

# **Occupation-Education Mismatch of Immigrant Workers in Europe: the Role of Home and Host Country Characteristics**

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*This version: June 1, 2010*

*FIRST DRAFT – VERY PRELIMINARY AND INCOMPLETE*

This paper documents the extent of the occupation-education mismatch of immigrant workers in the EU in the past decade, and analyzes its determinants. We consider three broad sets of factors: individual immigrant characteristics; country of residence effects; and migration decade-specific country of origin characteristics. First, we find that immigrants have a higher probability of being both over- and under-qualified as opposed to the native-born, with only marginal evidence of assimilation. Second, we examine two types of country of residence effects: general labor market and economic conditions, such as labor market rigidities and trade union coverage, that may be relevant for the occupation-qualification mismatch of both immigrants and native-born; as well as migrant-specific effects, such as policies for recognition of diplomas, labor market integration and antidiscrimination. We find that while for native-born it is the first type of country-specific indicators that matters; for immigrants, it is rather immigrant-specific policies that play a role. Lastly, among migration decade-specific country of origin characteristics, we distinguish between the factors that affect the selection of immigrants, such as conflicts or income inequality, and factors that affect the transferability of human capital, such as overall level and quality of education, and find that it is the latter type of factors that improves the occupation-education match at destination. The data used for the analysis are: first four waves of the European Social Survey; POLITY-IV, World Bank Development Indicators, Cohen-Soto education data; MIPEX inventory of migration policies; OECD statistics; CEPII geo data.

JEL classification: I21, J24, J61, F22

Keywords: immigration, occupational mismatch, over-education, over-qualification, ORU realized matches

## Introduction

Labour market success of immigrants can be measured in terms of their employment status, wages<sup>1</sup>, but also in terms of the match between jobs and required qualifications. In any country, the match is rarely perfect for the native-born; and it is even less perfect for immigrants.

The contribution of this paper is two-fold. First, we provide Europe-wide evidence on the occupation-qualification mismatch of immigrants as compared to native-born. Second, we analyze the factors responsible for this mismatch; with a specific emphasis on the destination and source country characteristics in this process.

The literature offers numerous reasons for the occupation-qualification mismatch. These include (as outlined by Chiswick and Miller, 2009): search and match theory, according to which mismatch is a natural outcome in the imperfect information setting; human capital theory, which tells that experience and formal education can be substitutes; technological change theory, according to which technological progress may require having workers with a different level of education for similar posts; and a screening hypothesis, according to which acquired schooling can be informative of the unobserved abilities. These factors have a different degree of implication for immigrants and native-born. For example, employers may be less able, or eager, to assess the quality of foreign schooling, and hence may prefer hiring immigrants with education levels higher than needed for the job.

In addition to these reasons, there are two factors affecting the mismatch which are specific to immigrants. These concern the skill transferability and self-selection of immigrants (Chiswick and Miller 2009). Differences in schooling and non-recognition of diplomas; different technologies and barrier to entry into specific occupations, as well as discrimination against immigrants make skill transferability across labour markets less than perfect. This usually leads to over-qualification of immigrants, which has a tendency to decrease with the duration at the destination. In contrast, as immigrants are often favorably selected (Chiswick, 1999), due to their talent and ability, there are more able to substitute schooling with experience, and hence to be under-educated. This tendency may be independent of duration at destination; or actually increase with time, as more country-specific experience is gained.

It is interesting to observe that all these factors and theories of occupation mismatch have an individual-specific dimension, but also a country-specific dimension. For example, the mismatch of immigrants depends, by definition, on the level of acquired schooling; and also, presumably, on talent, individual adaptability. However, it also depends on the policies of destination and sending countries that may accommodate, or impede a perfect match. For instance, if the firing costs are high, an employer will be more willing to hire only individuals particularly suited for the job, hence the incidences of over-education may be high. In the case of immigrants, if they are not eligible to take specific jobs, the mismatch will also aggravate. However, to date, to the best of our knowledge, most of the literature on immigrants' occupation mismatch has focused on the individual determinants of the mismatch, and little

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<sup>1</sup>Chiswick, 1978; Borjas, 1985, 1995; Friedberg, 2000.

research has been done on the role of host and home country characteristics in this process. Most of the studies are done in a setting of one country, but control for country-of-origin effects (Green, 1999; Amuedo-Dorantes and de la Rica, 2006; Barrett and Duffy, 2007; Wheatley, 1998; to name a few). In this paper, we would like to shift the focus, and shed more light on the country-specific dimension of analysis. It is particularly interesting to do so in the setting of Europe, as the European countries are characterized by vast variation in their migration histories and patterns, consequently, immigrant populations across Europe are very heterogeneous, too.

Specifically, we distinguish the following factors affecting the mismatch:

- 1) individual characteristics relevant for both immigrants and native-born, such as gender, labour market experience, previous incidents of unemployment;
- 2) immigrant-specific characteristics, such as the length of stay in a country, citizenship, language proficiency;
- 3) characteristics of the labour markets at destination, relevant for both immigrants and native-born, such as their overall flexibility, overall unemployment level, degree of formality
- 4) characteristics of the labour markets at destination, relevant only for immigrants, such as migration policies, labour market integration and eligibility policies; as well as policies aimed at antidiscrimination;
- 5) characteristics of the source countries, relevant for both skill transferability and self-selection of immigrants, such as overall level and quality of education; share of public sector;
- 6) finally, a set of bilateral (dyadic) factors, such as distance, past colonial ties, common language or ethnicity, and stocks of immigrants from the same or culturally close countries in the same destination countries (migration networks) may also be important.

The paper is organized as follows. We first describe the data and provide descriptive evidence on the occupation mismatch in Europe. We then analyze individual determinants of mis-match, difference between native-born and immigrants, as well as between immigrants with different duration at the destination. Finally, we analyze what home and host country effects are responsible for both types of phenomenon.

## **Evidence on Occupation-Education Mismatch in Europe**

The main source of data used for the analysis is the first four waves of the European Social Survey (ESS), for years 2002-2009. The ESS collects individual-level data in most European Union countries every two years. It provides information on individual socio-economic characteristics, occupation, education, as well as on individual's country of birth, allowing to distinguish between natives and immigrants, and the amount of time spent in the country for foreign-born. We work with the main questionnaire of the survey.

We restrict the sample to men and women aged 20-64, to insure focusing on individuals likely to have completed their formal schooling<sup>2</sup>, and to those being employed. A sizeable share of people reported an occupation but are either unemployed or out of the labor force at the time of the survey. We exclude these individuals as their mismatch is likely to result from their joint decision of occupation and employment status.

For immigrants, we also exclude those with unknown place of birth or duration of residence, and whose both parents are born in the destination country. We further restrict the sample to immigrants represented by more than five individuals from the same source to the same destination country. The final sample consists of 59,044 natives and 4,765 immigrants in 16 host countries<sup>3</sup> and from 132 source countries. Table A1 of the Appendix describes the sample by focusing on destination countries, while Table A2 also provides the number of immigrants by country of origin in the sample. While the majority of immigrants come from other European countries, there is also a significant number of non-EU-15 nationals, notably from Turkey, Russia, Eastern Europe and MENA region.

To measure education-qualification mismatch, we relate to the literature that has offered numerous ways of analyzing this phenomenon. Proposed measures of over- and under-qualification include «normative» approach, which amounts to using national/international standards to match jobs with educational requirements (Chevalier, 2003; Dumont, Monso, 2007), or using occupational prestige scores (Chiswick, 2002). They also include measures of workers job satisfaction or self-assessment of skills needed for the job performed (McGoldrick and Robst, 1996), or probability of being in an occupation, or occupying a top position (Barrett and Duffy, 2007).

Perhaps the most widely used widely-used measure of mismatch is the one based on realized matches' procedure (see, for example, Chiswick and Miller, 2009c; and Hartog, 2000, who also show that the analysis of the questions of interest is relatively insensitive to the choice of the measure, be it realized matches or workers self-assessment). This measure amounts to computing a mode of educational attainment within each occupation, and qualifying individuals with education level above this mode as being over-qualified, and individuals with education level below this mode as under-qualified. Alternatively, one can compute a mean of educational attainment within each occupation, and qualifying individuals with education level one standard deviation above this mean as being over-qualified, and individuals one standard deviation below this mean as under-qualified (Verdugo and Verdugo, 1989; Kiker et al, 1997). We give preference to this latter statistical technique, because for most occupations, there is a high concentration of individuals with comparable but dissimilar education levels. To illustrate, Table A3 shows the dispersion of the years of education across occupations grouped into nine categories of ISCO classification. While the mode is the same for all but one occupation; the mean is different in all instances, and is either below or above the mode. For occupation such as 3, the mode is 12 years of education, and 1417 individuals in the sample attained this level; however, there are as many as 1408 individuals with schooling equal to 15 years, and 1291 individuals with 14 years of schooling.

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<sup>2</sup> Restricting further the sample to prime-age individuals (25-64) leads to similar results.

<sup>3</sup> Austria, Belgium, Switzerland, Denmark, Germany, Spain, Finland, France, Great Britain, Greece, Ireland, Luxembourg, the Netherlands, Norway, Portugal, and Sweden.

It is to avoid erroneously qualifying these latter individuals as over-qualified, that we choose the measure based on the mean and standard-deviation difference<sup>4</sup>.

Figure A1 of the Appendix shows the differences in distribution of immigrants and native-born across occupations. The largest concentration of immigrants is in the low-skilled sectors, such as personal and protective services workers; sales and services elementary occupations, and extraction and building, where immigrants are also more numerous than native-born in relative terms. Further, there is also a relatively high number of immigrants in the high-skilled occupations (associate and other professionals; ISCO codes (24-34), although their number is smaller than that of the native-born in relative terms.

Further, Table A4 describes the incidence of mismatches by occupation. Overall, there is approximately the same number of under- and over-qualified native-born individuals (about 13,5%), which is a relatively common finding, given the definition of the mismatch that reflects the normal distribution property of realized matches (Hartog, 2000). In contrast, immigrants have a higher incidence of mismatch, particularly of over-qualification (about 20%).

In the high- to semi-high skill requiring jobs (which correspond to ISCO occupations 11-52), immigrants tend to have much higher incidences of over-education as opposed to the native-born. Over-qualification in these occupations most probably reflects the less than perfect skill transferability of immigrants (Chiswick and Miller, 2009), which can be due to individual immigrant characteristics, but also due to specific local labor market conditions or source country characteristics. In contrast, in the intermediary- and low-skill occupations, immigrants have a higher incidence of under-education, which rather reflects the favorable selectivity of immigrants (ibid).

In addition, we observe some intermediary occupations, in which both under- and over-qualification of immigrants are important. These are machine operators and assemblers, drivers and mobile plant operators, and agricultural laborers. Potentially, both skill-transferability factors and favorable selectivity are at work here, but also the duration of stay may matter. For example, among craft and related trades workers, 77% of immigrants have less than twenty years of residence, and among them, 27,4% are over-qualified. Among remaining 23% of immigrants, only 10% are over-qualified.

### ***Immigrants and natives individual heterogeneity***

Because the immigrant status is a (constrained) optimal choice outcome, immigrants are expected to have different characteristics than both natives in their host countries and non-immigrants in their countries of origin. For each nativity group, Table 1 provides shares and sample means for characteristics which have been shown to be important determinants of occupational outcome. For immigrants we further present separate results for recent arrivals

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<sup>4</sup> To check whether the results based on mode still hold

(less than 20 years of residence) and for earlier immigrants (more than 20 years of residence).<sup>5</sup>

Statistics presented in Table 1 confirm that immigrants have different characteristics than natives and that recent immigrants differ from earlier arrivals. Not surprisingly, recent immigrants are younger while veteran ones are older than natives reflecting that immigrants came at young ages. The share of males among immigrants is similar than that among natives among earlier arrival cohorts, the share of women is 2 percentage higher among recent immigrants. Immigrants are also more frequently married and they live in household of similar size than natives. Not surprisingly a large share of immigrants belongs to an ethnic minority groups in their host country.

Years of education and experience in the labor market are the most important components of human capital and the main determinants of occupational status and mobility along the career (Sicherman, 1991). Relatively to natives, recent immigrants are slightly more educated and earlier ones are less educated. Lower education level of immigrants is expected given that they are also older than natives.<sup>6</sup>

Labor market experience differences mirrored age differences, with recent immigrants being less experienced on average than natives and long term stayers having more experience. Looking at their labor market outcome, immigrants are more likely to be unemployment and significantly more so for recently arrived immigrants. Unemployment rate of immigrants exceed that of natives by 4 percentage points for recent immigrants, but the gap is narrowing with duration of residence even though it remains high at 2 percentage points after 20 years of residence. These differences in unemployment rates are the most striking once we take into account the comparatively small differences in education level between immigrants and natives. For recent immigrants part of this gap could result from the fact that they are younger and lack labor market experience. However, veteran immigrants still have higher unemployment rate than natives despite having significantly higher labor market experience and being just slightly less educated. This suggests that some persistent difference between immigrants and natives other than observable human capital measures are at work. The aim of this paper is to precisely investigate persistent differences that relate to host countries in one hand and origin countries in the other hand.

Summing-up, the most important differences between immigrants and natives is their age which translates into marked differences in labor market experience, their education level and their employment status.

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<sup>5</sup> While the length choice is arbitrary, it has the advantage of splitting our immigrants in two samples of comparable size

<sup>6</sup> At comparable age they should not be much different than natives in terms of average years of schooling

**Table 1. Immigrants and Native-born: Differences in Main Individual Characteristics**

	Native born	Immigrant	
		Recent immigrants	Veteran immigrants (duration of stay>20)
Age	42,51	36,46	48,47
Age squared/100	19,56	14,20	24,53
Share of male	0,48	0,50	0,48
Years of education	12,83	13,04	12,19
Years of experience	23,67	17,42	30,29
Share of unemployed	0,07	0,11	0,09
Share of married	0,59	0,63	0,65
Household size	3,07	3,22	3,04
Share of being a member of an ethnic minority	0,02	0,29	0,28

We next describe in Table 2, the distribution of natives and immigrants across the three possible occupation-education matches. For the later, these probabilities are also distinguished along several dimensions which are specific to immigrants and may be correlated with mismatch outcome. Overall, immigrants are more likely to be both over and under educated than natives. This single fact is consistent at the same time with immigrants having less than perfect international transferability of human capital (overeducation) and immigrants being positively selected (undereducation). More interesting, is the evolving distribution of immigrants across these categories with duration of residence in host countries. Undereducation increases while overeducation decreases with years of residence in host countries. The share of immigrants having the required level of education increases, steeply in the first five years of residence (from 61.2% to 64.5%) and stabilizes afterward, but overall the change is much more attenuated than it is for the two other categories. Correct matches are more frequent for immigrants speaking the official language at home and for those originating from countries sharing the same language or with past colonial relationship with host country. Interestingly, under education is more frequently observed for immigrants from more distant countries in terms of language or past colonial relationship. Of course, this may come from the fact that more distant immigrants are from earlier immigrants' cohort and that earlier arrivals are more frequently under educated. However we do not observe that they are less educated as it is the case for early arrivals. Thus part of these differences may likely reveal other characteristics than just difference across cohorts.

### ***Heterogeneity across host countries***

For reasons previously discussed we expect immigrants/native education mismatch to vary across host countries.

**Table 2. Incidence of Mismatch by Nativity and Immigrants' Characteristics**

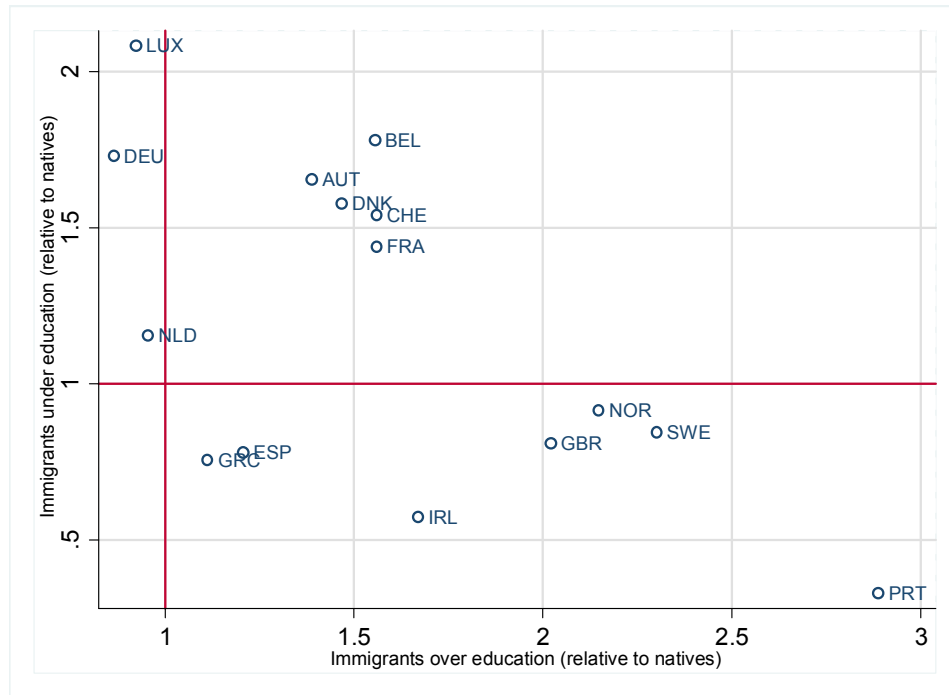
	Under-required	Matched	Over-required
Natives	<b>12,67</b>	<b>73,59</b>	<b>13,74</b>
Immigrants	<b>15,36</b>	<b>64,33</b>	<b>20,31</b>
Immigrants by years of residence			
<i>0 to 5</i>	10,18	61,26	28,56
<i>6 to 10</i>	12,31	64,5	23,19
<i>11 to 20</i>	16,03	64,17	19,8
<i>more than 20</i>	17,76	65,54	17
First language spoken at home is official language			
<i>Yes</i>	12,69	73,18	14,12
<i>No</i>	17,07	65,5	17,43
Immigration and colonial relationship			
<i>Yes</i>	15,27	64,34	20,39
<i>No</i>	16,62	62,91	20,47
Immigrants with from countries with language commonality			
<i>Yes</i>	10,27	66,71	23,02
<i>No</i>	16,9	63,48	19,62

Indeed, the interest in using cross country data to investigate host countries' determinants of international differences in immigrants labor market outcome lies in the substantial disparities in occupational outcome across these countries [Ref: OECD studies]. Graph 1 provides an overview of this heterogeneity. We concentrate on the over and under educated categories, as they reflect our interest in immigrant's human capital portability and immigrants' selection. The over education of immigrants relative to natives is plotted against the relatives under education of immigrants relative to natives. Countries lying above the vertical and horizontal unit line are those where immigrants are respectively more likely to be under and over educated.

The plot confirms the important differences across host countries in terms of over and under education. On average countries where immigrants are relatively more likely to be over educated are also those where they are more likely to be undereducated. In some countries immigrants are both more likely to be under educated and over educated. In others, immigrants are more likely to be over educated and less likely to be undereducated possibly due to a lack of human capital and negative selection. For few countries, and notably in Germany, immigrants' overeducation is not different than that of natives while at the same time immigrants are more likely to work in jobs requiring higher level of education. Thus we see large discrepancies in the pattern of mismatch across countries.



**Figure 1. Immigrants and Native-born Relative Mismatch across Host Countries**



*Distinguish between traditional migration country and others, may be do the plot distinguishing veteran and recent immigrants.*

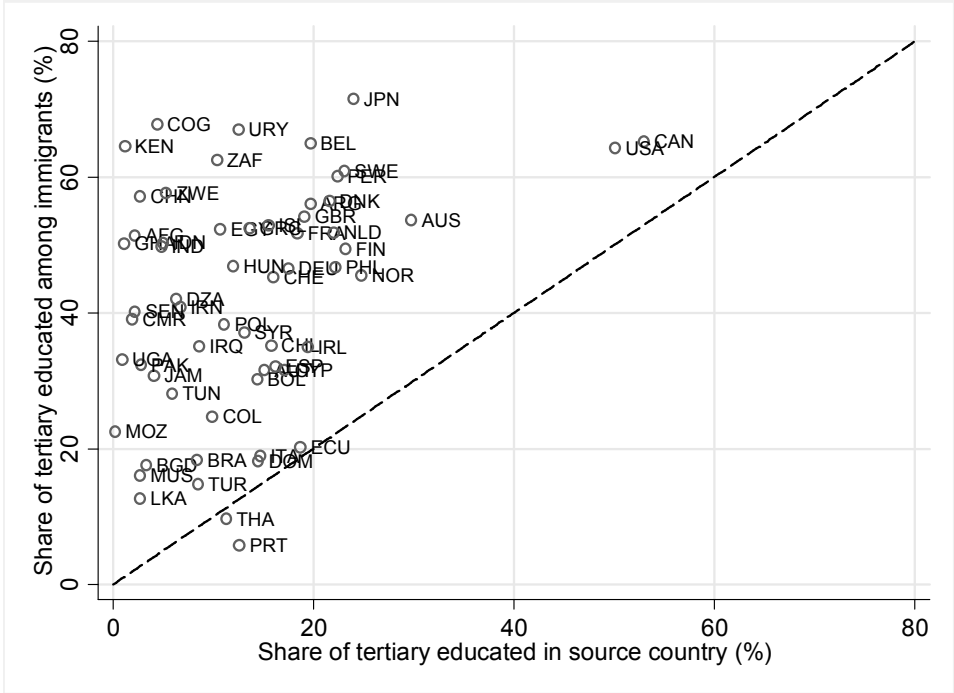
### ***Heterogeneity across source countries and migrants' selection***

One important determinant of immigrants' occupational match is their self-selection among the pool of immigrants. This process of self-selection is important in our context as the negative or positive selection of immigrants may explain their over-representation among over or under educated workers. Immigrants may be selected along dimensions that could positively or negatively affect their occupation outcome at destination. We illustrate this selection in Graph 2 with respect to education. This graph portrays the important heterogeneity of education level of immigrants across origin countries. Moreover, it shows that movers are disproportionately drawn from the highly educated fringe of their native country. Lately, we also remark that differences in immigrants' level of education at destination are much more pronounced than these differences at origin. This translates into large differences in schooling selectivity across countries. This evidence of positive selection is important since education is also likely to be correlated with other "non observable" productive characteristics that could explain the labor market outcome of immigrants in their host countries.<sup>7</sup>

<sup>7</sup> To the extent that education and talent are correlated positive selection on education may drive a positive selection on unobserved heterogeneity.

Important differences across countries in terms of selection justify our interest for investigating further the exact origin of source country heterogeneity that explain immigrants' selection and eventually immigrants' labor market outcome at destination.

**Graph 2. Tertiary Education in Source Countries and among Immigrants**



Source: own calculations on the basis of the ESS and of the education data from Barro and Lee (reference year is 2000).

**Empirical Analysis**

Following the literature (Kiker et al., 1997, Chiswick and Miller, 2009), we estimate a multinomial logit model for the probability of being over- or under-educated versus being perfectly matched, for native-born, pooled sample of native-born and immigrants, and for immigrants. The model for the education occupation match is given by

$$prob(Y_i = j) = \frac{e^{\beta_j x_i}}{\sum_k e^{\beta_k x_i}}$$

The dependant variable  $Y_i$  is an education-occupation match category for an individual  $i$  and  $j$  is one of the three education-occupation match category: undereducated, correctly matched and overeducated. The explanatory variables,  $x_i$ , are grouped in several categories. We first consider individual determinants of mismatch that has been included in the literature, some are common to both natives and immigrant and others are immigrants' specific.

**Individual determinants of occupational mismatch**

Human capital model and search theories of labor market have offered natural candidates for these determinants. Among determinants common to immigrants and natives we include level of labor market experience, and variables affecting labor market participation

and possibly occupational choice, such as gender, marital status and household size. Among immigrant specific variables we consider citizenship, language spoken and duration of residence to catch accumulation of country specific human capital over time.

A worker actual level of education, although it is an important determinant of occupational outcome, is omitted from the model. As it already appears in the construction of our dependant variables introducing it will produce a spurious correlation between these variables.

Table 3 presents our baseline regressions and reports the estimated coefficients transformed to relative-risk ratios, with perfect match being the benchmark.

We first consider separately determinants of mismatch among natives (columns 1 and 5). We will mostly concentrate on the effect of experience, in all regressions considered; labor market experience has the expected sign on over and undereducation. Overeducation decreases with years of labor market experience, while undereducation increases. This is a typical finding that confirms those of previous studies in Europe and the US (Groot et al., 2000). This is the pattern expected by human capital theories of over and undereducation whereby individuals accept jobs requiring lower educational credential as an investment for being attached to the labor market and improve their career prospect. Whereas undereducated workers substitute their lack of formal schooling with years of labor market experience to get job requiring higher educational credentials. Similar pattern could also be explained by increasing educational standard owing to technological change over time as emphasized by Kicker (2000). Other socioeconomic variables affects under and over education in opposite directions.

[TABLE 3 here]

The other columns of the table consider differences between immigrants and natives. First, these differences are assessed in the pool sample, assuming that other characteristics except the one of being an immigrant will affect identically immigrants and natives (columns 2, 3, 6 and 7). Reported estimates show that the average immigrants are relatively more likely to be overeducated [*provide the predicted value at mean level of experience*]. We do not find any effect of being an immigrant on the odd ratio of being undereducated. The next two columns distinguish immigrants according to their tenure in host country and show no statistically significant effect of years of residence on the likelihood of being either over or undereducated.

Finally, we investigate whether determinants of mismatch affect differently immigrants and natives by considering separately the immigrant's sample. Unlike what we observe for natives, years of labor market experience does not change the likelihood of being overeducated for an immigrant. These suggest that constraints on labor mobility for immigrant are stronger than that for natives. Ideally one would like to distinguish between experience acquired abroad and experience accumulated in host countries, unfortunately our data does not allow such a comparison. Thus our results may still be driven by differences in the quality of labor marker experience between immigrants and natives that are not controlled for by our dummy variables for duration of residence. However, this explanation should not

be overlooked, the reason being that indeed labor market experience pay for immigrants! This is shown by looking at the comparatively large and positive impact of labor market experience on the odd ratio of being undereducated. This result is rather suggestive of a positive selection of immigrants among lower skilled workers that materializes with time passed accumulating labor market experience.

Table 4 digs further into important sources of heterogeneity among immigrants and natives. A first source of heterogeneity is the host countries' specific unobserved effects that could affect sorting of immigrants across host country and be systematically correlated with mismatch probability. Indeed, unlike natives, immigrants choose their country of residence, column (2) shows that once these fixed effects are control for we find a positive but lower impact of experience on undereducation, suggesting that immigrants are more likely to settle and work in countries that offer better employment prospect. We still do not find any effect of experience on overeducation; results for natives remain essentially unaffected by the inclusion of countries' fixed effects.<sup>8</sup>

Columns (5) to (8) of the table complete our specification check of immigrants-natives heterogeneity by introducing industry fixed effects. Indeed, immigrants may also choose their sector of occupation, these sectors may differ in their distribution of occupations, and some may be characterized by more open occupations than others. In this specification the positive effect of experience on immigrants' undereducation become even stronger. Thus, presumably undereducated immigrants are more likely to be in industries where they can substitute their lack of formal schooling by their talents, this substitution happens over the time spend accumulating labor market experience.

**[TABLE REG 4: HERE]**

Lately we investigate heterogeneity among immigrants using immigrants' specific variables in Table 5. First, a set of bilateral specific variables are introduced. These variables are included to take into account immigrants' determinants of sorting across destination countries which may be correlated with characteristics that could affect the portability of their human capital (overeducation) and their selection (undereducation), and thus their occupation outcome. Five gravity-type variables are considered, the distance between the origin and destination countries, an history of past colonial relationship, the linguistic proximity between countries, and immigrants' networks. These variables are specific to an origin-destination pair and allow us to control for bilateral specific relationship that may influence the occupational mismatch. These bilateral variables follow the international trade gravity literature applied to immigration (Docquier et al., 2008, Grogger and Hanson, 2008, Mayda, 2007) which has shown that these variables shape the distribution of immigrants across host countries. Most of these variables affect the costs to move to a particular country for an immigrants from a given source country. With higher moving costs, we expect that only individuals with better employment prospect and earning potential at destination will move.

We will further pay a particular attention to migration networks in host countries. The presence of family members or of persons with the same origin has been shown to be an

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<sup>8</sup> The fact that the estimated effect for the native sample is not affected by the inclusion of country fixed effects, suggest no systematic differences across countries in the determinants of under and overeducation.

important explanation for the geographic concentration of migrants (Carrington, et al. 1996). For new migrants, the opportunity to benefit from the assistance of a family network is a major consideration in the choice of residence. In addition to this "network effect", Bauer et al. (2002) have stressed the importance of "herd effects": in a context of imperfect information, new migrants tend to imitate the behavior of previous migrants from the same country and this contributes (at least in an initial period) to increasing "ethnic" concentration. Both language and network effects act as gravity variables, reducing the cost for moving to a particular country, above that, networks may help new comers to identify jobs more suitable with their skills. Immigrants' networks are measured as the share of persons from a specific source country in the population of the destination country. Unlike other measures of network used in the literature, we also distinguished network size according to educational level of their members. In this instance, immigrants' networks are measured as the share of persons from a specific source country in the population of the destination country of a similar educational level. We consider three educational levels: below upper secondary, upper secondary and tertiary education. We introduce this distinction to take into account composition heterogeneity across immigrants' network which may make easier for immigrants to enter occupations where their peers are large contributors.

Results are presented in table 4. Columns 1 and 5 report previous estimates for natives. Columns 2 and 6 introduce the bilateral specific effects with the simple immigrant network measure. We first notice a larger effect of experience on the likelihood of being undereducated, suggesting that immigrants from different level of experience share different proximity with their host countries. In this specification none of the bilateral variables have an effect on immigrants' likelihood of being undereducated. Column 6 shows that higher share of network decreases the likelihood of being overeducated, which is the case if the networks help in providing job referrals in occupations where human capital of their members are the most portable (see Montgomery, 1991). Columns 3 and columns 7 introduce the skill composition of the network. We find a positive effect of low skilled network on likelihood of undereducation and no effect of network composition on overeducation. Lately, the last columns add origin country fixed effect to control for systematic differences across immigrants from different origin that may be correlated with our others explanatory variables. This last specification shows that immigrants from past colonies are less likely to be undereducated and more likely to be overeducated which is the case if it is less costly for an immigrants to immigrate to a former occupant country because of its past persistent cultural influences.<sup>9</sup> Results on immigrants' networks in column 4 suggest that high and low skilled networks help in channeling its low skilled but potentially talented members to better jobs than what their level of education would otherwise suggest.

[TABLE REG 4: HERE]

### ***Country-Specific Determinants of Immigrants' Mismatch***

In this section, we examine the effect of host and home country effects on the mismatch of immigrants and native-born. To this end, we collect additional data on home and

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<sup>9</sup> For instance a large share of populations from the former African colonies of Portugal and France nowadays still speak and have the Portuguese and French as official language.

host characteristics from various sources (see Appendix Table 6 for definitions, sources, and descriptive statistics).

To the best of our knowledge, this is the first paper that looks at the host-country and home-country level determinants of immigrants occupation-qualification mismatch, notwithstanding because most of the studies have been done on the level of one country, and/or do not have information on immigrant countries of origin. Thus, we do not have a priori defined set of factors that would affect the (mis-)match; and provide an analysis of what seems to us as the most pertinent characteristics.

To start with, we propose structuring characteristics of destination countries, or the demand side, along two dimensions. The first one describes general characteristics of economy and labour markets, and as such, is relevant for the mismatch of both immigrants and native-born. The second category is immigrant-specific and is expected to be of relevance for the mismatch of immigrants, but not necessarily for the native-born.

The first group of factors includes the degree of income inequality, degree of informal sector, overall level of education in a country, general level of unemployment, trade union coverage, and measures of labour market rigidity, such as index of employment security.

If unemployment levels are high, we expect a greater degree of a mismatch, especially of over education, as individuals will be eager to take any job available.

With higher unemployment competition for jobs among workers are more intense and educated workers may compete with the less educated for low skill jobs.

If markets are flexible, for example, if firing costs are low, workers are more likely to be laid off (Boeri and Jimeno, 2003), and employers may be more eager to hire workers with qualifications different from those needed for the job, hence the implication for the mismatch.

It is well known that employment protection act as firing cost and lowers labor market reducing turnover and increasing unemployment duration (Bentotilla and Bertola, 1990). Immigrants are new comers in host countries labor market and for these reason are more likely to face the barriers created by EPL to enter into new jobs, the later affect their likelihood of being overeducated. Another relevant feature of employment protection is to increase the costs of on the job screening, pushing employers to select workers for which careers are less costly to assess in terms of information; if this is the case immigrants are clearly disadvantaged with respect to a similarly educated natives, especially if they have been educated or have accumulated part of their labor market experience abroad.

To measure labour market rigidity, we use the OECD employment protection index (EPL), which is a synthetic measure of the length of the advance notice and of the severance payment. Its higher values indicated stricter degree of protection, and hence more rigid firing conditions.

Unionism has been shown to reduce the probability of separations, as workers, dissatisfied with conditions, are able to voice their concerns (Freeman, 1980). As such, it may also have implications for the employers' willingness to hire individuals most suited for the

job, but also for employees' ability or inclination to stay with this employer and move within an organization.

As for the strictness of EPL unions affect employment prospect of outsiders. Immigrants because they are the "last in", are more likely to find the labor market prospect affected by stronger unions.

The effect of these variables should not necessarily be same for immigrants and for native-born. For example, the larger share of informal economy may allow native-born to move freely between jobs and substitute more easily experience for education, hence increasing the probability of being under-qualified. In contrast, for immigrants, it may lead little protection against discrimination and limited recognition of their qualifications, and hence overqualification. Larger informal sectors can also affect the selectivity of immigrants, affecting the costs of moving to and operating in an informal setting.

*To do: provide logic, expected results, and references for all*

Another group of factors is more immigrant-specific. We work with the Migrant Integration Policy Indices (MIPEX), which measure policies to integrate migrants European countries. Specifically, we use the aggregate indicator of the easiness of labor market access for immigrants. This index is constructed from questions regarding immigrants eligibility to take up specific jobs or being precluded; the availability of labor market integration measures provided by the state; the security of migrants employment or easiness to lose work permits; as well as rights that immigrants have as workers. This index ranges from 1 to 100, with higher values indicating more unfavorable conditions for immigrants. We also use the aggregate index of antidiscrimination policies, which measures the practice of various countries with respect to discrimination on the grounds of religion or belief, ethnicity, race, and nationality. Linked both to the transferability of human capital, and positive selection, better anti-discrimination practices are expected to reduce the over-qualification, and potentially lead to under-qualification of immigrants.

Further, we also look at differences in characteristics of source countries for immigrants, or the supply side, broadly grouping them into factors that affect the selection of immigrants, and the factors that affect the transferability of human capital. As the information on years since migration is available, we work with the home country characteristics at the time of migration. In particular, we construct a dataset of origin country characteristics over three decades: the decade of arrival in the 00-es, in the 90-es, and in the 80-es and earlier. For each immigrant, home country - specific effects are linked to her decade of migration.

The factors affecting human capital portability include indicators of source country quality of education, measured as overall level of education, expenditures per student, and teacher-to-pupil ratio. The second set of variables determine immigrant selection, and include GDP per capita and income inequality, measures of workers protection rights and freedoms. For example, immigrants from countries with higher income inequality are expected to be more negatively selected (Borjas, 1987). Some mixed factors include the degree of public sector and conflicts. Immigrants fleeing conflicts, especially conflicts of political nature, are

particularly known to be both positively selected, and having low portability of their qualifications; as a result, they exhibit significant over-qualification (Chiswick et al, 2002).

Tables 6 and 7 summarize the results of multinomial logit estimations for immigrants and native-born, in which we include one home/host characteristic at a time, controlling for individual characteristics, industry, sector, time, and dyadic effects.

One of the critics to these estimations is that each country characteristic may actually work as a country dummy, capturing all other unobserved effects, and also restraining the relationship between this characteristic and the outcome of interest be linear. To address this concern, we employ the procedure used by Blau (1991), Card and Krueger (1992), and Fernandez and Fogli (2005), which consists in collecting vectors of coefficients on home and host country fixed effects from individual-level estimations, and then regressing these vectors on home and host country indicators. Formally, let the  $M_{idst}^j$  represent the probability to be in  $j$  education category for a worker  $i$ , residing in destination country  $d$ , born in source country  $s$ , and having migrated in the decade  $t$  (for native-born, there are only  $i$  and  $d$  effects).

Assume that the mismatch is determined by the equation of the form:

$$(M_{idst}^j | Y_{idst}) = \frac{e^{\beta_j Y_{idst}}}{\sum_{j=1}^3 e^{\beta_j Y_{idst}}}, \quad i = 1, \dots, n; j = 1, \dots, 3 \quad (1)$$

$$\text{with } Y_{ijkt} = X_{ijkt}\beta + \delta_d + k_{st} + \Delta_{ds}\gamma + \varepsilon_{idst}$$

where  $X_{ijkt}$  is a set of individual socio-economic characteristics as before;  $\delta_d$  is a fixed effect for the country of current residence;  $k_{st}$  is a migration decade - specific fixed effect for the country of birth;  $\Delta_{ds}$  is a set of country-pair (dyadic) effects, which in our case include distance between capitals, common language, being a former colony, being one country in the past; and  $\varepsilon_{idst}$  is a stochastic error term.

Then, one may analyze the impact of country-specific effects on the variation in the country-fixed-effect coefficient, by estimating, for host country effects:

$$\delta_d = \alpha_d + A_d b + B_d c$$

where  $A_d$  is a vector of general labour market characteristics, and  $B_d$  is a vector of immigrant-specific effects.

In the same fashion, the role of host country effects can be assessed by estimating

$$k_{st} = \alpha_{st} + C_{st} b + D_{st} c$$

where  $C_{st}$  are factors that affect the selection of immigrants, and  $D_{st}$  are the factors that affect the transferability of human capital.

Tables 8-9 summarizes the results of second-stage regressions, fitted to the estimated destination country effects. We do separate estimations for native-born; immigrants; immigrants with a split by tenure at destination; and immigrants by type of origin country.

From Table 8A, country-specific fixed effects have little significant variation for over-qualification; while they vary substantially for under-qualification.



Looking at what country-specific indicators determine these variations (Table 8B), we see that the degree of shadow economy is negatively correlated with under qualification, especially for immigrants from non-OECD countries and with less than 20 years at destination. Degree of income inequality is important for both under- and over-education of native-born. The level of education matters. Unemployment does not seem to affect the mismatch, while the trade union coverage does. For immigrants, but not for native-born, all policies of labour market integration are important predictors of the match; and mostly so for immigrants with a long duration at destination.

Table 9 summarizes the analysis of home-country effects. We find that home country characteristics mainly affect the degree of over-qualification, and to a lesser extent of under-qualification, consistently with the theories on selectivity and human capital portability theories.

*Our current work: exploring these results further and commenting on them.*

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**Table A1. Sample Statistics: Focus on Destination Countries**

	Native-born as % of the sample	First-generation immigrants as % of the sample	Immigrants with over 20 years of residence, % of first-generation immigrants	Second generation immigrants as % of the sample	Total number of observations
AT	85,28	5,76	38,14	8,96	6150
BE	83,77	6,52	51,27	9,71	6046
CH	70,80	16,29	45,82	12,91	6607
DE	86,14	6,64	32,96	7,22	9366
DK	91,79	3,55	38,42	4,67	4992
ES	91,23	6,96	5,35	1,81	5907
FI	97,53	0,96	11,29	1,51	6437
FR	82,99	5,69	67,05	11,33	6083
GB	85,11	6,76	38,39	8,13	6815
GR	87,00	8,06	9,31	4,95	3599
IE	91,25	5,01	28,05	3,75	4913
LU	56,39	26,30	39,42	17,30	2768
NL	87,20	6,52	50,71	6,28	6438
NO	90,73	5,02	32,46	4,25	6071
PT	93,31	4,43	27,45	2,26	5752
SE	82,56	8,39	49,54	9,05	6473

**Table A2. Sample Statistics: Focus on Origin Countries**

Largest countries of immigrant origin	DE	IT	PT	FR	TR	GB	PL	RU	MA	FI
Largest countries of immigrant origin, % of all first-generation immigrants in the sample	7,7	5,2	5,1	4,6	4,4	3,9	3,4	2,9	2,9	2,3
Largest countries of non-EU-15 immigrant origin	TR	PL	RU	MA	AL	BA	RO	BR	DZ	IN
Largest countries of non-EU-15 immigrant origin in Europe, % of first-generation immigrants	4,4	3,4	2,9	2,9	1,9	1,8	1,8	1,5	1,4	1,4

**Table A3. Incidence of Over- Under- and Correctly- Matched among Native-born and Immigrants, Age 16-65, 4 rounds of the ESS**

<i>Self-Reported Years of Education</i>	<i>ISCO 1-Digit Classification of Occupations</i>								
	1	2	3	4	5	6	7	8	9
0	4	2	6	1	9	10	13	6	26
1	6	3	5	2	4	1	14	7	8
2	5	3	7	7	12	7	10	4	13
3	8	15	20	13	28	12	22	9	31
4	43	30	54	36	158	37	243	97	246
5	25	12	21	14	36	14	41	25	52
6	47	22	41	52	178	146	253	130	209
7	31	22	52	22	98	33	110	98	144
8	116	28	131	130	263	125	315	229	316
9	295	153	519	515	779	207	690	435	542
10	278	112	466	400	701	172	588	412	478
11	369	161	616	680	893	189	760	517	533
12	657	393	1417	1421	1632	265	1197	751	609
13	512	407	131	980	1027	141	803	422	342
14	509	554	1291	683	805	103	591	248	204
14.5	0	0	0	0	0	0	1	0	0
15	590	1019	1408	505	606	91	368	156	141
16	570	1423	1253	394	346	46	218	79	86
17	522	1643	1003	244	230	27	102	42	53
18	458	1509	675	194	136	18	70	28	30
18.5	0	1	0	0	0	0	0	0	0
19	212	872	325	83	79	8	31	15	12
20	247	846	297	84	54	5	29	12	19
21	60	319	94	22	14	1	9	1	2
22	57	237	57	19	12	2	3	1	2
23	37	143	33	8	6	0	2	2	1
24	16	95	15	4	9	0	0	1	2
25	26	81	28	5	4	1	4	1	0
<i>Mean</i>	14,28	16,72	14,16	12,78	12,00	10,67	11,28	11,01	10,24
<i>Mode</i>	12	17	12	12	12	12	12	12	12
<i>Total Obs</i>	5700	10105	11144	6518	8119	1661	6487	3728	4101

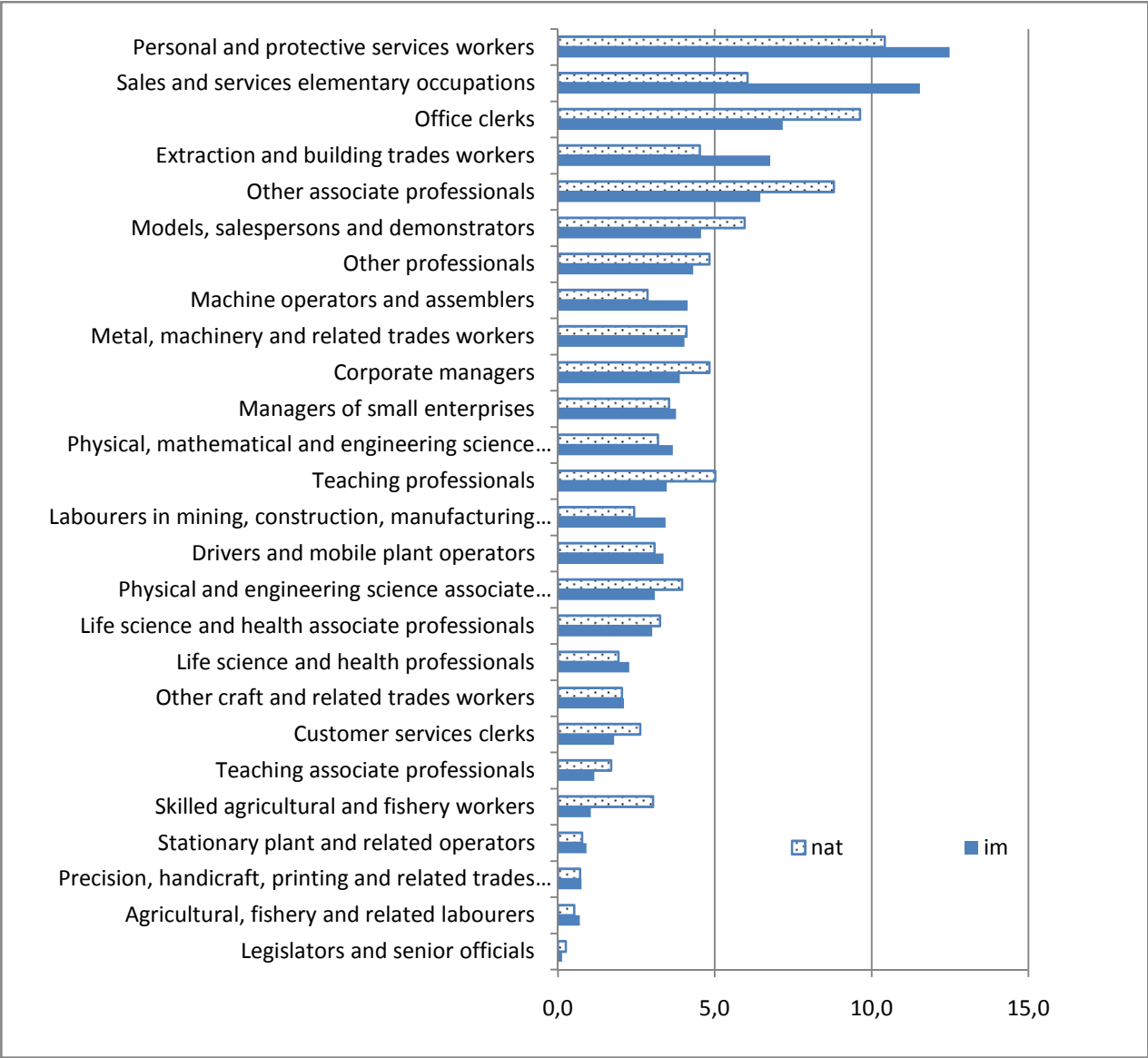
**Table A4. Incidence of Over- Under- and Correctly- Matched among Native-born and Immigrants, Age 16-65, 4 rounds of the ESS**

		%under	%matched	% over	% of individuals employed in this sector
ISCO	All occupations	13,36 <i>15,46</i>	72,83 <i>64,36</i>	13,81 <i>20,18</i>	
	11 Legislators and senior officials	14,05 <i>12,50</i>	72,43 <i>37,50</i>	13,51 <i>50,00</i>	0,25 <i>0,13</i>
	12 Corporate managers	14,35 <i>11,01</i>	72,19 <i>71,81</i>	13,46 <i>17,18</i>	4,83 <i>3,88</i>
	13 Managers of small enterprises	14,58 <i>13,62</i>	69,73 <i>69,48</i>	15,69 <i>16,90</i>	3,54 <i>3,77</i>
	21 Physical, mathematical and engineering science professionals	15,59 <i>8,84</i>	71,37 <i>68,37</i>	13,04 <i>22,79</i>	3,19 <i>3,67</i>
	22 Life science and health professionals	13,63 <i>8,73</i>	71,95 <i>71,43</i>	14,42 <i>19,84</i>	1,93 <i>2,27</i>
	23 Teaching professionals	11,33 <i>14,93</i>	75,68 <i>58,21</i>	12,98 <i>26,87</i>	5,01 <i>3,47</i>
	24 Other professionals	15,67 <i>9,24</i>	71,78 <i>70,28</i>	12,55 <i>20,48</i>	4,83 <i>4,31</i>
	31 Physical and engineering science associate professionals	14,64 <i>16,09</i>	70,12 <i>57,47</i>	15,24 <i>26,44</i>	3,96 <i>3,09</i>
	32 Life science and health associate professionals	13,03 <i>7,19</i>	74,42 <i>72,46</i>	12,55 <i>20,36</i>	3,25 <i>3,00</i>
	33 Teaching associate professionals	16,05 <i>7,58</i>	70,86 <i>72,73</i>	13,10 <i>19,70</i>	1,70 <i>1,16</i>
	34 Other associate professionals	13,71 <i>10,34</i>	71,72 <i>65,52</i>	14,57 <i>24,14</i>	8,80 <i>6,45</i>
	41 Office clerks	12,06 <i>11,46</i>	75,31 <i>67,56</i>	12,63 <i>20,98</i>	9,63 <i>7,17</i>
	42 Customer services clerks	13,68 <i>10,78</i>	71,81 <i>68,63</i>	14,50 <i>20,59</i>	2,62 <i>1,79</i>
	51 Personal and protective services workers	14,90 <i>15,08</i>	70,98 <i>64,87</i>	14,12 <i>20,06</i>	10,42 <i>12,49</i>
	52 Models, salespersons and demonstrators	13,68 <i>15,44</i>	72,31 <i>61,78</i>	14,01 <i>22,78</i>	5,96 <i>4,56</i>
	61 Skilled agricultural and fishery workers	10,84 <i>19,35</i>	74,33 <i>53,23</i>	14,83 <i>27,42</i>	3,03 <i>1,05</i>
	71 Extraction and building trades workers	13,01 <i>20,70</i>	74,17 <i>65,84</i>	12,82 <i>13,47</i>	4,52 <i>6,77</i>
	72 Metal, machinery and related trades workers	11,73 <i>17,57</i>	73,62 <i>66,53</i>	14,65 <i>15,90</i>	4,10 <i>4,03</i>

73	Precision, handicraft, printing and related trades workers	12,30 <i>18,60</i>	72,42 <i>62,79</i>	15,28 <i>18,60</i>	0,70 <i>0,75</i>
74	Other craft and related trades workers	10,33 <i>21,49</i>	74,97 <i>59,50</i>	14,71 <i>19,01</i>	2,04 <i>2,11</i>
81	Stationary plant and related operators	12,43 <i>20,37</i>	73,71 <i>64,81</i>	13,85 <i>14,81</i>	0,77 <i>0,91</i>
82	Machine operators and assemblers	11,50 <i>21,07</i>	74,41 <i>57,02</i>	14,09 <i>21,90</i>	2,86 <i>4,13</i>
83	Drivers and mobile plant operators	17,26 <i>18,62</i>	68,52 <i>60,11</i>	14,22 <i>21,28</i>	3,08 <i>3,37</i>
91	Sales and services elementary occupations	10,53 <i>22,14</i>	76,57 <i>58,25</i>	12,90 <i>19,61</i>	6,04 <i>11,55</i>
92	Agricultural, fishery and related labourers	14,88 <i>9,76</i>	70,50 <i>68,29</i>	14,62 <i>21,95</i>	0,52 <i>0,70</i>
93	Labourers in mining, construction, manufacturing and transport	12,23 <i>21,94</i>	72,82 <i>62,24</i>	14,95 <i>15,82</i>	2,43 <i>3,43</i>

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**Figure A1. Distribution of Native-born and Immigrants Across Occupations**



## *Appendix Table A5. Variables' Definition and Data Sources*

### *Dependent Variable*

Mismatch: 1 – if under-educated; 2 – if perfectly matched, 3 – if over-educated

### *Individual characteristics*

Exp – experience, created as age minus education minus six

Exp2 – experience squared

Male – dichotomous variable equal one if individual is male

Immigr – dichotomous variable equal to one if individual is foreign-born

Official language spoken at home – dichotomous variable equal one if an individual names any official language of the country of residence as the first choice of the language spoken at home

Ethnic minority – dichotomous variable equal to one if an individual belongs to ethnic minority of the country

### *Country Characteristics:*

Gini Gini coefficient UN Statistics Division

Educ Average years of schooling in the population aged 15+ Cohen and Soto, 2007

Teacher-to-pupil ratio in 1990-es Quality of education indicator World Bank Development Indicators (WBDI)

Trade union coverage OECD statistics

GRR Gross replacement rates OECD statistics

EPL Employment protection legislation index OECD + Tonin (2007)

Shadow Economy Percent of GDP produced in the informal sector Schneider(2007)

Eligibility Index, from 0 to 100 %. Are immigrants excluded from taking some jobs? 0% - critically unfavourable; 41-59% - half way to best practise.

Labour Market Integration measures Index, from 0 to 100 %. What is the State doing to help immigrants adjust to the demands of the labour market? 0% - critically unfavourable; 41-59% - half way to best practice

Antidiscrimination - Index, from 0 to 100 %. Composite index, which consists of 4 components: 1) is discrimination on the grounds of religion/belief, ethnicity/race and nationality punished? 2) In which areas of life does anti-discrimination law apply? 3) Enforcement: Are victims encouraged to bring forward the case? 4) – equality policies: what roles can equality bodies and the state play? 0% - critically unfavourable; 41-59% - half way to best practise.

Access to nationality for immigrants - Index, from 0 to 100 %. Composite index, which consists of 4 components: eligibility, acquisition conditions, security of status, and access to dual nationality. 0% - critically unfavourable; 41-59% - half way to best practise. Source : MIPEX Integration Index, [www.integrationindex.eu](http://www.integrationindex.eu)

### *Home Country Variables*

PPP GDP per capita: World Bank Development Indicators (WBDI)

Gini coefficient: UN Statistics Division

Government consumption: share of government consumption (WBDI)

Share of agriculture land – WBDI

Empowerment rights index - an additive index constructed from the Foreign Movement, Domestic Movement, Freedom of Speech, Freedom of Assembly & Association, Workers' Rights, Electoral Self-Determination, and Freedom of Religion indicators. It ranges from 0 (no government respect for these seven rights) to 14 (full government respect for these seven rights). Source: CIRI Database

Protection of workers' rights: indicates the extent to which workers enjoy internationally recognized rights at work, including a prohibition on the use of any form of forced or compulsory labor; a minimum age for the employment of children; and acceptable conditions of work with respect to minimum wages, hours of work, and occupational safety and health. Ranges from 0 to 2: 0 - severely restricted; 2 - fully protected. CIRI Database.

Women economic rights: Ranges from 0 to 3. 0- no economic rights for women in law; systematic discrimination based on sex may have been built into law. 3 - all or nearly all of women's economic rights were guaranteed by law and the government fully and vigorously enforces these laws in practice. CIRI Database.

Women political rights: analogous measure. CIRI database

Women social rights: analogous measure. CIRI database.

Communist: equal to 1 if country was communist; and zero otherwise.

Civic law: 1 if civic law; 0 if common law. Source: The Citizenship Laws Dataset. Bertocchi and Strozzi, 2009

Oil country: Dummy for oil countries (OPEC countries plus Oman, Angola, Qatar, Bahrain, and Brunei).

Main religion Islam: Dummy for countries with Islam being main religion. Source: ARDA database

Education level: Average years of schooling in population 15+. Source: Cohen and Soto, 2007.

Teachers to pupils ration in primary and in secondary school: WBDI

Share of public expenditure for primary and secondary education: WBDI

Dummy variables for source regions: African, Asian, Latin American, Eastern European, Western Europe, North African, Caribbean



*Bilateral effects:*  
 Distance CEPII geo database  
 Common language  
 Former colony  
 Stock of migrants at destination OECD statistics

*To complete ...*

**Appendix Table A6. Home and Host Country Effects : Descriptive Statistics**

	Mean	St. Dev	Min	Max	N. Obs
<b>Destination Country Effects:</b>					
<b>General State of the Labour Markets:</b>					
Gini coefficient	31.27	4.15	24.7	38.5	20
Average years of education	11.32	1.36	7.58	13.23	17
Teacher-to-pupil ratio, secondary; in the 1990-es	12.15	3.30	7.2	18.2	17
Trade union coverage	0.34	0.22	0.08	0.78	18
Gross replacement rates (GRR)	28.75	11.62	6	49	20
Employment Protection Index (EPL)	2.32	0.63	1.1	3.5	20
<b>Host Country Variables Specific for Immigrants:</b>					
Labour market integration	45.00	33.37	0	100	20
Antidiscrimination policies	61.75	20.03	27	94	20
Access to nationality	46.75	14.48	22	71	20
<b>Origin Country effects:</b>					
Educ	<i>To be</i>	<i>filled in</i>	<i>further</i>	<i>...</i>	
GDP pc					
OECD					
Worker rights protection index					
Teacher-to-pupil ratio					
Spending on schooling ; secondary					
Conflict					

**Table 3**

VARIABLES	Odd ratio : undereducation				Odd ratio : overeducation			
	(1) Native	(2) Pooled sample	(3) Pooled sample	(4) Foreign born	(5) Native	(6) Pooled sample	(7) Pooled sample	(8) Foreign born
exp	0.0169 (0.187)	0.0186 (0.114)	0.0189 (0.113)	0.0506** (0.0147)	-0.0396** (0.0200)	-0.0392** (0.0118)	-0.0396** (0.0116)	-0.0324 (0.144)
exp2	0.00109*** (1.53e-06)	0.00105*** (5.06e-07)	0.00105*** (5.87e-07)	0.000572 (0.154)	-0.000511 (0.165)	-0.000497 (0.142)	-0.000496 (0.144)	-0.000450 (0.386)
immigr		0.187 (0.147)	0.192 (0.330)			0.321*** (0.00197)	0.256** (0.0373)	
Duration of residence (years)								
5 to 10			0.0156 (0.946)	-0.140 (0.587)			0.0988 (0.494)	0.00407 (0.979)
10 to 20			0.258 (0.181)	0.0909 (0.719)			-0.118 (0.440)	-0.327* (0.0780)
more than 20			-0.161 (0.352)	-0.408 (0.119)			0.236 (0.125)	0.0527 (0.802)
male	-0.0980 (0.315)	-0.101 (0.263)	-0.100 (0.266)	-0.161 (0.320)	0.286*** (5.88e-09)	0.263*** (1.80e-07)	0.264*** (1.60e-07)	0.0420 (0.783)
Not a citizen	0.624** (0.0437)	0.0611 (0.735)	0.0860 (0.628)	0.0530 (0.844)	-0.179 (0.566)	0.0221 (0.902)	0.00170 (0.992)	-0.198 (0.446)
Household size	0.121*** (0)	0.112*** (0)	0.113*** (0)	0.0420 (0.498)	-0.102*** (0)	-0.102*** (0)	-0.102*** (0)	-0.110* (0.0781)
Married	-0.306*** (1.12e-08)	-0.289*** (1.19e-07)	-0.290*** (9.63e-08)	-0.130 (0.585)	0.377*** (0)	0.372*** (0)	0.372*** (0)	0.367*** (0.00208)
Memb. of an ethnic minority	0.255 (0.174)	0.448*** (0.00311)	0.456*** (0.00266)	0.648*** (0.000326)	0.370 (0.161)	0.235 (0.207)	0.234 (0.211)	0.0795 (0.643)
Speak official language	-0.171 (0.412)	-0.387*** (0.000624)	-0.356*** (0.00193)	-0.536*** (0.000217)	0.00632	0.108	0.0851	0.115
Observations	51346	55375	55353	4011	51346	55375	55353	4011

Notes : White robust standard errors clustered on country of birth in pare

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

All regressions include a full set of time dummies

**Table 4**

VARIABLES	Panel A: Host country FE				Panel B: Host country and industry FE			
	Undereducation		Overeducation		Undereducation		Overeducation	
	(1) Native	(2) Foreign born	(3) Native	(4) Foreign born	(5) Native	(6) Foreign born	(7) Native	(8) Foreign born
exp	0.0164 (0.262)	0.0383* (0.0625)	-0.0432*** (0.00804)	-0.0280 (0.206)	0.0181 (0.234)	0.0464** (0.0164)	-0.0429** (0.0144)	-0.0248 (0.289)
exp2	0.00113*** (1.16e-05)	0.000803** (0.0286)	-0.000444 (0.203)	-0.000571 (0.260)	0.00112*** (2.48e-05)	0.000702* (0.0523)	-0.000446 (0.224)	-0.000678 (0.221)
immigr								
5 to 10		-0.201 (0.468)		0.0789 (0.606)		-0.190 (0.457)		0.0542 (0.729)
10 to 20		-0.0580 (0.836)		-0.286 (0.121)		-0.0548 (0.824)		-0.323* (0.0948)
more than 20		-0.491* (0.0917)		-0.0487 (0.828)		-0.442 (0.116)		-0.117 (0.616)
male	-0.109 (0.266)	-0.148 (0.370)	0.285*** (1.04e-09)	0.0624 (0.676)	-0.121 (0.232)	-0.254 (0.127)	0.360*** (9.86e-08)	0.0292 (0.857)
Not a citizen	0.694** (0.0249)	-0.0339 (0.913)	-0.267 (0.416)	-0.189 (0.457)	0.663** (0.0201)	0.0488 (0.869)	-0.128 (0.739)	-0.174 (0.497)
Household size	0.120*** (0)	0.0701 (0.284)	-0.0924*** (0)	-0.117* (0.0568)	0.125*** (0)	0.0676 (0.300)	-0.0885*** (0)	-0.112* (0.0663)
Married	-0.307*** (4.62e-08)	-0.168 (0.472)	0.371*** (0)	0.359*** (0.00405)	-0.313*** (1.89e-08)	-0.140 (0.562)	0.348*** (0)	0.370*** (0.00633)
Member of an ethnic minority	0.284 (0.128)	0.683*** (7.47e-05)	0.390 (0.156)	0.0890 (0.609)	0.269 (0.148)	0.686*** (3.18e-05)	0.363 (0.142)	0.129 (0.455)
Speak official language first at home	-0.173 (0.397)	-0.574*** (0.000157)	0.0438 (0.539)	0.193 (0.261)	-0.109 (0.627)	-0.574*** (7.18e-05)	0.0700 (0.374)	0.205 (0.261)
Observations	51346	4011	51346	4011	50439	3936	50439	3936

Notes : White robust standard errors clustered on country of birth in parenthesis

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

All regressions include a full set of time dummies

**Table 5**

VARIABLES	Odd ratio : undereducation				Odd ratio : overeducation			
	Host country and industry FE			Col. 3 + country of birth FE	Host country and industry FE			Col. 7 + country of birth FE
	(1) Natives	(2) FB	(3) FB	(4) FB	(5) Natives	(6) FB	(7) FB	(8) FB
exp	0.0181 (0.234)	0.0753*** (0.00372)	0.0762*** (0.00290)	0.0762*** (0.00727)	-0.0429** (0.0144)	-0.0374 (0.177)	-0.0381 (0.169)	-0.0521* (0.0815)
exp2	0.00112*** (2.48e-05)	0.000701 (0.132)	0.000691 (0.134)	0.000964* (0.0782)	-0.000446 (0.224)	-0.000409 (0.516)	-0.000395 (0.528)	-0.000345 (0.595)
5 to 10		-0.255 (0.408)	-0.257 (0.404)	-0.393 (0.238)		0.00177 (0.991)	0.00266 (0.987)	-0.0462 (0.805)
10 to 20		-0.138 (0.660)	-0.161 (0.610)	-0.500 (0.185)		-0.0786 (0.743)	-0.0722 (0.763)	-0.0617 (0.826)
more than 20		-0.954*** (0.00162)	-0.978*** (0.00126)	-1.227*** (0.000440)		-0.138 (0.651)	-0.118 (0.705)	0.00819 (0.983)
male	-0.121 (0.232)	-0.363 (0.154)	-0.398 (0.121)	-0.470 (0.108)	0.360*** (9.86e-08)	0.139 (0.467)	0.147 (0.441)	0.0313 (0.888)
Not a citizen	0.663** (0.0201)	0.475 (0.191)	0.516 (0.161)	0.708** (0.0481)	-0.128 (0.739)	-0.165 (0.570)	-0.159 (0.579)	0.00457 (0.988)
Household size	0.125*** (0)	0.0784 (0.176)	0.0713 (0.230)	0.0668 (0.249)	-0.0885*** (0)	-0.105 (0.114)	-0.100 (0.131)	-0.0856 (0.199)
Married	-0.313*** (1.89e-08)	-0.370 (0.230)	-0.375 (0.223)	-0.494 (0.139)	0.348*** (0)	0.300** (0.0482)	0.314** (0.0365)	0.446** (0.0165)
Mem. of an ethnic minority	0.269 (0.148)	0.373 (0.157)	0.312 (0.232)	-0.0777 (0.784)	0.363 (0.142)	0.151 (0.468)	0.178 (0.387)	0.184 (0.452)
Speak official language	-0.109 (0.627)	-0.759*** (0.000933)	-0.739*** (0.000954)	-0.630** (0.0157)	0.0700 (0.374)	0.299 (0.188)	0.296 (0.182)	0.151 (0.556)
common language		-0.196 (0.478)	-0.120 (0.647)	-0.0612 (0.850)		-0.0618 (0.780)	-0.147 (0.513)	-0.214 (0.504)
Past colony		-0.343 (0.282)	-0.224 (0.479)	-0.787** (0.0437)		0.230 (0.374)	0.260 (0.341)	0.759** (0.0313)
Distance		0.0142 (0.671)	0.00408 (0.903)	-0.148 (0.479)		-0.0330 (0.294)	-0.0328 (0.298)	-0.176 (0.323)
Network size		2.675 (0.787)				-19.63** (0.0455)		
Network size among High skilled			4.573 (0.787)	31.91** (0.0139)			-4.170 (0.766)	7.103 (0.508)
Low Skilled			19.45* (0.0830)	19.28* (0.0880)			-23.10 (0.154)	-8.037 (0.326)
Middle Skilled			-46.92 (0.133)	-48.89 (0.123)			14.71 (0.607)	-12.01 (0.662)
Observations	50439	3143	3143		50439	3143	3143	3143

Notes : White robust standard errors clustered on country of birth in parenthesis

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

All regressions include a full set of time dummies

**Table 6. Residence Country Effects Relevant for Immigrants and Native-Born**

	Under-education				Over-education			
	Native-born		Immigrants		Native-born		Immigrants	
Shadow	0.002***	(0.000)	-0.004***	(0.001)	0.001*	(0.000)	0.003	(0.002)
Gini	-0.001*	(0.000)	-0.001	(0.002)	-0.001*	(0.001)	-0.001	(0.003)
Education	-0.003**	(0.001)	0.016***	(0.006)	-0.003**	(0.001)	-0.012	(0.009)
EPL	0.008***	(0.003)	-0.024**	(0.010)	0.009***	(0.003)	0.019	(0.016)
Unempl	0.002***	(0.001)	-0.006**	(0.003)	0.002**	(0.001)	0.004	(0.006)
TU mmbship	0.009	(0.006)	0.025	(0.027)	-0.021**	(0.008)	0.047*	(0.022)
N obs	51304		3577		51304		3577	

*Each cell contains results from a separate regression, in which dependent variable is column heading, and independent variables are row heading. The full set of individual variables, year, sector, and occupation fixed effects is included in each regression. In addition, for immigrants, duration of stay, language, and citizenship variables, interacted with the immigration dummy, as well as a full set of dyadic effects is included.*

**Table 7. Residence Country Effects Relevant for Immigrants**

	Under-education		Over-education	
	Native-born	Immigrants	Native-born	Immigrants
Eligibility		-0.001*** (0.000)		0.000 (0.000)
Labour Market				
Integration		-0.001*** (0.000)		0.001 (0.000)
Labour Market Access		-0.001*** (0.000)		0.001 (0.001)
Antidiscrimination		-0.001** (0.000)		0.000 (0.001)
First principal component on all migration policy measures		-0.007** (0.003)		0.010* (0.005)
N obs		3577		3577

*Each cell contains results from a separate regression, in which dependent variable is column heading, and independent variables are row heading. The full set of individual variables, year, sector, and occupation fixed effects is included in each regression. In addition, for immigrants, duration of stay, language, and citizenship variables, interacted with the immigration dummy, as well as a full set of dyadic effects is included.*

**Table 8A. Residence Country Effects. Example of a First Stage Regression, Immigrants**

	<i>Over-qualification</i>		<i>Under-qualification</i>	
	<i>Coefficients</i>	<i>St.Errors</i>	<i>Coefficients</i>	<i>St.Errors</i>
BE	0.077	(0.313)	-0.164	(0.364)
CH	0.31	(0.258)	-1.063**	(0.333)
DE	-0.376	(0.283)	-0.201	(0.336)
DK	0.072	(0.352)	-0.237	(0.417)
ES	-0.010	(0.328)	-1.553***	(0.445)
FI	0.175	(0.544)	-1.325***	(0.445)
FR	0.380	(0.319)	-0.412	(0.369)
GB	0.151	(0.308)	-0.421	(0.395)
GR	0.178	(0.324)	-1.642***	(0.417)
IE	0.186	(0.334)	-0.865**	(0.496)
LU	0.075	(0.279)	-0.674***	(0.337)
NL	-0.266	(0.299)	-0.414	(0.365)
NO	0.394	(0.295)	-0.909***	(0.402)
PT	1.296***	(0.346)	-1.829***	(0.570)
SE	0.609***	(0.269)	-0.725***	(0.348)
Observations	4080			

*Estimation method: maximum-likelihood multinomial logit. Reported are coefficients on the log-odds scale. All equations include full set of socio-economic characteristics, country of origin migration decade-specific fixed effects and dyad effects (distance, common language, former colony, being the same country ever in the past). Standard errors are robust and clustered on dyads. Omitted country of residence fixed effect: Austria*

**Table 8B. Residence Country Effects. Second Stage Regression Results**

	Natives	Under-education					Natives	Immigrants	Over-education				
		Immigrants	Imm <20	Imm 20+	Imm OECD	Imm non-OECD			Imm <20	Imm 20+	Imm OECD	Imm non-OECD	
Shadow	0.002 (0.011)	-0.031** (0.016)	-0.031** (0.014)	-0.037 (0.023)	0.015 (0.014)	-0.031* (0.017)	0.002 (0.007)	0.009 (0.013)	0.020 (0.017)	-0.001 (0.013)	0.015 (0.015)	0.015 (0.014)	
Gini	-0.015** (0.006)	-0.026 (0.019)	-0.017 (0.019)	-0.030 (0.024)	0.013 (0.020)	-0.034* (0.017)	0.009* (0.005)	0.014 (0.019)	0.023 (0.024)	-0.011 (0.020)	0.013 (0.020)	0.013 (0.020)	
Education	0.013 (0.036)	0.117** (0.059)	0.096** (0.048)	0.131* (0.071)	-0.096* (0.052)	0.118** (0.048)	-0.031* (0.017)	-0.081 (0.058)	-0.121* (0.068)	0.004 (0.058)	-0.096* (0.053)	-0.096* (0.053)	
EPL	0.023 (0.061)	-0.192* (0.105)	-0.105 (0.108)	-0.213 (0.138)	0.160 (0.109)	-0.165 (0.114)	0.038 (0.039)	0.082 (0.102)	0.144 (0.136)	-0.026 (0.119)	0.160 (0.107)	0.160 (0.106)	
Unempl	0.009 (0.015)	-0.023 (0.030)	-0.016 (0.030)	-0.020 (0.045)	0.010 (0.032)	-0.035 (0.031)	-0.004 (0.011)	-0.003 (0.024)	0.000 (0.029)	0.020 (0.037)	0.010 (0.031)	0.010 (0.031)	
TU membership	0.161 (0.142)	0.286 (0.296)	-0.029 (0.338)	0.332 (0.362)	0.139 (0.341)	0.268 (0.290)	-0.191** (0.094)	0.059 (0.251)	0.048 (0.330)	0.388 (0.411)	0.139 (0.353)	0.139 (0.343)	
Eligibility	-0.001 (0.001)	-0.004* (0.002)	-0.004 (0.002)	-0.005* (0.003)	0.002 (0.003)	-0.004** (0.002)	-0.000 (0.001)	0.003 (0.002)	0.003 (0.003)	0.001 (0.002)	0.002 (0.003)	0.002 (0.003)	
LM Integration	0.000 (0.001)	-0.004* (0.002)	-0.003 (0.002)	-0.004 (0.003)	0.001 (0.003)	-0.003 (0.002)	-0.000 (0.001)	0.002 (0.002)	0.003 (0.002)	-0.002 (0.003)	0.001 (0.003)	0.001 (0.003)	
LM Access	0.001 (0.002)	-0.008** (0.004)	-0.006 (0.004)	-0.009* (0.005)	0.003 (0.004)	-0.006 (0.004)	-0.001 (0.002)	0.005* (0.003)	0.007 (0.004)	0.001 (0.004)	0.003 (0.004)	0.003 (0.004)	
Antidiscr	0.001 (0.002)	-0.002 (0.004)	-0.003 (0.004)	0.001 (0.005)	0.006* (0.003)	-0.004 (0.004)	-0.001 (0.001)	0.005 (0.003)	0.007* (0.004)	0.005 (0.004)	0.006* (0.003)	0.006* (0.003)	

*Dependent variable: coefficient vector of fixed effects from the first stage. Each cell represents a separate regression; where column heading indicates the subsample; and row heading indicates independent variable. Estimation method: OLS, with bootstrapped standard errors (5000 replications). Significant at: \*\*\*-1%, \*\*-5%*

**Table 9. Source Country Effects. Second Stage Regression Results**

	<i>Under-qualification</i>		<i>Over-qualification</i>	
PPP GDP pc	0.001***	(0.000)	0.001***	(0.000)
Gini	-0.011	(0.017)	-0.046***	(0.017)
Government consumption	0.040	(0.034)	0.108***	(0.031)
Share of agriculture land	0.007	(0.009)	0.016	(0.010)
Empowerment rights index	-0.028	(0.068)	-0.060*	(0.035)
Protection of workers' rights	-0.045	(0.237)	-0.152	(0.240)
Women economic rights	0.336	(0.296)	0.590**	(0.275)
Women political rights	0.375	(0.348)	0.796**	(0.352)
Women social rights	0.212	(0.207)	0.520***	(0.195)
Communist	0.457	(0.336)	0.971***	(0.333)
Civic law	1.073***	(0.403)	0.595	(0.433)
Oil country	0.124	(0.744)	0.311	(0.686)
Main religion : Islam	1.730***	(0.394)	1.055***	(0.402)
Education level	-0.070	(0.101)	0.002	(0.091)
Teacher to pupil ratio in primary school	-0.036**	(0.017)	-0.053***	(0.016)
Teachers to pupil ratio in secondary school	-0.033	(0.031)	-0.052	(0.032)
Share of public expenditure for primary education	0.010	(0.023)	0.038*	(0.022)
Share of public expenditure for secondary education	-0.002	(0.010)	0.013	(0.011)
African	-0.861	(0.526)	-0.946*	(0.495)
Asian	0.019	(0.509)	-0.790	(0.500)
Latin American	-0.876*	(0.527)	-0.384	(0.583)
Eastern European	0.162	(0.388)	0.637*	(0.368)
Western European	0.633*	(0.349)	0.741**	(0.363)
North African	0.907	(0.569)	0.164	(0.567)
Caribbean	-2.429***	(0.532)	-1.137	(2.002)

Dependent variable: coefficient vector of country of residence/decade fixed effects from the first stage. Sample: Immigrants. Each cell represents a separate regression; where row heading indicates independent variable. Estimation method: OLS, with bootstrapped standard errors (5000 replications). Significant at: \*\*\*-1%, \*\*-5%