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Occupation–education mismatch of immigrant workers in Europe: Context and policies[☆]



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ABSTRACT

This paper analyses occupational matching of immigrants from over seventy countries of origin to 22 European countries. Using European Social Survey for the years 2002–2009, we show that immigrants are more likely to be both under- and overeducated than the native born for the jobs that they perform. However, immigrants' outcomes converge to those of the native born with the years of labor market experience. The mismatch is due to immigrants' selection and sorting across countries. Notably, origin countries' quality of human capital, by affecting selection, mostly matters for undereducation of immigrants. Overeducation is determined to a greater extent by destination country economic conditions and labor market institutions. Immigrant-specific policies in destination countries, such as those improving labor market access, positively affect overall matching; however, other policies, such as those improving eligibility or aimed at antidiscrimination may aggravate overeducation by attracting a wider range of educated immigrants.

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1. Introduction

Immigrants' labor market outcomes are by far the key indicators of their success and integration in the receiving societies. However, one of the salient features is the mismatch between immigrants' skills, qualifications, and jobs. When one thinks of immigrants' labor market outcomes, she often pictures a Romanian engineer working as a cleaner in Italy or Greece, or a famous taxi driver being

a former scientist from Eastern Europe (Mattoo, Neagu, & Özden, 2008). Indeed, 22% of immigrants face overeducation in Europe, against only 13% of the native born. Overqualification reaches up to 35% of immigrants in some countries like Great Britain, and up to 47% in Portugal.¹ In addition to representing a certain “waste”, overeducation may also translate into persisting wage penalties (Chiswick & Miller, 2008, 2011a), potentially aggravating inequalities between immigrants and the native born.

A less common picture that one has in mind is of an African or Asian trader or cook, who, despite having a significantly lower level of schooling compared to the native born in the same profession, manages to succeed in the job. As it appears, the mismatch between immigrants' skills and qualifications is a complex phenomenon, and may also take the form of undereducation. In fact, up to

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¹ Source: authors' calculations based on the European Social Survey; see details below.

16% of European immigrants have qualifications significantly lower than those required for the job. These are the individuals who, despite their low formal schooling, were positively selected from the talent and ability distribution in their origin countries. It is this talent that they are able to substitute for formal required schooling in certain jobs. These immigrants hence represent a certain success story, the one that is rarely revealed.

The contribution of this paper is two-fold. First, using the European Social Survey data, we provide Europe-wide evidence on the occupation–qualification mismatch of immigrants as compared to the native born. Previous studies have mainly focused on the US or on individual European countries. Second, we analyze the factors responsible for both types of the mismatch. Exploring differences across origin and destination countries, we organize the discussion around selection, sorting, and human capital transferability issues, with a special focus on the role of institutions and policies in destination countries.

The paper contains three main results. First, immigrants' mismatch relative to the native born is important and pervasive across all countries: immigrants are more likely to be both under- and overeducated in the jobs that they perform compared to the native born. These outcomes are consistent with the notions of both poor human capital transferability among better educated immigrants, and positive selection among lower educated immigrants.

Second, controlling for origin and destination specific effects, we show that the labor market outcomes of immigrants do converge to those of the native born, as the years of labor market experience increase. Most of this convergence is due to a better match of those immigrants who are overeducated upon arrival.

Third, and this is perhaps the most novel result in the literature, we report a differential impact of selection and sorting on under- and overeducation of immigrants. We are able to do so thanks to the rich data that cover several destination and origin countries, and thus allow controlling for bilateral effects. By doing so, we confirm the independence of selection and sorting suggested by [Grogger and Hanson \(2011\)](#) in the setting of occupational matching.

Specifically, controlling for the migration–decade–specific host country and origin continent effects, we identify the home and host country characteristics for immigrants' matching. Some destination country labor market institutions and institutional features, such as the degree of unemployment, trade unions, and the extent of a shadow economy, affect immigrants' mismatch. At the same time, immigrants' outcomes are determined to a large extent by immigrant-specific policies adopted in destination countries. For example, specific measures of labor market integration targeted at immigrants allow reducing their overeducation. However, some other policies, such as those promoting antidiscrimination, may actually lead to overeducation, by attracting educated immigrants from a wider range of ability. At the same time, quality of education in origin countries, by affecting selection, mostly matters for undereducation of lower educated immigrants.

Our paper contributes to bridging the gap between two strands of migration literature. The first is on immigrants'

assimilation in the labor markets. This literature examines immigrants' outcomes in terms of wages and return to education ([Chiswick, 1978](#); [Borjas, 1994](#)), employment ([Wheatley, 1998](#)), and occupational matching ([Green, 1999](#); [Amuedo-Dorantes & De la Rica, 2007](#); [Barrett & Duffy, 2008](#)). One of the common features of these studies is their focus on the assimilation process, or convergence of immigrants' outcomes to those of the native born. The mere possibility and the speed of assimilation, however, are inevitably linked to immigrant's selection and to the transferability of their skills ([Chiswick & Miller, 2009](#)), and we build in both issues into our analysis.

The second strand of literature is on cross-country differences as determinants of migration and assimilation. These differences are at the heart of migration selection models ([Borjas, 1987](#)). Thus, our paper is related to [Blau, Kahn, and Papps \(2011\)](#), who look at long lasting effects of origin country characteristics on immigrants' labor market outcomes at destination, as well as to [Mattoo et al. \(2008\)](#), who explain significant differences in the occupational attainment of immigrants in the US from different origin countries by quality of human capital and selection effects. However, these authors rely on a single destination country, thus not being able to distinguish selection (supply side) and sorting (demand side) effects, and this is a key difference of our paper.

The paper is organized as follows. Section 2 contains the literature overview on mismatch and its relevance for immigrants, organizing the discussion along the role of individual, destination, and origin-specific effects. In Section 3, we describe the data and give descriptive evidence on the occupation mismatch in Europe. Section 4 provides the results of the econometric analysis and their discussion. The last section concludes.

2. Why mismatch? A theoretical overview

2.1. Individual-specific reasons

Imperfect matching of education and jobs is a standard feature of labor markets in general, and has been documented for North America and Europe ([Chevalier, 2003](#); [Dolton & Vignoles, 2000](#); [Freeman, 1976](#); [Groot, 1996](#); [Rumberger, 1981](#)). Theoretical and empirical explanations of this phenomenon include, among others, the imperfect “screening” of workers' education by employers ([Spence, 1973](#)); the incorrect temporary matches due to imperfect information in the labor market ([Groot & Van Der Brink, 2000](#)); career building or conscious overeducation that can bolster promotion ([Sicherman & Galor, 1990](#)); the trade-off between, and hence a substitution of, different types of human capital, such as education and experience ([Sicherman, 1991](#)). The latter suggests that overeducation does not necessarily represent a waste, but may be an optimal, albeit temporary, outcome. It also implies that overeducated workers will typically have less experience, while undereducated workers will have more.

[Chiswick and Miller \(2009\)](#) offer a theoretical explanation to how these and other reasons may aggravate or mitigate the mismatch for immigrants, as opposed to the

native born. For example, employers may be less able, or eager, to correctly “screen” the quality of foreign schooling, and hence may prefer hiring immigrants with education levels higher than needed for the job. In addition to this, skill transferability plays a paramount role (Chiswick & Miller, 2009; Friedberg, 2000). Differences in schooling and non-recognition of diplomas, different technologies and barriers to entry into specific occupations, as well as discrimination against immigrants make skill transferability across labor markets less than perfect. This usually leads to overeducation of immigrants, which, however, has a tendency to decrease with the duration at the destination.² In contrast, as immigrants are often favorably selected, they are more able to substitute schooling with other productivity-enhancing skills, and hence to be undereducated. This tendency may be independent of duration at destination in some cases; or increase with time in others, as more country-specific experience is gained.

These theories directly provide several hypotheses for testing: extra year of experience lowers the probability of being overeducated but increases the probability of being undereducated. For immigrants, duration of stay may have an asymmetric implication for the mismatch, while better knowledge of the market and especially possession of language skills may improve matching.

2.2. Home country determinants: selection and the supply side

Immigrants’ occupational outcomes, as well as their observed individual characteristics, are also a result of immigrants’ selection and further sorting across destination countries. Significant amount of evidence points to a general positive selection of immigrants (Beine, Docquier, & Rapoport, 2001, 2007, 2008). However, negative selection also remains a possibility. Both are determined by income differential and relative inequality between origin and destination countries, which largely influence the reward to skill and the incentives to migrate, as well as by the costs of moving (Borjas, 1987, 1999a; Chiswick, 1999).

Thus, a direct implication of the selection models is that numerous bilateral factors, such as distance between countries, sharing a common border or a common language, having a common colonial past, by reducing the costs of moving, should negatively affect selection (Belot & Hatton, 2008; Docquier, Faye, & Pestieau, 2008; Mayda, 2010). With higher moving costs, only individuals with better employment prospects and earning potential at destination will move. Both common language and past colonial relationship may also ease the transferability of human capital and reduce overeducation.

In addition, selection, and the portability of human capital, is also affected by the level and quality of schooling

that immigrants receive at home. Some authors have tested the impact of input measures, such as expenditures per pupil or pupil-to-teacher ratio as indicators of the education settings that translate into individuals’ labor market outcomes (Card & Krueger, 1992; Bratsberg & Terrell, 2002). Others have used outcome measures, such as test scores in international standardized tests (Chiswick & Miller, 2010a) to show that poor quality of schooling incites only “most able and most highly motivated to migrate”, while higher quality of schooling allows immigrants’ drawing from a wider ability distribution (Chiswick & Miller, 2010a, p. 34). Given a certain controversy regarding the use of the schooling input measures (reviewed in Hanushek, 1986), we give a preference to outcome measures in this paper.

2.3. Destination country determinants: sorting and the demand side

Immigrants’ further choice of destination countries is rarely a random outcome. Once bilateral country characteristics are accounted for, this choice is also influenced by destination country’s economic conditions and its attractiveness in terms of providing a better return to skill. These destination-country conditions are the same for the native born and immigrants, although they may affect the outcomes of the two population groups differently. Immigrants’ choice can be also influenced by immigration policies, both general and specific to skill transferability and selection. Once at the destination, these conditions will also have a long-lasting, and repeating, effect on labor market outcomes, accommodating or impeding correct matching of skills.

We consider the following general characteristics of destination economies, or the demand side, relevant for occupational matching of natives and immigrants: income level and income inequality measures, general level of unemployment, quality of education, measures of labor market flexibility, and the extent of the informal sector. This list is not exhaustive, but allows covering the largest part of most relevant features suggested by earlier literature.

High levels of unemployment have direct implications for the assignment of workers to available jobs (Sattinger, 1993). Competition for jobs is more intense generally, and educated workers may compete with the less educated for any job available, irrespectively of occupation. Hence, we expect a higher overall incidence of overeducation in an economy with higher levels of unemployment. At the same time, undereducated workers are more likely to change jobs within the same occupation because of their previous investments in occupation-specific, rather than general, human capital (Alba-Ramirez, 1993). They may thus be preferred to perfectly matched or overeducated but inexperienced workers, thus increasing the incidences of undereducation, too. The effect of overall excess supply of workers in the economy should be the same for immigrants and the native born, although potentially more pronounced for the former if they are more affected by unemployment than natives.

² In contrast with this “positive” assimilation, Chiswick and Miller (2011b) also document a possibility of “negative assimilation” in terms of earnings, when skill transferability is very high. This is the case, for example, of immigrants from the advanced English-speaking developed countries to the United States.

Higher quality of schooling gives a higher payoff in the labor markets, especially for correctly matched individuals (Chiswick & Miller, 2010a). However, higher quality of education may also allow an easier substitution of the years of experience for schooling, thus having a direct implication for the probability of being undereducated compared to the requirements of the job.

If markets are flexible, for example, if firing costs are low, workers are more easily laid off (Boeri & Jimeno, 2005), turnover is increased, while unemployment duration may become lower (Bentolila & Bertola, 1990). Increased turnover, coupled with the firing flexibility for employers, will increase incidences of over- and undereducation in the short-run. It may also lead to higher incidences of perfect match and undereducation in the long run, as only most suited workers, in terms of education or experience, will remain in the job. As higher employment protection also increases the costs of on the job screening, employers will tend to select those whose education and experiences is less costly to assess. For immigrants, this may translate into higher incidences of overeducation, as screening of foreign diplomas and experiences may be particularly costly. Also, employers will be more risk averse to substitute immigrants' foreign experience with required schooling; hence undereducation of immigrants will be rare.

Unionism has been shown to reduce the probability of separations, because workers, dissatisfied with conditions, are able to voice their concerns (Freeman, 1980). As such, unionism has similar implications for matching as stricter firing restriction. At the same time, unionism has positive implications for the availability and duration of on-the-job training (Booth, Francesconi, & Zoega, 2003), the latter having a significant positive impact on undereducation, but not overeducation (Groot, 1997).

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 undereducated. In contrast, for immigrants, it may provide little protection against discrimination and limited recognition of their qualifications, and hence overeducation. Larger informal sectors can also enhance the negative selection of immigrants, by lowering the costs of moving to and operating in an informal setting.

Finally, we may also think of immigrant-specific policies that may additionally affect the mismatch. For example, specific policies of labor market integration, such as eligibility to take up specific jobs or availability of labor market integration measures provided by the state, would be expected to have direct implications for matching. Linked both to the transferability of human capital, and positive selection, policies and practices of anti-discrimination are also expected to reduce the overeducation, and potentially lead to undereducation of immigrants.

Given considerable difference between European countries in their migration-specific policies, our interest is to see to what extent these differences translate into the matching outcomes of immigrants.

3. Data and descriptive statistics

3.1. The data

The analysis of this paper builds on the European Social Survey (ESS), conducted biannually in most European Union countries.³ We use the main questionnaire and the first four waves of the survey, available for the years 2002–2009. The data contain 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 the foreign born.

The sample is restricted to men and women employed at the time of the survey, and aged 20–64 as to insure focusing on individuals likely to have completed their formal schooling.⁴ 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 ten individuals from the same source to the same destination country. The final sample consists of 59,477 native born and 4425 immigrants in 22 host countries and from 76 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 the MENA region.

3.2. Dependent variable

To measure education–qualification mismatch, we use the realized matches' procedure (Chiswick & Miller, 2010b; Hartog, 2000). It amounts to computing the mean and standard deviation of educational attainment within each occupation, and qualifying individuals with education level one standard deviation above this mean as being overeducated, and individuals one standard deviation below this mean as undereducated (Verdugo & Verdugo, 1989; Kiker, Santos, & Mendes de Oliveira, 1997). We undertake this construction within 2-digit classification of occupations. Further occupational disaggregation results in a prohibitively low number of individuals in some occupations. To compute the mean of the educational level within an occupation, only the education level of the native born is used as a reference, of both males and females, aged 20–64. As education levels within an occupation may vary across countries, the measure is also constructed on a country by country basis. The resulting variable is composed of three categories: undereducated, matched,

³ ESS is a representative survey. For details on methodology and sampling procedure, see www.europeansocialsurvey.org. See also Jowell et al. (various issues).

⁴ Restricting further the sample to prime-age individuals (25–64) leads to similar results.

Table 1
Incidence of mismatch in the European labor markets in 2002–2009, in percent.

	Undereducated	Correctly matched	Overeducated
The native born	12.67	73.59	13.74
Immigrants in destination countries	16.15	61.15	21.93
<i>Of which:</i>			
Report having lived in a country			
0–5 years	10.18	61.26	28.56
6–10 years	12.31	64.50	23.19
11–20 years	16.03	64.17	19.80
More than 20 years	17.76	65.54	17.00
Speak any official language of this country at home			
Yes	12.69	73.18	14.12
No	17.07	65.50	17.43
Originate from a country that shares colonial past			
Yes	15.27	64.34	20.39
No	16.62	62.91	20.47
Originate from a country with a common language			
Yes	10.27	66.71	23.02
No	16.90	63.48	19.62
Originate from developed countries			
Yes	13.71	65.03	21.26
No	12.98	63.61	23.42

Source: Authors' calculations based on the ESS.

and overeducated, and is used as a dependent variable in further analysis.⁵

Table 1 presents the distribution of the native born and immigrants across the three possible occupation–education matches. Overall, there is approximately the same number of under- and overeducated native-born individuals, it is around 13%. This 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 significantly higher incidence of both types of the mismatch. Undereducation of immigrants has a clear tendency of rising with duration at destination, while the opposite pattern is observed for overeducation. Correct matches are also more frequent for immigrants speaking an official language of their residence country at home, and for those originating from countries sharing a common language with their destination country. Differences between immigrants from countries with our without colonial past, as well as between immigrants from developed and non-developed countries are less pronounced.

⁵ Alternatively, one may operate with the mode of educational attainment within each occupation, however, this reduces significantly the variation of the variable, and may also lead to an erroneous qualification of individuals with schooling that is around the mode as over- or under-qualified. See Tables A3 and A4 for an illustration (computations at 1-digit): the self-reported mean schooling is different across all occupations, while the mode is the same for all but one occupation. Other measures of over- and under-qualification proposed in the literature include “normative” approach, which amounts to using national/international standards to match jobs with educational requirements (Chevalier, 2003; Dumont and Monso, 2007); using occupational prestige scores (Chiswick, Lee, & Miller, 2005); workers self-assessment of skills needed for the job performed (McGoldrick & Robst, 1996); probability of being in an occupation, or occupying a top position (Barrett and Duffy, 2008). Chiswick and Miller (2011b) and Hartog (2000) show that the analysis of the questions of interest is relatively insensitive to the choice of the measure, be it realized matches or, for example, workers self-assessment.

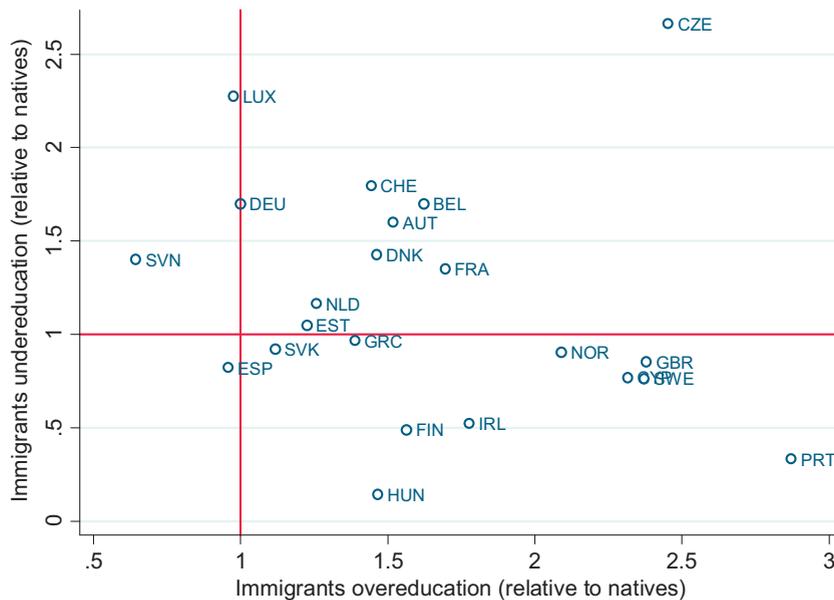
Table A4 of the Appendix additionally describes the incidence of mismatch by occupation. In particular, relatively to the native born, immigrants' overeducation is more frequent in high- and semi-high skill requiring jobs, mostly reflecting the less than perfect skill transferability of immigrants. In contrast, undereducation is prevailing in the intermediary and low-skill occupations, reflecting mostly favorable selectivity of these immigrants. In some intermediary occupations, however, both under- and overqualification of immigrants are important. Potentially, both skill transferability factors and favorable selectivity are at work for these types of jobs.

3.3. Independent variables

Human capital model, search and mobility theories offer natural candidates for individual determinants of mismatch. These include experience in the labor market as the most important component of human capital and the main determinant of occupational status and mobility along the career. Variables affecting labor market participation and possibly occupational choice also include marital status, household size, being a member of an ethnic minority, past unemployment, total hours worked, and being a union worker (see Appendix Table A5 for variables' definitions).

Since the immigrant status is a (constrained) optimal choice outcome, immigrants are expected to differ from the native born along these characteristics. This is confirmed by the descriptive statistics of Table A6, which contains sample means of individual characteristics for both the native born and immigrants. The two groups differ substantially in marital status, belonging to an ethnic minority, having incidences of past unemployment, and belonging to a trade union. They are, however, not different in terms of the number of hours worked.

While at first sight there is also no difference in experience, computed as age minus years of schooling,



Source: authors' calculations based on the ESS

Fig. 1. Immigrants and native-born relative mismatch across host countries.
Source: Authors' calculations based on the ESS.

minus six, the disparities become apparent if immigrants are distinguished by years since migration. More recent cohorts of immigrants are more educated: those with more than 20 years since migration have 12.73 years of schooling on average, compared to 13.04 years among more recent immigrants, and compared to 13.24 years among the native born. The incidence of past unemployment is also significantly higher among immigrants as opposed to native born, regardless of the relative advantage of veteran immigrants over native born in terms of experience. This suggests that some persistent differences between immigrants and the native born, other than observable human capital, are at work, and potentially they are related to persistent differences between host and origin countries.

Further, the European-level data allow us comparing differences in occupational match of immigrants and the native born across European destinations. Fig. 1 plots the share of undereducated against the share of overeducated immigrants, both measured relatively to the share of the native born in the same group. Countries lying above the horizontal unit line and to the right of the vertical unit line are those where immigrants are more likely to be under- and overeducated, respectively.

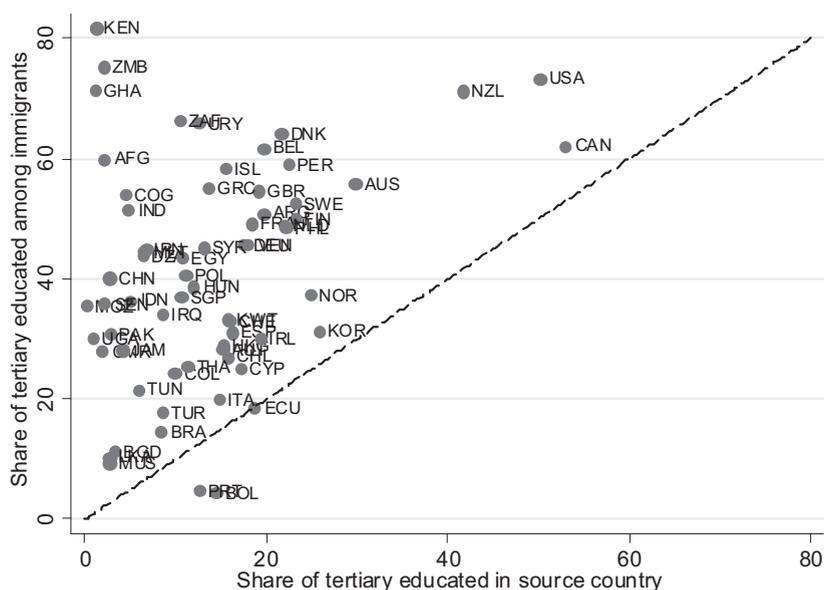
The plot confirms important heterogeneity of outcomes across host countries. In a large majority of countries, immigrants have significantly higher rate of overeducation than the native born. The incidence of undereducation is widespread, too. It is however less often observed among immigrants than among the native born in South-European and some new immigration countries (Portugal, Spain, Ireland, Hungary, Slovakia), but also in Great Britain and Nordic countries. This discrepancy may be related to both

specific labor market conditions in these countries, as well as to specific migration patterns.

Another reason for immigrants' occupational mismatch may be their self-selection from the population of origin countries along dimensions that could positively or negatively affect their occupation outcome at destination. We illustrate this point in Fig. 2 with respect to education selectivity. The graph shows that migrants are disproportionately drawn from the highly educated segment of their origin country population. This evidence of positive selection is important since education is also likely to be correlated with other non-observable productive characteristics that could explain labor market outcomes of immigrants in their host countries: to the extent that education and talent are correlated, positive selection on education may drive a positive selection on unobserved heterogeneity.⁶ These differences across countries in terms of selection motivate our interest for investigating further the exact origin of source country heterogeneity that can explain immigrants' selection and eventually immigrants' labor market outcomes at destination.

Thus, we compile the data on bilateral and country-level unilateral characteristics from various sources (Appendix Table A5). For bilateral controls, we distinguish,

⁶ While education is also correlated with social status and income, existing evidence shows that it is neither the poorest, nor the wealthiest individuals who migrate for economic reasons. Further, as long as the correlation between talent and education is positive, selection on schooling should, although partially, reflect selection on talent. In countries where schooling is mostly inherited from parents this is of course less likely to be the case than in more meritocratic schooling systems.



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

Fig. 2. Tertiary education in source countries and among immigrants.

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

on the one hand, characteristics that affect the costs of moving from and to a particular country which are constant across cohorts, such as geographic distance, past colonial relationship, common language, and sharing a common border. On the other hand, we control for differences across cohorts in selection and sorting using general economic variables, such as the ratio of GDP per capita at destination to the GDP per capita at the origin, and a similar ratio of Gini coefficients. These variables are measured at the time of migration. We use average values over three decades: the decade of arrival in the 2000s, in the 1990s, and in the 1980s and earlier. Thus, for each immigrant, home country effects are linked to her decade of migration.

Unilateral country characteristics include destination and home country measures of human capital quality, proxied by the average skills assessed by international standardized tests, the percent of top-performing students, and the percent of students reaching basic literacy in primary-end of secondary school. Tests score variable was constructed by Hanushek and Woessmann (2012) by averaging the standardized math and science test scores on International Student Achievement Tests Score over all years of available data for each origin country (the first assessment started in 1964 and the latest in 2003). Unfortunately, and unlike Bratsberg and Terrell (2002) who make use of an input based measure (such as expenditures per pupil), we could not measure this variable at the time of migration. Our small sample size does not allow us to incorporate origin country cohort-specific effects to control for time-varying changes in origin country output quality. However, in regressions, we will allow some variation across origin countries by including cohort fixed effects common to groups of countries having similar level

of development. This will ensure that our effect of school quality is not driven by some changes in the composition of immigrants across cohorts toward, for example, poorer or richer countries whose test score is either improving or worsening over time. Despite their shortcomings, and unlike input-based or educational attainment measures, the key advantage of school output quality measures is that they are based on standardized tests. They thus provide comparable metric against which average skill differences across countries can be assessed. Moreover, there is much more persistence in schooling quality differences across countries than in schooling attainments or investments. Hanushek (in press) notes that developing countries have been much less successful at closing the gap in school quality than schooling attainment or investments, while it is the former that matters the most for growth performance. Thus, cognitive measures of schooling output quality may capture persistent effects of human capital differences across countries. At a microeconomic level, origin country cognitive skills, more than origin country schooling attainment, have been shown to be related to immigrants' individual earnings (Hanushek & Woessmann, 2012) in host countries.

Destination countries' characteristics additionally include two measures of labor market rigidity (EPL index and the extent of trade union density), the rate of unemployment, and the extent of shadow economy. Destination country's GDP is measured at the year of the survey; all other variables correspond to the year 2005.⁷

⁷ Other studies assessing the role of home country characteristics in the labor market assimilation of immigrants also addressed the issues such as female labor force participation, fertility rates, or other notions of culture (see, for example, Blau et al., 2011; Fernandez and Fogli, 2009).

The data on migration-specific institutions in destination countries come from the MIPEX database. It measures the friendliness of over 140 policy indicators in integrating migrants into various dimensions of social and economic life in European countries. Among those, we focus on three policy dimensions most relevant for our research question: eligibility of immigrants to take up specific jobs; degree of labor market integration; and an aggregate index of anti-discrimination policies. These and other MIPEX indices have been shown to be indeed important predictors of immigrants' assimilation (Bisin, Patacchini, Verdier, & Zenou, 2011; Aleksynska, 2011).

The index of immigrants' eligibility to take up specific jobs or being precluded from them ranges from 0 to 100, 100 meaning that immigrants are not excluded from any jobs available for the native born, while 0 meaning that the situation is highly unfavorable for immigrants. The degree of labor market integration, which is also measured on the scale from 0 to 100, reflects what the state is doing to help migrants adjust to the demands of the labor market. Conceptually, this measure is different from the eligibility index, as it embeds specific measures taken up by the government in face of immigrants already present on its territory, their needs, as well as specific needs of the economy. In contrast, the eligibility measure is more likely to affect immigrants' sorting and, to a certain extent, transferability of their diplomas.

To appreciate the differences in these two measures, consider, for example France. It has one of the worst scores in Europe in terms of eligibility, as migrants are denied legal access to approximately 30% of all jobs in the country. This is more jobs than in any other European country, placing France way below the EU average (see MIPEX methodology and country analysis for details). In contrast, France scores above the European average in terms of targeted measures of labor market integration, as it has targeted policies of migrants' professional orientation toward jobs where shortages are observed.

Lastly, the MIPEX composite index of anti-discrimination policies measures the practice of various countries with respect to discrimination on the grounds of religion or belief, ethnicity, race, and nationality. It also ranges from 0 to 100, with 100 signifying best practice. The index takes into account the punishment of discrimination on the grounds of religion, belief, ethnicity, race and nationality; the coverage of these principles; the degree of the enforcement; and the role of the equality bodies and the state. Linked both to the transferability of human capital and fairer screening, better anti-discrimination practices are expected to reduce overeducation, and potentially lead to undereducation of immigrants.

4. Empirical analysis

We estimate a multinomial logit model for the probability of being over- or undereducated versus being perfectly matched, for the pooled sample of the native born and immigrants, and separately for natives and immigrants. The model for the education occupation match is given by:

$$Y_{iodj}|X_{iod} = \frac{e^{\beta_j X_{iod}}}{\sum_{j=1}^3 e^{\beta_j X_{iod}}} \quad (1)$$

where Y_{iodj} is the probability that worker i coming from country o to country d is in one of the three (j th) education–occupation match categories: undereducated, correctly matched, or overeducated. The vector X_{iod} includes individual-specific characteristics outlined above.⁸ Additionally, to control for differences in the distribution of workers across industries and occupations due to sorting, different skill requirement, or regulations of occupations, in all regressions, we include one-digit occupation fixed effects and industry fixed effects. All specifications include a full set of survey year and country of residence fixed effects. Depending on the regression, they also include immigrant-specific characteristics, such as citizenship, language spoken at home, and the length of residence, as well as country-specific and country-pair effects. In the regressions for the native born, and in basic regressions for immigrants without home-country and dyadic controls, expression $Y_{iodj}|X_{iod}$ reduces to $Y_{idj}|X_{id}$.

4.1. Baseline results

The benchmark results of estimating model (1) are presented in Table 2. Column (1) is estimated on the sample of the European native born, column (2) pools the sample of the native born and immigrants, and column (3) is estimated on the sample of immigrants. The estimated coefficients are transformed to relative-risk ratios, with perfect match being the benchmark.

For the native born, our estimates of the key labor market ingredient of the model – experience – confirms previous studies for Europe and the US. From column (1) of Table 2, an increase of labor market experience raises the relative risk of being in the group of undereducated as compared to the group of perfectly matched. This suggests that workers do substitute their lack of formal schooling with years of labor market experience to obtain a job requiring higher educational credentials, as predicted by human capital theories. At the same time, an extra year of experience lowers the probability of being overeducated. This is the pattern suggested by optimal mobility and on-the-job search theories, whereby individuals accept jobs requiring lower educational credentials as an investment into the labor market and better career prospects. A similar pattern could also be explained by increasing educational standard owing to technological change over time (Kiker, Santos, & Mendes de Oliveira, 2000).

Socio-economic characteristics, such as being male, married or divorced, increase the relative risk of being overeducated rather than perfectly matched, and at the same time diminish the probability of undereducation. The opposite effect is observed for household size. Describing oneself as a member of an ethnic minority increases the odds of both types of the mismatch, potentially due to the discrimination. On the one hand, positive self-selection of potentially discriminated immigrants belonging to ethnic

⁸ Worker's 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 the dependant variables, its inclusion would lead to spurious correlation.

Table 2
Individual determinants of occupational mismatch: baseline results.

	(1) Native Born		(2) Pooled Sample		(3) Immigrants	
	Under-	Over-	Under-	Over-	Under-	Over-
Exp	1.031 ^{***} (0.007)	0.955 ^{***} (0.007)	1.030 ^{***} (0.007)	0.956 ^{***} (0.006)	1.035 (0.030)	0.951 ^{**} (0.021)
Exp sq	1.001 ^{***} (0.000)	1.000 ^{***} (0.000)	1.001 ^{***} (0.000)	1.000 ^{***} (0.000)	1.001 [*] (0.001)	1.000 (0.000)
Male	0.875 ^{***} (0.044)	1.411 ^{***} (0.066)	0.876 ^{***} (0.043)	1.386 ^{***} (0.062)	0.919 (0.172)	1.270 (0.195)
Hhmb	1.152 ^{***} (0.023)	0.902 ^{***} (0.017)	1.146 ^{***} (0.021)	0.903 ^{***} (0.016)	1.065 [*] (0.062)	0.877 ^{***} (0.041)
Married	0.577 ^{***} (0.035)	1.562 ^{***} (0.080)	0.610 ^{***} (0.035)	1.542 ^{***} (0.075)	0.929 (0.208)	1.636 ^{***} (0.274)
Divorced	0.725 ^{***} (0.057)	1.305 ^{***} (0.103)	0.750 ^{***} (0.057)	1.346 ^{***} (0.101)	1.124 (0.350)	1.984 ^{***} (0.513)
Ethnic Min	1.304 [*] (0.193)	1.395 ^{***} (0.177)	1.633 ^{***} (0.172)	1.201 [*] (0.117)	1.722 ^{***} (0.304)	1.024 (0.160)
Past Unempl	1.099 (0.075)	1.167 [*] (0.080)	1.088 (0.070)	1.130 [*] (0.074)	0.959 (0.205)	0.934 (0.198)
TU mem	0.911 [*] (0.047)	1.146 ^{***} (0.055)	0.902 ^{**} (0.045)	1.147 ^{***} (0.053)	0.720 (0.153)	1.192 (0.233)
Hours worked	0.996 ^{**} (0.002)	1.004 ^{**} (0.002)	0.996 ^{**} (0.002)	1.005 ^{***} (0.002)	0.991 (0.006)	1.008 (0.006)
Immigr			1.542 ^{***} (0.128)	1.605 ^{***} (0.122)		
YSM6-10					0.830 (0.245)	0.919 (0.187)
YSM11-20					0.952 (0.255)	0.735 (0.159)
YSM20+					0.581 [*] (0.164)	0.950 (0.216)
Language					0.606 ^{***} (0.105)	1.088 (0.170)
Citizen					0.715 ^{**} (0.121)	1.148 (0.179)
Pseudo R-sq		0.109		0.111		0.160
Observations	59,477	59,477	63,902	63,902	4425	4425

Source: Authors' calculations based on the ESS.

Notes: Reported are coefficients in terms of relative risk ratios from multinomial logit regression. Robust standard errors, clustered on the destination country, are in parentheses. Dependent variable: individual education–occupation match category, taking values: undereducated, correctly matched, overeducated. Correct match is used as a reference category. All regressions include the full set of survey, occupation, industry, and destination country fixed effects, and are estimated accounting for the population and design survey weights.

* Statistical significance at $p < 0.1$.

** Statistical significance at $p < 0.05$.

*** Statistical significance at $p < 0.01$.

minorities may explain higher incidence of undereducation. On the other hand, however, deliberate specialization in tasks may also explain better match of immigrants belonging to ethnic minorities.

The same is true for having been unemployed in the past: opportunity costs of being overeducated for these individuals are lower, and they are more prone to accepting any kind of job. We also find that trade union members have a higher probability of being overeducated, which is probably due to their lower turnover. Individuals working more hours are also more prone to the mismatch, although this effect is quantitatively small.

From column (2), reported estimates on immigrant dummy suggest that for immigrants relative to the native born, the relative risk of being either under- or overeducated rather than perfectly matched would be expected to increase by 54% and 61%, respectively. This increase could be the result of imperfect transferability of skill. Alternatively, or in addition, it could also be the result of negative

selection among more educated immigrants and positive selection among the lower educated ones.

In the specification of our model, the effect of labor market experience is conditioned on duration of residence fixed effects. Therefore, changes in accumulated experience reflect the effect of experience acquired abroad. Thus, comparison of the effect of experience in the sample of immigrants (column 3) with that in the sample of the native born (column 1) allows assessing the importance of the skill transferability hypothesis. Accumulated experience changes the likelihood of being overeducated among both immigrants and the native born by approximately the same magnitude. However, the relative probability of undereducation among immigrants is virtually unaffected by years of labor market experience (only the square term is significant, and only at 10%). On the one hand, this implies that immigrants have difficulties substituting their lack of formal schooling with their experience. A human capital interpretation of this finding suggests that

experience accumulated abroad is a poor substitute to formal schooling. Another possibility could be that immigrants specialize in jobs in which accumulated experience is less useful for accessing jobs at the upper level of the skill ladder. On the other hand, this also suggests that the higher incidence of undereducation for immigrants is rather due to some persisting differences with the native born, consistently with the idea of an initial positive self-selection of low-educated immigrants.

For immigrants, years since migration seem to have little impact on occupation matching (omitted category is less than 6 years since migration). Undereducation has a tendency to decrease only after twenty years after migration. This suggests that among immigrants, mismatch is a relatively persistent phenomenon. However, we would be cautious to interpret this finding as a lack of assimilation or of upward occupational mobility, since the use of cross section data inevitably confounds assimilation and changes in cohort quality (Borjas, 1985, 1994). In our case, it could be that earlier arrivals are of a lower quality than newer ones, perhaps due to a more selective immigration policy. In addition, the results of our analysis are limited by the data and hand, and particularly by unavailable data on potential out-migrants. The concern may be that falling rates of undereducation with time in the destination could be related to the fact that undereducated are (presumably) more likely to stay. The ideal data to address this issue would be longitudinal data tracking individual histories, including pre-migration and out-migration episodes. This, unfortunately, is a general limitation of the literature.

In contrast, other immigrant-specific characteristics, such as speaking an official language of a country at home or being a citizen, lower the likelihood of undereducation as compared to a perfect match.

4.2. Bilateral determinants of immigrants' mismatch

To account for the immigrants' choice of destination countries along characteristics influencing the portability of their human capital and their selection from skill distribution, we control for specific country-pair factors, starting with bilateral characteristics common to all cohorts. They include the natural logarithm of distance between origin and destination countries, dichotomous variables for common language, common border, and common colonial past.

Table 3 column (1) summarizes the estimates of this specification. Previous results remain robust to the inclusion of bilateral controls. Common colonial past decreases the likelihood of undereducation, consistently with the cost interpretation: countries sharing a colonial past may also share certain institutions, educational systems, and have stronger networks, making it less costly to migrate for low educated immigrants. As a consequence, they are less positively selected. However, colonial past does not affect overeducation for more educated workers. This can signify the lack of human capital transferability advantage for highly educated immigrants from these countries, or the balancing out of the negative selection and of the transferability effects. In its turn, the common

border effect in our setting mostly reflects the intra-European migration. Since institutional barriers to mobility are lower among European countries, positive self-selection dominates for these immigrants. In addition, there may be better information flows about available jobs between neighboring countries, making it easier for immigrants to find more suitable jobs before moving.

Potentially important economic determinants of immigrants' selection and sorting are income differential and relative inequality between origin and destination countries, which largely determine the reward to skill and the differential incentives to migrate for more and less educated workers (Borjas, 1999a; Grogger & Hanson, 2011). Thus, in Table 3 column (2) we further control for the ratio of GDP per capita between destination and home countries, as well as the ratio of Gini coefficients. Both variables are cohort-specific and are measured at the time of migration, distinguishing three cohorts: the 2000-es, the 1990-es, the 1980-es and earlier. This allows us to increase the variability in the data, and also to control for different quality of cohorts.

We find a positive impact of higher income differential on the probability of being undereducated, and no effect on overeducation. Since migrants between countries with comparable levels of development should also have comparable levels of human capital, we interpret these results as differential selection pattern among lower educated and more educated workers. Our result suggests that immigrants with low education from relatively poorer countries are more positively selected.⁹ This could be the outcome of higher migration costs for immigrants from poorer countries, such that despite having more incentives to move only the most able will succeed.

In its turn, the coefficient on relative income inequality shows that low educated immigrants from relatively more unequal countries are more likely to be undereducated, suggesting a positive selection for this group of lower educated immigrants. In contrast, there is a positive, albeit non-statistically significant effect on overeducation. These results contrast those of Borjas (1987), but are in line with other studies (Orrenius & Zavadny, 2005; Belot & Hatton, 2008). Taken together, results on sorting point to differential barriers to mobility between less educated and more educated immigrants that originate from unequal and poorer countries.

We use the obtained estimates on the mismatch of immigrants, and also of the native born, to plot predicted

⁹ Clearly, undereducation is a phenomenon that mostly concerns lower educated workers, while overeducation mostly concerns more educated workers. Indeed, in our sample, workers with education level below lower secondary are over 6 times more likely to be undereducated than overeducated. Instead, tertiary educated workers are more than 5 times more likely to be overeducated than undereducated. This is the reason why, throughout the paper, and as an approximation, we often interpret undereducation as an issue related to the selectivity among the lower educated workers and overeducation as an issue involving skill transferability and selection among more educated workers. Consequently, we interpret policies or variables affecting undereducation as those that work through the selectivity among lower educated workers, while those affecting overeducation are interpreted in terms of selectivity or skill transferability affecting the more educated workers.

Table 3
Immigrants' occupational mismatch: focus on country-pair effects.

	(1)		(2)		(3)		(4)	
	Under-	Over-	Under-	Over-	Under-	Over-	Under-	Over-
Exp	1.033 (0.028)	0.953*** (0.012)	1.030 (0.032)	0.954*** (0.014)	1.030 (0.032)	0.958*** (0.014)	1.044 (0.045)	0.921*** (0.015)
Exp sq	1.001 (0.001)	1.000 (0.000)	1.001 [†] (0.001)	1.000 (0.000)	1.001 (0.001)	1.000 (0.000)	1.001 (0.001)	0.999 (0.000)
YSM6-10	0.816 (0.107)	0.921 (0.060)	0.817 (0.120)	0.933 (0.071)	0.888 (0.163)	0.824 (0.136)	0.850 (0.147)	1.144 (0.130)
YSM11-20	0.978 (0.140)	0.737 (0.217)	1.037 (0.168)	0.726 (0.239)	1.142 (0.159)	0.622 (0.228)	1.125 (0.196)	1.742 [†] (0.539)
YSM20+	0.604 [†] (0.130)	0.927 (0.127)	0.563 [†] (0.134)	0.977 (0.112)	0.572 [†] (0.139)	0.842 (0.174)	0.480 [†] (0.156)	3.165*** (0.770)
Language	0.651*** (0.091)	1.188 (0.222)	0.594*** (0.095)	1.291 (0.224)	0.623*** (0.119)	1.188 (0.188)	0.532*** (0.095)	1.057 (0.212)
Citizen	0.717 [†] (0.129)	1.185 (0.167)	0.774 (0.143)	1.144 (0.141)	0.717*** (0.116)	1.089 (0.162)	0.556*** (0.071)	1.201 (0.243)
Ldist	1.172 (0.137)	0.884 (0.124)	0.924 (0.102)	0.901 (0.154)	1.218 [†] (0.139)	1.075 (0.159)	1.497*** (0.200)	1.209 (0.164)
Colony	0.539*** (0.101)	0.871 (0.184)	0.504*** (0.104)	0.766 (0.212)	0.511*** (0.134)	0.742 (0.200)	0.437*** (0.112)	0.750 (0.234)
Common Lang	1.057 (0.162)	0.955 (0.358)	0.982 (0.186)	1.114 (0.437)	1.068 (0.264)	0.973 (0.365)	1.074 (0.310)	0.966 (0.457)
Contiguity	0.815 (0.180)	0.620 [†] (0.174)	1.023 (0.327)	0.493*** (0.112)	1.515 [†] (0.357)	0.536*** (0.081)	1.548 (0.428)	0.580*** (0.128)
GDP ratio			1.024 [†] (0.011)	1.010 (0.005)	1.038*** (0.007)	1.007 (0.027)	1.046 [†] (0.023)	0.998 (0.034)
Gini ratio			0.060*** (0.044)	2.190 (1.744)	0.056*** (0.080)	1.862*** (1.094)	0.064 [†] (0.090)	1.598*** (0.997)
Africa					0.337 (0.230)	1.706 [†] (0.476)	0.267 [†] (0.211)	1.244 (0.256)
MENA					1.562 (0.700)	1.859*** (0.451)	1.507 (0.736)	1.842 (0.690)
LA Carib					0.365 (0.256)	2.082 (1.180)	0.290 (0.244)	2.049 (1.064)
East Asia Pacific					0.786 (0.368)	1.379 (0.462)	0.524 (0.307)	1.172 (0.362)
South Asia					0.523 (0.251)	0.414 (0.267)	0.382 [†] (0.210)	0.374 (0.247)
East Central Europe					0.981 (0.119)	1.024 (0.135)	0.674 [†] (0.163)	1.088 (0.084)
Pseudo R-sq		0.162		0.181		0.187		0.203
Observations	4389	4389	3601	3601	3601	3601	2793	2793

Source: Authors' calculations based on the ESS.

Notes: Reported are coefficients in terms of relative risk ratios from multinomial logit regression. Robust standard errors, clustered on the destination country, are in parentheses. Dependent variable: individual education–occupation match category, taking values: undereducated, correctly matched, overeducated. Correct match is used as a reference category. All regressions include the full set effects as in Table 2, and are estimated accounting for the population and design survey weights.

* Statistical significance at $p < 0.1$.

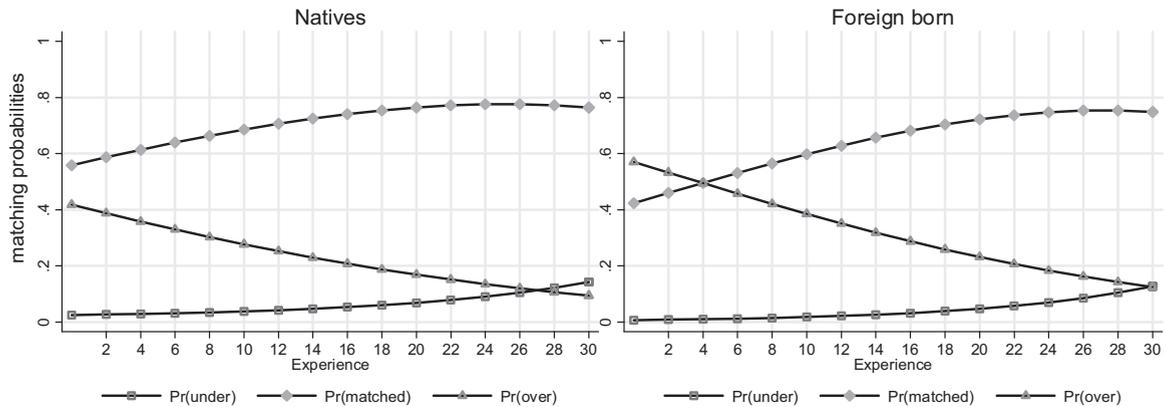
** Statistical significance at $p < 0.05$.

*** Statistical significance at $p < 0.01$.

probability of each education–occupation match category across years of labor market experience (Fig. 3). In plotting this figure, we assume that immigrants and the native born have average characteristics of their respective groups. In particular, for immigrants, the effect of experience on education–occupation matching is computed assuming that duration of residence is constant. Unfortunately, given the interval form of duration of residence variable and the lack of cohort level data, we could not separate experience acquired abroad from that acquired in host country. From Fig. 3, there is a striking convergence of immigrants with the native born with years of labor market experience. Most of the convergence takes the form of better match for the initially larger share of overeducated pool of

immigrants. Provided that overeducation is associated with wage penalty compared to a correctly matched worker (Chiswick & Miller, 2009), the figure points to occupational upgrading as a potentially important form of immigrant wage assimilation.

The multinomial logit model and the relatively small sample size do not allow us to include the full set of origin country fixed effects. In an effort to control for fixed origin-specific differences across immigrants, we introduce regional dummies in column (3) of Table 3. Compared to immigrants from other Western European and North American countries (the omitted group), it is African and MENA immigrants that have the higher likelihood of being overeducated. There are no significant differences between



Note: Predicted probabilities are computed at sample means for immigrants and natives using coefficient estimates of Table 2 column 1 for the native born and Table 3 column 2 for immigrants.
Source: authors' calculations based on the ESS

Fig. 3. Mismatch predicted probabilities over the life-cycle. *Note:* Predicted probabilities are computed at sample means for immigrants and natives using coefficient estimates of Table 2 column 1 for the native born and Table 3 column 2 for immigrants.
Source: Authors' calculations based on the ESS.

European and American immigrants and immigrants from other regions of the world.¹⁰

In the literature, immigration is mostly viewed as an individual decision. Yet, very often it is a joint family decision, and migration takes place involuntarily for migrant children (Borjas & Bronars, 1991). On the one hand, the lack of country specific human capital, and thus skill transferability, should be more of a concern for those who acquired most of their skills in their origin country. On the other hand, selectivity should be mostly observed among those involved in the decision-making, but not among tied movers. For these reasons, we further restrict our estimation sample to those who migrated at the age of 18 or older, and thus who have higher chances to have acquired their schooling at the origin, and to have migrated voluntarily. The results for this restricted group are presented in column (4) of Table 3. They show that experience acquired at home is of no relevance for undereducation, while overeducation decreases with years of labor market experience, and at a higher rate than in the whole sample of immigrants. This differential rate of return is consistent with the idea that these immigrants start with a lower level of country-specific human capital. Other effects point into the same direction as in the whole sample, and, in most cases, are amplified. Thus, selection and skill transferability explain labor market outcomes of immigrants who are involved in the migration decision making.

4.3. Country-specific determinants of immigrants' mismatch

As a last step, in this section we take advantage of sorting across multiple destination countries of immigrants sharing similar characteristics with respect

to the origin country, in order to analyze separately the role of home and host country characteristics in the occupational outcomes.

Table 4 column (1) focuses on host-specific determinants of mismatch for the native born. The only significant effect on the mismatch is that of the employment protection policies. This result suggests that in countries with more stringent labor regulations, individuals tend to have a higher propensity of undereducation. This result could be explained by higher screening at a hiring stage that puts more weight on workers characteristics other than schooling. It can also be explained in terms of Acemoglu and Pischke (1999) proposition that firms offer more on-the-job training, as a substitute for formal schooling, in more rigid labor markets. We do not find, however, any impact of cross-country differences in unemployment, trade union coverage, or the degree of shadow economy, on the occupational match of the native born.

In column (2) of Table 4, we repeat similar regression for immigrants. In addition, we add also three immigrant-specific labor market-oriented policies, and also the origin-specific measures of education quality (Hanushek & Woessmann, 2012). These regressions also include all previous country-pair controls. Further, to mitigate the differences in cohort quality that may be correlated with host and home country fixed effects, we include destination country cohort-specific and continent cohort-specific fixed effects. This allows us to identify the effect of non-varying country-specific policies and quality of education on the mismatch from within cohorts' variation across countries. Inclusion of these effects is in fact a robustness check for the effect of our school quality measures. One of the limitations of these measures is that they do not take into account changes across cohorts, assuming that school quality is common to all cohorts of the same origin country. As we do not have a cohort-specific measure of

¹⁰ These results also hold if we omit North American migrants (86 observations) from the analysis.

Table 4
Mismatch: the role of destination and origin countries' context and policies.

	(1) Native Born		(2) Immigrants		(3) Immigrants		(4) Immigrants	
	Under-	Over-	Under-	Over-	Under-	Over-	Under-	Over-
Educ score	1.590 (0.222)	0.784 (0.397)	0.814 (0.904)	0.210 (0.270)				
EPL dest	1.259*** (0.000)	0.988 (0.823)	0.962 (0.934)	1.927 (0.194)				
Unempl dest	1.002 (0.922)	0.983 (0.329)	1.146* (0.062)	0.917 (0.304)				
TU dest	1.001 (0.583)	0.998 (0.237)	1.007 (0.414)	1.013* (0.051)				
Shadow dest	0.988 (0.204)	0.999 (0.878)	0.958 (0.483)	0.872** (0.038)				
Eligib			1.000 (0.952)	1.008** (0.006)				
LM integr			0.992 (0.393)	0.979** (0.011)				
Antidiscr			1.002 (0.678)	1.015*** (0.008)				
Educ basic			0.919** (0.000)	1.011 (0.745)	0.918*** (0.000)	1.014 (0.682)	0.904*** (0.000)	1.007 (0.822)
Educ score			14.925*** (0.003)	0.643 (0.736)	15.440*** (0.003)	0.585 (0.688)	22.706*** (0.001)	0.738 (0.808)
Educ top			0.964 (0.423)	1.074* (0.092)	0.963 (0.415)	1.076* (0.090)	0.959 (0.372)	1.061* (0.132)
Pseudo R-sq		0.124		0.135		0.211		0.232
Observations	62,063	62,063	3601	3601	3601	3601	4664	4664

Source: Authors' calculations based on the ESS.

Notes: Reported are coefficients in terms of relative risk ratios from multinomial logit regression. Robust standard errors, clustered on the destination country, are in parentheses. Dependent variable: individual education–occupation match category, taking values: undereducated, correctly matched, overeducated. Correct match is used as a reference category. All regressions include the full set effects as in Table 3 column 3, and are estimated accounting for the population and design survey weights. Columns 2–4 additionally contain the full set of destination–decade specific fixed effects. Column 3 repeats the estimation in Column 2, but replacing destination variables by destination-specific fixed effects. Column 4 is like Column 3, but is based on an extended sample featuring larger number of destination countries; it includes destination country fixed effects.

* Statistical significance at $p < 0.1$.

** Statistical significance at $p < 0.05$.

*** Statistical significance at $p < 0.01$.

the quality of schooling, to partially control for changes of cohort quality correlated with changes in the composition of immigrants origin country unobservable determinants of mismatch, we introduce continent cohort specific effects. They control for changes in immigrants quality across cohorts common to a group of countries belonging to the same continent.

From this regression, immigrants have a higher propensity of being undereducated in countries with higher incidences of unemployment. Widespread presence of trade unions increases the relative risk of overeducation of immigrants. Higher presence of trade unions is usually associated with higher labor market rigidity and higher separation costs. In our case, it suggests that when separations costs are high, while the screening of migrants' diplomas and abilities is imperfect, employers may deliberately increase education standards at a hiring stage. Thus, higher credentials serve as an insurance against the risk of poorer performance and the difficulty of firing that is linked to the wider trade unions presence. In its turn, higher degree of shadow economy in the destination countries has a negative association with overeducation. This result points to a demand-driven positive selection of unskilled

immigrants who can more easily find lower quality jobs in an informal economy.¹¹

We also consider three types of immigrant-specific policies embraced by destination countries: eligibility of immigrants to take up some specific jobs, the degree of labor market integration, and anti-discrimination policies. All three types of policies affect overeducation. We find a

¹¹ The issue of welfare is also an important one in the context of positive and negative selection (Borjas, 1999b), and especially in the European context. According to welfare magnet theories, countries with higher level of social expenditure should attract larger flows of immigrants from relatively poor countries – and differently selected. If these unobservable characteristics are correlated with school quality variables, controlling for welfare policy should affect the estimated impact of school quality variables. While our estimations do not include welfare measures, destination country cohort-specific fixed effects should absorb differences across countries in immigrants' mismatch outcome driven by different welfare regimes. Alternatively, we considered social expenditure per capita, at the time of migration, as a single, although crude, measure of the generosity of the welfare system. Cohorts that migrated toward more generous welfare systems were found to be less likely overeducated, but there was no effect on undereducation; the effects of all other policy variables remained largely similar. These preliminary results suggest limited evidence for welfare migration; they are available on request.

negative correlation of labor market integration policies with overeducation. Instead, countries with better eligibility practices and anti-discrimination policies seem to attract educated immigrants from a wider ability distribution, which leads to the overall enhancement of overeducation.

Further, the quality of education in the origin countries also plays a significant role in immigrants' matching: selection is key to explaining immigrants' skill mismatch. At first sight, the magnitude of the coefficient on *Educ score* is particularly high: a one point increase in the level of the variable increases the likelihood of being undereducated relatively to correctly matched by a factor of 14. However, a one point increase in the score corresponds to almost two standard deviations, which is indeed a very large increase. This is, for instance, the gap in school output quality between Singapore, which scores the highest, and Armenia, which is just around the mean score in our sample, or between Egypt or Mexico (both are one standard deviation below the mean) and France or Sweden (both are just around one standard deviation above the mean). Another way to assess the magnitude of one point level change in *Educ score* is by putting it in perspective with respect to the corresponding change in the two other schooling quality variables. A two standard deviation increase in *Educ basic* (share of pupils reaching basic literacy) corresponds to a 36 percentage point increase: this is the gap between countries such as Nigeria or Columbia (1 standard deviation below the mean) compared to countries such as Sweden and the US (1 standard deviation above the mean). Considering the share of top performing students (*Educ top*), two standard deviations increase represents a 7% increase in the share of top performing students, which is also a large magnitude.

Thus, once school output quality variables are appropriately rescaled to reflect meaningful variations, the magnitude of their impact – while still high – sounds more plausible. A half standard deviation seems to be a more comparable change across origin countries for the three schooling quality variables, it amounts to a 9% point increase in the share of students reaching basic literacy and 1.8% point increase in the share of top performing students. A half standard deviation increase in *Educ score* increases the likelihood of being undereducated compared to perfectly matched by 2.25, while a half standard deviation increase in the share of student reaching basic literacy decreases undereducation by slightly more than half. Although still high, both effects are of similar magnitude and have opposite effect on mismatch. Thus, lower educated immigrants from countries having a larger share of students that reach basic literacy are more negatively selected. In fact, those who do not succeed in reaching higher education level are drawn from a lower end of ability distribution. At the same time, in terms of average quality of education at home (*Educ Score*), less educated emigrants from countries with higher educational quality are more favorably selected; immigrants from countries with lower quality of education may be selected from the full range of the ability distribution. Both results seem to suggest that lower educated immigrants from more educationally unequal countries are positively selected

(see also the positive effect of *Educ top* on overeducation). This result is consistent with the results on income inequality: immigrants from countries that are more unequal in terms of income are more positively selected. Thus, it seems that lower educated immigrants from unequal countries face greater barriers to mobility, such that only those with better occupational prospects succeed in moving. Consistently with the findings for the US labor market (Hanushek & Woessmann, 2012), the quality of education in origin countries improves the labor market performance of lower educated immigrants.

Overall, our results reveal that home country characteristics, by affecting selection, mostly matter for undereducation of immigrants. In contrast, overeducation is determined to a much greater extent by destination-country economic conditions, policies, and institutions, confirming that, in addition to selection, the sorting of immigrants plays an independent, and important, role for their labor market outcomes.

Could there be a limited number of origin countries driving this result? For example, one may argue that many Eastern European countries score well on international tests of educational output and much of migration in Europe in the 2000-es was from Eastern to Western Europe. Since we control for regional cohort effects in all regressions starting from Table 3 column (3), in principle, this concern is mitigated, as specific effects attributable to specific cohorts, such as those of Eastern Europeans in the 2000-es, are accounted for. Nevertheless, we perform a robustness check for a sub-sample of immigrants, excluding the Eastern European origin group. Results of these estimations, available on request, still support the reported findings of Table 4 column (2), though excluding these immigrants increases the estimated impact of educational quality on undereducation. This is consistent with Table 3 column (4), which shows that Eastern Europeans are less likely to be undereducated.

A remaining worry is that immigrants from countries with better school quality systematically sort into host countries offering better opportunities to trade off talent and other non-observable skills for formal education. If this is indeed the case, the measured effect of school quality would rather be attributable to the positive sorting of immigrants across destination countries based on their comparative advantage in terms of human capital quality. In our regressions, sorting is mitigated by including origin and destination country specific set of characteristics both measured at the time of migration, and also by destination country fixed effects. However, we recognize that this may still be insufficient if, for instance, we miss some important origin and destination country specific characteristics correlated with schooling quality and affecting sorting across countries. To check whether the estimated effect of schooling quality is substantially driven by positive sorting of some groups of origin countries, we do a regression that excludes immigrants originating from the top 10 countries in terms of education quality (based on *Educ score* variable) and living in the top 5 destination countries in terms of undereducation. On the other extreme, low education quality countries may also sort into countries offering the

worst opportunities for undereducation. Therefore, we also exclude immigrants from origin countries in the bottom 10 countries in terms of education quality living in destination countries in the bottom 5 in terms of undereducation (compared to the correctly matched). If our effect on school quality is driven by sorting on unobservable comparative advantage, excluding these countries should substantially decrease the effect of school quality on undereducation. Results, which are available in the online Appendix, show that coefficients on school quality variables are only marginally affected by these restrictions on the sample. At the same time, the large size and the direction of the effect suggest that, in addition to human capital quality, positive selection is still a potentially very important factor explaining immigrants' undereducation at destination.

Finally, in column (3) of Table 4, we repeat the estimation, but replace destination variables by destination-specific fixed effects. In column (4), we repeat estimation similar to column (3), but add all other countries that were excluded from earlier analysis due to the missing data on destination-country characteristics. These additional countries are Ukraine, Russia, Israel, Turkey, and Bulgaria. Including these countries and using destination-specific fixed effects does not alter the result on the quality of education in the origin countries.

5. Conclusions

In this paper, we used the European Social Survey to examine differences in education–occupation mismatch between immigrants and the native born. Immigrants are shown to be more likely than the native born to be both over- and undereducated.

In addition to differences in individual characteristics, occupational outcomes of immigrants are attributed to both sorting and self-selection of immigrants. Our results suggest that human capital quality in origin countries affects immigrants' labor market outcomes at destination by changing the selection process rather than by affecting immigrants' human capital transferability per se. In turn, differences across destination countries have to do with the differential impact of labor market institutions and conditions on the mismatch of immigrants as compared to the native born.

We have also documented significant correlations between immigrant-specific policies adopted by destination countries and immigrants' occupational placement. These correlations are important in their own right, supporting further sorting hypothesis. However, since some of the policies are very recent, in the current context we are not able to distinguish whether better policies have attracted certain migrants, or whether the establishment of some policies has changed the outcomes of immigrants who were already at destination. Clearly, more research into this direction is needed. Despite this shortcoming, our results suggest that some “best practice” countries can achieve a considerably fuller use of immigrants' potential. If this is the general objective of other countries, too, our results suggest that there is room for improving immigrant outcomes through policies.

Recent literature has also been concerned with understanding the immigrants – natives' differences in earnings and returns to schooling within the overeducation – undereducation framework. Our findings have implications for the results that one could obtain from the earnings equations in the European context. As far as heterogeneity across countries is concerned, the reward that immigrants receive for their human capital varies across origin and destination countries, is also due both to selection and sorting. Occupational upgrading is a potentially important form through which immigrants' earnings could converge to those of the native born.

Appendix A. Supplementary data

Supplementary material related to this article can be found, in the online version, at <http://dx.doi.org/10.1016/j.econedurev.2013.06.001>.

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