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Who benefits from school-to-work linkages in the labour market? A comparison between natives, migrants educated abroad, and those educated domestically

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Abstract

Recent research suggests that people with more occupation-specific qualifications (i.e. qualifications that link to a smaller set of occupations) experience greater benefits in the labour market. Based on human capital, signalling and credentialing theory, we argue that these benefits may vary between the native majority population, individuals with a migration background who hold a foreign qualification, and individuals with a migration background with a domestic qualification. Using data from the German Microcensus, we find that for both the native majority and immigrants with a domestic qualification, holding a more occupation-specific qualification relates to a higher chance of working in a position the individual is educated for in terms of both level and field. Holding a more occupation-specific qualification also relates to higher labour market returns (i.e. income and occupational status) for those who work in a job for which they are educated, yet is mostly negatively related to the labour market returns for those who do not work in a job for which they are educated. Migrants with a foreign qualification profit less from holding occupation-specific qualifications and suffer more from their associated disadvantages.

Introduction

There is an ongoing debate about how to best prepare people for the labour market. Recent studies show that people who hold a more occupation-specific educational qualification experience benefits in terms of labour market access (e.g. lower unemployment rates) and returns (e.g. higher wages) (Shavit and Müller, 2000; Müller and Gangl, 2003; Vogtenhuber, 2014; DiPrete *et al.*, 2017; Forster and Bol, 2018; Bol *et al.*, 2019; Muja *et al.*, 2019). Occupation-specific qualifications refer to qualifications that link to a relatively narrow set of occupations (e.g. medical doctors) and are contrasted with general qualifications that link to a wide range of occupations (e.g. social scientists). Especially people who achieve a ‘match’—that is, who end up in an occupation that matches both their level and field of education—tend to profit from holding

an occupation-specific qualification, as they can more directly convert their job-specific skills into productivity and earnings (Bol *et al.*, 2019).

While people seem to benefit from holding occupation-specific qualifications (e.g. Vogtenhuber, 2014; Bol *et al.*, 2019; Muja *et al.*, 2019), theory predicts that not all people may benefit equally. For example, for some people, occupation-specific qualifications may work in a restrictive way, preparing them only for a small number of jobs (Forster and Bol, 2018; Rözer and Bol, 2019). However, we still know very little about potential variations in the benefits of holding occupation-specific qualifications across different demographic groups. In this paper, we study how the benefits differ for migrants and the native majority.

Research shows that migrants are a typically disadvantaged group with respect to labour market

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outcomes. Differences in educational qualifications are often put forward as an important explanation for this. Studies find that native-migrant labour market inequalities are partly due to the fact that the educational level of immigrants is generally lower than that of the native majority (Granato and Kalter, 2001; Waters and Jiménez, 2005; Heath, Rethon and Kilpi, 2008; Kogan, 2011; Luthra, 2013). Moreover, migrants have often received their educational qualifications in a foreign country, and therefore tend to possess less country-specific job skills; or employers assume this to be the case (Friedberg, 2000; Lancee and Bol, 2017; Tibajev and Hellgren, 2019). While differences in level and place of education provide explanations for native-migrant labour market inequalities, inequalities persist after accounting for these factors (e.g. Blommaert, Coenders and Tubergen, 2014; Nanos and Schluter, 2014).

One aspect of educational qualifications that has received little attention in the literature on the native-migrant gap in labour market outcomes is the occupation-specificity of qualifications, and this may have masked important sources of inequality. The restrictiveness that has been associated with occupation-specific qualifications may form a greater liability for immigrants than for natives, especially for immigrants with foreign qualifications. Building on the literature on the transferability of skills and educational qualifications, immigrants who are educated for fewer jobs may face a greater risk that they lack, or are assumed to lack, the necessary country-specific skills for the jobs for which they are educated. However, occupation-specific qualifications may also grant unique access to jobs where access is (in)formally restricted (i.e. closed jobs; Collins, 1979; Weeden, 2002). Holding qualifications for such jobs may be especially beneficial for migrants, as hiring procedures for these jobs tend to be more formalized. According to research on ethnic discrimination, such formalization could shield against discriminatory practices in the labour market (Drange, 2013; Drange and Helland, 2019; Di Stasio and Lancee, 2020). Hence, it is by no means clear how the occupation-specificity of qualifications relates to native-migrant labour market inequality.

Recent cross-national studies find native-migrant differences in how the occupation-specificity of a country's educational system relates to labour market outcomes. In countries where there is a tighter link between the educational system and the labour market, the employment rate of the native population is higher, while the employment rate (Lancee, 2016) and early-career occupational status of migrants (Spörlein, 2018) is lower. These studies only consider the education-occupation linkage strength as a country characteristic. However, linkage strength is also a characteristic of educational qualifications, as there are large *within*-country differences in the extent to which

educational qualifications link to specific occupations (Vogtenhuber, 2014; DiPrete *et al.*, 2017; Bol *et al.*, 2019; Muja *et al.*, 2019; Rözer and van de Werfhorst, 2020). Building on this, we do not restrict comparisons to a few country cases but exploit the variation in educational qualifications within a country.

We examine how holding an occupation-specific qualification is related to labour market outcomes for the native majority, immigrants with domestic qualifications, and immigrants with foreign qualifications. In doing so, we bridge research on the occupational specificity of educational qualifications and research on the native-migrant gap in labour market outcomes, thereby contributing to both fields. More specifically, we contribute to the literature on occupational specificity by studying potential heterogeneities in the benefits of holding occupation-specific qualifications. Simultaneously, we contribute to the literature on the role of education in native-migrant labour market inequalities by considering the occupational specificity of educational qualifications. In doing so, we distinguish between three different groups (i.e. the native majority, immigrants with domestic qualifications, and immigrants with foreign qualifications). Studies on native-migrant = labour market inequalities usually only compare two of these groups, and either focus on differences between the native population and migrants with domestic qualifications (e.g. Heath, Rethon and Kilpi, 2008) or migrants with foreign qualifications (Lancee, 2016). A few recent studies compare migrants with foreign and domestic qualifications with each other, to better understand the effect of place of education (e.g. Lancee and Bol, 2017), yet do not include the native population. By comparing all three groups, we shed light on both native-migrant inequality, whilst also being able to better separate the 'place of education' effect from the 'migrant status' effect. In sum, we aim to gain a more comprehensive understanding of the role of educational qualifications in native-migrant labour market inequalities by studying the *combined* role of the level, place, and occupation-specificity of qualifications.

Our empirical analyses rely on data from the German Microcensus (GMC), which provides a comparatively large sample for all three groups under study. Germany is an interesting case, as the link between education and occupation is relatively high, and hence the benefits and costs related to holding an occupation-specific qualification are also more pronounced (Bol *et al.*, 2019). Our analyses will thus provide an upper bound for the effects of occupational specificity by migration background and place of education. With respect to labour market outcomes, we provide a comprehensive analysis of both labour market access (i.e. employment status, and whether respondents secure employment in

a matching occupation) and returns (i.e. income and occupational status).

Theory

Occupation-specificity of qualifications and labour market outcomes

There are various mechanisms underlying the relationship between the occupation-specificity of qualifications and labour market outcomes. According to human capital theory, people with an occupation-specific qualification have more job-specific skills and are therefore more productive (Becker, 1964). According to signalling theory, people with occupational-specific qualifications are not necessarily more skilled, but educational qualifications function as a sign of quality to employers or consumers (Weeden, 2002), and occupation-specific qualifications are believed to convey a clearer quality signal than general degrees (Spörlein, 2018). Finally, according to credentialing theory, holding an occupation-specific qualification may be a necessary condition for gaining access to jobs whose access is (in)formally restricted (Collins, 1979; Weeden, 2002). People who work in these ‘closed jobs’ will receive higher returns in the labour market, as they tend to be in greater demand, whilst their supply is limited (Weeden, 2002).

Taken together, human capital, signalling and credentialing theory all lead to the expectation that people who hold an occupation-specific qualification have a higher employment rate and the likelihood of working in matched occupations (i.e. occupations they are educated for, in terms of both level and field). Moreover, once employed in a matching job, people should receive higher returns (e.g. wages). This is because clients and employers are willing to pay a higher price for the services of people who are scarce, and/or (signal to be) better qualified for the tasks at hand (Weeden, 2002). In line with this, research shows that people who hold a more occupation-specific educational qualification are more likely to work in (matching) jobs and receive higher labour market returns (Shavit and Müller, 2000; Müller and Gangl, 2003; Vogtenhuber, 2014; DiPrete *et al.*, 2017; Forster and Bol, 2018; Bol *et al.*, 2019; Muja *et al.*, 2019).

Variations by migration background

The extent to which occupation-specific qualifications will enhance labour market outcomes may, however, vary by a person’s migration background and place of education. Building on human capital, signalling, and credentialing theory, we first argue why we expect occupation-specific qualifications to offer fewer advantages for migrants with foreign qualifications than for the native population and migrants with domestic

qualifications. We start by discussing the implications for labour market access, followed by returns.

Migrants with foreign qualifications versus natives and migrants with domestic qualifications

Credentialing and signalling theory provide a first reason for why foreign-educated migrants with more occupation-specific qualifications may have a harder time in gaining access to the labour market than their native and domestically educated counterparts. According to the migration literature, foreign qualifications generally provide a weaker signal of employee quality and skills than domestic qualifications, as employers lack information and are more uncertain when evaluating foreign qualifications (Chiswick and Miller, 2009; Prokic-Breuer and McManus, 2016; Lancee and Bol, 2017; Tibajev and Hellgren, 2019). Accordingly, the quality signal that occupation-specific qualifications convey may primarily apply to domestic qualifications, and less to foreign ones. Moreover, while occupation-specific qualifications can serve as an entry ticket into a closed occupation (Bol *et al.*, 2019), this does not necessarily hold for *foreign* qualifications. Foreign qualifications are not always *formally* recognized, and occupational requirements are often formulated in terms of educational degrees from the host country (Lancee and Bol, 2017). In other words, the ‘occupation entrance ticket’ that is associated with an occupation-specific qualification is likely to be uniquely associated with a specific domestic qualification. In fact, protecting workers against the outside competition is the very aim of some closure institutions, such as credentialing or licensing (Weeden and Grusky, 2014). Especially qualifications from non-Western countries may provide weaker quality signals and may not be formally acknowledged in Western destination countries.

Human capital theory provides a second reason for why foreign-educated migrants may benefit less from holding occupation-specific qualifications. While people with more occupation-specific qualifications are generally assumed to possess more job-relevant skills, this may apply less to immigrants with foreign qualifications. Labour market knowledge and skills are partly country-specific, and therefore not always (fully) transferable across contexts. Context-specific labour market skills and knowledge could be as general as language skills (Duvander, 2001), yet can also constitute job-specific skills, such as knowledge of building materials or styles (e.g. for positions in construction), knowledge regarding laws and customs (e.g. for positions in law and accounting), or knowledge concerning destination flora and fauna (e.g. for positions in agriculture). Research suggests that this

limited transferability of human capital contributes to native-migrant differences in the labour market (Friedberg, 2000; Duvander, 2001; Prokic-Breuer and McManus, 2016; Lancee and Bol, 2017; Tibajev and Hellgren, 2019).

While a lack of country-specific job skills and knowledge will generally hamper access to the labour market for foreign-educated migrants, we argue that it will especially cause a burden for those who hold more occupation-specific qualifications, as they are assumed to be less flexible in the labour market, and match to a smaller set of jobs (c.f., Hanushek *et al.*, 2017; Forster and Bol, 2018;). More specifically, foreign-educated migrants with more occupation-specific qualifications may have a harder time finding a matching occupation and face a greater risk that all the occupations that they are educated for require country-specific skills. Moreover, the specificity of their skill set could make it harder to switch to alternative jobs. While previous studies show that foreign-educated migrants are less likely to work in a job that matches their educational *level* than natives and immigrants with domestic degrees (e.g. Nielsen, 2011; Prokic-Breuer and McManus, 2016), these studies have not considered how this depends on the occupational-specificity of qualifications. Moreover, these studies define matches solely in terms of educational level, yet matching on both educational level and field is important for receiving optimal rewards for one's skills in the labour market (Bol *et al.*, 2019).

H1: The positive relationship between holding a more occupation-specific qualification and labour market access (being employed, working in an occupation that matches one's educational level and field) is weaker for immigrants with foreign qualifications than for natives and immigrants with domestic qualifications.

The (supposed) lack of country-specific labour market skills among foreign educated migrants with occupation-specific qualifications could also reduce their labour market returns. According to human capital and signalling theory, employers will try to compensate for a (supposed) lack of country-specific skills by offering foreign-educated migrants lower wages and/or status positions (Chiswick and Miller, 2003). Although employers may also compensate for the (supposed) lack of country-specific skills among migrants with general foreign qualifications, the compensation is expected to be larger for those with occupation-specific degrees. This is because a more specific skill set increases the chance that relevant (country-specific) skills are (perceived to be) missing, and reduces the flexibility to work in occupations not educated for.

H2: The positive relationship between holding a more occupation-specific qualification and labour market returns is weaker for immigrants with foreign qualifications than for natives and immigrants with domestic qualifications.

While, on average, we expect foreign educated migrants to receive smaller labour market returns from holding occupation-specific qualifications (H2), this disadvantage may be confined to foreign-educated migrants who do not work in a matching occupation. Recently, Bol *et al.* (2019) demonstrated that among German individuals who hold an occupation-specific qualification, those who work in an occupation that matches their educational level and field receive a small to moderate earnings premium, whereas those who do not work in a matching occupation suffer a penalty. Migrants with occupation-specific foreign qualifications are not only less likely to work in matching occupations (see H1), leading to disadvantages in their labour market returns (see H2); they may also suffer more from not working in a matching occupation than their native and domestically educated counterparts. As argued before, migrants with foreign occupation-specific qualifications have less transferable skills, or employers assume this to be the case. Consequently, compared to their native and domestically educated counterparts, they will be relegated to non-matching jobs with lower wages and occupational status.

Moreover, based on credentialing and signalling theory, foreign-educated migrants with occupation-specific qualifications may profit more from working in a matching occupation than domestically educated migrants and the native majority. Among the population who works in a matching job, people with more occupation-specific qualifications are more likely to work in (formally) closed jobs (Bol *et al.*, 2019). Recent work on native-immigrant labour market inequalities suggests that pay differences by migration background are smaller in such jobs (Drange and Helland, 2019). This is supposedly due to the fact that wages are more standardized and less dependent on the discretion of the employer, and thereby protect against wage discrimination (Drange and Helland, 2019). Moreover, employees for closed jobs are in limited supply and great demand, which further reduces incentives for wage discrimination (Drange, 2013; Drange and Helland, 2019).

Compared to the native majority and domestically educated migrants, foreign-educated migrants with occupation-specific qualifications are assumed to face the greatest difficulties in having their skills recognized, and therefore are expected to have to compensate more for this by working in lower status and lower-paying non-matching jobs. If earning differentials are reduced

in matching occupations, this group will therefore also gain the most from accessing matching occupations. Research in Denmark indicates that working in an occupation that matches one's educational level is related to similarly positive wage returns for natives, domestically educated migrants, and migrants with foreign qualifications (Nielsen, 2011). However, migrants with foreign qualifications do seem to be punished more for being overeducated. While people who are overeducated tend to earn more than people with the required educational level in similar jobs, this applies less to migrants with foreign qualifications than to natives and migrants with domestic qualifications. In the current study, we examine how the effects of working in a matching occupation vary by the occupational-specificity of qualifications, and consider mismatches in terms of both educational level and field.

We expect the following three-way interaction:

H3: Holding a more occupation-specific qualification is related to smaller labour market returns for foreign-educated migrants than for natives and migrants with domestic qualifications (H2), yet this disadvantage is only present among people who do not work in a matching occupation. Among the group working in a matching occupation, holding a more occupation-specific qualification is related to larger labour market returns for foreign-educated migrants than for natives and domestically educated migrants.

Migrants with domestic qualifications versus natives

Compared to migrants with foreign qualifications, migrants with domestic qualifications have been more exposed to institutions generating destination country job skills. Despite this, differences with the native majority tend to persist. Research for example shows that migrants with domestic qualifications have lower literacy proficiency than natives with the same level of education, age, gender, and parental background (Bonfanti and Xenogiani, 2014). Hence, for similar reasons as for foreign-educated migrants, occupation-specific qualifications may offer fewer benefits for domestically educated migrants than for the native majority. That is, occupation-specific qualifications enhance the risk that all the occupations a person is educated for require country-specific skills, and thus reduce a person's flexibility to switch to other jobs that require less of such skills. Even in a situation where the country-specific occupational skills of domestically-educated migrants are similar to those of their native counterparts, employers may *assume* that migrants possess less of such skills. Employers may try

to compensate for the (assumed) lack of country-specific skills by offering lower returns.

However, occupation-specific qualifications may also offer additional benefits for migrants with domestic qualifications than for natives. Migrants face discrimination in the labour market: they are less likely to receive positive reactions to job applications, even when they hold the same, domestic, qualifications (e.g. Blommaert, Coenders and Van Tubergen, 2014; Di Stasio and Lancee, 2020). According to arguments relating to statistical discrimination, employers face uncertainty when hiring employees and therefore may rely on the average traits of the larger group to which an applicant belongs (e.g. the average skill level). Occupation-specific qualifications could shield against such labour market discrimination, as they provide a clearer signal that migrants do indeed possess the skills that are necessary for the job (Chavez and Redbird, 2015; Drange and Helland, 2019).

Second, occupation-specific domestic qualifications may provide access to (formally) closed jobs. As argued before, employees for such jobs are often in limited supply and great demand (Drange, 2013; Drange and Helland, 2019), and hiring and promotion procedures tend to be relatively standardized (Drange and Helland, 2019). This may not only reduce the (incentives for) discrimination against migrants but may also lead employers to rely less on specific forms of social and cultural capital that migrants typically tend to have less of (Drever and Hoffmeister, 2008; Kanas, Van Tubergen and Van der Lippe, 2011). Based on these arguments, we expect occupation-specific qualifications to be more advantageous for domestically educated migrants than for natives, as these qualifications can help to overcome disadvantages that are related to being a migrant. For the native majority, labour market outcomes may be more independent of the occupation-specificity of their qualifications.

Different theories thus lead to different predictions on how the relationship between the occupation-specificity of qualifications and labour market outcomes will differ for natives and domestically educated migrants. On the one hand, occupation-specific qualifications are associated with labour market inflexibility, and this may harm domestically educated migrants more than members of the native majority. However, occupation-specific qualifications may also shield against labour market discrimination and informal hirings, and thereby relate to larger labour market advantages for domestically educated migrants. Since we do not have clear hypotheses on the differences between natives and domestically educated migrants, we examine these differences in an explorative manner. This explorative examination is nevertheless important, as the benefits of occupation-specific

qualifications may depend on (i) being a migrant as well as (ii) holding a foreign qualification. To be better able to separate these two effects, we need to study natives, migrants with domestic, and migrants with foreign qualifications.

We study these differences in Germany, a west-European context that is characterized by a relatively long migration history (Ballarino and Panichella, 2015). Migration to Germany started after the Second World War, with the recruitment of semi- and unskilled workers from Southern Europe and Turkey. In the 1980s, this first migration wave was followed by the arrival of migrants from Eastern European countries. This relatively long migration history could facilitate the labour market integration of migrants, because institutions and ethnic networks supporting integration may be more established (e.g. compared to Spain or Italy). However, Germany's educational and labour market institutions are likely to form a barrier to migrants' labour market integration.

First, Germany is known for its tight link between the educational system and the labour market. It is marked by a relatively fast transition to the labour market, as well as high early career labour market returns (Müller and Gangl, 2003). Furthermore, the educational system is characterized by a high level of stratification where children are differentiated relatively early (after grade four, around the age of 10) into separate tracks based on their academic performance. These tracks physically separate students and prepare them for different educational and/or occupational pathways. The 'lowest' ability track (i.e. Hauptschule) tends to channel students into vocational education or the labour market. The 'highest' ability track (i.e. Gymnasium) enables direct access to tertiary education. Due to this tight link between the educational system and the labour market, educational titles tend to convey more information for employers than less stratified and tightly linked systems (Allmendinger, 1989). Accordingly, employers might be more hesitant to hire applicants with foreign qualifications. Research indeed finds more severe labour market inequality between immigrants and natives in such high information contexts (Spörlein, 2018). Moreover, Germany is typically classified as a 'coordinated market economy', implying strong employee protection and high firing costs (Ballarino and Panichella, 2015). This may further stimulate employers to avoid 'risky' choices for candidates with foreign qualifications.

By focusing on Germany, we thus expect to provide an upper bound of the labour market inequality associated with differences in migration background, place of education and occupational-specificity of qualifications. Less stratified and tightly linked systems might be more accommodating to applicants with foreign (occupational-specific) credentials.

Data and methods

Data

We use the scientific use file of the 2014 GMC, a yearly 1% household sample of the German population. Because key measurements were only surveyed in 2014, we do not pool multiple yearly samples into a larger dataset. The large sample size of the GMC ensures that categories for comparatively small occupations or educational titles, and foreign and domestically educated migrants contain enough cases. Because our focus is on patterns of labour market incorporation, we restrict the sample to individuals aged 15 to 65, who completed at least secondary education, and participate in the labour market. The total analytical sample covers 191,535 respondents, 13 per cent of whom have a migration background. Among the 25,678 immigrants, 52 per cent hold a foreign qualification.

Operationalization

We operationalize educational titles using information on both (i) educational attainment, based on three-digit International Standard Classification of Education 11 (ISCED) coding; and (ii) field of study, based on the 25-category coding used by Bol *et al.* (2019: [Supplementary Appendix, Table A4](#)). Hence, educational titles combine information on vertical placement in the education hierarchy (through ISCED) as well as its horizontal dimension (through field of study). Individuals are sub-optimally matched as soon as one dimension is mismatched, as they may not be able to fully realize their skills (Bol *et al.*, 2019). In total, *educational titles* encompass 145 distinct categories.

The central independent measure, *link strength*, refers to the extent to which an educational title—the combination of level and field of study—is linked to a specific set of occupations. We use the entropy-based Mutual Information Index (MII) which is often applied to study patterns of residential or spatial segregation (Frankel and Volij, 2011; Mora and Ruiz-Castillo, 2011). In the current application, higher values signify that a person's educational qualification forms a better predictor for their occupational position, thus indicating a stronger link between educational qualification and occupation (i.e. a more occupation-specific qualification; see also Bol *et al.*, 2019; Forster and Bol, 2018).

We calculate the MII using the *segregation*-package for R (Elbers, 2019). The MII can range from 0 to infinity. Among German university graduates, social scientists score relatively low (0.7), whereas engineers (2.0) and medical doctors (2.7) show tight linkages.

We identify *first-generation immigrants* by nationality.¹ We exclude second-generation immigrants. Not only is there very little variation in the place of education within this group, but they may also differ with

respect to other important compositional characteristics such as their origin country, language skills or host-country cultural capital. To determine whether first-generation immigrants hold a *foreign qualification*, we combine several pieces of complementary information: first, the GMC includes a direct question asking respondents whether they completed their education abroad. When information on this question is missing, we rely on information regarding the time of immigration, and the time when individuals completed their education. We consider those who completed their education before migration as holding foreign qualifications.

We study four labour market outcomes as dependent variables. Two of these measure labour market access. *Employment status* records whether respondents are employed or unemployed. For employed individuals, we identify whether they *work in a matching occupation* (0 = no, 1 = yes). People work in a matching occupation when they are employed in one of the three occupations that individuals with the same specific combination of field and level of study (i.e. the same educational title) most frequently work in (Bol et al., 2019).

We analyse labour market returns by studying *income* and *occupational status*. Income is measured as last month's total net income. This includes labour market income as well as other income sources, such as transfers or capital gains. Restricting the analyses of labour market returns to employed individuals should reduce the impact of systematic group differences in non-labour market income. Moreover, when describing our findings, we will focus on occupational status, which is independent of this issue. We measure occupational status by International Socio-Economic Index of Occupational Status scores (ISEI) based on occupational information classified according to the three-digit ISCO-08 standard.

We control for several variables that are typically accounted for in research on migrant labour market integration, as they vary by migration background, and are also associated with labour market outcomes (Waters and Jiménez, 2005; Heath, Rethon and Kilpi, 2008): age (in years) and age squared, whether respondents are female, whether respondents are married, working hours, and the number of children under the age of 10 in the household. In addition, we include educational attainment (measured in five ISCED-11 categories, ranging from upper secondary education [ISCED 3] to holding a doctoral degree [ISCED 8]). This enables us to compare individuals with the same level of education, but who differ in their degree of occupational specificity. Moreover, by excluding individuals whose educational attainment is below ISCED 3, we make sure that we restrict the analyses to

individuals who completed a minimum of education/occupational training.²

In the analyses of labour market returns, we also include inverse Mills ratios to account for differential selection into employment (Heckman, 1979). The subsample of people who manages to secure employment may be selective on several dimensions, including both observable as well as unobservable characteristics (e.g. motivation). By including Mill's ratios into the return models, we account for this differential selection. Mill's ratios are computed for each individual on the basis of a probit model predicting employment probabilities by the respondent's immigrant status, country of origin, educational attainment, marital status, the number of children aged below 10 in the household, gender, and field of education.

Note that we cannot control for destination-specific human capital indicators (e.g. language skills or duration of stay) in the analyses, as these are constant for the native population and therefore lead to collinearity issues when estimating differences between immigrants and natives.

Table 1 presents descriptive information for all measurements, separately for the three study groups (the native majority, immigrants with German qualifications, and immigrants with foreign qualifications).

Methods

We rely on two sets of analyses. We use linear probability multilevel models to analyse the dichotomous indicators of labour market access. Although logistic regression is commonly used for binary outcomes, linear probability models generally lead to the same conclusions while retaining the advantages of linear regression. That is, the interpretation of coefficients is relatively intuitive, and coefficients can easily be compared across different models (Hellevik, 2009; Gomila, 2020). To analyse labour market returns, we use linear multilevel models, because link-strength is a characteristic of educational titles rather than individuals. Ignoring the clustering of individuals within the 83 educational titles may underestimate the standard errors associated with this measure (Hox, Moerbeek and van de Schoot, 2017). Replication code for data preparation and analyses is available at <https://osf.io/vfhkp/>.

Results

Access to the labour market and positions

Table 2 presents the results from a series of linear probability multilevel models predicting employment. In Model 1 we only account for educational link strength and the group variables, but not for other demographic characteristics or educational attainment. The model

Table 1. Descriptive information for measurement, separately for study groups ($n = 191,535$)

| | Range | Majority | | Immigrants with domestic qualifications | | Immigrants with foreign qualifications | | % NA |
|-------------------------------------|-----------|----------|-------|---|-------|--|-------|------|
| | | Mean | SD | Mean | SD | Mean | SD | |
| Dependent variables | | | | | | | | |
| Employed | 0-1 | 0.96 | | 0.95 | | 0.92 | | |
| In occupation | 0-1 | 0.37 | | 0.38 | | 0.23 | | |
| Log (income) | 4.32-9.80 | 7.40 | 0.66 | 7.31 | 0.67 | 7.16 | 0.72 | 2.96 |
| ISEI | 16-85 | 46.79 | 15.36 | 45.54 | 15.34 | 41.07 | 16.03 | 5.96 |
| Independent variables | | | | | | | | |
| Link strength | 0.44-3.64 | 1.11 | 0.46 | 1.06 | 0.48 | 1.07 | 0.48 | |
| Female | 0-1 | 0.47 | | 0.46 | | 0.46 | | |
| Age | 16-65 | 44.33 | 11.47 | 38.28 | 10.68 | 42.13 | 11.95 | |
| Married | 0-1 | 0.55 | | 0.58 | | 0.63 | | |
| Number of children present under 10 | 0-7 | 0.24 | 0.58 | 0.44 | 0.76 | 0.31 | 0.66 | 0.01 |
| Upper secondary | 0-1 | 0.54 | | 0.57 | | 0.57 | | |
| Post-secondary non-tertiary | 0-1 | 0.13 | | 0.15 | | 0.11 | | |
| Bachelor | 0-1 | 0.19 | | 0.14 | | 0.14 | | |
| Master | 0-1 | 0.12 | | 0.12 | | 0.16 | | |
| Doctoral | 0-1 | 0.02 | | 0.02 | | 0.01 | | |
| Inverse mills ratio | 0.01-0.50 | 0.09 | 0.05 | 0.13 | 0.06 | 0.13 | 0.06 | 0.01 |
| Full-time employment | 0-1 | 0.75 | | 0.74 | | 0.70 | | 4.43 |
| Work hours | 0-98 | 32.13 | 17.01 | 31.05 | 16.47 | 30.30 | 16.55 | 4.43 |

shows that both immigrant groups are less likely to be employed than the native population. On average, employment probabilities of immigrants holding domestic and foreign qualifications are, respectively, 2 and 4 percentage points lower than those of natives. In line with previous research, we find that an increase in the link strength of educational titles is associated with an increase in employment probabilities. However, this increase is small: a standard-deviation increase in link strength relates to an increase in employment probabilities of less than one percentage point.

In model 2, we control for demographic characteristics (female, age, marital status, number of children under 10 in the household, and educational attainment). In this model the link strength coefficient turns insignificant, suggesting that the positive relationship between link strength and employment probability is mostly due to the fact that demographic and educational groups with higher employment probabilities also hold higher linkage strength qualifications (Model 2). The difference between immigrants and the native majority increases somewhat when controlling for compositional differences.

Model 3 includes the theoretically relevant interaction between migration status and link strength. The

interaction terms are close to zero, suggesting that link strength plays little to no role in differences in labour market access between the three groups under study.

Access to the labour market is unquestionably important, but so is access to *matching* positions (see Table 3). These models provide more specific evidence of inequality with respect to labour market access, because models of employment may mask cases where immigrants are relegated to jobs other than those they are educated for. In a model in which we do not account for compositional group differences (model 1), we find that immigrants who graduated from the German educational system are at an advantage compared to natives (+3 percentage points). However, the probability of working in matched occupations are 14 percentage points lower for immigrants with foreign qualifications than for the native majority. As with the models for employment status, higher link strength is associated with working in matching occupations: a one-standard deviation increase relates to a 9 percentage points higher probability of working in a matching occupation.

Model 2 shows that the advantage of immigrants with domestic qualifications is largely due to compositional differences. Conversely, these differences explain

Table 2. Linear probability multilevel model predicting employment status ($n = 191,535$, $N = 83$)

| Employed (1: yes, 0: no) | Model 1 | | Model 2 | | Model 3 | |
|--|-------------|----------------|-------------|----------------|-------------|----------------|
| | Coefficient | Standard error | Coefficient | Standard error | Coefficient | Standard error |
| Intercept | 0.96* | 0.00 | 0.88* | 0.01 | 0.88* | 0.01 |
| Majority (reference) | | | | | | |
| Immigrant with domestic qualification (DQ) | -0.02* | 0.00 | -0.02* | 0.00 | -0.02* | 0.00 |
| Immigrant with foreign qualification (FQ) | -0.04* | 0.00 | -0.05* | 0.00 | -0.05* | 0.00 |
| Link strength | 0.00* | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| DQ*link strength | | | | | 0.00 | 0.00 |
| FQ*link strength | | | | | -0.00 | 0.00 |
| Female | | | -0.00 | 0.01 | -0.00 | 0.01 |
| Age | | | 0.00* | 0.00 | 0.00* | 0.00 |
| Age*age | | | -0.00* | 0.00 | -0.00* | 0.00 |
| Married | | | 0.04* | 0.00 | 0.04* | 0.00 |
| Number of children present under 10 | | | -0.01* | 0.00 | -0.01* | 0.00 |
| REML | -64492 | | -66121 | | -66103 | |
| Level 1 Variance Individuals | 0.04 | | 0.04 | | 0.04 | |
| Level 2 Variance Educational titles | 0.00 | | 0.00 | | 0.00 | |

* = $P < 0.05$; link strength standardized; in models 2 and 3 we control for educational attainment (ISCED).

very little of either the disadvantaged position of immigrants with foreign qualifications, or the general advantage associated with holding an educational title with a higher link strength.

In Model 3, we allow the effect of link strength to vary by migration background. We find no differences between the native majority and immigrants with domestic qualifications. However, compared to the native majority, educational link strength is less positively related to entering a matching job for immigrants with foreign qualifications. More specifically, a one-standard-deviation increase in educational link strength is associated with a 10-percentage point increase in the probability of working in a matching occupation for the native majority and immigrants with domestic qualifications (0.10–0.00 ~ 0.10), and a 6 percentage points increase for immigrants with foreign qualifications (0.10–0.04 ~ 0.06).

Labour market returns

How do those who manage to gain access to the labour market fare with respect to occupational status and income? This question is especially relevant given the finding that migrants (with occupation-specific qualifications) are less likely to end up in matching

occupations, as this may have severe consequences for labour market returns. We focus on the results for occupational status, as income differences may be more dependent on how successful people are in employment negotiations, a factor which may systematically vary between the native population and people with a migration background (e.g. because of differences in language skills).

Table 4 presents the results of the linear multilevel models. Model 1 shows the differences without controlling for compositional effects. Compared to the native majority, immigrants with domestic qualifications work in jobs where occupational status is around 1.2 points lower. This difference amounts to 7.3 points for immigrants with foreign qualifications. Individuals who hold credentials with a higher link strength generally work in higher status jobs (+3.5 points). Working in matching occupations relates to a small status bonus of 0.4 points.

Demographic characteristics (Model 2) account for slightly less than half of the link strength advantage, and for a small part of the difference between the native majority and immigrants with German qualifications. The disadvantage of immigrants with foreign credentials remains comparatively large (around 7.0 points).

Table 3. Linear probability multilevel model predicting whether respondents are in the occupation they are educated for ($n = 183,071$, $N = 83$)

| In occupation educated for (1: yes, 0: no) | Model 1 | | Model 2 | | Model 3 | |
|---|-------------|----------------|-------------|----------------|-------------|----------------|
| | Coefficient | Standard error | Coefficient | Standard error | Coefficient | Standard error |
| Intercept | 0.29* | 0.03 | 0.57* | 0.05 | 0.57* | 0.05 |
| Majority (reference) | | | | | | |
| Immigrant with domestic qualification (DQ) | 0.03* | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Immigrant with foreign qualification (FQ) | -0.14* | 0.00 | -0.13* | 0.00 | -0.13* | 0.00 |
| Link strength | 0.09* | 0.02 | 0.10* | 0.02 | 0.10* | 0.02 |
| DQ*link strength | | | | | -0.00 | 0.00 |
| FQ*link strength | | | | | -0.04* | 0.00 |
| Female | | | 0.01 | 0.00 | 0.01 | 0.00 |
| Age | | | -0.01* | 0.00 | -0.01* | 0.00 |
| Age*age | | | 0.00* | 0.00 | 0.00* | 0.00 |
| Married | | | 0.01* | 0.00 | 0.01* | 0.00 |
| Number of children present under 10 | | | -0.00 | 0.00 | -0.00 | 0.00 |
| REML | 223481 | | 221239 | | 221176 | |
| Level 1 Variance Individuals | 0.20 | | 0.20 | | 0.20 | |
| Level 2 Variance Educational titles | 0.04 | | 0.04 | | 0.04 | |

* = $P < 0.05$; link strength standardized; in models 2 and 3 we control for educational attainment (ISCED).

Model 3 shows how the relationship between link strength and occupational status varies between the native majority and immigrants. Immigrants with domestic qualifications and the native majority tend to benefit equally from holding high link strength qualifications in terms of occupational status (+1.6 points in status for each standard deviation increase in link strength). As hypothesized (H2), immigrants with foreign qualifications benefit less from holding a qualification with a higher link strength (1.6–0.4 = 1.2-point increase in status per standard deviation increase in link strength). These patterns are thus in line with what we found for access to matching occupations and provide additional evidence that immigrants with foreign occupation-specific credentials end up in systematically different jobs (i.e. with lower status).

We hypothesized that differences by migration background in the relationship between link strength and labour market returns would depend on whether people work in a matching occupation (H3). Figure 1 plots the three-way interactions between link strength, working in a matching occupation, and the migration groups based on a model that includes the three-way interaction and all underlying two-way

interactions (see Table A3). Overall, the positive association between link strength and labour market returns is conditional on whether individuals are employed in a matching occupation. Among the population who works in a matching occupation (left-hand panel), higher link strength relates to higher occupational status for all groups. Moreover, in this population, we find *no* native-immigrant differences in occupational status either among individuals with relatively general qualifications, or those with relatively occupation-specific qualifications. In contrast to H3, foreign-educated migrants working in matching occupations do not profit more from holding occupational-specific qualifications than their native majority and domestically educated counterparts.

For the native majority that does not work in a matching occupation (right-hand panel), higher link strength seems unrelated to occupational status. For immigrants with foreign qualifications who do not work in a matching occupation, higher link strength is associated with lower occupational status. Put differently, immigrants with foreign qualifications experience a larger penalty for not working in matching occupations, especially when holding high link strength titles

Table 4. Linear multilevel model predicting occupational status ($n = 175,818$, $N = 83$)

| ISEI | Model 1 | | Model 2 | | Model 3 | |
|--|-------------|----------------|-------------|----------------|-------------|----------------|
| | Coefficient | Standard error | Coefficient | Standard error | Coefficient | Standard error |
| Intercept | 47.88* | 1.21 | 33.52* | 1.47 | 33.60* | 1.47 |
| Majority (reference) | | | | | | |
| Immigrant with domestic qualification (DQ) | -1.21* | 0.12 | -0.90* | 0.15 | -0.85* | 0.15 |
| Immigrant with foreign qualification (FQ) | -7.34* | 0.11 | -6.96* | 0.14 | -6.86* | 0.14 |
| Link strength | 3.49* | 0.78 | 1.54* | 0.63 | 1.57* | 0.63 |
| In occupation educated for | 0.35* | 0.06 | 0.29* | 0.06 | 0.29* | 0.06 |
| DQ*link strength | | | | | -0.03 | 0.12 |
| FQ*link strength | | | | | -0.42* | 0.11 |
| Female | | | 0.16* | 0.07 | 0.15 | 0.07 |
| Age | | | 0.23* | 0.02 | 0.23* | 0.02 |
| Age*age | | | -0.00* | 0.00 | -0.00* | 0.00 |
| Married | | | 0.10 | 0.18 | 0.05 | 0.18 |
| Number of children present under 10 | | | 0.62* | 0.06 | 0.63 | 0.06 |
| Inverse mills ratios | | | -8.09* | 2.20 | -8.77* | 2.22 |
| Full-time employment | | | 2.68* | 0.08 | 2.68* | 0.08 |
| Work hours | | | 0.04* | 0.00 | 0.04* | 0.00 |
| REML | 1360726 | | 1357466 | | 1357457 | |
| Level 1 Variance Individuals | 134.12 | | 131.69 | | 131.68 | |
| Level 2 Variance Educational titles | 86.17 | | 37.22 | | 37.12 | |

* = $P < .05$; link strength standardized; in models 2 and 3 we control for educational attainment (ISCED).

(i.e. the gap is around 10 status points for the highest link strength titles, and 5 points for the lowest link strength ones). While migrants with domestic qualifications not working in matching occupations also experience a penalty from holding titles with a higher linkage strength (i.e. their slope for link strength is negative), the penalty is more pronounced for migrants with foreign qualifications (difference in the slope is -0.8 points). Moreover, the occupational status of immigrants with domestic qualifications who do not work in matching occupations is indistinguishable from that of their native counterparts, even at the extreme ends of the link strength measure (see [Figure 1](#)).

In sum, and in line with hypothesis 3, the disadvantages that foreign-educated migrants experience in relation to holding an occupation-specific qualification are confined to the population not working in a matching occupation. The findings also imply that, more than for foreign-educated migrants with general qualifications, it is important for foreign-educated migrants

with occupation-specific qualifications to work in a matching occupation. When a matching occupation is secured, occupation-specific qualifications relate to higher labour market returns. However, when a matching occupation is not secured, foreign-educated migrants with occupational-specific qualifications fare worse than those with general qualifications. The profit related to “making the match” is thus more substantial for foreign educated migrants with more occupation-specific qualifications.

[Supplementary Appendix Figure A1](#) presents the findings for income differences. For the group of people who work in matching occupations, findings resemble the patterns for occupational status. For the group who does not work in a matching occupation, more occupation-specific qualifications relate to a lower income for immigrants with foreign degrees, yet a higher income for both the native majority and immigrants with domestic degrees. Hence, the disadvantages associated with holding occupation-specific qualifications

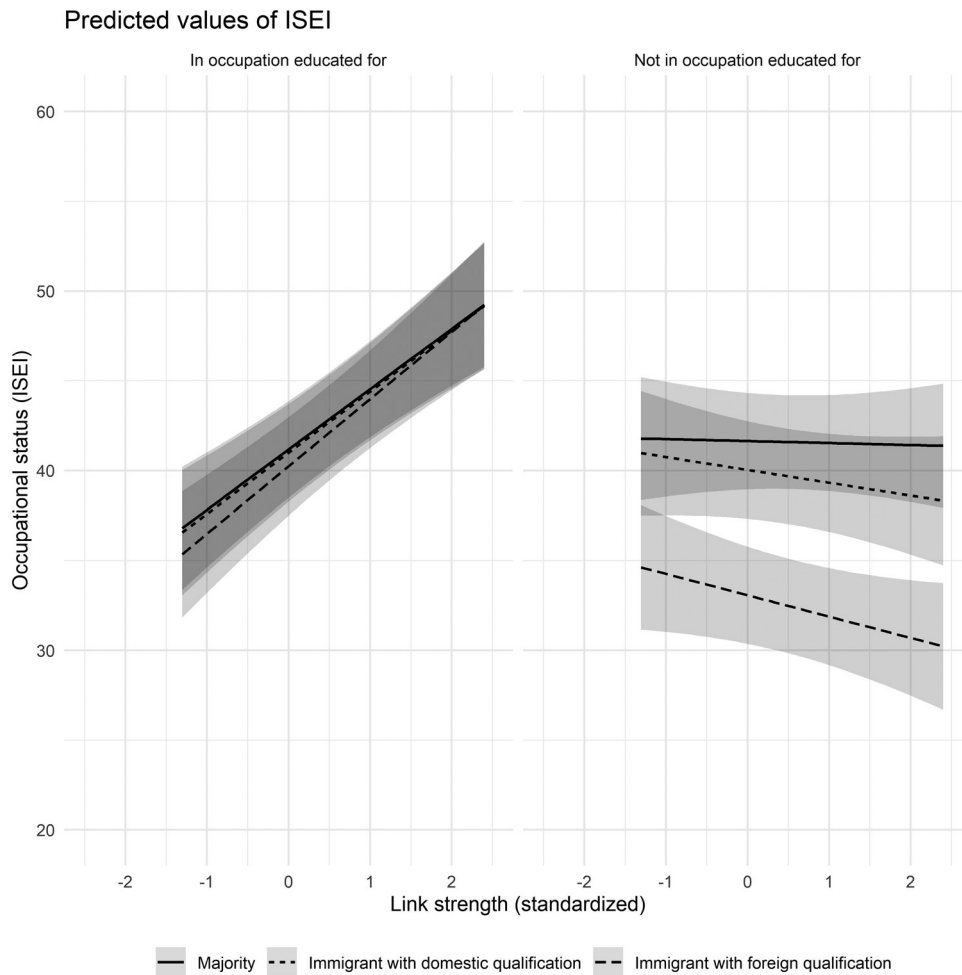


Figure 1. Three-way interaction of link strength, in occupation educated for and group indicators on occupational status scores.

for immigrants with foreign qualifications who do not make the match are even more pronounced for income than for occupational status.

Summary and conclusion

Combining work on (i) the occupational-specificity of educational qualifications and labour market outcomes (Vogtenhuber, 2014; Bol *et al.*, 2019; Muja *et al.*, 2019), and (ii) the role of education in native-migrant labour market inequalities (e.g. Friedberg, 2000; Granato and Kalter, 2001; Tibajev and Hellgren, 2019), we studied how the occupational-specificity of educational qualifications relates to labour market inequality between the native population and immigrants with domestic and foreign qualifications. Previous research showed that occupation-specific qualifications relate to labour market advantages.

However—based on human capital, signalling and credentialing theory—we argued that immigrants with foreign qualifications profit less from holding such qualifications than natives and immigrants with domestic qualifications.

Using the 2014 round of the GMC, we find that members of the native majority and immigrants with German qualifications clearly profit from holding occupation-specific qualifications: they are more likely to work in occupations they are educated for (i.e., occupations that matched their educational level and field), with higher status and earnings. However, as expected, immigrants with foreign qualifications do not profit as extensively from occupation-specific qualifications. For this group, we find a substantially reduced positive impact on working in occupations they are educated for, as well as on occupational status and income.

Prior research already showed that immigrants with foreign qualifications generally fare worse in the labour market than the native majority (e.g. Nielsen, 2011; Lancee, 2016) and immigrants with domestic qualifications (e.g. Lancee and Bol, 2017). However, these studies did not consider how these disadvantages depend on the occupational-specificity of educational qualifications. The current paper stresses the importance of taking this aspect into account by showing that labour market disadvantages for foreign educated migrants are especially pronounced among the population with more occupation-specific qualifications. Our findings also suggest that these disadvantages primarily relate to the penalization of a lack of destination-specific credentials rather than the penalization of migration status as such, as we find few differences between the native majority and immigrants with domestic qualifications. This highlights the importance of differentiating between immigrants with domestic and foreign qualifications.

Our findings underline that to fully understand native-migrant inequality in labour market outcomes, we should not only study employment rates and labour market returns, but also *how* migrants *access* the labour market. More specifically, access to *matching* occupations is one essential mechanism structuring inequality in labour market returns between natives and (foreign educated) immigrants. Among the population that works in a matching occupation, holding an occupation-specific qualification relates to receiving a higher income and working in higher status positions for both natives and immigrants. However, among people who fail to work in an occupation for which they are educated, link strength is unrelated to labour market returns for the native population, yet associated with reduced labour market returns for immigrants with foreign qualifications. In sum, access to matching jobs appears to be the bottleneck structuring the native-immigrant gap in labour market returns and is especially important for foreign-educated migrants with occupation-specific qualifications. Compared to the native majority, foreign-educated immigrants are less likely to secure a matching occupation, and also face higher penalties for not securing such a position, particularly when they hold occupation-specific qualifications. Once immigrants do find matching positions, they are at par with the native majority in terms of labour market returns and benefit similarly from occupation-specific qualifications.

At face value, our results with respect to employment in matching occupation may be interpreted as being in line with human capital theory and to provide limited support for the credentialing theory. We assumed that, among the population working in a matching occupation, people with more occupation-specific qualifications would be more likely to work in (formally)

closed occupations (Bol *et al.*, 2019). Based on credentialing theory, we argued that migrants would gain more from working in such a closed occupation than the native majority, as closed occupations may shield against wage discrimination (Drange and Helland, 2019). Although we find little support for such additional gains, this may be due for the very reason that credentialist mechanisms are at play. That is, immigrants may fail to find work in exactly those (closed) occupations that primarily shelter against wage discrimination. Drange and Helland (2019) showed that jobs characterized by high levels of licensing and unionization equalize wages between immigrants and natives, while jobs characterized by high levels of credentialing and certification do not have this equalizing effect. Migrants may be especially underrepresented in licensed occupations, as these jobs are the most difficult to gain access to (i.e. they are formally closed by law). Unfortunately, we were unable to test this, and future research could profit from data that include information on the level of closure of specific occupations, such as the presence of formal entry tests and unionization. Future studies may also want to include indicators of employment risks—such as a lack of work experience in the specific job—as this plays a crucial role in signalling theory. Including (specific) work experience is also important when comparing natives to (foreign) educated migrants, as this may provide an alternative explanation for why foreign educated migrants work in less desirable jobs.

Our findings generate important implications. First, immigrants with foreign qualifications may profit from investments in destination-country human capital to increase their chances of securing a matching occupation. This will especially apply to those holding occupation-specific qualifications. The viability of this strategy may, however, depend on the concrete nature of the qualification. Some will fall under more stringent licensing requirements which are not easily overcome by investing more in destination human capital but may require immigrants to retake exams to acquire destination credentials. From the perspective of destination countries, it may be important to design policies facilitating the labour market entry of immigrants with occupation-specific foreign credentials.

Immigrants with foreign qualifications may currently also fall behind because employers simply *assume* that they lack occupational-specific skills, even in the absence of a skill gap. Hence, investments in a more informative and efficient system to authenticate foreign educational credentials could also reduce inequality in the chances to secure a matching occupation. Given that it is a reasonable assumption that occupation-specific qualifications incorporate valuable human

capital, destination countries would likely profit from tapping into these skills rather than leaving potential at the wayside—an issue especially pertinent for occupations with severe skill shortages (Brunello and Wruuck, 2019).

Endnotes

1. The [Supplementary Appendix](#) shows robustness analyses in which we also distinguish between migrants originating from non-Western and Western countries. Especially the former group may face problems in having their qualifications recognized and may experience labour market discrimination.
2. The [Supplementary Appendix](#) presents robustness analyses using the Programme for the International Assessment of Adult Competencies (PIAAC) data which include measures of numeracy skills in addition to education thereby providing a more fine-grained measure of productivity. These analyses show essentially a similar pattern although at a considerable loss of power regarding the immigrant case numbers.

Supplementary data

Supplementary data are available at *ESR* online.

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