Skill structure and labor market integration of immigrants in Europe

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Johan Westerman, Swedish Institute for Social Research (SOFI), Stockholm University
johan.westerman@sofi.su.se

Ryszard Szulkin, Sociological Department, Stockholm University

Michael Tåhlin, Swedish Institute for Social Research (SOFI), Stockholm University

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Abstract

Across European countries, immigrants are disadvantaged in labor market attainment relative to natives: foreign-born individuals are less likely to be employed and more likely to be unemployed. Previous research indicates that immigrants' employment chances are better when the share of low-skill jobs in the labor market is large. Upgrading of the job structure, which has taken place in many countries over recent decades, might therefore have hurt immigrants' employment prospects. However, an exclusive focus on skill demand neglects another important development in the skill structure of advanced economies: educational expansion. The rapid rise in skill supply has tended to outpace the decline in the low-skill job share with increasing over-education as a consequence, potentially leading to crowding-out of immigrant workers from employment. Based on data from the European Union Labour Force Surveys (EU-LFS) 2004-2016, we perform analyses that jointly consider the demand and supply sides of labor markets. Our results indicate that the size of the low-skill job sector is positively related to immigrants' employment if and only if those employed in the low-skill sector have low qualifications. In economies with high rates of over-education, where many well-educated natives occupy low-skill jobs, the labor market prospects of immigrants deteriorate.

Introduction

In response to global economic and political turmoil, international migration has reached record levels in recent years. Several European countries now host a large proportion foreign-born individuals. New immigrants are coming to a continent of aging populations and low fertility (Eurostat 2018a). Immigration of working-age people might potentially relieve European welfare systems from the fiscal burdens of costly internal demographic change. However, research on how immigrants fare in the labor market of their destination countries shows that employment rates are relatively low and unemployment rates high among the foreign-born across Europe, but also that there is considerable variation between countries in this regard (see e.g. Dustmann and Frattini 2011, OECD 2018).

There are several factors that may explain why employment and unemployment rates among immigrants vary across countries. Different countries attract (and accept) immigrants with different levels of education and other individual productivity enhancing characteristics (Borjas 1999, Pichler 2011). Previous research emphasizes also the importance of institutional or other country-specific traits such as the structure of the welfare state, the political complexion of the government, the labor market's degree of flexibility, the level of the lowest wages in the economy, the supply of low-skill jobs, the design of unemployment insurance, and the rate of discrimination (Jean et al. 2010; Kesler 2006; Kogan 2006; Meyer Christensen and Pavlopoulos 2010; Reyneri and Fullin 2009; OECD 2007). The major problem faced by comparative research in this area is that the number of reasonable country-level determinants is greater than the number of countries examined. The findings hence become sensitive to the choice of what institutional variables to include in (or exclude from) the analyses and to the sample of countries examined.

The present paper makes two main contributions to the literature on immigrants' employment chances. First, we examine the importance of the skill structure of receiving countries' labor markets by jointly considering supply and demand factors. There are strong reasons to believe that the availability of low-skill jobs affects the employment rate of immigrants, especially among recent arrivals (see, e.g., Kogan 2006, Fleischmann and Dronkers 2010). However, a narrow focus on the demand side – the declining proportion low-skill jobs of all employment – neglects another important development in the skill structure over recent decades: educational expansion on the supply side. If skill supply rises faster than skill demand, highly educated individuals unable to find jobs at their own skill level are compelled to accept jobs at lower levels; over-education hence appears. In turn, as further spelled out below, such educational mismatch may limit employment prospects for immigrants and other marginal workers due to crowding-out. Previous comparative research on immigrant employment has in general not considered this interplay between supply and demand factors.

Our second contribution is to apply fixed-effects (FE) models at the country-year level to data from the European labor force surveys (EU-LFS) for 15 countries in north-western and southern Europe covering the period 2004 to 2016. Previous research on the association between skill structure and immigrant employment has been limited by a short time-frame that has ruled out FE models. With yearly updates of EU-LFS, FE models have gradually become more viable, an opportunity that we exploit here. This modelling allows a more efficient elimination of potentially confounding factors and thus increases confidence in more causal interpretations than what is feasible with standard covariate models. While FE models are obviously not sufficient for causal identification in the more strict sense of eliminating endogeneity bias, they are a significant step forward relative to standard estimation models.

In most of our analyses below, we consider variation over subgroups in the estimated associations between skill structure and immigrant employment chances. Immigrants of non-

European heritage, recently arrived immigrants, and low-educated immigrants are expected to be especially disfavored by a reduction in the availability of low-skill jobs.

The paper is organized as follows. We begin by outlining our theoretical approach and main hypotheses. We proceed with a description of the data and variable constructions and a discussion of our strategy for empirical analysis. The empirical results are then reported in two steps, starting with demand-side models examining the importance of the job structure for immigrants' employment chances before turning to joint supply-demand models of how the skill structure of labor markets is associated with immigrant employment rates. We conclude by discussing our main findings and offering suggestions for future research.

Theoretical approach

Decline of the low-skill job sector

The rate at which the low-skill job sector declines in contemporary labor markets is determined by several factors. Technological change in recent decades has been skill-biased, i.e., the share of high-skill jobs has grown relative to the low-skill job share (see e.g. Acemoglu 2002). The process of technology-induced skill upgrading starts with productivity growth in the manufacturing sector which leads to wage increases in the whole economy via the interplay between supply and demand in the general labor market (Baumol 1967). In turn, rising relative wage costs in sectors with limited productivity growth, including large parts of the service industries, brings falling general demand for low-productive and thus low-skill labor.

Descriptive accounts of advanced economies from the 1960s to date (e.g. Handel 2012) show that this development has led to increasing shares of engineers and technicians relative to manual workers in manufacturing and construction as well as an expansion of high-skill service sector occupations in finance, insurance, education and health care. A general skill upgrading thus implies a gradual shift of labor demand from low-skill to high-skill work. This trend is potentially reinforced by globalization that brings about a movement of manufacturing jobs (of which many are low-skill) overseas, especially noticeable in countries with a relatively compressed wage structure (such as most European countries as compared to the United States) that make low-skill jobs relatively expensive and thus profitable to eliminate or move to less costly environments (Krugman 1994).

A labor market increasingly dominated by highly qualified labor matched to jobs with high skill requirements contributes to a highly productive economy and a large share of high-skill work. However, a less bright side of this process is that the reduction of the low-skill sector may lead to declining employment opportunities for less resourceful groups in the labor market. One example is immigrants to economically advanced countries who tend to have lower educational attainment than the native population (OECD 2014, Eurostat 2018b) and are therefore relatively dependent on low-skill rather than high-skill jobs. Insufficient educational attainment in a context of upgrading skill structures may thus partly explain immigrants' employment disadvantage in western labor markets.

Additional individual-level factors explaining immigrants' disadvantage in the labor market are foreign education, limited labor market experience in the new country, and deficient language skills (see, e.g., Heath and Cheung 2007). Relatedly, prospects of attaining work in the new country are influenced by age at – and time elapsed since – arrival, and whether migration is motivated by economic concerns, family reunification or by experience of persecution. Moreover, country of origin and outright discrimination may also be important

(van Tubergen *et al.* 2004, OECD 2015, 2018). Several categories of immigrants, i.e., not only the formally low-skilled, are hence perceived by employers as relatively less productive than natives.

Jobs in the low-skill sector are usually low-paid and insecure, even if the labor market is regulated, and the appreciation of human capital is less important in this sector, which means that the competition from native workers is less intense (Piore 1986, Kogan 2006, Fleischmann and Dronkers 2010). For many immigrants, a low-skill job may thus constitute a stepping stone for future labor market progress (Kogan 2006), and its attainment may be paramount for integration regardless of the person's qualification level.¹

In sum, the availability of low-skill work is likely to be essential for immigrants' labor market integration, especially for the low-educated but also more generally. As often discussed, in countries with comparatively limited low-skill sectors, such as in Scandinavia, it may be especially difficult for immigrants to find work (cf. Devitt 2011). Accordingly, we expect better labor market opportunities for immigrants in countries with larger low-skill sectors. In previous research, this expectation has been borne out regarding unemployment risks for third country immigrants to the 'old' EU² (Kogan 2006) and for immigrants in general and their offspring in the 'old' EU-countries (Fleischmann and Dronkers 2010).³

The interplay between skill demand and supply

Earlier research on the link between the labor market's skill structure and immigrants' employment chances has tended to focus on the demand side, i.e., the share of low-skill jobs in the economy. However, as indicated above, the supply side of skill – individuals' human capital – is also essential to consider. It is thus important to take into account which individuals are hired to the positions available in the labor market. As outlined in this section,

the relative supply of native well-educated workers might have a strong impact on immigrants' labor market prospects.

In European countries, the rise in demand for high-skill work has generally been exceeded by an even more rapid growth in the supply of highly educated individuals (see, e.g., Tåhlin and Westerman 2020). This development is partly political, partly driven by rational individual behavior. It is common among policy makers to see educational expansion as an instrument with many virtues – raising social mobility, boosting economic growth, providing productive alternatives to unemployment in cyclical downturns – and few drawbacks. At the individual level, expanding educational opportunities sets a process of self-fulfilling prophecy in motion. Due to an excess supply of educated individuals, people with high qualifications are increasingly compelled to accept low-skill work; they will choose not to wait for a qualified job as the queue to these jobs is gradually extended. Meanwhile, due to the abundance of skill supply among job applicants, employers raise educational requirements for entry to positions with work tasks that in reality can be carried out without much schooling or training. The low-educated are hence crowded out into non-employment and average educational attainment among workers in the low-skill sector rises. This compositional change provides a signal for the next generation of students that a higher education is necessary for attaining not only a high-skill job, but any kind of employment. When educational attainment beyond the compulsory level *appears* from an individual viewpoint to be necessary for achieving any type of employment, it *will* become increasingly required also at the aggregate level. Hence, the educational composition will gradually shift upwards, both generally and especially within the low-skill sector, with each generation of labor market entrants. As a consequence, the *availability* of low-skill jobs for less resourceful individuals, who are particularly dependent on such work because they cannot compete for more skilled jobs, will continue to decline, even if the actual share of low-skill jobs would stop falling (Tåhlin and Westerman 2020).

Previous studies (e.g. Gesthuizen and Wolbers 2010, Abrassart 2015) have mainly analyzed crowding-out of the low-educated. Tåhlin and Westerman (2020) argue that crowding-out related to structural over-education is consequential also for young workers, due to their lack of work experience, since high-skill jobs typically require more experience than do low-skill jobs. In the present study, this line of reasoning is extended to immigrants. We suggest that a relatively low appreciation of immigrants' human capital (acquired in their origin countries), including their experience, and their (possible) deficits in (receiving country) language skills make them a relatively disadvantaged group in the competition for jobs, especially for high-skill work. The availability of low-skill jobs is hence expected to be crucial for them, but this availability is reduced not only by a falling share of such jobs but also by rising over-education.

In sum, we extend previous research on immigrants' labor market opportunities by simultaneously considering demand-side and supply-side factors. More specifically, we expect that (a) when the number of jobs with low skill requirements is increasingly limited and (b) when the low-skill jobs that remain to a growing extent are occupied by relatively well-educated native workers, the prospects for successful economic integration of immigrants diminish.

Empirical approach

Data

The European Labour Force Surveys (EU-LFS) are a collection of nationally representative surveys with standardized indicators of employment, education and occupation; see Eurostat

(2018c). The countries selected for the analyses reported below are EU15 except Luxembourg and Greece plus Switzerland and Norway, i.e., the sample of countries contains Austria, Belgium, Denmark, Finland, France, Germany, Ireland, Italy, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, and the United Kingdom.⁴ Information on immigrant status is standardized across countries from 2004 onwards. Thus, the analytical sample includes 194 country-year units of observation from 2004 to 2016.⁵ The number of respondents for any country-by-year combination varies from around 15,000 to around 500,000 (for details see Eurostat 2018c).

Outcome variables: Measuring labor market participation

Our measure of labor market participation is the employment rate, i.e., the employed share of the population in a given group and given year. An alternative measure is the unemployment rate. The unemployment rate, often used in empirical research on economic integration of immigrants, is problematic since it is (usually) expressed as a proportion of the labor force. Individuals not actively looking for a job, including discouraged workers, are thus excluded from this measure. We therefore see the employment rate as the best activity measure for the adult population. In our analyses, we include prime-age persons only, 25-54 years old. In this way, we reduce the impact on the results of the variation between countries in retirement age and the age when young people usually finish their education.

We distinguish several sub-categories among immigrants. We start by calculating employment rates for all immigrants (per country and year). We then calculate employment rates separately for immigrant men, immigrant women, immigrants with no more than 10 years of residence in the receiving country, immigrants born outside Europe, and low-educated immigrants.

In the analyses, we take the gap between immigrants and natives as an indicator of the employment success of immigrants. Gaps can emerge due to a low employment level among immigrants, but also due to a high employment level among natives. A large gap may thus indicate favorable labor market conditions for natives, rather than labor market integration problems of immigrants. By applying fixed effects for countries and years (see further below) such stable country-specific traits are taken into account, as well as fluctuations in cross-nationally general conditions.

Explanatory variables: Size of the low-skill job sector and the interplay between skill demand and supply

As spelled out in detail below, we measure skill demand and supply by aggregate data on occupation and education, respectively, while considering the individual-level match between them. In a first set of empirical models, we examine the impact of skill demand on immigrants' employment chances by estimating associations (by country and year) between the share of low-skill jobs in the labor market and the employment gap between immigrants and natives. In a second set of models, we turn to the joint impact of skill demand and supply by taking both occupational and educational distributions, including occupation-education matches, into account.

In line with the theoretical discussion above, a central task of our analysis is to estimate separate employment effects of skill upgrading and over-education. To achieve this, we use a measurement model suggested by Duncan and Hoffman (1981). They decompose attained education (in years) into three parts: (a) education required in the worker's current job, (b) education attained by the worker that exceeds current job requirements, and (c) education required by the current job that exceeds what the worker has attained. This model (known as

ORU: Over-Required-Under) thus allows estimation of separate payoffs to education dependent on the nature of the job match.

We apply the ORU model, originally designed for micro-level analyses (wage attainment models), to data on occupation and education that we aggregate to the country-by-year level. Skill demand is indicated by ISCO (International Standard Classification of Occupations) categories of the jobs held by individual workers while skill supply is indicated by individual education (coded in ISCED categories; International Standard Classification of Education).

Three skill levels of both education and occupation are distinguished: *high*, *medium* and *low*. The distinction of medium skill as a separate category relies, for both jobs and individuals, on theoretical conventions as well as on empirical grounds (see further below in this section) but is not essential for our theoretical framework, which has the low-skill sector in focus.

ISCO's first digit distinguishes major occupational groups. We classify groups 1 (managers) and 2 (professionals) as *high-skill jobs*; groups 3 (associate professionals), 4 (clerical workers) and 7 (craft workers) as *mid-skill jobs*; and groups 5 (sales and service workers), 6 (agricultural workers), 8 (factory workers) and 9 (workers in elementary occupations) as *low-skill jobs*. This categorization is validated below.

ISCED "classifies educational programmes into seven broad ordinal levels (0 to 6), which ... reflect the degree of complexity of the content of an educational programme ... from very elementary to more complex learning experiences" (Schneider and Kogan 2008: 17). The seven levels are the following: 0=pre-primary education, 1=primary, 2=lower secondary, 3=upper secondary, 4=post-secondary non-tertiary, 5=first stage tertiary, and 6=second stage tertiary education. It is common to collapse these seven levels into three major stages of schooling: primary (levels 0-2), secondary (levels 3-4) and tertiary (levels 5-6) education, respectively. We follow this convention here.

Although the three stages clearly correspond to different amounts of schooling, as indicated by years of education, there is no standard conversion rate between stages and years, not least because such rates tend to vary between countries as well as over time. Still, good proxies are available. For example, according to average expert ratings used in the PIAAC survey for a group of countries similar to the present (see Tåhlin and Westerman 2020), primary education (ISCED 0-2) is on average 8.0 years long; secondary education (ISCED 3-4) adds an average of 3.9 years; and tertiary education (ISCED 5-6) adds a further 3.4 years on average. A complete secondary education would thus typically involve around 12 years of schooling while the corresponding number for a tertiary degree would be about 15 years.

Concerning job-level skill requirements, two international surveys – the European Social Survey (ESS) and the Programme for International Assessment of Adult Competences (PIAAC) – provide data that strongly validate the ISCO-based approximations of skill levels. On average across countries in western Europe, the educational requirements (measured as years beyond compulsory school) among workers in our high-skill job category (ISCO 1 and 2) are 5.2 years in ESS and 5.3 years in PIAAC; in our mid-skill job category (ISCO 3, 4, 7) 2.7 years in ESS and 2.5 years in PIAAC; and in our low-skill job category (ISCO 5, 6, 8, 9) 1.2 years in ESS and 0.6 years in PIAAC.

The match between skill supply and demand is measured by cross-classifying the three educational (ISCED) and occupational (ISCO) levels into a 9-cell matrix (3 by 3 = high-mid-low education by high-mid-low occupation). Each cell contains a specific kind of worker-job match, expressed as a proportion of total employment in a given country-year. The nine cells are labelled LL, ML, HL, LM, MM, HM, LH, MH and HH, with the first letter (L=low, M=mid, H=high) indicating educational level and the second letter indicating occupational level. The structure of this matching procedure is shown in Table 1. The shares of the nine education-by-occupation categories sum to unity for each country-year observation; the size

of any single category (LL, ML, etc.) is hence always 1 minus the sum of the other eight shares.

Table 1

Using this notation, three match measures are constructed as follows:⁶

$$\text{Matched education} = LL * 0 + MM * 0.5 + HH * 1$$

$$\text{Over-education} = ML * 0.5 + HM * 0.5 + HL * 1$$

$$\text{Under-education} = LM * 0.5 + MH * 0.5 + LH * 1$$

Matched education is a measure of labor market development characterized by jointly rising skill supply (educational attainment of individuals) and skill demand (educational requirements of jobs). It is thus a general measure of average skill levels in the population reflecting parallel changes in demand and supply. According to the theoretical discussion above, matched skill upgrading is assumed to affect immigrants' employment chances negatively by reducing access to low-skill jobs.

In contrast to matched upgrading, over-education and under-education both measure skill mismatch, i.e., worker-job combinations where the skill level of the worker differs from that of the job. Mismatch occurs either because more individuals pursue post-compulsory education than can be matched to skilled jobs, resulting in over-education (excess skill supply), or because skill requirements of jobs rise faster than individual education, resulting in under-education (excess skill demand).

Note that $LL=0$ in the scale of matched education does not imply that the LL category (low education, low-skill job) is weighted zero in the analyses, since LL is given by 1 minus the sum of the other eight cells of the matrix. The value zero reflects that LL is the lowest

combined (education/occupation) skill level among the nine distinguished categories. LL can be seen as a measure of available low-skill jobs, i.e., low-skill jobs not occupied by workers with excess (above L, i.e., M or H) education. We expect immigrant employment to decline when other categories expand at the cost of LL's share of total employment.

Setting the mid-level skill values (between 0 for low and 1 for high) to exactly 0.5 assumes that a mid-level education corresponds to half the value of a high-level education. As indicated above, these values can be replaced with empirically grounded numbers of years of education needed for each level. ESS and PIAAC include information on educational requirements in the respondents' jobs and typical years of schooling completed at different stages of education. According to ESS (see above) the average number of years of education required in jobs at the three skill levels is 5.2, 2.7 and 1.2, respectively. On a scale of 0 to 1, with low-skill jobs at 0 and high-skill jobs at 1, the ESS estimates imply that the value of a mid-level education is 0.375 $((2.7-1.2)/(5.2-1.2) = 1.5/4 = 0.375)$ if the value of a high-level education is set to 1. The corresponding value based on PIAAC data (see above) is 0.426 $((2.6-0.6)/(5.3-0.6) = 2/4.7 = 0.426)$. For education, the conversion rate in PIAAC (see above) between stages and years of education is primary = 8 years, secondary = 11.9 years and tertiary 15.3 years. On a 0-1 scale, with low education (primary) at 0 and high education (tertiary) at 1, the PIAAC estimates imply a mid-level (secondary education) value of 0.534 $((11.9-8)/(15.3-8) = 3.9/7.3 = 0.534)$. These empirically grounded values are apparently close enough to 0.5 to not warrant any modification of the conversion rate between stages and continuous measures of educational demands and education. The empirical analyses reported below are therefore based on the simpler 0-0.5-1 scale. Models incorporating ORU measures based on these empirically grounded scales do not substantially alter any of the parameters (results are available upon request).

The three structural measures described in the present section – matched education, over-education and under-education – are calculated for native workers in the age interval 25-54, in order to minimize endogeneity with regard to immigrant employment. Under-education is strongly negatively correlated with over-education: $r = -0.97$ (net of fixed effects for countries and years). This strong correlation introduces collinearity problems. Since our hypotheses are not linked to under-education we omit this component from our models, conceding that the dynamics captured by the over-education and matched education parameters may to some extent reflect changes in under-education.

In sum, for the measurement of the processes linking skill supply with skill demand we distinguish between low-skill jobs held by workers with low education and low-skill jobs held by mid- or high-educated workers. This is equivalent to decomposing the low-skill job sector into two parts: one where skills of workers and skill requirements of jobs are well matched with each other (LL) and another part where workers are over-educated (ML and HL). The decomposition allows a simultaneous analysis of the demand and supply sides of the labor market.

Analytic strategy

The EU-LFS data have a three-level hierarchical structure: individuals are nested within countries and years. The surveys are thus a time-series cross-sectional (TSCS) data set. Our aim is to estimate regression models predicting immigrant-native employment gaps with the measures of the skill structure (see above) as main independent variables.

A common problem in country-comparative studies is omitted variable bias, in our case e.g. institutional variation between countries and compositional differences in the sources of immigration. In order to account for such bias, we apply fixed effects for countries and years

in our models, i.e., dummy variables for countries and years (with one country and one year, respectively, as reference categories) are included as covariates. Fixed effects provide a more efficient way of accounting for stable confounders at the country level and country-common changes at the year level than using explicit controls; the latter tend to exhaust available degrees of freedom and the list of controls can in any case never be complete. The inclusion of yearly fixed effects also adjusts for a break in the time-series of the skill structure parameters in 2011 (due to a shift from ISCO-88 to ISCO-08 as occupational classification).

However, fixed effects do not control for time-variant confounders that vary between countries. In order to control for country-specific business cycle effects, we hence include GDP per capita as an additional control variable. Further, to account for the composition of the immigrant population regarding migration reasons, which is likely to be important for the immigrant employment rate, we use data on the number of refugees receiving asylum for each country and year divided by the size of the already present immigrant population.⁷ Individual-level information on the reason for migration would be preferable, but unfortunately data of this kind exist only in EU-LFS ad hoc modules for two years (2008 and 2014).

Among individual-level covariates, sex, age and education are typically tied significantly to employment rates and therefore need to be taken into account when assessing immigrant-native employment gaps. We control for differences in age and educational attainment between immigrants and natives by weighting individuals with respect to their distribution over three age groups (25-34, 35-44, and 45-54) by three educational levels (primary, secondary, and tertiary). The weighted distribution of age and education (including their interaction) is thus made equal for immigrants and natives across all observed country-years.⁸ Sex is controlled by estimating separate models for women and men.

A common problem with regressions on time-series cross-sectional data is autocorrelation. As a solution, the Prais-Winsten transformation (of the regression equation) takes account of serial correlation of the first order, i.e., one year back in time (see e.g. Wooldridge 2008). Other potential problems include heteroscedasticity of residual error terms and dependence across time and countries. In such cases, Beck and Katz (1995) recommend the use of panel-corrected standard errors. Accordingly, in all regression models below, we apply Prais-Winsten transformations with panel-corrected standard errors.

In the following analyses, we first estimate associations – both with and without fixed effects for countries and years – between the structure of skill demand (the low-skill share of all jobs) and the immigrant-native employment gaps for (a) all immigrants, (b) separately for males and females, and (c) separately for sub-groups according to origin country, time since arrival and educational attainment. In a second step, we repeat the procedure with joint supply-demand models, thus estimating separate effects of matched skill upgrading and over-education.

Results

We begin with a description of the central variables. In figure 1 we show how the employment gap between natives and immigrants develops over time. The overall picture is a rather large cross-country variation regarding both the size of the gap and the direction of its change. In some northwestern European countries the gap is (to a varying extent) narrowing; in some countries of southern Europe the gap is instead widening. As a consequence of this heterogeneous development the average gap during the period is roughly constant. A general deterioration of immigrants' employment chances has thus been avoided despite upgrading skill structures. One explanation might be the increasing share of labor (as distinct to refugee)

immigrants to many of these countries over the examined period, following the integration of eastern European countries into the EU from 2005. Consistent with this explanation, the employment gap for non-European immigrants relative to natives has generally widened since 2008.

Figure 1

The size of the low-skill job sector and its change over time in the 15 examined European countries is displayed in figure 2. In this case as well, there is considerable cross-national variation in levels and direction of change. With regard to levels, Germany, the Netherlands and Switzerland have especially small proportions low-skill jobs (i.e., there are many mid-skill and/or high-skill jobs in the economy) while southern European countries, in particular Portugal and Spain, have large low-skill job shares. Regarding change, the proportion low-skill jobs has declined (and the share of mid- or high-skill jobs correspondingly increased) over the observed time-period in several countries: rapidly in Norway and Sweden, more slowly in Finland, Germany, Switzerland and the United Kingdom.

Figure 2

Finally, as shown in figure 3, the structural change of labor markets has resulted in a matched skill upgrading in almost all examined countries while over-education has increased in nine of the 15 countries; exceptions are Denmark, Germany, Norway, Sweden, Switzerland and the UK. The period has thus been characterized by rising skill levels of both jobs and individuals, i.e., of both skill demand and supply. Due to the differential speed of the two trends – with the growth in skill supply outpacing the rise in skill demand – a rather large and in many countries increasing share of well-educated individuals are employed in low-skill jobs. Both features of the supply-demand dynamics – matched skill upgrading and increasing over-education – are potentially detrimental to immigrants' employment opportunities. We

evaluate these expectations empirically below. But first we assess the separate role played by the change in skill demand.

Figure 3

Low-skill labor demand

Previous research on the link between the skill structure of labor markets and the employment chances of immigrants has focused on the demand side rather than jointly considering skill demand and supply. In order to provide an empirical context that allows comparisons with earlier studies (reviewed in the introduction), we begin our explanatory analyses by estimating the associations between the proportion low-skill jobs and the native-immigrant employment gap, before turning in the next section to matching models. When estimating these associations, we control for compositional differences between immigrants and natives in productivity-related individual characteristics (indicated by age and education), for country-specific economic change (indicated by GDP per capita), and for migration reason (indicated by granted asylums).

As explained above (see section ‘Explanatory variables’), low-skill labor demand is measured by the proportion working in ISCO one-digit categories 5, 6, 8 and 9 (service, agricultural, factory and elementary workers, respectively). According to the theoretical discussion, we expect a positive association between this variable and immigrant employment prospects, i.e., that immigrants’ chances of employment (relative to natives) increase with the size of the low-skill job sector (and hence diminish as the low-skill share of all jobs declines).

In Table 2, we present results for all immigrants, as well as separately for men and women. Estimates in models without fixed effects (1a, 2a, 3a) point in the expected direction, in line

with earlier studies (e.g. Kogan 2006, Fleischmann and Dronkers 2010). A large low-skill job share narrows the employment gap between natives and immigrants. The associations are statistically significant for all immigrants taken together and for female immigrants (models 1a and 3a) but non-significant for males (model 2a). The (significant) regression coefficients indicate that an increase in size of the low-skill job sector with ten percentage points narrows the native-immigrant employment gap by three to six percentage points; hence a substantively strong association.

Table 2

As discussed earlier, omitted variable bias may occur due to unobserved stable differences across countries (e.g. tied to institutional variation and unaccounted compositional differences), as well as time-bound country-common influences (e.g. the financial crisis in 2008-2009). We therefore provide an additional set of tests by running models where stable differences between countries, as well as global trends, are controlled through the inclusion of fixed effects for countries and years.

Apparently, the previous findings do not survive this test. The estimates change direction and are significant, with an unexpected sign, for all immigrants (model 1b) and for male immigrants (model 2b), indicating (surprisingly) that large low-skill job shares widen rather than narrow native-immigrant employment gaps. In contrast, the effects of GDP and granted asylums are (mostly) significant and in the expected direction, both with and without fixed effects: higher rates of economic growth and lower rates of refugee immigration tend to be positively associated with immigrants' employment opportunities.

In Table 3 we run our models separately for three categories of immigrants that can be expected to be especially affected in a negative direction by a reduction of the low-skill job share. These groups include (a) immigrants with a (relatively) short period of residence in the

host country, (b) those born outside Europe (and outside the English-speaking countries in North America and Oceania), and (c) those with low (only primary or less) educational attainment.⁹

Table 3

Estimates in all models without fixed effects for countries and years (4a, 5a, 6a) point in the expected direction. Labor markets with a comparatively small low-skill job share tend to have relatively large native-immigrant employment gaps; a larger low-skill sector thus results in a reduction of the gap (indicated by the negative β coefficient). This pattern applies to all three vulnerable immigrant categories (recent, non-European and low-educated); the association is strongest for non-European immigrants and weakest for recent immigrants.

Again, however, just as in the analyses reported in table 2, the findings are invalidated in the fixed-effects models (4b, 5b, 6b). The estimates change direction and are (except for non-European immigrants) significant with an unexpected sign.

In sum, the expectation that a reduction in demand for low-skill labor has a negative impact on labor market opportunities for immigrants is not confirmed. Empirical findings in earlier research indicating such an association are not validated in our analyses including fixed effects for countries and years. However, as discussed in the theoretical part of the present paper, we believe that an analysis of the process of matching persons to jobs is needed in order to firmly assess the association between skill structure and immigrant employment chances by taking joint account of skill demand and supply.

We suspect, specifically, that the significant associations reported in tables 2 and 3, with large low-skill job shares unexpectedly being tied to poor employment prospects for immigrants, are a net outcome of two underlying gross effects that need to be separated: one of matched

skill upgrading and one of over-education. Both effects are negative for immigrants, but only the former (of matched skill upgrading) clearly reflects a small low-skill job share. The latter effect (of over-education) instead reflects a large low-skill job share: for any given level of skill supply (education), the rate of over-education grows – by definition – in tandem with the low-skill job share. Without separating these two gross effects, the estimated net effect will therefore be biased, not only in size but potentially also in direction. In the following analyses, we consider this potential bias through a specification that considers the interplay between skill demand and supply in the labor market, i.e., the matching between jobs and individual workers.

The interplay between skill demand and supply

In the analyses reported below, we provide estimates of how matched skill upgrading and over-education are associated with the native-immigrant employment gap. The matched skill upgrading parameter, by construction, tests the expectation that a reduction of the labor market's low-skill sector (low-skill jobs held by individuals with low education) is negative for immigrant employment prospects. The over-education parameter tests the additional expectation that crowding into low-skill jobs by individuals with more than compulsory schooling increases competition for these jobs, which is also negative for immigrant employment. In contrast to the analyses in the previous section, the ORU model specification (see above) allows separation between these two parameters, thus taking skill demand and supply into joint account.

Table 4 provides a demand-supply analysis similar in form to the demand-based model presented in Table 2, first regressing the native-immigrant employment gap for all immigrants and then for male and female immigrants separately. We begin by including our indicators of

the matching process (matched upgrading and over-education) with measures of country-specific business cycles (GDP) and the asylum immigration rate as control variables (7a, 8a, 9a).¹⁰

Table 4

In all three models the parameter estimates for matched skill upgrading are positive (i.e., widening the employment gap) and significant. Regarding over-education the association with the native-immigrant employment gap is also positive, but significant only in models for all immigrants. Immigrants' labor market prospects are thus comparatively bleak both (a) in a highly productive economy with a small low-skill sector, and (b) in a surplus schooling economy, with an excess rate of low-skill jobs relative to the supply of well-educated individuals. This implies that when we examine the association between skill structure and immigrant employment we need to consider not only the proportion of low-skill and high-skill jobs, but also the skill levels of individuals who compete for and occupy these jobs. A large share of low-skill jobs may do little for immigrants (and other unprivileged groups) if they have to compete with well-educated native workers when applying for them.

Next, we estimate models (7b, 8b, 9b) with fixed effects for countries and years, hence eliminating the influence of all time-constant variation across countries (stable institutional factors) and all internationally constant variation across years (country-common trends). In all models the parameters involving indicators of the matching process are – in line with theoretical expectations – positive and (except for over-education among women) statistically significant. For men (but not for women), the estimates for over-education are much stronger than those for matched upgrading. This contributes to explaining the unexpected negative association between immigrant employment and the low-skill job rate that we found in the previous section. Apparently, at least in a fixed-effects setting, the low-skill job share is

positively linked to the over-education rate (indeed, for given levels of skill supply, this must be the case); failing to take this link into account – i.e., failing to jointly consider the skill levels of jobs and individuals – leads to biased estimates, potentially not only in size but also in sign (direction).

So far the results clearly indicate that when we combine information on the demand for and the supply of skill we get a sharper picture of how the labor market works and, more specifically, how the interplay between skill demand and supply affects the opportunity structure for immigrant employment.

Table 5

In the analyses in Table 5 we turn to those groups of immigrants that can be expected to have especially vulnerable positions in the labor market. The estimates for recent immigrants, immigrants from non-European countries, and low-educated immigrants all point in the expected direction and are all statistically significant at conventional levels. This applies both to models without fixed effects (models 10a, 11a, 12a) and with fixed effects (models 10b, 11b, 12b). In all fixed-effects models, over-education is a stronger (judging by t-values) predictor of the gap between natives and immigrants than is matched skill upgrading. However, when we compare the results in Table 5 with the results in Table 4 (for men), the differences between estimates are rather small. Thus, there is no clear indication that conceivably more vulnerable groups of immigrants are especially affected by the skill structure; the processes analyzed here seem general rather than specific, although partially different for women and men.¹¹ One possible explanation is that – perhaps due to status-related considerations – low-skill jobs typically employed by female immigrants are less exposed to competition from native well-educated individuals than low-skill jobs typically employed by male immigrants, thus making the over-education effect weaker for women.

Visualizing the skill demand and supply dynamics

To clarify our main findings, and make them more concrete, we display predicted values from model 7b in Table 4; see Figure 4. These values include the two regression equation terms that are functions of matched skill upgrading and over-education, respectively (see equations 1 and 2 above). The two skill parameters are free to vary over the 194 country-year units (indicated as dots in the figure) while all other parameters (GDP, the asylum immigration rate, and fixed effects for countries and years) are held constant; the predicted values are shown on the vertical axes in the figure. On the horizontal axes, actual changes in the six proportions underlying the matched skill upgrading and over-education indicators are shown: LL (low-educated individuals in low-skill jobs), MM (mid-educated in mid-skill jobs), HH (high-educated in high-skill jobs), HL (high-educated in low-skill jobs), HM (high-educated in mid-skill jobs) and ML (mid-educated in low-skill jobs); see table 1 above. In figure 4 we can hence see how the actual pattern of skill demand and supply (indicated by occupational and educational distributions, including their individual-level match) is associated with the immigrant-native employment gap (as predicted by model 7b in Table 4).

Figure 4

We focus our exposition on the cells involving low-skill jobs. A partition of the low-skill job share into one part with employment of low-skill workers (LL) and another part with employment of high-skill workers (HL) shows that these two cells have the strongest associations of all with predicted immigrant-native employment gaps. An (observed) increase of about five percentage points in the LL proportion is associated with a decrease of about four percentage points in the (predicted) native-immigrant employment gap. LL is crucial because it reflects the number of low-skill jobs that are available to low-educated – and plausibly other disadvantaged – individuals. For HL, i.e., low-skill jobs that employ high-skill

workers, a rather modest (observed) increase of two percentage points is associated with an increase in the (predicted) employment gap of almost three percentage points. Hence, in attempting to understand how the job structure influences the labor market opportunities of immigrants it is crucial to take the match between skill demand and skill supply into account. A high rate of low-skill jobs is potentially a positive factor for immigrant employment but the potential is realized only if immigrants do not need to compete for these jobs with well-educated natives.

The patterns in the other cells are less distinct yet provide some additional information. The pattern in the HH cell (high-educated individuals in high-skill jobs) mirrors the pattern of LL, with an opposite slope. The cell including mid-educated workers in mid-skill jobs (MM) shows a rather scattered shape, being on the border between the oppositely sloped LL and HH. Finally, an increase of mid-educated persons in low-skill jobs (ML) is negatively linked to immigrant employment prospects, again an indication of the negative role of over-education for the labor market prospects of immigrants.

Concluding discussion

There is a long tradition of research on labor market processes that generate variation between different groups in society in access to jobs and job rewards. This tradition includes many studies of the differences in labor market prospects between immigrants and natives. There are several reasons why immigrants may be less competitive than natives in the labor market of the host country. Deficient human capital, but also a depreciation of the human capital that individuals bring to the new country, as well as outright discrimination, may be among the causes of immigrants' difficulties in the labor market.

Aside from these general factors, research studying variation between countries in immigrant employment rates has analyzed specific characteristics of the receiving countries' labor markets. Quite often, the size of the low-skill job sector has been at the center of such analyses. This is a reasonable approach given that immigrants are often overrepresented in low-skill jobs (as indicated also by a large literature on over-education among immigrants) and that these jobs may constitute ports of entry for groups that have problems in establishing themselves in the labor market. Cross-sectional studies have also shown that there is a positive association between the proportion low-skill jobs in the economy and immigrant employment chances. An important empirical result of the present paper is that this relationship is conditional on the supply of educated native workers not being so large that existing low-skill jobs become unavailable through over-education. Studies of how the skill structure of labor markets affects opportunities for different groups should therefore consider both the demand for and supply skills. Otherwise, unmeasured effects of supply (potentially involving over-education) will bias the measured effects of demand (the low-skill job share).

We have performed analyses that combine information on the demand and supply sides of labor markets. Our results indicate that the size of the low-skill job sector is positively related to immigrants' employment if and only if those employed in this sector have low qualifications. Furthermore, in an economy where many well-educated native persons hold low-skill jobs, the prospects for immigrants tend to deteriorate. Thus, our over-arching conclusion is that the *availability* of low-skill jobs, as determined by the size of the low-skill job sector *as well as* the proportion of educated persons in that sector, affects the employment outcomes of immigrants (relative to natives). In other words, a situation where well-educated natives are compelled to accept low-skill jobs in an otherwise upgrading economy creates the most unfavorable conditions for immigrants with respect to their employment opportunities.

To get a job is of course a necessary step in the process of labor market integration of immigrants. However, concerns about the prospects of immigrants in the labor market of receiving countries may also include considerations of job quality, including earnings, on-the-job learning and training, promotion prospects, work intensity, and job autonomy. Recent comparative research analyzing “ethnic penalties” examines the relationship between favorable employment opportunities for immigrants and their job rewards once employed (Panichella 2018). One possible outcome is a trade-off: in countries with relatively high levels of immigrant employment their job quality and earnings may be comparatively low. Conversely, in countries with relatively poor prospects for gainful employment those immigrants who pass the selection process may have relatively high job rewards. Other logical but perhaps less probable possibilities are double penalties and no penalties at all. An analysis of how the interplay between skill demand and supply in the labor market influences the relationship between employment prospects and job rewards among immigrants in European countries would be an important complement to the research presented in the present paper.

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Table 1. Combinations of education and occupation by three levels of skill.

Occupation	Education			
		Low (ISCED 0-2)	Medium (ISCED 3-4)	High (ISCED 5-8)
	Low (ISCO 5,6,8,9)	Low-skill jobs held by Low-skill workers (LL)	Low-skill jobs held by Mid-skill workers (ML)	Low-skill jobs held by High-skill workers (HL)
	Medium (ISCO 3,4,7)	Mid-skill jobs held by Low-skill workers (LM)	Mid-skill jobs held by Mid-skill workers (MM)	Mid-skill jobs held by High-skill workers (HM)
	High (ISCO 1,2)	High-skill jobs held by Low-skill workers (LH)	High-skill jobs held by Mid-skill workers (MH)	High-skill jobs held by High-skill workers (HH)

Note: Table content borrowed from Tåhlin and Westerman (2020).

Table 2. Regression of native-immigrant employment gaps on the low-skill job share

	All immigrants		Men		Women	
	M1a	M1b	M2a	M2b	M3a	M3b
Low-skill job share	-0.309* (-2.55)	0.209* (2.09)	-0.206 (-1.55)	0.264* (2.15)	-0.580*** (-5.37)	0.076 (0.74)
GDP per head (000s of \$ PPPs)	-0.001** (-2.84)	-0.002** (-3.10)	-0.001** (-3.23)	-0.002*** (-3.50)	-0.001** (-2.61)	-0.001 (-1.70)
Granted asylums	0.036** (3.09)	0.036** (3.12)	0.044** (3.10)	0.029* (2.10)	0.046*** (4.58)	0.044*** (3.32)
Fixed effects (countries, years)	Yes		Yes		Yes	
N	194	194	194	194	194	194

*** p < .001 ** p < .010 * p < .050

Data: European Labour Force Surveys (EU-LFS) 2004-2016; panel-corrected z-values in parentheses. Included countries: Austria, Belgium, Denmark, Finland, France, Germany (omitted in regressions for non-European immigrants; see tables 3 and 5), Ireland (no data 2004), Italy (2004 omitted in regressions for non-European immigrants; see tables 3 and 5), the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom. All models are estimated with country-specific auto-correlation parameters. All outcomes are weighted in order to eliminate compositional differences across country-years in educational attainment and age.

Table 3. Regression of native-immigrant employment gaps on the low-skill job share. Three vulnerable subgroups.

	Recent immigrants		Non-European immigrants		Low-educated immigrants	
	M4a	M4b	M5a	M5b	M6a	M6b
Low-skill job share	-0.274* (-2.09)	0.340* (2.25)	-0.471*** (-4.85)	0.255 (1.82)	-0.371* (-2.43)	0.564** (2.84)
GDP per head (000s of \$ PPPs)	-0.003*** (-4.44)	-0.003*** (-3.63)	-0.000 (-0.42)	-0.001 (-0.84)	-0.002* (-2.24)	-0.001 (-0.67)
Granted asylums	0.056*** (3.41)	0.030 (1.57)	0.068*** (6.03)	0.046** (2.82)	0.068** (3.02)	0.052* (2.29)
Fixed effects (countries, years)		Yes		Yes		Yes
<i>N</i>	194	194	180	180	194	194

Notes: see table 2

Table 4. Regression of native-immigrant employment gaps on matched skill upgrading and over-education.

	All immigrants		Men		Women	
	M7a	M7b	M8a	M8b	M9a	M9b
Matched skill upgrading	0.331*** (4.41)	0.219** (2.90)	0.250** (2.89)	0.298* (2.52)	0.407*** (4.31)	0.176* (2.33)
Over-education	0.317*** (3.69)	0.447*** (4.76)	0.217 (1.91)	0.645*** (5.26)	0.160 (1.46)	0.190 (1.82)
GDP per head (000s of \$ PPPs)	-0.002*** (-4.27)	-0.001** (-2.64)	-0.002*** (-4.07)	-0.001* (-2.38)	-0.002*** (-4.13)	-0.001 (-1.37)
Granted asylums	0.027* (2.41)	0.029** (2.65)	0.031* (1.96)	0.017 (1.25)	0.039*** (3.30)	0.043*** (3.29)
Fixed effects (countries, years)		Yes		Yes		Yes
<i>N</i>	194	194	194	194	194	194

Notes: see table 2.

Table 5. Regression of native-immigrant employment gaps on matched skill upgrading and over-education. Three vulnerable subgroups.

	Recent immigrants		Non-European immigrants		Low-educated immigrants	
	M10a	M10b	M11a	M11b	M12a	M12b
Matched skill upgrading	0.390*** (3.70)	0.301* (2.00)	0.562*** (5.17)	0.310** (2.59)	0.311** (2.96)	0.317** (2.68)
Over-education	0.272* (2.32)	0.514*** (3.40)	0.212* (2.32)	0.615*** (3.96)	0.328* (2.20)	0.697*** (4.12)
GDP per head (000s of \$ PPPs)	-0.004*** (-7.22)	-0.002** (-2.77)	-0.002* (-2.04)	-0.000 (-0.40)	-0.002** (-2.90)	-0.001 (-0.62)
Granted asylums	0.047* (2.58)	0.021 (1.13)	0.058*** (4.32)	0.038* (2.38)	0.057* (2.53)	0.045* (1.98)
Fixed effects (countries, years)		Yes		Yes		Yes
<i>N</i>	194	194	180	180	194	194

Notes: see table 2.

Figure 1. Native-immigrant employment gaps (%)

Figure 2. Proportion low-skill jobs (%)

Figure 3. Trends in matched skill upgrading and over-education

Note: Break in all series 2010–11 due to a shift from ISCO–88 to 08

Figure 4. Predicted immigrant employment gaps over observed changes in ed./occ. combinations

Note: Predicted values are computed for observed combinations of values in the cells underlying the variables matched skill upgrading and over-education. Variation in cells linked to either matched skill upgrading or over-education can not be interpreted as controlled for the other variable in this visualization (in contrast to the regression), only for fixed effects, gdp and granted asylums.

¹ However, it should be noticed that it is an empirical question whether unqualified jobs are stepping stones or traps. The future prospects of highly qualified immigrants who take up low-skill positions may very well be limited. Immigrants are often compelled to accept low-skill and low-quality jobs regardless of their individual qualifications. Accordingly, immigrants have a higher incidence than natives of over-education implying relatively small returns to education (OECD 2014).

² According to the EU vocabulary third country immigrants are residents who are not EU citizens and therefore lack the right of free movement between EU countries.

³ Kogan's analysis is based on the European Labour Force Surveys (1992-2000) and Fleischmann and Dronkers' on the second wave of the European Social Survey (2004).

⁴ Recent EU member countries are not included since they have a relatively short (modern) history of immigration. Norway and Switzerland are included due to the relatively extensive long-term immigration into these countries as well as their economic integration with the EU15 countries. We exclude Greece because of missing data on several variables and Luxembourg due to its very small population.

⁵ Ireland lacks data for 2004.

⁶ In the descriptive analysis the measures are multiplied with 100.

⁷ We collected data on granted asylums from both Eurostat and the OECD, as well as the share of the population having received asylum, collected by the WHO. The three measures differed, yet were all positively correlated (r for OECD and Eurostat = 0.49, r for OECD and WHO = 0.59, and r for Eurostat and WHO = 0.49). Since there is no standard regarding which one of them is most accurate, and since they all contain gaps in the time-series, we include all of them in a measurement model (imputing gaps in the data through maximum likelihood procedures) and use the predicted value as a composite indicator of granted asylums.

⁸ Specifically, we make all groups (defined by the cross-categorization of education and age, in total 9 groups) equally sized (1/9 of the analyzed population) for both immigrants and natives across all country-years.

⁹ For analyses taking account of country of origin of immigrants, Germany and Italy lack data for 2004. In the analyses of low-educated individuals, in contrast to all other analyses, educational weights are not applied.

¹⁰ All analyses are performed on data weighted by education and age which removes variation across countries and years, and between immigrants and natives within countries and years, in these variables.

¹¹ Separate analyses for women and men within the examined vulnerable groups would be of interest but are not feasible given the limited number of cases.