migrants. If the condition is not satisfied, it is quite conceivable that migrants are negatively selected in terms of observable and unobservable skills. In his empirical analysis, Borjas (1987, p.552) actually finds "strong country-specific fixed effects in the (labor market) quality of foreign-born persons." This finding highlights the

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<sup>1</sup> See Pekkala Kerr and Kerr (2011) for an excellent survey on the economic impacts of immigration.

<sup>2</sup> This differentiation follows to some extent Kalter and Granato (2007).

importance of differentiating immigrants according to their home country. With Borjas' reply also emerged a debate about whether migrants arriving at the US labour market more recently have less favourable characteristics than older cohorts and its impact on economic performance (see, for instance, Borjas, 1995, Card, 2005, LaLonde and Topel, 1997 or Lubotsky, 2007). Hence, not only differentiating between nationalities but also between entry cohorts seems to be essential. Dustman (1993, 2000) emphasizes that migration is often temporary. Migrants envisaging the date of their return to the home country might invest less in host country-specific human capital.

Turning to the second point, wage gaps which could then be attributed to discrimination might appear even with equal observable and unobservable characteristics of immigrants and natives. According to the seminal study of Becker (1971) there is a strong relationship between competition and discrimination. He found that employment discrimination is lower in competitive industries.<sup>3</sup> What does this mean for our empirical analysis? Kalter and Granato (2007) argue that the labour market segmentation in Germany along occupations (instead of firms) restricts the monopsonistic power of firms. Therefore, discrimination should be of minor importance. More recent studies (see e.g. Coleman 2002, 2004), however, give reasons to doubt Becker's finding. Coleman (2004) finds no relationship between lower industry concentration and wage gaps in a study of wage discrimination. He concludes that discrimination cannot be reduced solely by market forces. Hence, discrimination should still be a matter of major interest for researchers when analyzing wage assimilation of foreigners.

The third point, sample-selection issues, is to some extent also related to temporary migration. If predominantly the unsuccessful migrants leave the host country, the weight of successful migrants increases over time. This selection effect is interesting per se as it measures whether integration problems are 'solved' by exit-options. Besides that, selection effects have to be wiped out to isolate assimilation effects based on observable characteristics.

Compared to the results from the large international literature, evidence for the German labour market is unclear. There is broad consensus among the literature regarding the existence of migrant wage gaps in Germany. For instance, Diekmann et al. (1993) find from the Mikrozensus data that foreign male workers earned 9 percent less than German male workers in 1985. Decomposing the gap they obtain a

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<sup>3</sup> This finding is corroborated by Shepherd (1969), Comanor (1973) or Heywood and Peoples (1994).

discrimination component of 4 Percent and an endowment effect of 5 percent. A similar analysis was conducted by Velling (1995) with data from the Institute for Employment Research (IAB). He finds a total wage differential of 13 percent with just 2 percent being accounted by discrimination. Aldashev et al. (2008) obtain a raw male foreigner wage gap of 11 percent from the GSOEP survey. According to the authors, less than half of this gap can be explained by differences in endowments, leaving considerable scope for discrimination. All these studies (see also Bender and Seifert, 1996) suggest that immigrants are in general less successful than natives. In most studies, however, foreigners are broadly defined as non-Germans due to sample size restrictions, and therefore provide no information on nationality-specific differences within the groups of foreigners (an exception is Velling, 1995). When differentiating for specific groups of foreigners, the general result holds also for most groups (Algan et al., 2011; Lehmer and Ludsteck, 2011). For male Poles, for instance, the latter find a raw wage gap of -44 percent compared to Germans, while it is only -8 percent for Spaniards.

Turning to the assimilation literature for Germany, there is no clear picture whether foreigners are able to catch up over years. While Constant and Massey (2005), Gundel and Peters (2007) and, to some extent (for 2 out of 4 cohorts), also Fertig and Schurer (2007) find evidence in favour of an assimilation process, the majority of studies (Pischke, 1992; Dustmann, 1993; Licht and Steiner, 1994; Schmidt, 1997; Bauer et al., 2005) do not. It is worth noting here that all these studies use the GSOEP survey where the number of foreigners is very limited. Therefore they have to pool entry cohorts over various years and are therefore faced with several problems related to changing cohort quality or business cycle effects. Moreover, they are not able to analyze sufficiently differentiated the impact of the country of origin.

We close this research gap by focusing on a cohort entering the German Labour market via full-time job in the year 2000. The large sample size –more than 500,000 observations remain after several sample restrictions for about 90,000 male migrants – allows us to analyze the effects for 30 migrant groups separately. We do this by estimating fixed effects regressions for every migrant group and Germans separately. Based on the estimated coefficients, we assess the contributions of the various right hand side variables to wage convergence between a migrant group compared to native Germans by generating predictions and by averaging them by year. This approach allows us to decompose the

wage adjustment of foreigners into three components: the adjustment due to observed time-varying characteristics (as e.g. tenure or transitions between industries), the adjustment due to selectivity effects, and a third component capturing the adjustment due to unobserved time-varying factors including age.

The remainder of the paper is organised as follows: the next section deals with a description of our data source and gives evidence on the raw wage gap between a specific foreigner group and Germans. Section 3 describes the estimation approach and presents the results. Section 4 concludes.

## **2 Data and descriptive evidence on the German-foreigner wage gap**

### **2.1 Data**

Our analyses are based on data extracts from the Integrated Employment Biographies (IEB) of the Institute for Employment Research (IAB). The IEB covers event history data on employees liable to social security, benefit recipients, persons who are searching for employment, unemployed persons and participants in measures of active labour market policy. Thus the data set provide detailed information on a person's employment and benefit recipient history.<sup>4</sup> We extract a full sample of all foreigners<sup>5</sup> who are registered in the IEB at least once between 1 January 1995 and 31 December 2008 (this means we select persons with at least one foreigner spell within this time span). Altogether the sample contains more than six million persons for whom we have information on important personal characteristics (e.g. sex, age, qualification level, job/unemployment status), information on occupation, industry, establishment identifiers, wages, as well as information on unemployment durations. Of particular interest for our purpose is the nationality variable. Since the nationality variable in our data is afflicted with some errors, a first step is to improve the quality of the variable. For instance, we observe that a person is Turkish in the years 2000 to 2003, and in 2004 the nationality variable has changed to German. The information is either correct, i.e. the person has received German

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<sup>4</sup> A more commonly used data set in Germany is SIAB, which is a 2 percent random sample of the IEB. A detailed description of the data set is given in Dorner et al. (2010).

<sup>5</sup> Please note, that German resettlers who immigrated from the former Soviet Union are Germans by law when immigrating and are therefore not included in the foreigner sample.

citizenship, or an error has occurred (this is sometimes the case when persons start working at a new employer). By analyzing the complete biographies we check the reliability of such changes. We apply an imputation procedure and – coming back to the example – trust the change if the weighted<sup>6</sup> subsequent spells are predominantly German. If they are for the most part Turkish (i.e. it turns out to be a back and forth change), then we correct the nationality variable. For about 4 percent of all cases, however, the imputation procedure indicates that a person starts with German nationality and changes to a foreign nationality thereafter. These persons are dropped from our foreigner sample. Additionally we drop all individuals where the imputation procedure still leaves missings (about 0.5 percent of all persons).

To increase the comparability between the migrant groups, we restrict our analysis to a cohort of foreigners who have their first full-time employment on the German labour market in the year 2000.<sup>7</sup> This allows us to analyze the assimilation process up to ten years.<sup>8</sup> This basic selection of foreigners leaves us with 246.000 persons. A further restriction to male foreigners is required as gender differences between nationalities (see, e.g. Kalter and Granato, 2007 or Lehmer and Ludsteck, 2011) can be expected to have a large impact on nationality-specific assimilation processes. Furthermore we drop all persons with apprentices and student trainee spells. This is necessary because (i) wages during apprenticeships are strictly regulated (which makes it impossible to measure wage assimilation), (ii) persons with apprenticeship spells in Germany are likely second-generation movers who already grew up in Germany (the focus of this paper is on first-generation movers), and (iii) persons who study at German universities and enter the labour market thereafter seem to be a highly selective group. After these restrictions we still have about 120,000 persons with more than 2.1 million observations in our foreigner sample.

We draw a 2 percent random sample of male Germans (666,484 persons) from the IEB to obtain a comparison group of natives. Within this sample we drop all persons who start as foreigners in the data. Additionally we apply the nationality variable imputation to control for missings and changes

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<sup>6</sup> We weight unemployment spells with 0.6 and employment spells with 0.3. The weighting is adequate since information from job centres seems more reliable than from employers.

<sup>7</sup> Note that the cohort contains also persons who are registered in the data already in the years 1995 to 1999 (via other-than-fulltime spells like unemployment, marginal employment or part-time employment spells).

<sup>8</sup> The current right border date of our data source is 31 December 2008.

within the nationality variable. Persons showing reliable episodes as foreigners in their biography are dropped. Since the cohort of foreigners is restricted to those who have their first full-time employment on the German labour market in the year 2000 we ensure that Germans are also full-time employed in this year.<sup>9</sup> As the German sample still is huge compared to foreigners, 100,000 persons (with 2.7 million observations) are selected randomly in a final step.

Since specific groups of foreigners, first of all Poles, are disproportionately often employed as seasonal workers and seasonal work compensation differs considerably from other employment relations, we exclude furthermore all persons who ever worked in the agricultural sector from the sample to increase the comparability between nationalities. For the same reason and to avoid problems due to imprecise working time information in our data we restrict the sample to full-time workers aged between 20 and 60, only.<sup>10</sup> As a final restriction we drop observations of foreigners from adjacent countries where the place of residence variable indicates foreign residence.<sup>11</sup>

Thus, the estimations sample contains about 147,000 individuals with more than 1.2 million observations (see *Table 1*). This large sample allows us not only to differentiate between country groups (for instance classical EU-countries, eastern EU-countries, industrialized non EU-countries,...) but also to analyze specific nationalities. Besides Germans, the largest ethnicities in our sample are Turks (12,364), Italians (4,998) and Yugoslavians<sup>12</sup> (3,872). *Table 1* presents the number of persons for the most important nationalities, all other foreigners are collected in the categories remaining east EU-countries (OEAST), remaining others advanced (OADV) and remaining others (OTHER).<sup>13</sup> Altogether we differentiate in our analysis between 30 foreign nationality groups.

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<sup>9</sup> Note that this is not an entry year selection for the group of Germans.

<sup>10</sup> To be sure that the restriction eliminates a great deal of the variation in working hours we use another data set where working hours are reported, that is the German Microcensus. After restricting the sample to full-time prime-aged male workers we actually find only minor differences in working hours between nationality groups.

<sup>11</sup> This group should not be compared with the rest of the sample since cross-border commuters are likely to accept lower wage offers due to lower living costs in the home country.

<sup>12</sup> More precise, for this group the country of origin is the Federal Republic of Yugoslavia which was formed from the countries Serbia and Montenegro.

<sup>13</sup> The category remaining east EU (OEAST) contains migrants from Czech Republic and Bulgaria. Please note that the number of Czechs has substantially decreased since cross-border commuters are excluded from the analyses. In the category remaining others advanced (OADV) that picks up migrants from advanced industrialized countries, the largest groups come from Sweden, Switzerland, Denmark, Japan and Canada. The largest groups in the category remaining others (OTHER) are from Bosnia-Herzegovina, Albania, Tunisia, Pakistan, Nigeria and Macedonia.



## 2.2 Descriptive evidence on the German-foreigner wage gap

We start by looking at raw wage gaps by nations compared to Germans in the years 2000 and 2008 (see *Figure 1*). The length of the bar indicates the corresponding wage adjustment between starting and end point of the observation period. It is obvious from the figure that for the bulk of countries the wage adjustment between first and last year is positive and statistically different from zero. We observe the largest wage adjustments for French (43 percentage points), Spaniards (35 percentage points) and persons of the remaining east- category (29 percentage points). For other nationalities (US and IN) the wage adjustment is positive but statistically not significant or even negative (IQ, AF and LB). The latter is marked with the dashed bars in *Figure 1*. If one would not differentiate nationalities, one obtains a wage adjustment of 10 percentage points for all migrants (MIG) together, ranging from -50 percent in the year 2000 to -40 percent in 2008.

Moreover, it is worth noting that the wage gaps relative to Germans in the year 2000 are only small or even positive for most of the advanced industrialized countries (AT, NL, UK, US and OADV). The wage gaps for these countries exceed +10 percent at the end of the period.

Contrarily, for some other countries (e.g. GR, IT, MA, TR, VN) the wage gaps in 2008 remain - despite wage adjustments - below -50 percent. Altogether, it is evident from *Figure 1* that there is a distinct positive correlation between the entry wage level and the adjustment thereafter. The lower the wage gap compared to Germans in the first year, the higher is the adjustment in the subsequent years. Migrants from countries starting from a more favourable position experience considerably greater wage increases.

As briefly discussed in section 1, the differences in adjustment remain less meaningful from a theoretical point of view and hardly usable for policy interventions until we can decompose them into adjustment due to changes of observed characteristics and selection effects. The next section presents our straightforward decomposition approach.

### 3 Econometric estimates

#### 3.1 Outline of the estimation approach

The descriptive evidence presented above reveals marked differences in wage levels and wage adjustments of different ethnicities. To explain these differences we employ fixed effects models which are estimated for every migrant group and Germans separately. Let the wage equation for a group of migrant workers and the reference group of German workers be given as

$$\ln w_{it} = x_{it}'\beta + a_{it}^2\delta + \sum_{t=1}^T d_t\gamma_t + \phi_i + \varepsilon_{it} \quad \text{and} \quad \ln W_{it} = X_{it}'B + A_{it}^2\Delta + \sum_{t=1}^T D_t\Gamma_t + \Phi_i + E_{it}$$

respectively. Here,  $\ln w_{it}$  and  $\ln W_{it}$  stand for the logarithm of gross daily earnings<sup>14</sup> for person  $i$  in year  $t$ ,  $x_{it}$  ( $X_{it}$ ) are vectors of individual and establishment level control variables,  $a_{it}^2$  ( $A_{it}^2$ ) denotes squared age  $d_t$  ( $D_t$ ) are year dummies and  $\gamma$  ( $\Gamma$ ), ( $B$ ) contain the corresponding coefficients. The error term comprises the fixed individual effects  $\phi_i$  ( $\Phi_i$ ) and residuals  $\varepsilon_{it}$  ( $E_{it}$ ) which are assumed to be uncorrelated with all other right hand side variables. We include several control variables which presumably have an impact on individual wages: age squared, linear and squared terms of tenure (and log of establishment size, nine industry categories, dummies controlling for the region (seven categories) and the region type (4 categories) and twelve aggregated occupation categories as suggested by Blossfeld, 1985).

We cannot control for other personal characteristics as e.g. marital status and the number of children which are not available in our data. We are quite confident, however, that these controls are of minor importance for our estimation sample of full-time working men. The regressions for foreigners additionally include entry year dummies in order to account for potential differences in assimilation processes. Some of these differences in assimilation processes may be caused by network effects which are tackled by inclusion of a variable measuring the share of compatriots working in the same region. Additionally, we include three dummy variables which use the information from the nationality variable imputation procedure. The first variable *chgerm* indicates a reliable change to

German citizenship; the others capture differences between the nationality information given by the employer and the information from the workers' whole employment biography: *chnat1* takes on the value unity if the employer registers the person as German although he is actually foreigner and *chnat2* captures the opposite.

A straightforward approach to assess the contributions of the various right hand side variables to wage convergence between a migrant group compared to native Germans is to generate predictions based on the estimated coefficients and to average them by year. For example, the change of the log wage differences between a migrant group and Germans for the period 2000 to 2008 explained by the  $k$  – th regressors  $x_{kit}$  ( $X_{kit}$ ) is given by  $(\bar{x}_{k\bullet 8} - \bar{x}_{k\bullet 0})\hat{\beta}_k - (\bar{X}_{k\bullet 8} - \bar{X}_{k\bullet 0})\hat{B}_k$  where  $\bar{x}_{k\bullet 8}$  denotes the mean of  $x_{k\bullet 8}$  in year 2008 and all other means are defined correspondingly. Similarly, changes of the migrant-German wage gap caused by selectivity based on unobserved time-constant characteristics are given by  $(\bar{\phi}_8 - \bar{\phi}_0) - (\bar{\Phi}_8 - \bar{\Phi}_0)$  (variation across years is generated here through sample composition changes.) The fixed effects approach is highly attractive as it allows us to identify the impact of selectivity based on rather weak and transparent assumptions.<sup>15</sup> As in many other applications, sparsity and robustness come, however, at the cost of reduced information in some respects. The limitation imposed by the fixed effects approach regards the impossibility to include time constant regressors (as they are wiped out by the within transformation and therefore enter the fixed effects term). This limitation is not serious in our application as time-constant characteristics cannot contribute to convergence by definition.<sup>16</sup> It, however, restricts the interpretation of the time dummies and age effects. A linear age term cannot be included as a regressor into the equation since it is increased by unity in every year and therefore perfectly collinear with a time trend or a complete set of time

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<sup>15</sup> The alternative to model selectivity based on unobservables explicitly using the Heckman-procedure would require exclusion restrictions (variables determining whether a person is observed as full time workers which have no impact on wages). It is not viable for our application due to lack of reliable exclusion restrictions.

<sup>16</sup> Strictly speaking, this statement is wrong since wage effects may be caused either by a change of a regressor or its coefficient. Regarding education (which remains constant for most workers after the start of their working biography) e.g. the skill premium could change in the course of time. Such valuation effects could in principle be detected by running separate OLS regressions for every year. This procedure were, however, prone severely to selectivity bias. For example, a spurious increase of the skill premium would result if the mediocre highly skilled workers drop out of the sample in the course of time and only the best remain. As our data indicate huge sample changes for the migrants, we limit our investigation to the more robust fixed effects models here.

dummies (as in our specification). Since the trend (modelled nonparametrically by the time dummies in our specification) estimates are likely influenced by other (aggregate) time effects as e.g. the business cycle, only a composite estimate of age and other unobserved trend and time effects can be obtained by generating a joint prediction including the time dummy effects and age squared. The problem caused by contamination through unobserved trend effects is mitigated somewhat by the fact that we conduct a diff-in-diff analysis here, i.e. that we are interested only in time changes of migrant wages compared to the Germans. Bias in this comparison is induced only by effects affecting migrants and Germans differently. Since we have neither prior knowledge nor good information on the symmetry of such shocks, the combined trend-age profile predictions have to be interpreted very cautiously (i.e. we should not give them specific interpretations at all and draw no conclusions based on them.)

Altogether, this approach allows us to decompose the wage adjustment of foreigners as presented in *Figure 1* into three components: the adjustment due to observed time-varying characteristics as e.g. tenure or change of industries/occupations (hereinafter referred to as: *Observed Excluding Age/Trend*), the adjustment due to selectivity effects (hereinafter: *Selectivity*) and a third component capturing the adjustment due to unobserved time-varying factors and age as discussed above (hereinafter: *Age/Trend*).

## 3.2 Results

The results of the threefold decomposition are depicted in *Figure 2*<sup>17</sup> where countries are (as in figure 1) sorted by the size of total wage adjustment to visualize the relation between total adjustment and its components. Starting with the aggregated group of migrants (not differentiating for the specific nationality, MIG) wage adjustment of foreigners seems to be explained mainly by the component *Observed Excluding Age/Trend*, i.e. time-varying observable characteristics. This summary information is, however, of limited worth as it mainly reflects the Turks' results which dominate the

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<sup>17</sup> Due to space restrictions we do not present the results of the fixed effects-regressions for 30 countries in detail. To give an impression of the precision of the estimates, coefficients are listed for three countries in the Appendix, *Table A1*. All other results are available from the authors on request. Point estimates and standard errors for the predicted effects are included in the left panel of *Table A2* in the Appendix.

entire sample due to their huge weight. Differentiating for nationalities shows that a dominating effect of observed characteristics characterizes countries with moderate adjustment (for instance TR, YU, HR, MA). *Selectivity* as well as *Age/Trend* effects play a minor role for these countries and the aggregate. Things are, however, quite different for countries on the top ranks of the convergence ordering. *Selectivity* effects play a crucial role there and even exceed the contribution of observed characteristics in some cases. *Selectivity* accounts for more than 50 percent of the wage adjustment for French, Hungarians and the persons from the remaining east category. Thus a good deal of the raw observed wage adjustment for these countries is caused by the exits of the less successful persons and artificial in the sense that the prolific workers remaining in Germany obtained better wages already after entering Germany. In contrast, the selection effect is even negative for a number of countries located at the end of the convergence ordering (RU, KZ, US, IN, OTHER, LB, AF), indicating an improvement of the sample composition over time. This corroborates and details the finding of Borjas (1987) of strong country-specific fixed effects for migrants.

From both theoretical as well as policy points of view it makes a difference whether adjustment takes place mainly through improvement of human capital, search gains or employment stability. Though the informativeness of our observed covariates is limited, they give at least a rough indication in this respect. *Figure 3* gives a finer decomposition, differentiating the impact of *Establishment Size/Tenure*, *Employment Stability*, *Industries/Occupations* and the totaled remaining effects (*All Other*).<sup>18</sup> For the aggregate of all migrants, adjustment through *Establishment Size/Tenure* (4.0 percentage points), which comprise the effect (black bars) of changing into a larger firm, working in firms with above-average employment growth or remaining in the same firm for several years, explains a substantial part of the overall convergence. Further adjustment is accomplished by *Employment Stability* (1.8 percentage points) and the change of industries and occupations (2.3 percentage points). Within the remaining effects<sup>19</sup> (1.0 percentage point) the largest impact is through changes to German citizenship

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<sup>18</sup> The right panel of Table A2 in the Appendix contains point estimates and standard errors for the predicted effects of *Establishment Size/Tenure*, *Employment Stability* and *Industries/Occupation*. Due to space restrictions, point estimates and standard errors for the remaining effects are not presented, but available on request from the authors.

<sup>19</sup> The remaining effects contain the effects of changing region, types of region, citizenship and network effects. Since they are of minor importance, they are not presented in the paper, but available from the authors on request.

(0.8 percentage points). Differentiating for nationalities again indicates limited worth of the aggregate results. While *Establishment Size/Tenure*-effects are very important for, e.g. Hungarians and migrants of the remaining east group or Turks, they are even negative for Spaniards, Austrians or British. *Employment stability*, measured as days employed per year, adds significantly to the wage convergence of Spaniards, migrants from advanced industrial countries (FR, NL, UK, OADV, US) and also Croats and Portuguese. Weak or even negative influence of *Employment Stability* is obtained for -to name just a view- Slovaks, Hungarians or Greeks. The sorting into better branches and occupations over time, captured by *Industries/Occupations* is most important for Indians, Spaniards and British and again negative for other countries (OEAST, HU, PT, US). All these results corroborate the view that migrants are very heterogeneous and therefore it is not adequate to aggregate different nationalities in order to analyze them as a whole.

#### **4 Summary of findings**

This paper examined the sources of wage assimilation for migrants in Germany by estimating fixed effects regressions for migrants and Germans separately. Based on the estimated coefficients, we assessed the contributions of the various right hand side variables to wage convergence between migrants compared to native Germans by generating predictions and by averaging them by year. This approach allows to decompose the wage adjustment of foreigners into three components: the adjustment due to observed time-varying characteristics as e.g. tenure or change of industries/occupations, the adjustment due to selectivity effects and a third component capturing the adjustment due to unobserved time-varying factors and age.

If all migrants are tarred with the same brush (by pooling them into one group), we find that the raw wage gap (compared to native Germans) decreases from -50 percent in the year 2000 to -40 percent in 2008. According to the decomposition results this wage assimilation of 10 percentage points can almost completely be traced back to time-varying observable characteristics. Migrants increase their wages over time mainly by changing their workplaces into larger firms, by accumulating firm-specific human capital and by sorting themselves into better-paying industries and occupations. Furthermore,

employment stability contributes to the wage convergence as well as changes to German citizenship. Selectivity- and age/trend- effects play only a minor role here.

These results from a ‘one size fits all model’ pooling all migrants into one group mask considerably heterogeneity between countries and yields conclusions similar to the statement that average earth citizens speak Chinese. The large size of our data allows us to differentiate between 30 nationality groups. We observe that the wage assimilation is significantly higher for countries with a small entry wage gap compared to German natives. It turns out that a large proportion of the total wage adjustment can be explained by selectivity effects especially for migrants from countries with large wage increases whereas adjustment is mainly driven by time-varying observable characteristics for countries in the midfield of the adjustment ranking. Considering the importance of sorting effects, further research is required to figure out in detail whether the exits of the less successful migrants point to personal tragedies and social decline or to home returns after ‘experimenting periods’ implying *temporary* losses only. In summary, the nationality-specific results reveal considerable heterogeneity regarding adjustment and its causes, indicating that effective migrant policy should account for that by creating nationality-specific integration measures.

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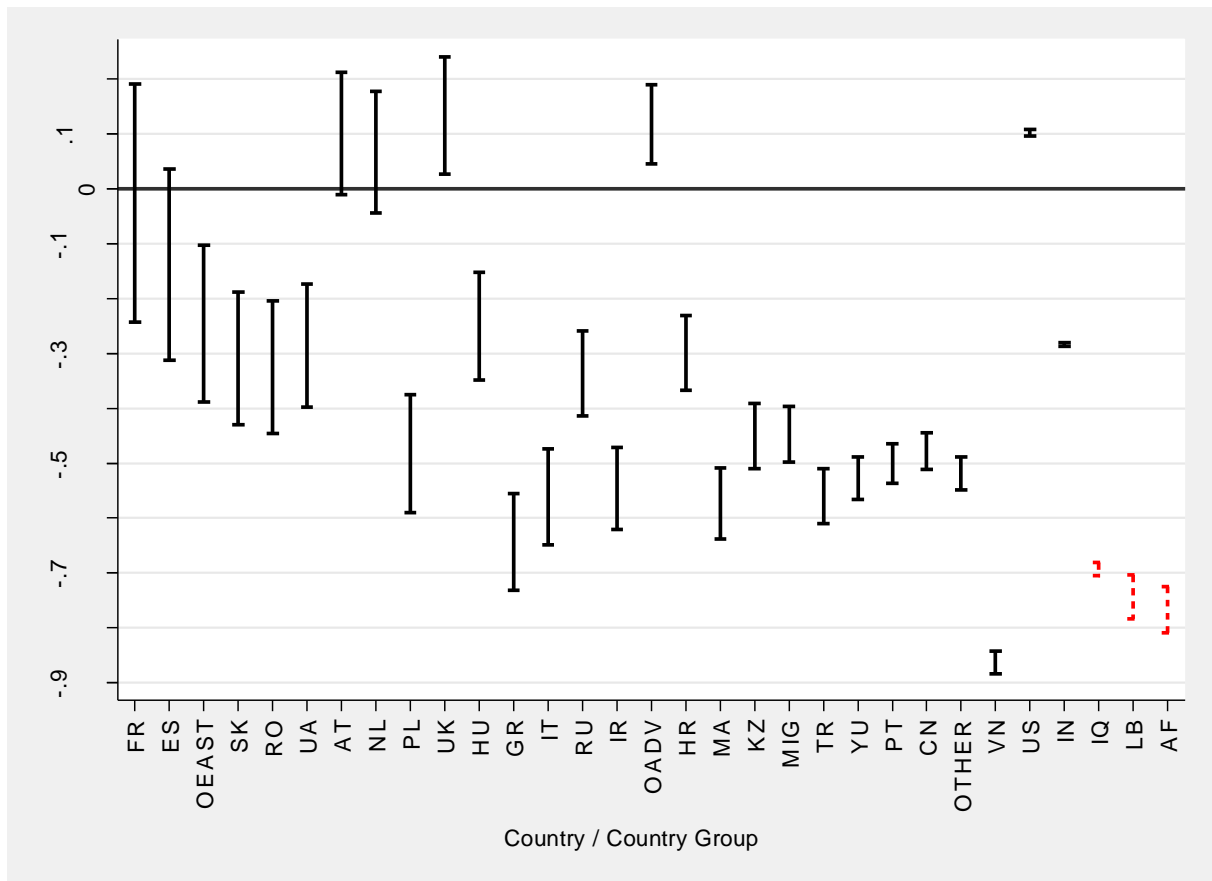
## Tables

**Table 1: Numbers of Observations and Persons by Country and Country Group**

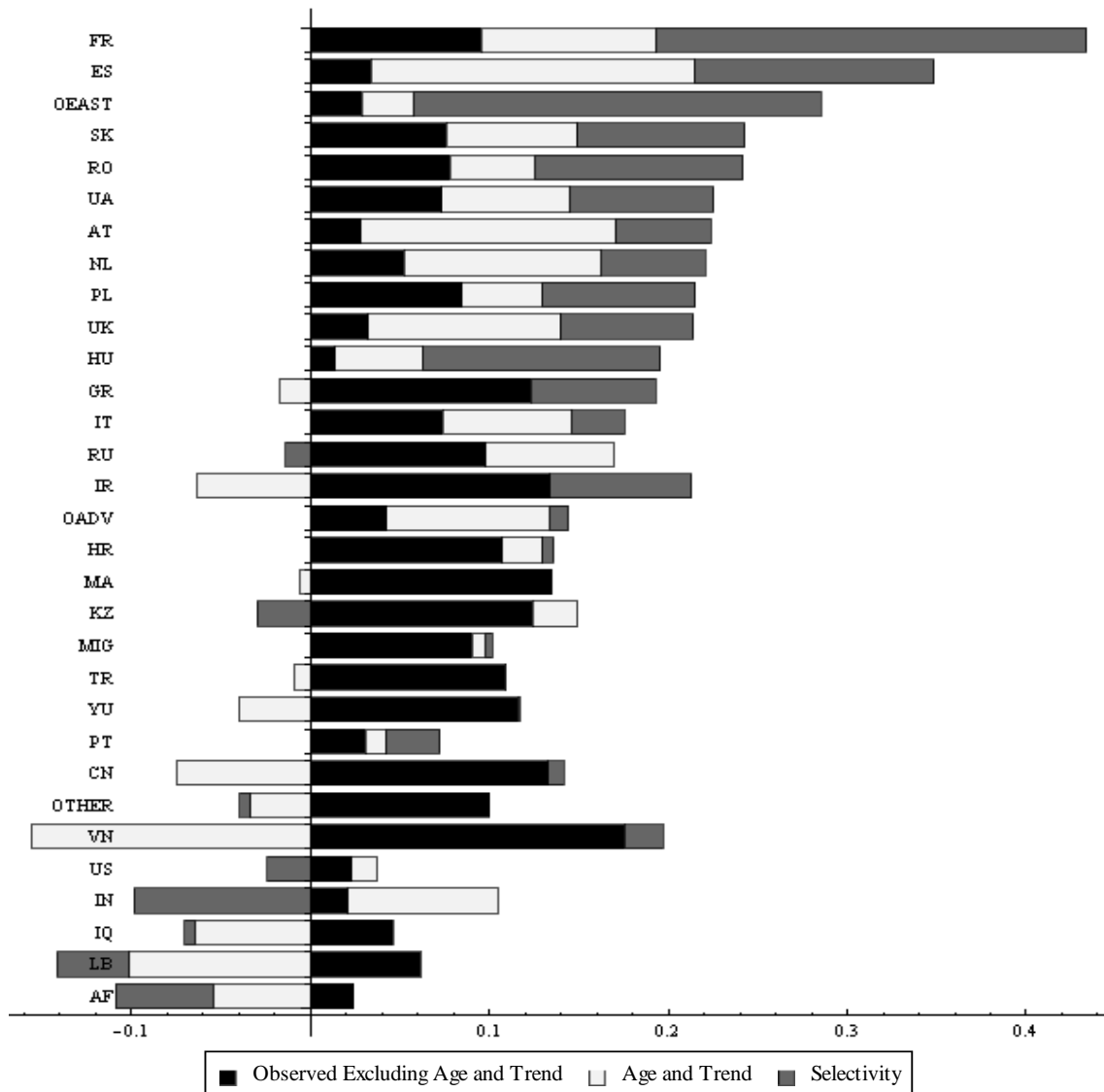
Country ID	Country	Observations	Persons 2000	Persons 2008
DE	Germany	729.695	75.947	62.691
FR	France	12.344	2.079	542
HR	Croatia	7.408	885	537
GR	Greece	18.111	3.038	854
IT	Italy	30.560	4.998	1.507
YU	Yugoslavia	33.190	3.872	2.345
NL	Netherlands	6.084	885	344
AT	Austria	10.430	1.486	569
PL	Poland	20.149	2.815	1.044
PT	Portugal	10.751	1.759	555
RO	Romania	9.666	1.450	564
SK	Slovakia	4.151	811	151
RU	Russian Federation	30.775	3.545	2.400
ES	Spain	4.822	809	206
TR	Turkey	101.645	12.364	7.433
HU	Hungary	4.555	993	176
UA	Ukraine	12.214	1.473	900
GB	United Kingdom	11.478	1.840	605
MA	Morocco	8.806	1.040	622
US	United States	8.270	1.332	395
AF	Afghanistan	7.071	979	438
VN	Vietnam	5.815	800	310
IN	India	5.822	908	285
IQ	Iraq	20.839	2.671	1.270
IR	Iran	7.021	1.083	424
KZ	Kazakhstan	13.384	1.387	1.064
LB	Lebanon	4.159	747	226
CN	China	5.321	956	242
OEAST	Other East-European Countries	5.918	1.166	256
OTHER	Other Countries	87.286	11.163	5.749
OADV	Other Advanced Countries	13.314	2.299	657
Total		1.251.054	147.580	95.361

Notes: The category remaining east EU (OEAST) contains migrants from Czech Republic and Bulgaria. In the category remaining others advanced (OADV) that picks up migrants from advanced industrialized countries, the largest groups come from Sweden, Switzerland, Denmark, Japan and Canada. The largest groups in the category remaining others (OTHER) are from Bosnia-Herzegovina, Albania, Tunisia, Pakistan, Nigeria and Macedonia.

## Figures



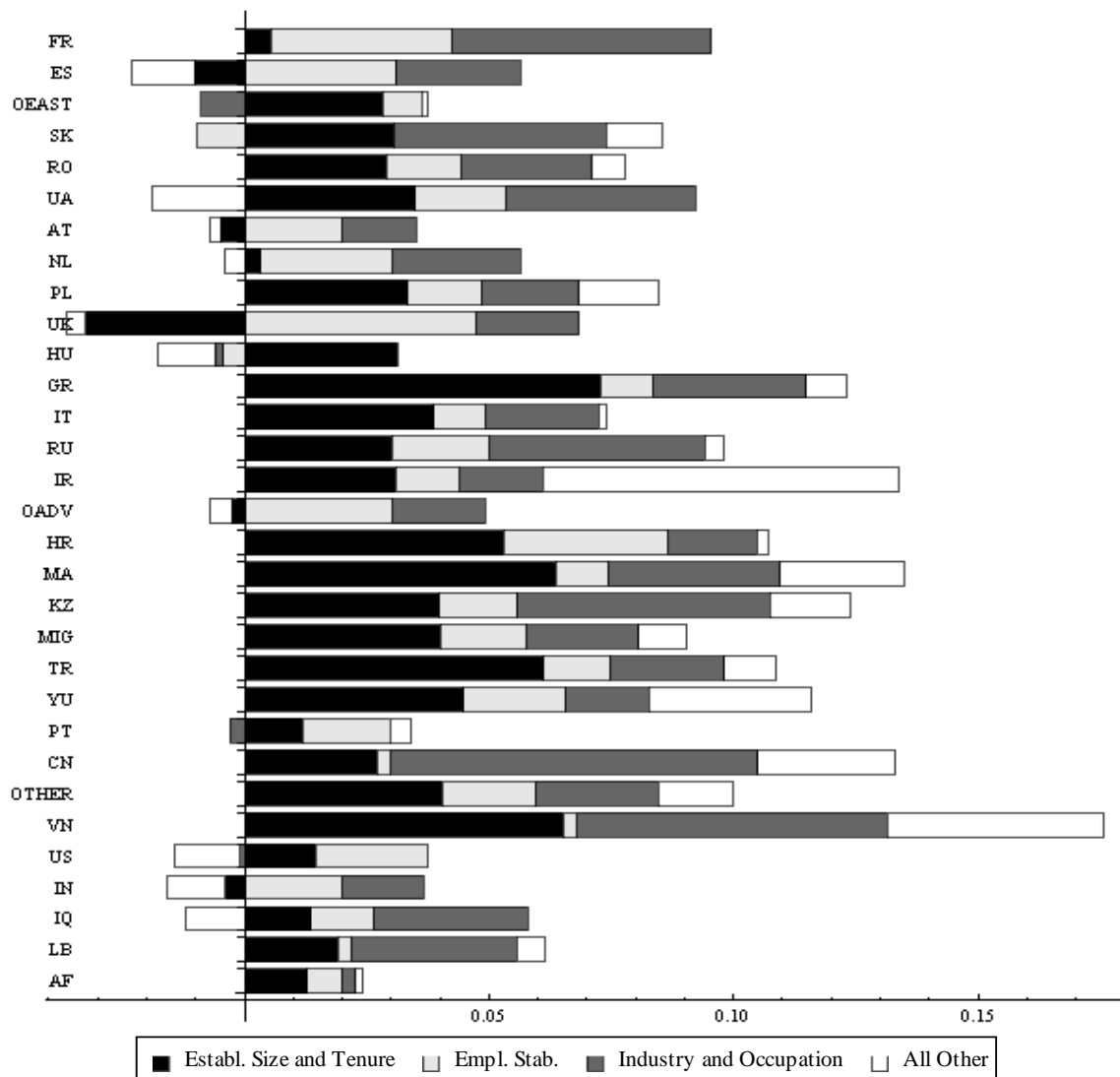
**Figure 1: Wage Gaps of Specific Foreigner Groups Compared to Germans in the Year 2000 and 2008 and the Wage Adjustment Between**



**Figure 2: Decomposition of Wage Adjustment of Foreigners**

Notes: The black bars represent changes of the migrant/German (log) wage gap explained by all observed time-varying characteristics except the combined Age/Trend component as described in the model section. The gray bars represent changes of the migrant/German (log) wage gap explained by selectivity (measured as changes of year-means of fixed person effects).

See Table A2 in the Appendix for standard errors of the predictions.



**Figure 3: Decomposition of the Component "Observed excluding Age/Trend"**

Notes: The black bars (Establ. Size/Tenure) represent changes of the migrant/German (log) wage gap explained by changes of the (log) establishment size and Tenure effects. The light gray bars (Empl. Stab.) represent corresponding changes due to employment stability (measured as share of day employed per year). The dark gray bars (Industry/Occupation) capture corresponding changes due to moves between industries or occupations. The white bars represent changes due to all remaining observed covariates (excluding the trend + age component).

See Table A2 in the Appendix for standard errors of the predictions.

## Appendix

**Table A1: Fixed Effects Regression Results for Selected Countries**

Variables	Germany		Turkey		Spain	
	Coeff.	Std. Dev.	Coeff.	Std. Dev.	Coeff.	Std. Dev.
Time dummy 2001	4.58	0.09	3.81	0.34	3.87	1.36
Time dummy 2002	8.02	0.12	7.64	0.47	8.13	2.15
Time dummy 2003	13.23	0.15	9.19	0.62	13.07	2.95
Time dummy 2004	15.47	0.19	8.66	0.78	15.63	3.81
Time dummy 2005	17.81	0.23	7.69	0.95	16.83	4.66
Time dummy 2006	21.08	0.27	8.38	1.13	18.74	5.54
Time dummy 2007	24.48	0.31	10.38	1.30	20.10	6.46
Time dummy 2008	27.27	0.36	11.07	1.50	18.44	7.52
Age squared	-3.95	0.05	-2.15	0.29	0.28	1.39
Log establ. size	-1.15	0.06	2.34	0.19	1.76	0.94
Log establ. size squared	0.22	0.01	0.31	0.02	-0.11	0.10
tenure	0.57	0.06	2.17	0.25	-0.62	1.12
Tenure squared	-0.58	0.88	-3.93	3.86	12.00	17.38
Dummy high tenure	4.09	0.11	13.19	0.70	-1.94	3.17
weight	11.86	0.09	6.93	0.39	11.52	1.56
chgerm	-	-	6.65	0.68	0.63	3.30
chnat1	-	-	0.14	0.34	1.95	1.59
chnat2	-	-	-3.93	0.99	10.16	8.46
Share compatriots	-	-	1.88	18.23	2638.05	819.69
Dummy occupation 2	5.73	0.39	0.97	0.81	2.63	4.80
Dummy occupation 3	8.80	0.39	1.16	0.85	11.54	5.02
Dummy occupation 4	17.01	0.43	13.33	1.80	11.23	5.23
Dummy occupation 5	18.84	0.47	16.82	2.45	15.46	4.68
Dummy occupation 6	5.42	0.39	4.67	0.83	5.34	4.49
Dummy occupation 7	12.43	0.55	2.39	1.62	0.22	6.72
Dummy occupation 8	11.79	0.59	13.96	2.41	33.46	7.62
Dummy occupation 9	19.47	0.68	-1.47	3.48	23.19	7.08
Dummy occupation 10	11.66	0.44	-0.93	0.97	10.77	5.16
Dummy occupation 11	15.76	0.41	8.38	1.14	15.45	4.34
Dummy occupation 12	20.06	0.45	17.42	2.02	13.13	5.52
Dummy industry 2	3.16	0.30	15.30	0.69	12.45	7.32
Dummy industry 3	2.18	0.32	18.10	0.89	4.87	7.39
Dummy industry 4	2.15	0.31	7.29	0.76	13.59	8.11
Dummy industry 5	-4.54	0.30	-8.64	0.65	1.40	7.12
Dummy industry 6	-7.53	0.32	-0.93	0.77	7.15	7.86
Dummy industry 7	-14.45	0.30	-15.56	0.63	-4.62	7.01
Dummy industry 8	-13.31	0.39	-9.39	1.12	-3.38	8.56
Dummy industry 9	-8.74	0.39	-7.74	1.02	18.61	8.25
Dummy region 2	0.20	0.28	2.45	0.97	11.28	4.23
Dummy region 3	0.44	0.30	2.28	1.03	4.12	4.27
Dummy region 4	2.82	0.32	5.98	1.08	7.55	4.29
Dummy region 5	2.02	0.31	2.45	1.13	8.94	4.34
Dummy region 6	-11.72	0.33	-17.46	1.41	6.12	5.04
Dummy region 7	-14.89	0.33	-12.95	1.51	17.77	7.81
Dummy region type 2	-1.78	0.19	3.19	0.62	2.47	3.13
Dummy region type 3	-2.77	0.17	-0.91	0.53	6.11	2.45
Dummy region type 4	-3.35	0.19	0.51	0.76	-16.03	3.87
Constant	471.22	0.90	371.31	2.64	370.38	14.97
Obs/R squared	729,695	0.10	100,719	0.17	4,765	0.14

Notes: All coefficients and standard errors are multiplied by 100 for sake of readability.

**Table A2: Point Estimates and Standard Errors for the Predictions Based on Estimated Coefficients**

Country	Observed excl. Age/Trend	Age/Trend	Selectivity	Est./Ten.	Emp Stab.	Ind./Occ.
FR	.095*** (.003)	.098*** (.003)	.24*** (.000)	.005*** (.000)	.037*** (.000)	.053*** (.002)
ES	.034*** (.003)	.181*** (.003)	.134*** (.000)	-.01*** (.000)	.031*** (.000)	.025*** (.002)
OEAST	.029*** (.003)	.029*** (.003)	.228*** (.000)	.028*** (.000)	.008*** (.000)	-.009*** (.002)
SK	.076*** (.003)	.074*** (.003)	.093*** (.000)	.031*** (.000)	-.01*** (.000)	.043*** (.002)
RO	.078*** (.003)	.047*** (.003)	.117*** (.000)	.029*** (.000)	.015*** (.000)	.027*** (.002)
UA	.073*** (.003)	.072*** (.003)	.08*** (.000)	.035*** (.000)	.018*** (.000)	.039*** (.002)
AT	.028*** (.003)	.143*** (.003)	.053*** (.000)	-.005*** (.000)	.02*** (.000)	.015*** (.002)
NL	.052*** (.003)	.11*** (.003)	.058*** (.000)	.003*** (.000)	.027*** (.000)	.026*** (.002)
PL	.085*** (.003)	.044*** (.003)	.086*** (.000)	.033*** (.000)	.015*** (.000)	.02*** (.002)
UK	.032*** (.003)	.108*** (.003)	.074*** (.000)	-.032*** (.000)	.047*** (.000)	.021*** (.002)
HU	.014*** (.003)	.049*** (.003)	.133*** (.000)	.031*** (.000)	-.004*** (.000)	-.002 (.002)
GR	.123*** (.003)	-.017*** (.003)	.07*** (.000)	.073*** (.000)	.011*** (.000)	.031*** (.002)
IT	.074*** (.003)	.071*** (.003)	.03*** (.000)	.039*** (.000)	.01*** (.000)	.023*** (.002)
RU	.098*** (.003)	.071*** (.003)	-.014*** (.000)	.03*** (.000)	.02*** (.000)	.044*** (.002)
IR	.134*** (.003)	-.063*** (.003)	.079*** (.000)	.031*** (.000)	.013*** (.000)	.017*** (.002)
OADV	.042*** (.003)	.091*** (.003)	.011*** (.000)	-.002*** (.000)	.03*** (.000)	.019*** (.002)
HR	.107*** (.003)	.022*** (.003)	.006*** (.000)	.053*** (.000)	.034*** (.000)	.018*** (.002)
MA	.135*** (.003)	-.006** (.003)	.000 (.000)	.064*** (.000)	.011*** (.000)	.035*** (.002)
KZ	.124*** (.003)	.025*** (.003)	-.03*** (.000)	.04*** (.000)	.016*** (.000)	.051*** (.002)
MIG	.09*** (.003)	.007*** (.003)	.004*** (.000)	.04*** (.000)	.018*** (.000)	.023*** (.002)
TR	.109*** (.003)	-.009*** (.003)	.001*** (.000)	.061*** (.000)	.014*** (.000)	.023*** (.002)
YU	.116*** (.003)	-.039*** (.003)	.001*** (.000)	.045*** (.000)	.021*** (.000)	.017*** (.002)

*Table A2 continued*

Country	Observed excl.			Est./Ten.	Emp Stab.	Ind./Occ.
	Age/Trend	Age/Trend	Selectivity			
PT	.031*** (.003)	.012*** (.003)	.03*** (.000)	.012*** (.000)	.018*** (.000)	-.003 (.002)
CN	.133*** (.003)	-.075*** (.003)	.009*** (.000)	.027*** (.000)	.003*** (.000)	.075*** (.002)
OTHER	.1*** (.003)	-.034*** (.003)	-.006*** (.000)	.04*** (.000)	.019*** (.000)	.025*** (.002)
VN	.175*** (.003)	-.156*** (.003)	.022*** (.000)	.065*** (.000)	.003*** (.000)	.064*** (.002)
US	.023*** (.003)	.014*** (.003)	-.024*** (.000)	.015*** (.000)	.023*** (.000)	-.001 (.002)
IN	.021*** (.003)	.084*** (.003)	-.099*** (.000)	-.004*** (.000)	.02*** (.000)	.017*** (.002)
IQ	.046*** (.003)	-.064*** (.003)	-.006*** (.000)	.014*** (.000)	.013*** (.000)	.031*** (.002)
LB	.061*** (.003)	-.102*** (.003)	-.04*** (.000)	.019*** (.000)	.003*** (.000)	.034*** (.002)
AF	.024*** (.003)	-.054*** (.003)	-.055*** (.000)	.013*** (.000)	.007*** (.000)	.003 (.002)

Notes: Bootstrapped standard errors are reported in parentheses. \*, \*\*, \*\*\* indicate significance at the 10, 5, or 1 percent level, respectively. The Standard errors are obtained from 100 cluster bootstrap iterations (clusters are persons). As the regressions run for every country separately, the standard errors are based on the assumption of zero correlations between the German and the respective migrant samples. This should, however, be a good approximation since the samples are disjunct, implying that correlations can be caused only by common establishment, region, region type, industry or occupation level shocks. We control for all shocks except the establishments by including dummies. The impact of the latter should be negligible since only tiny shares of the migrant sample work in the same establishments as the persons in the German sample.