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The Transferability of Skills and Degrees: Why the Place of Education Affects Immigrant Earnings

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An important explanation for immigrants' wage disadvantage is that human capital acquired in the country of origin is not fully transferable to the country of destination. Credentialing theories, on the other hand, argue that being educated abroad results in lower wages because foreign degrees are weaker signals to employers and might impede formal access to occupations. In this study, we use the Programme for the International Assessment of Adult Competencies 2012 (PIAAC) data and include—besides educational degrees—measures of cognitive, non-cognitive, and job-specific skills to explain wages. In our analysis of 11 European countries, we find robust evidence that having a non-Western foreign degree is associated with lower wages. After accounting for different types of skills, the wage penalty associated with having a foreign degree remains substantial, as skills explain only a third of the place of education effect. This finding is in line with the argument that being educated abroad results in lower wages because of not only the limited transferability of skills, but also the limited transferability of degrees.

Introduction

In the past decades, an extensive body of literature has emerged that investigates immigrants' labor market performance in comparison to the native population (Heath and Cheung 2007; Kesler 2006; Kogan 2006). A recurrent finding is that, compared to the native population, immigrants earn lower wages.

An important explanation for this disadvantage is the limited transferability of immigrants' human capital. Human capital that is accumulated in the education system of the origin country is not fully transferrable to the labor market of the country of destination (Chiswick and Miller 2008, 2009; Friedberg 2000; Kanas and Van Tubergen 2009; Zeng and Xie 2004). The central assumption of human capital theory is that individual skills are the prime determinant of labor market success. Consequently, the wage disadvantage of having a foreign degree is due to differences in productivity-related skills. Friedberg (2000) argues that the (non-)transferability of human capital can almost fully explain the wage

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disadvantage of immigrants. According to this perspective, the wage disadvantage associated with being educated abroad can be explained by the difference in *skills* between holders of foreign and native degrees.

Credentialing theory offers a different explanation as for why being educated abroad is associated with lower wages and argues that, instead of skills, wages are primarily determined by educational degrees. As Kerckhoff, Raudenbush, and Glennie (2001, p. 2) put it, "human capital theory suggest[s] that, if anything, skill should be the more effective source of explanation," whereas "credential theory suggest[s] a stronger effect of educational attainment." Within credentialing theory, there are at least two arguments that explain why degrees matter: signaling and occupational closure.

Signaling theory argues that employers do not reward individuals for their skills, as these are unobservable. Instead, employers use educational degrees to select and promote workers (Bol and van de Werfhorst 2011; Ferrer and Riddell 2008; Hungerford and Solon 1987; Spence 1973; Weiss 1995). Signaling theory thus states that education results in higher wages because degrees function as a signal (Spence 1973) on the basis of which employers screen potential employees (Arrow 1973; Layard and Psacharopoulos 1974). Because employers have less information on the quality of foreign degrees, the signaling hypothesis predicts that such degrees are inferior signals and will result in lower wages compared to native degrees of the same level.

Degrees can also be used as a means of closure: educational qualifications are then formally required to obtain access to some occupations (Collins 1979). Occupational closure argues that education affects wages because individuals with the right degree have access to better-paid occupations (Bol and Weeden 2015; Weeden 2002). Since the educational requirements for occupational access are predominantly defined for native degrees, immigrants with foreign degrees will have difficulties in getting formal access to occupations. As a consequence, the returns to foreign degrees are lower.

Credentialing theory thus argues that immigrants who are educated abroad receive lower wages because they possess a degree that is less valuable in the country of destination. This implies that immigrants' educational disadvantage is due to the limited transferability of degrees, resulting in immigrants' earnings disadvantage that is not caused by differences in skills.

Existing studies that investigated the role of education in immigrants' wage disadvantage could not empirically separate the human capital and credentialing explanation (Akresh 2007; Chiswick and Miller 2008; Duleep and Regets 1997; Duvander 2001; Friedberg 2000; Kaida 2013; Tong 2010). Friedberg (2000), for example, finds that education acquired abroad is associated with lower wages, but she does not separate the human capital and credentialing mechanisms. Similarly, Chiswick and Miller (2008) argue that signaling is an important explanation for pay differentials between immigrants and natives, but are empirically unable to identify credentialing. Ferrer and Riddell (2008) conclude that "it is often difficult to distinguish between human capital and signaling theories with the available data" (2008, p. 214). Indeed, in the previous literature on the transferability of human capital (Bratsberg and Terrell

2002; Chiswick 1978; Chiswick and Miller 2010; Friedberg 2000), there are only a few studies that include direct measures of individual skills (but see Ferrer, Green, and Riddell 2006; Kahn 2004).

Although it has been shown repeatedly that the place of immigrants' education affects wages, there is much less knowledge about *why* the returns to foreign education are lower. Such knowledge is important, as the policy implications for disadvantage due to disparities in human capital are fundamentally different from disadvantage that is rooted in the lower value of a foreign degree. In this paper, we argue that when skills are properly controlled for, the remaining effect of being educated abroad may, at least partly, be attributed to credentialing. By analyzing differences in skills and educational degrees of immigrants educated in the origin and destination country, this study contributes to a better understanding of how the place of education affects the earnings of immigrants.

We use survey data from the Programme for the International Assessment of Adult Competencies (PIAAC 2012; OECD 2013a). The PIAAC contains detailed information on both skills and degrees. Furthermore, the sample size is sufficiently large to separate immigrants who are educated abroad from immigrants who completed their education after migration. While the PIAAC data is cross-national, our sample contains only 11 (West European) countries. Therefore, testing comparative hypotheses is outside the scope of this paper.

The Place of Education and Immigrant Earnings

Many studies conclude that educational returns in the labor market are lower for individuals with foreign degrees than for individuals with native degrees (Chiswick and Miller 2008, 2009; Friedberg 2000). Chiswick (1978), for example, finds for the United States that the effect of one year of schooling on wages is 7.2 percent for natives and 5.7 percent for the foreign born. Similar findings are reported for the UK (Shields and Price 1998) and Germany (Dustmann 1993).

The lower educational payoff is not limited to years of schooling. In her study on immigrants in Canada, Li (2001) concludes that foreign educational degrees carry a wage penalty. In a more recent study on the United States, Arbeit and Warren (2013) estimate that the returns to foreign degrees are 11 percent and 17 percent lower than the returns to comparable native degrees for males and females, respectively. Although it can be argued that the penalty is caused by ethnic group instead of place of education, Zeng and Xie (2004) conclude that, rather than ethnicity, the (foreign) place of education is crucial in explaining wage disadvantages of Asian Americans in the United States.

There is also evidence that the educational disadvantage is larger for immigrants from non-Western countries than for immigrants from Western countries. Studies on the United States and Canada show that degrees from lesser developed or non-Western countries are associated with a larger wage disadvantage (Arbeit and Warren 2013; Bratsberg and Terrell 2002; Buzdugan and Halli 2009; El-Araby Aly and Ragan 2010). An explanation for this difference is the lack of knowledge of employers to evaluate the quality of non-Western degrees (Buzdugan and Halli 2009). In our analysis, we therefore differentiate between

foreign degrees obtained in non-Western countries and foreign degrees obtained in Western countries.

We expect that immigrants with a non-Western foreign degree have lower wages compared to immigrants with a native degree, also when controlling for region of origin, level of educational attainment, and demographic characteristics. The central question of this study is, however, *why* foreign education is associated with lower wages. Human capital theory and credentialing theory offer different explanations for the lower returns to foreign education.

The Transferability of Human Capital

The central assumption of human capital theory is that individual skills determine labor market outcomes (Becker 1964). In the market for labor, employers reward the most skilled individuals, as these will be the most productive. Education can be seen as the primary provider of human capital, equipping individuals with productivity-enhancing skills. Through education, individuals maximize their human capital and, consequently, their labor market returns (Becker 1964).

In explaining why immigrants who are educated abroad obtain lower returns to their education, many scholars focus on the transferability of their human capital. Since most human capital has a country-specific component, skills acquired in the country of origin might not be compatible with the skill demands of the labor market in the country of destination, and immigrants' skills will be underutilized (Reitz 2001). A second reason for lower returns to foreign education is that the quality of education may be worse, in particular for degrees from non-Western countries (Bratsberg and Terrell 2002). Indeed, several studies show that skill levels of immigrants educated abroad are lower than that of natives (Ferrer, Green, and Riddell 2006; Kahn 2004).

Keeping the level of education constant, these two arguments then explain why the returns to foreign education are lower than the returns to native education. Some studies find support for this hypothesis. Duleep and Regets (1997), for example, conclude that the gap between immigrants and natives in the United States is due to the lower transferability of skills, rather than to the immigration of lower-ability immigrants. Duvander (2001) draws similar conclusions with regard to immigrants in Sweden, concluding that country-specific skills help explain labor market integration.

A major shortcoming of these studies is that instead of using a direct measure of skills, educational attainment is used as a proxy. An implicit assumption is therefore that education equals skills. Ferrer, Green, and Riddell (2006) are an exception. They find that immigrants' returns to university education in Canada are lower than those of natives, and that this difference largely disappears once controlling for skills in the form of literacy. They therefore conclude that "foreign universities generate lower levels of 'usable' … skills" (2006, p. 408).

Another limitation of previous work on immigrants' returns to education is that, often, immigrants educated abroad are compared with the native-born population. While documenting wage differentials between immigrants and the

majority population is insightful, such analysis potentially conflates the place of education effect with that of being an immigrant. For this reason, we follow Zeng and Xie (2004) and compare immigrants with a foreign degree to immigrants who are educated in the country of destination. By doing so, we keep (unobserved) characteristics between individuals with a foreign and native degree constant. For example, an often-mentioned explanation for immigrants' wage disadvantage is ethnic discrimination (Heath and Cheung 2007; Kogan 2006; Pager, Western, and Bonikowski 2009). When analyzing immigrants only, we rule out ethnic discrimination as a rival explanation.

To the extent that the limited transferability of skills explains the lower returns to foreign education, the effect of having a non-Western foreign degree should be explained by differences in skills. We formulate a human capital hypothesis accordingly.

> *H1: The wage disadvantage of having a non-Western foreign degree is explained by the differences in skills between immigrants with a foreign degree and immigrants who obtained their highest degree in the destination country.*

The Transferability of Degrees

Several scholars claim that education does not solely pay off because of the skills it provides to individuals. Credentialing theory argues that because of signaling and closure, degrees affect wages *net* of the skills that individuals possess.

Signaling theory argues that employers do not have complete information about the productivity of job seekers and therefore use educational degrees as a signal on which they base their hiring decision (Spence 1973). Accordingly, degrees are used as a predictor for characteristics that are otherwise difficult to observe, such as skills or motivation (Weiss 1983). Therefore, even in the case that education does not contribute anything to the actual productivity of an individual, degrees are still valuable, as they signal quality.

Because of employers' higher uncertainty about the productivity of workers with foreign credentials, the signaling value of a foreign degree is likely to be lower than that of a native degree (Buzdugan and Halli 2009; Chiswick and Miller 2008; Damelang and Abraham 2016; Friedberg 2000). Hence, foreign degrees—and especially foreign degrees that are unknown to employers—are inferior signals. In the (Western) destination countries that we study, employers are less likely to be familiar with non-Western foreign degrees. Signaling theory thus predicts a wage penalty especially for non-Western foreign degrees.

A second argument why, net of skills, foreign education yields lower returns than native education is that educational degrees are used to regulate access to occupations. As Weeden (2002, p. 61) puts it: "educational credentialing refers to the use of the familiar symbols or markers of knowledge (e.g., grade levels, diplomas) conferred by formal educational institutions to monitor entry into occupations." In the case of closure, access to occupations is restricted by formal rules.

Occupational closure is likely to have particularly negative consequences for individuals with a foreign degree:[1] Even when immigrants possess a degree testifying their suitability for an occupation, sometimes they are not allowed to work in that position if their degree is not legally recognized in the country of destination. These formal regulations will affect the transferability of degrees (cf. Weeden 2002). Occupational regulation thus implies an extra hurdle for job seekers with a foreign degree. In Europe, such regulations have recently been formalized, and several occupations now require a formally recognized (often Western) educational degree, disadvantaging those with non-Western qualifications.[2]

Studies indeed show that getting their degree recognized is often a tedious process for immigrants. Based on interviews in Canada and Sweden with representatives from regulatory authorities, Andersson and Guo conclude that "the knowledge possessed by immigrants is not acceptable, transferable, or recognizable because their experiences and credentials are deemed different, deficient and, hence, inferior" (2009, p. 435). Previous research suggests that legal recognition affects immigrants' earnings: Chapman and Iredale (1993) show that immigrant men in Australia who did not have their overseas qualifications formally recognized have 15–30 percent lower hourly wages than immigrants who did receive formal recognition of their credentials.

Following the credentialing argument, individuals with a non-Western foreign degree have lower earnings because of the degree they possess. If human capital fully explains the place of education effect, there should be no remaining effect of being educated abroad once we take skills into account. If, on the other hand, educational degrees affect wages directly, the effect of being educated abroad remains even after controlling for skills. Because credentialing theory assumes that degrees affect wages independently of human capital, the negative effect of being educated abroad should remain when taking into account an individual's skills. The credentialing hypothesis thus reads:

> *H2: Compared to immigrants educated in the destination country at a similar level, immigrants with a non-Western foreign degree have lower wages,* net of their skill level.

Skills in the Labor Market

Different types of skills are relevant on the labor market. We differentiate between three types of skills. First, employers might demand general cognitive skills like abstract thinking. Second, employers might demand non-cognitive skills such as motivation or initiative. Specific skills, such as the ability to operate a particular machine, are the third type of skills that might be required. Jobs differ in the extent to which they demand each of these three skills.

The relation between general cognitive skills and wages is well established (Murnane, Willett, and Levy 1995), also for immigrants (Kerckhoff, Raudenbush, and Glennie 2001). Cognitive skills usually refer to abstract thinking and problem solving, and the ability to understand and use information (Farkas 2003). The main objective of the PIAAC survey is to measure these general cognitive skills.

The numeracy and literacy variables in PIAAC assert cognitive skills in a level of detail far superior to what is available in earlier data (Hanushek et al. 2015). Schleicher (2008, p. 630, italics added) even states that "by providing a direct measure of *key cognitive skills* in addition to measures of formal educational attainment, PIAAC will offer a far more complete and nuanced picture of the stock of human capital than has yet been available." In the Measurement section, we describe how general cognitive skills are operationalized.

Non-cognitive skills are also an important determinant of labor market success (Bowles and Gintis 2002; Heckman 2000; Jencks 1979). Gutman and Schoon (2013, p. 2) define non-cognitive skills as "a set of attitudes, behaviors, and strategies that are thought to underpin success in school and at work, such as motivation, perseverance, and self-control." Unlike other surveys that include skills, PIAAC also measured non-cognitive skills. We measure the non-cognitive skills that can broadly be understood as the "willingness to learn" (see the Measurement section).

Finally, job- and industry-specific skills are also important for an individual's success in the labor market (Becker 1962; Bishop 1998; Mincer 1962; Neal 1995). Job-specific skills are particularly relevant in the context of this study, as they may not be fully transferrable from the country of origin to the country of destination. However, the main challenge is how to measure them. This is a well-known problem in the literature: Solga, for example, argues that "available competence measurements indicate only basic general competencies, not occupation-specific competencies" (Solga 2014, p. 276). Indeed, studies examining the effect of being educated abroad assume that job-specific skills are important, but do not measure them (e.g., Chiswick and Miller 2009; Duvander 2001; Friedberg 2000).

We take job-specific skills into account in four ways. An important source of job-specific skills is on-the-job training (Mincer 1962). Skills acquired in on-the-job training are known to be country specific (Bassanini et al. 2005), and it is therefore important to take participation in on-the-job training into account. Second, job seniority is important, as the time that one has spent at an employer captures accumulated job- and firm-specific human capital (Topel 1991). Third, job-specific skills are captured by the number of years' working experience. Fourth, as a measure of destination-country-specific skills, we include the number of years of residence. This accounts for the fact that immigrants differ in the amount of time they had to acquire skills that are specific to the country of destination (Borjas 1994; Buzdugan and Halli 2009; Chiswick 1978).

The available measures are a very good proxy for the total set of individuals' skills and competencies that are relevant on the labor market (Bowles and Gintis 1976; Farkas 2003; Kerckhoff, Raudenbush, and Glennie 2001). Although they are correlated with each other, all of them indicate different aspects of the total skill composition of workers. While we include several indicators to measure skills, they may still not capture the full skill profile of an individual. In the discussion, we come back to this issue.

Data and Measurement

To test our hypotheses, we use the data from the PIAAC of 2012, collected by the OECD (2013a). In the PIAAC, adults living in Western countries are tested

on their numeric, linguistic, and problem-solving skills. In contrast to earlier cross-national datasets that include measures of skills (International Adult Literacy Survey [IALS] and Adult Literacy and Lifeskills [ALL]), PIAAC provides scholars with a high-quality measure of wages and the educational attainment of individuals. Furthermore, the PIAAC contains detailed information about the migration background and the location where the educational degree was obtained. The public use file is extended with the uncensored German data[3] (Rammstedt et al. 2014).

The PIAAC data collection, survey design, and sampling framework are carefully harmonized across countries (OECD 2013b, 2014, 2016). The target population consisted of individuals aged 16–65 years residing in the country at the time of data collection, irrespective of nationality, citizenship, or language status. The sampling frame was required to cover at least 95 percent of the target population. In the 11 countries analyzed, with 2 percent, the UK has the highest percentage of exclusion of the target population; the other countries score substantially lower. The overall response rates varied from 48 percent (Spain) to 67 percent (France).[4]

In this study, we use data of employed foreign-born individuals, aged 25–65, in 11 Western European countries: Belgium, Denmark, Finland, France, Germany, Ireland, Italy, the Netherlands, Norway, Spain, and the United Kingdom. Although the sample sizes are substantial, there are too few respondents with a foreign degree to analyze countries separately. Our analytical sample consists of 3,102 immigrants, of which 60.7 percent have obtained their highest qualification abroad. We analyze these countries in pooled models using Heckman selection models with country fixed effects (see the Method section).

There are reasons to assume that effects vary across countries (see the Discussion and Conclusion section). We know that labor markets substantially differ between countries (Hall and Soskice 2001). Labor markets with little job mobility might make it difficult for immigrants to access work. Similarly, countries differ in their educational systems: whereas some educational systems have very strict educational requirements to occupations, for others, access is much less regulated (Bol and Van de Werfhorst 2011). This cross-national variation in institutional context is likely to affect the extent to which a wage penalty is associated with a non-Western foreign degree. As mentioned above, the data do not allow us to test cross-national hypotheses: we only have 11 countries. Although our estimates might obscure interesting heterogeneity between countries, they can be interpreted as the average effect across all Western European countries in our sample.

Measures

Wages

Our dependent variable is the natural logarithm of hourly wages. The wages are adjusted for differences in Purchasing Power Parity[5] (PPP), which makes them comparable across countries. To make sure that extreme outliers do not affect

our results, we code the respondents with 1 percent highest and lowest wages as missing, although including them does not alter the results.

Place of education

We categorized the following respondents as having a foreign degree: first, all respondents who migrated after they obtained their highest qualification. Second, all respondents who indicate a foreign country as the country where they have obtained their highest degree. Last, we differentiate into foreign degrees from Western and non-Western countries.

Cognitive skills

Numeracy is defined as the ability to use, apply, interpret, and communicate mathematical information and ideas (OECD 2013a; Schleicher 2008). Respondents had to solve mathematical puzzles, for example involving the interpretation of tables, or evaluating a hypothetical special offer for a product. A total of 52 items were used to assess individuals' numeracy. The numeracy test is adaptive, meaning that the difficulty of the upcoming question is based on how well the respondent performed on the previous items. Because it would be too time consuming to let all respondents make the complete test, respondents answered only a random set of items (see the Method section for more information).

Literacy is defined as the ability to understand and use information from written texts in different contexts. The literacy test includes 52 items that, for example, dealt with reading and understanding of drug labels and small newspaper articles. Just like numeracy, respondents answered a random selection of items. To obtain interpretable effect sizes, we have divided both variables by 100.[6] Besides a standard measure of cognitive skills, for immigrants, literacy score may well be the best possible measure of destination-country language proficiency that is available. There is ample research that shows that especially for immigrants, destination-country language skills are a key source of human capital, and important for earnings (Chiswick and Miller 1990, 2003; Dustmann and Van Soest 2002; Kaida 2013). Besides the literacy score, we also include a binary variable indicating whether or not the test language is the same as the language spoken most often at home (not the same = 1).

Non-cognitive skills

We measure the non-cognitive skills that are broadly understood as motivation and perseverance (Gutman and Schoon 2013). We construct a scale of six items: (1) "When I hear or read about new ideas, I try to relate them to real life situations to which they might apply," (2) "I like learning new things," (3) "When I come across something new, I try to relate it to what I already know," (4) "I like to get to the bottom of difficult things," (5) "I like to figure out how different ideas fit together," and (6) "If I don't understand something, I look for additional information to make it clearer." These items measure how eager and motivated individuals

are to learn new things. This is especially relevant, since migrants might differ not only from natives with regard to cognitive skills, but also in their attitude toward learning and acquiring new skills (Chiswick 1978; Portes and Rumbaut 1996). In the PIAAC data, this scale has been validated for the complete population (OECD 2011; ROA 2010). We performed a principal factor analysis on the immigrant sample, and the results are similar: the six items load highest on one factor, which has an eigenvalue of 2.83. The Cronbach's alpha of the six items is high as well (0.85). We label the new variable "Willingness to learn."

Job-specific skills

We include a dichotomous variable that indicates whether individuals attended *on-the-job training* in the past 12 months (yes = 1). Second, we include an indicator of *labor market experience* measured as years of paid work during lifetime (including its squared term). Third, we measure *job seniority* with the number of years that individuals have been employed with their current employer. Fourth, as a measure for host-country-specific labor market experience, we include the *number of years of residence* in the analysis containing immigrants only.

Educational attainment

To measure the educational level of individuals, we rely on the International Standard Classification of Education (ISCED-97).[7] The categories are primary or less (0/1), lower secondary (2), upper secondary (3/4), tertiary professional (5B), and university or post-university (5A/6). We include the categories as dummy variables with primary or less as reference category.

Place of birth

We control for region of birth with the country of destination as reference category and the following regions: (1) Western Europe and North America, (2) Southwest Asia, (3) Latin America, (4) Sub-Saharan Africa, (5) East-Asia Pacific, (6) Central/Eastern Europe, and (7) Arab states. These categories are provided by PIAAC; unfortunately, it is not possible to differentiate further. The regions and its corresponding countries are listed in appendix A.

Control variables

We include the following demographic control variables: gender (female = 1), age, partner status (married/cohabiting = 1), and a binary indicator of the type of contract that individuals have (tenured = 1).

A description of all variables can be found in table 1.

Method

We estimate regression models that are similar to previous studies that analyze the effect of education and skills on wages (Leuven, Oosterbeek, and Van Ophem

2004; Van de Werfhorst 2011). To account for possible sample selectivity with regard to differences between the employed and total population, we specify a Heckman selection model.[8] Another advantage of the Heckman model is that it accounts for cross-national differences in selection into employment. For example, selection in employment may differ between countries depending on the availability of unskilled jobs, or due to cross-national differences in how credentials are valued by employers (Bol and van de Werfhorst 2011). By including country fixed effects in the selection equation, the Heckman correction accounts for cross-national differences in selection in employment.

In the second stage, we make use of OLS regression with robust standard errors, where we fix the between-country variance in wages.[9] The equation is as follows:

$$\ln Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + c'V + \sum_{k=k-1} \beta_x D + \varepsilon$$

The dependent variable, ln Y, is the logged hourly wage adjusted by PPP; β_1 is the predicted effect of having a foreign degree (X_1), β_2 and β_3 are the predicted effects of cognitive (X_2), job-specific (X_3), and non-cognitive skills (X_4), respectively. In the equation, c' is a vector for the effects of all other individual-level control variables V. We add fixed effects β_x for countries D to control for between-country variation in wages.

The OECD provides researchers with a detailed description of how to analyze the skills measures (OECD 2013b). Since the total pool of 52 items is too time consuming for respondents and since the literacy and numeracy measures make use of multistage adaptive testing, PIAAC uses matrix sampling, where each respondent was administered a subset of items. To correct for the uncertainty in measurement that is a result of using a subset, the OECD provides numeracy and literacy as plausible values (Rubin 1976). The "plausible value" methodology accounts for error (or uncertainty) at the individual level by using multiple imputed proficiency values (plausible values) that are calculated using item response theory (IRT). Plausible values are drawn from a posteriori distribution by combining IRT scaling of the cognitive items with a latent regression model in a population model (OECD 2013b).

As a result, for each respondent, the PIAAC data contains 10 plausible values for literacy and for numeracy. Because taking the average of these plausible values results in biased estimates, we account for both the variance within and between plausible values in our regression models.[10]

Results

In table 1, we see that about 42 percent of all immigrants completed their highest degree in a non-Western country. About 15 percent are educated abroad in a Western country, while 42 percent obtained their highest qualification in the destination country.

Table 1. Descriptive Statistics Sample

	Percentage
Region of birth	
Western Europe and Northern America	29.56%
S/W Asia	9.06%
Latin America	7.48%
Sub-Saharan Africa	7.78%
East Asia/Pacific	7.16%
Central/Eastern Europe	30.87%
Arab states	8.09%
Language spoken at home not destination language	42.81%
Educational attainment	
Primary education and below	5.29%
Lower secondary	13.38%
Upper secondary	34.24%
Tertiary professional degree	12.83%
Tertiary BA/MA degree	34.26%
Place of education	
Native degree	42.17%
Foreign degree (Western)	15.15%
Foreign degree (non-Western)	42.68%
On the job training	37.20%
Female	51.48%
Married/cohabitating	71.34%
Tenured contract	76.95%

		Range		
	Mean	Min	Max	SD
Age	40.67	25	65	9.96
Number of years with employer	7.02	0	42	6.64
Years labor market experience	16.49	0	47	10.69
Numeracy	251.24	70.71	411.13	56.68
Literacy	252.18	89.33	396.45	52.05
Willingness to learn	0.11	−3.36	1.59	0.84
Years of residence	15.61	0	64	12.35

Source: Piaac 2012.

Table 2. Correlation Matrix for Skill Variables

	1	2	3	4	5	6	7	8
Cognitive skills								
1) Numeracy	1							
2) Literacy	0.88	1						
3) Language spoken at home not destination language	−0.17	−0.2	1					
Non-cognitive skills								
4) Willingness to learn	0.25	0.26	−0.06	1				
Job-specific skills								
5) Years of residence	0.08	0.06	−0.34	−0.04	1			
6) On-the-job-training	0.2	0.21	−0.08	0.12	0.04	1		
7) Years labor market experience	0.04	*0.01*	−0.18	*−0.02*	0.51	*0.01*	1	
8) Years with employer	0.05	*0.03*	−0.17	*−0.05*	0.51	0.04	0.49	1

Note: All correlations are estimated over the full sample ($N = 3{,}101$). All correlations are statistically significant ($p < 0.05$, two-tailed tests), with the exception of the italicized estimates.

Before we turn to our multivariate results, we inspect the correlation matrix for the different skill measures (table 2). The correlation between cognitive skills and the other skill indicators is low. There is especially little covariance with the indicators of specific skills. Cognitive skills are not strongly associated with having experience, either in the labor market (R = 0.04) or with the current employer (R = 0.05). The two measures of cognitive skills are, not surprisingly, strongly correlated with each other (R = 0.88), and there is a moderately positive correlation with on-the-job training for both literacy and numeracy. Respondents who do not speak the language of the survey at home tend to score lower on all skill measures, although the correlations are not particularly strong, ranging from R = −0.08 for on-the-job-training to R = −0.34 for years of residence.

With respect to our measures of job-specific skills, we see that years of residence is positively correlated with years of labor market experience and years with the current employer, both with a similar strength. On-the-job training, on the other hand, is very weakly correlated to any of the indicators of job-specific skills, indicating that this is a facet of job-specific skills that is more unique.

Finally, non-cognitive skills are only weakly correlated with job-specific skills: there is a small positive correlation between the willingness to learn and on-the-job-training (R = 0.12), but all other correlations are close to zero. We do find a stronger correlation between the willingness to learn and literacy (R = 0.26) and numeracy (R = 0.25).

The main insight from the correlation matrix is that the indicators of skills that we employ are not only theoretically but also empirically distinct. While, for sure, the indicators are subject to measurement error and may thus not perfectly mirror an individual's actual skill composition, table 2 shows that the

three different types of skills—specific, cognitive, and non-cognitive—cover a wide range of different workers' skills.

Table 3 presents the multivariate results and tests the extent to which skills can account for the negative association between being educated abroad and wages. Model 1 includes the control variables, region of birth, and educational attainment. There are substantial differences in wages across origin regions. In line with earlier studies (Heath and Cheung 2007), immigrants from non-Western regions earn significantly lower wages when being compared to individuals born in Western Europe and Northern America. This difference is largest for workers from Central and Eastern Europe. The other predicted effects of the control variables are all in accordance with a standard wage equation. Wages of females tend to be lower than wages of males by 6.6 percent ($1 - e^{-0.067}$), whereas age and tenure status are positively correlated. Finally, education is positively associated with wages. Our model predicts that immigrants with a tertiary degree earn 33 percent ($e^{0.288}$) higher wages than immigrants with only primary education or less.

In model 2, we add the indicator of having a foreign degree. Individuals with a non-Western foreign degree earn less than individuals who obtained their degree in the destination country. This effect is substantial: holders of a non-Western degree earn on average about 12.4 percent ($1 - e^{-0.132}$) less than individuals with a native degree—net of the highest level of educational achievement. Furthermore, since we control for origin region, this effect can be interpreted as a place of education, rather than an ethnic effect. Almost all origin effects are no longer statistically significant when we add the indicator of foreign degree. This is in line with the findings of Zeng and Xie (2004), who conclude that, rather than ethnicity, the (foreign) place of education is crucial in explaining wage differences. Finally, model 2 shows that individuals with a foreign degree from a Western country do not earn significantly less or more than individuals with a native degree.

In model 3, we add our measures of cognitive skills. As expected, the predicted effect of cognitive skills is positive: individuals with higher scores on the numeracy and literacy tests earn higher wages, also when controlling for their level of education and job-specific skills. The effect sizes are moderate: a one-standard-deviation increase in numeracy and literacy result in a predicted wage premium of 8.6 percent and 1.8 percent, respectively,[11] with a non-significant effect for literacy. We further observe a small effect of speaking the destination country language at home. In model 3, we observe only a slight reduction in the predicted effect of having a non-Western foreign degree, which remains substantial and statistically significant at 11.7 percent ($1 - e^{0.124}$).

In model 4, we add non-cognitive skills, measured as the willingness to learn. Non-cognitive skills matter too: individuals who are more willing to learn new things report slightly higher wages, net of their cognitive abilities. However, the place of education effect remains virtually unchanged at 11.3 percent ($1 - e^{0.120}$).

Finally, in model 5, we add job-specific skills. It will be no surprise that our models predict higher wages for individuals with more years of labor market experience and individuals who have been employed for a longer time with their current employer. The effect of on-the-job training is positive as well, with individuals who participated in on-the-job training earning about 9.1 percent

Table 3. OLS Regression Predicting Log Hourly Wages

	Model 1		Model 2		Model 3		Model 4		Model 5	
	b	se	b	se	b	se	b	se	b	se
Female	−0.067***	(0.015)	−0.072***	(0.015)	−0.142***	(0.020)	−0.142***	(0.017)	−0.119***	(0.018)
Married/cohabitating	0.002	(0.016)	0.002	(0.016)	0.017	(0.016)	0.018	(0.016)	0.010	(0.015)
Age of respondent	0.006***	(0.001)	0.007***	(0.001)	0.003**	(0.001)	0.003***	(0.001)	−0.005***	(0.001)
Tenured contract	0.142***	(0.017)	0.141***	(0.017)	0.141***	(0.017)	0.141***	(0.017)	0.094***	(0.017)
Region of birth										
Western Europe and Northern America	ref.		ref.		ref.		ref.		ref.	
S/W Asia	−0.113***	(0.030)	−0.033	(0.033)	−0.001	(0.033)	−0.001	(0.033)	0.029	(0.032)
Latin America	−0.118**	(0.036)	−0.030	(0.038)	−0.047	(0.038)	−0.053	(0.038)	−0.023	(0.037)
Sub-Saharan Africa	−0.095**	(0.031)	−0.014	(0.034)	−0.012	(0.034)	−0.016	(0.033)	0.032	(0.033)
East Asia/Pacific	−0.113***	(0.031)	−0.026	(0.034)	0.010	(0.033)	0.014	(0.033)	0.035	(0.032)
Central/Eastern EU	−0.194***	(0.019)	−0.100***	(0.025)	−0.036	(0.025)	−0.036	(0.025)	−0.009	(0.024)
Arab states	−0.048	(0.030)	0.032	(0.033)	−0.037	(0.037)	−0.040	(0.035)	−0.009	(0.035)
Educational attainment										
Primary education and below	ref.		ref.		ref.		ref.		ref.	
Lower secondary	−0.024	(0.031)	0.001	(0.031)	0.036	(0.033)	0.036	(0.032)	0.019	(0.033)
Upper secondary	0.029	(0.030)	0.050	(0.029)	0.093**	(0.034)	0.087**	(0.031)	0.066*	(0.032)
Tertiary professional degree	0.101**	(0.034)	0.123***	(0.034)	0.199***	(0.042)	0.188***	(0.038)	0.171***	(0.039)

(*Continued*)

Table 3. ***continued***

	Model 1		Model 2		Model 3		Model 4		Model 5	
	b	se	b	se	b	se	b	se	b	se
Tertiary BA/MA degree	0.288***	(0.031)	0.309***	(0.031)	0.343***	(0.038)	0.330***	(0.035)	0.331***	(0.036)
Place of education										
Native degree			ref.		ref.		ref.		ref.	
Foreign degree (Western)			0.013	(0.026)	−0.001	(0.026)	−0.003	(0.026)	0.036	(0.028)
Foreign degree (non-Western)			−0.132***	(0.018)	−0.124***	(0.018)	−0.120***	(0.017)	−0.080***	(0.019)
Cognitive skills										
Numeracy					0.146***	(0.034)	0.144***	(0.033)	0.131***	(0.033)
Literacy					0.034	(0.035)	0.029	(0.035)	0.024	(0.035)
Language spoken at home not destination language					−0.056***	(0.016)	−0.054***	(0.016)	−0.027	(0.016)
Non-cognitive skills										
Motivation							0.034***	(0.009)	0.031***	(0.008)
Job-specific skills										
On the job training in past 12 months									0.086***	(0.013)
Years labor market experience									0.014***	(0.002)
Labor market experience squared									−0.000***	(0.000)
Number of years with employer									0.009***	(0.001)
Years of residence									0.002*	(0.001)
Constant	2.545***	(0.058)	2.493***	(0.058)	1.952***	(0.082)	1.977***	(0.076)	2.070***	(0.078)
Adjusted R-squared	0.41		0.43		0.47		0.47		0.50	

Source: Piaac 2013.

* $p < 0.05$ ** $p < 0.01$ *** $p < 0.001$; two-tailed tests, robust standard errors.

Note: Models include country fixed-effects.

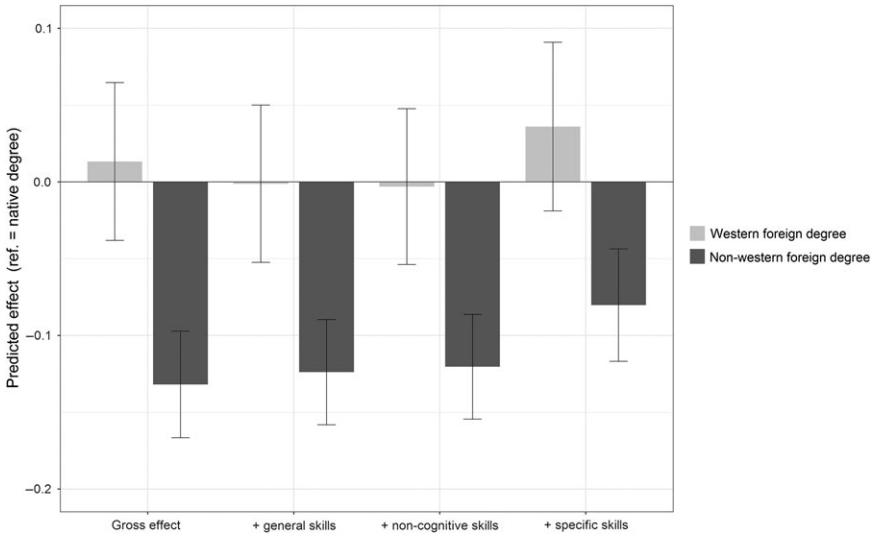
$(1 - e^{0.086})$ higher wages compared to individuals who did not attend any training in the past year. In line with previous findings (Buzdugan and Halli 2009), immigrants who have been longer in the destination country report higher wages. Most important is that in model 5 it becomes clear that when we control for job-specific skills, the wage disadvantage of having a foreign degree decreases, but remains significant and substantial at 7.7 percent $(1 - e^{0.080})$. Put differently, while our analyses predict that job-specific skills are associated with substantially higher wages, they correlate only moderately with the place of education effect that we observe.[12]

Figure 1 visualizes the predicted effect of having a foreign degree on wages, compared to immigrants who are educated in the destination country. The predicted values are calculated using the point estimates from models 2–5 in table 3. In the figure, any value lower than zero can be interpreted as the predicted mean difference in log hourly wages between immigrants with a non-Western foreign degree compared to immigrants with a native degree (dark-gray bar) or between immigrants with a Western foreign degree compared to immigrants with a native degree (light-gray bar).

As becomes clear from the figure, part of the effect of being educated abroad can be explained by disparities in human capital, as the effect decreases when we add the different indicators of skills. Put differently, a foreign degree is partly associated with lower wages because of the different skill composition of individuals educated abroad and individuals educated in the destination country.

In the context of this study, the most important finding is that the negative association between having a non-Western foreign degree and wages remains substantial across the different models. This implies that skills as we measure them do not fully explain the wage disadvantage associated with being educated

Figure 1. Predicted effects of being educated abroad



abroad. What is more, the predicted difference in log hourly wages between migrants with a non-Western foreign degree and migrants with a native degree decreases, but remains substantial (from −0.132 to −0.080).

The extensive set of skills that we include in our models explains about one-third of the wage disadvantage of having a non-Western foreign degree. We interpret this as partial support for hypothesis 1. However, supporting hypothesis 2, when accounting for skills, we still observe a substantial wage disadvantage of having a non-Western degree. This is in line with the view that, besides human capital deficiencies, immigrants' lower educational payoff is due to the educational degree that is obtained in the country of origin. Our results thus support the idea that the lower educational returns for individuals educated abroad is not only rooted in the limited transferability of skills, but can also be explained by the limited transferability of degrees.

Robustness Checks

We have carried out several robustness checks. First, we have tested whether the effect of a foreign degree varies by origin region. The only statistically significant interaction term is that of having a non-Western degree and Southwest Asian origin; for individuals from that region, the place of education effect is slightly smaller. This might be explained by cross-national variation in selection into migration, where respondents from Southwest Asia are relatively more highly educated (Sakamoto, Goyette, and Kim 2009). An important next step would be to focus on how the region of origin affects the transferability of skills and degrees (and how this might differ across countries of destination). However, our data do not allow for such tests. Since our models predict very similar point estimates across regions of origin, our robustness check does exclude the idea that the negative effect of a non-Western foreign degree is limited to one or a few origin regions.

We also tested whether the effects vary by gender. The wage penalty of having a non-Western degree is slightly larger for women, but the difference is not statistically significant.

Furthermore, the models control for the language spoken at home, an often-mentioned source of human capital that is essential for immigrants (Chiswick and Miller 2003; Friedberg 2000). It could be that the wage disadvantage of having a foreign degree is significant only for individuals who are less proficient in the destination language. We therefore tested whether the place of education effect is different for individuals who do not speak the destination language at home, but this interaction is not statistically significant. This suggests that the wage penalty is not due to differences in language proficiency.

It could be that that the immigrants who completed their highest degree in the destination country received *all* their educational training in the destination country. Consequently, the "native degree" effect may represent the accumulated benefit of education in the destination country. However, when restricting the sample to immigrants who arrived as adults, the penalty of having a non-Western degree even slightly increases. This suggests that the place of education

effect is not an accumulated benefit, but is really an effect of the highest obtained educational degree.

It is plausible that there is more variation in wages for individuals without a tenured job, or for respondents who work only a relatively short period for their current employer. We therefore included interaction terms with foreign degree and the following: tenure, the number of years that individuals have been employed with the current employer, and the number of years' working experience. None of these interaction terms were statistically significant.

One could argue that it is important to control for occupational groups, since job-specific skills are more similar for individuals in the same occupation. As a robustness check, we have included dummy variables for nine major occupational groups (ISCO-2008, 1 digit). Even when accounting for wage differences between occupational groups, we find that immigrants with a non-Western foreign degree have lower wages than immigrants with a native degree. The wage penalty is smaller (estimated at about 5 percent in the full model), however. The most likely explanation for this finding is the displacement of immigrants with a non-Western foreign degree to different (lower-paid) occupations. This suggests that the place of education effect that we find is due to both individuals receiving lower wages for the same job as immigrants educated in the county of destination, and individuals with foreign education being employed in lower-paid occupations.

Finally, to make sure that the analysis is not driven by outliers, we have estimated the models leaving one country out each time. The results are substantially the same. All robustness checks are available from the replication files, which can be found on the authors' website.

Discussion and Conclusion

Although it has been shown that the place of education is an important predictor for wages, we know much less about *why* the returns to education are lower for immigrants who obtained their degree abroad. Human capital theory argues that differences in skills explain why individuals educated abroad have lower earnings. Credentialing theory, on the other hand, assumes that individuals are rewarded for their educational degrees, net of their skills. In this paper, we have analyzed to what extent the wage disadvantage associated with having a non-Western foreign degree can be explained by the limited transferability of skills and by the limited transferability of educational degrees.

The presented evidence shows that in Western Europe, individuals with a non-Western foreign degree have considerably lower wages. As predicted by human capital theory, a substantial part of the wage penalty of having a non-Western foreign degree can be explained by differences in skills. Furthermore, in line with the findings of Kerckhoff, Raudenbush, and Glennie (2001), skills affect earnings independently of educational attainment.

However, when accounting for job-specific, cognitive, and non-cognitive skills, the wage penalty of having a non-Western foreign degree decreases but remains substantial at 7.7 percent. Furthermore, the extensive measures of skills that we include explain less than half of this wage disadvantage. While this

shows that skills are important in explaining why place of education matters, the findings are also in line with the idea that part of immigrants' lower educational payoff can be explained by the credentialing value of foreign degrees. Thus, the disadvantage that is associated with being educated in a non-Western country may not be rooted only in the limited transferability of skills, but also in the limited transferability of educational degrees. Hence, our main contribution is to show the relative importance of two central theories in explaining earnings (human capital and credentialing) that attach different importance to skills and educational attainment.

We have argued that because different types of skills are controlled for, the "net" effect of having a foreign degree can be interpreted as credentialing. This argument holds to the extent that there are no competing interpretations of the effect of being educated abroad on wages. A remaining question therefore is whether the residual effect could be something else than credentialing.

First, we are not able to measure social capital. There is evidence that for immigrants, social capital positively affects earnings, especially when it concerns contacts with the native born (Aguilera and Massey 2003; Lancee 2012). Furthermore, immigrants may profit from solidarity in ethnic niches on the labor market (Nee and Sanders 2001; Sanders 2002). It could be that immigrants' social capital depends on the place of education. If individuals who have obtained their education in the destination country have more valuable networks, for example in terms of more frequent contacts with natives, this may influence the place of education effect that we observe. Martinovic, Van Tubergen, and Maas (2009) indeed show that higher levels of host-country education are associated with more contacts with the native-born population. Kanas and Van Tubergen (2009), on the other hand, conclude that the higher labor market returns of host-country education are for the most part direct and cannot be explained by immigrants' social contacts with natives. Based on these studies, it is thus not clear to what extent the place of education effect that we find can be explained with differences in immigrants' social capital. Future research could study this issue.

Second, it could be argued that the foreign degree variable captures not only the inferior signal of the degree, but also the lack of host-country specific skills. The PIAAC survey contains state-of-the-art measures of skills. While an advantage of the survey is that numeracy and literacy are comparable across countries, by definition they are unable to capture country-specific skills. We have included several measures to take job-specific and country-specific skills into account. However, we acknowledge that our skill measures might still be an incomplete set of all skills that matter on the labor market. Our results can be biased when potentially unmeasured skills are uncorrelated with the measured skills, and part of the effect of being educated abroad is due to unobserved job-specific skills. At the same time, we believe that we make an important contribution to the existing literature, as our study contains one of the most elaborate set of skills so far (Farkas 2003; Kerckhoff, Raudenbush, and Glennie 2001).

Third, previous research shows that migration is a selective process (Borjas 1987). Selective migration may affect our findings if it correlates with the place of education and if such correlation is not explained by the variables that we

included in our analysis. For example, if above-average "ability" immigrants migrate before attending education and below-average ability migrate after completing education, then the place of education effect that we observe may be a consequence of ability, rather than the transferability of the degree. However, by controlling for skills, we control for ability in the form of cognitive and non-cognitive skills. Especially the non-cognitive skills, which capture perseverance and motivation, could drive selective migration.

Several limitations of the present study should be acknowledged. First, since we could include only 11 (West European) countries, testing cross-national hypotheses was outside the scope of this paper. Bol and Van de Werfhorst (2011), for example, show that the strength of signaling mechanisms varies across national contexts. As we discussed earlier, it is likely that national institutions, such as the educational system (Lancee 2016) or the structure of the labor market (Kogan 2006), affect the place of education effect as well—especially given the fact that previous work shows that ethnic inequality varies cross-nationally (Heath and Cheung 2007). Furthermore, societies differ in how labor markets accommodate immigrants (Joppke 1999), which may too result in cross-national variation in the place of education effect. Our findings therefore have to be interpreted as average effects for Western Europe. Second, previous studies found that the wage disadvantage depends on the country of origin (Arbeit and Warren 2013; Bratsberg and Terrell 2002). Due to data limitations, we could not differentiate the origin of foreign degrees further than Western versus non-Western.

Irrespective of these limitations, we believe that this study offers new and important insights in explaining immigrant disadvantage in the labor market. Our study shows that, in line with human capital theory, skills explain about a third of the wage disadvantage that is associated with being educated abroad. However, even when controlling extensively for different types of skills, there is a substantial place of education effect. We therefore argue that being educated abroad results in lower wages not only because of the limited transferability of skills, but also by the limited transferability of degrees. Of course, this does not imply that human capital is not important. Rather, it stresses that human capital does not suffice to explain returns to education and the wage disadvantage of being educated abroad. This article has shown that both are important in explaining why place of education is associated with wages.

Disadvantage rooted in the limited transferability of degrees is fundamentally different from disadvantage that is due to differences in skills. The policy implications of our findings are thus twofold. Disadvantage due to human capital implies that individuals have fewer, or the wrong, skills. As Friedberg (2000, p. 247) concludes in her seminal paper, differences in skills "suggest[s] a compound benefit to immigrants of receiving further training following immigration." A cogent policy response would thus be to train individuals with a foreign degree to acquire the skills they need to perform at par with individuals with a native degree. However, to the extent that disadvantage is rooted in the value of the credential itself, such training is not a solution. Our findings suggest that policy should simultaneously be targeted at recognizing or converting the foreign degree into a native equivalent.

Notes

1. Drange (2013) finds that immigrants with a native degree benefit from occupational closure. She argues that the establishment of formal boundaries also implies that wage discrimination against migrants with the right degree is not possible. Our study, however, focuses on immigrants that do not have the correct entry degree.
2. For more information on the regulations framework as implemented by the European Union, see http://ec.europa.eu/internal_market/qualifications/regprof/ (last accessed November 23, 2015).
3. Germany is included in the PIAAC data, but the public data file does not contain information where immigrants obtained their degree. We therefore append the public data with the German scientific data.
4. Overall response rates: Austria (53 percent), Belgium (62 percent), Denmark (50 percent), Germany (55 percent), Finland (66 percent), France (67 percent), Ireland (61 percent), Italy (55 percent), the Netherlands (51 percent), Norway (62 percent), and Spain (48 percent).
5. The OECD PPP correction implies that wages are expressed in purchasing power adjusted US dollars. PPPs are the rates of currency conversion that equalize the purchasing power of different currencies by eliminating the differences in price levels between countries (Eurostat 2012).
6. The correlation between numeracy and literacy is 0.88. Estimating models including either numeracy or literacy did not change the results.
7. Because of inconsistency in the measurement across countries, we collapsed ISCED 3ABC and 4A, as well as 5A and 6.
8. The Rho is significant, suggesting possible selectivity in our sample. We thus estimate a Heckman selection model. Besides the covariates included in the wage equation, we include household size and employment status of the partner as identifying variables.
9. The sample size at the country level is too small (11 countries) for multilevel analysis.
10. In accounting for the within- and between variance, we follow Heisig and Solga (2015, p. 207) and use the *mi imputed chained* module to estimate our modules.
11. This is calculated using $e^{(0.146*0.567)}$ and $e^{(0.034*0.521)}$ for, respectively, numeracy and literacy. When numeracy is not included in model 4, table 2, the effect of a one standard deviation increase in literacy on wages is 5.4 percent. This is due to the high correlation between numeracy and literacy (see note 4). While the correlation affects the size of the predicted coefficients of numeracy and literacy, this collinearity does not bias the parameter estimates on degree location.
12. One could argue that the place of education effect is driven by immigrants who did not attend on-the-job training. However, supplementary analyses showed that the place of education effect is not different for individuals who received training compared to those who did not receive training, as the interaction term between on-the-job training and having a non-Western diploma is not significantly different from zero.

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Supplementary Material

Supplementary material is available at *Social Forces* online.

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