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# The value of formal host-country education for the labour market position of refugees: Evidence from Austria

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ABSTRACT

Refugees hosted in countries with advanced economies often work in low quality jobs, regardless of the education they obtained in their home countries. In this paper, I analyse the long-term impact of formal host-country education for refugees on labour market outcomes, using 22 years of microcensus data on Bosnians arriving in Austria during the 1992–1995 Bosnian war. I estimate local average treatment effects using age at the time of forced migration as an instrument for the probability of receiving education in Austria instead of Bosnia. I find that receiving a formal degree in Austria significantly reduced the probability of work below educational attainment and low-skill employment for two decades after arrival. There are visible income differences between holders of Austrian and Bosnian degrees beyond this period. Female refugees benefited significantly more from obtaining host-country education than males.

## 1. Introduction

One of the key characteristics of refugee employment across the high-income world is the low quality of jobs of those who manage to obtain employment. Refugees predominantly find work in low-quality, low-income occupations regardless of education obtained before being forced to flee their country of origin (Bloch, 2008; Brell, Dustmann, & Preston, 2020; Ruiz & Vargas-Silva, 2018; Zwysen, 2019). The magnitude of this phenomenon is sizeable: Dumont, Liebig, Peschner, Tanay, and Xenogiani (2016) note that, in the European Union (EU), "a full 60 percent of employed tertiary-educated refugees [...] are overqualified for the jobs they occupy" (p.27).

In this study, I focus on the difference in the value of formal education attained in the country of origin and the host country to explain the phenomenon of low-quality employment among refugees in the developed world. I exploit a unique institutional setting in Austria, a country that hosted around 90,000 Bosnian refugees during and after the 1992–1995 Bosnian war, to assess the medium to long-term importance of formal host-country human capital acquisition for the labour market position of young humanitarian migrants. To identify causal estimates of the long-term impact of host-country education on employment and job quality, I exploit the unfortunate reality of humanitarian migrants who were unable to decide at what age they were forced to migrate. Depending on the age at the time of arrival in Austria, young Bosnians entered the Austrian education system on an ad-hoc basis: Bosnians aged up to 15 at the time of arrival were immediately obliged to attend compulsory schooling in Austria. Bosnians aged between 16 and 19 at the time of migration, who had almost no chance to complete education beyond compulsory schooling in Bosnia, had access to further education such as the degree granting vocational training within Austria's dual education system. Bosnians above the age of 19 who had finished their education in Bosnia received very little support to get their foreign degrees acknowledged and did not receive vocational training to prepare them for the Austrian labour market. The setting thus allows for comparing medium to long-term labour market outcomes of humanitarian migrants who were aged around these education thresholds at the time of displacement.

The results from the corresponding instrumental variable regressions imply that discouraging humanitarian migrants from pursuing host-country specific education in favour of meeting minimum employability requirements may be short-sighted: Over the observation period from five to 27 years after migration, the age-induced attainment of education in Austria led, on average, to a 11 percentage points lower likelihood to work below educational attainment compared to Bosnians who had attained similar education in Bosnia. Similarly, it led to a 8 percentage points lower likelihood to work in a low-skill profession. The gap in employment quality is largest in the earlier years of stay in Austria and then closes slowly over time. However, income differences are visible even two decades after Bosnians first entered Austria as refugees, implying that the scarring of overeducation extends beyond the period it is measurable in the data. Refugees educated above lower secondary level who did not receive any formal education in Austria

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still earned 16 percent less hourly wage income more than two decades after arrival. Splitting the sample by gender shows that these results are caused by both males and females in the early years after arrival. In the later years, they are largely driven by female Bosnians who, absent Austrian education, are likely to have permanently reverted to professions traditionally open to them in Bosnia prior to forced migration. In addition, the paper presents suggestive evidence that the discount on foreign diplomas is not entirely driven by quality differences in education: The findings show that Bosnian refugees who reside in Austrian federal states where larger co-ethnic networks were present prior to their arrival (and employers therefore had greater exposure to degrees from the former Yugoslavia) faced lower discounts on their education attained in the country of origin.

### 1.1. Contribution to the literature

The starting point of this paper is the observation that most refugees employed in developed countries work in low-quality and low-income jobs even compared to other migrant groups (Bloch, 2008; Brell et al., 2020; Connor, 2010; Dumont et al., 2016; Damas de Matos & Liebig, 2014; Ruiz & Vargas-Silva, 2018; Schultz-Nielsen, 2017; Zwysen, 2019). For example, Zwysen (2019) shows that in Europe, refugees are significantly more likely to work involuntarily part-time or in jobs of low social status than economic or family migrants even after ten years of stay. Similarly, Dumont et al. (2016) show that 60 percent of employed tertiary educated refugees in the EU work in professions that do not in fact require such a high level of education. This number compares to an estimated incidence rate of 30 percent among tertiary-educated non-EU born migrants that came for non-humanitarian reasons. At a high level, these observations can be partly explained by limitations in destination choices leading to less selection based on economic characteristics, uncertainty regarding the duration of stay in the host country and potential mental health issues resulting from the experience of war and persecution (Brell et al., 2020). On a more practical level, refugees likely face large discounts on their education due to the origin of their degrees: Since displacement happened abruptly, refugees almost exclusively attained their education in geographically and culturally distant countries, and bring no host-country specific human capital with them (Dumont et al., 2016).

Academic literature on the cross-border transferability of educational degrees indeed documents that foreign degrees are not easily transferable across borders, in particular from less developed countries where refugees mostly originate from. The returns to education in the hosting country are larger than for similar schooling attained abroad, and the value of foreign education decreases with cultural distance (Aleksynska & Tritah, 2013; Chiswick & Miller, 2009). Three reasons may explain these observations. First, in the European context, the quality of education vastly differs between origin countries of humanitarian migrants and more economically developed destination countries (Bonfanti & Xenogiani, 2014; Dumont & Monso, 2007; Hanushek & Woessmann, 2011). A second closely related reason is the weaker signalling effects of foreign diplomas compared to host-country education in the tradition of Spence (1973). In the migration context, this phenomenon has been coined "screening hypothesis" by Chiswick and Miller (2009): Risk averse employers may discount schooling abroad more heavily depending on the perceived distance to host-country education. For humanitarian migrants in developed countries this distance is often large. As a consequence, migrants with foreign degrees are also subject to statistical discrimination, making it relatively more difficult to get access to quality employment (Zwysen, 2019). Third, on the more practical side, humanitarian migrants often struggle to produce evidence for their past qualifications (European Commission, 2016b).

Attaining formal degrees has to be distinguished from two other types of host-country human capital in the general context of migration (Zwysen, 2019): Host-country language acquisition and naturalisation defined as the acquisition of the host-country nationality. Studies on the importance of host-country language skills for income and wages of immigrants in general date back at least to McManus, Gould, and Welch (1983), who showed that language proficiency explains much of the Hispanic wage differences in the US. Since then, a range of studies have confirmed the causal relationship between language skills and labour force participation, employment and earnings of immigrants in different countries and migration settings (Berman, Lang, & Siniver, 2003; Bleakley & Chin, 2004; Chiswick, 1991; Chiswick & Miller, 1995; Dustmann & Fabbri, 2003; Dustmann & Van Soest, 2002; Lochmann, Rapoport, & Speciale, 2019). The literature of the effect of naturalisation on the economic integration of migrants typically exploits (changes in) eligibility thresholds to acquire citizenship. Studies find a large positive effects of naturalisation on employment rates and wages among immigrants, with marginalised populations and women benefitting the most from acquiring host-country citizenship (Gathmann & Keller, 2018; Govind, 2021; Hainmueller, Hangartner, & Ward, 2019). The mechanisms these studies put forward as potential explanations for their findings include access to public sector employment, certainty regarding the stay in the host country and signalling that overcomes discrimination (Govind, 2021).

Some descriptive studies specifically analyse the resulting discount refugees face on their formal education in developed countries. Using data from the 2003 wave of the New Immigrant Survey, Connor (2010) first shows that while refugees have similar employment rates compared to non-humanitarian migrants in the US, they earn less and work in occupations of lower status. His results then show that schooling in the US is more highly associated with working in skilled occupations for refugees than economic migrants when total schooling is controlled for. Damas de Matos and Liebig (2014) use 2008 EU-LFS data and show that in Europe, the reason for migration is highly correlated with the origin of the education attained, with the majority of humanitarian migrants holding foreign diplomas. Conditional on the level of education, employment rates of refugees are similar to other migrants but refugees are significantly more likely to be overqualified for the occupation they work in, even once language skills are controlled for. Their findings thus suggest that refugees face a relatively larger discount on their educational attainment than other migrant groups, a finding confirmed by Dumont et al. (2016) using more recent 2014 EU-LFS data. Again using 2008 EU-LFS data, Zwysen (2019) finds similar results and further shows that qualifications obtained in the host-country or having taken steps to get foreign education recognised are associated with a lower likelihood of working part-time involuntarily or in jobs of low social status among migrants who initially came for humanitarian reasons.

While these studies are certainly informative of the overqualification phenomenon among refugees in the developed world, they cannot determine the value of formal host-country education against any valid counterfactual. Since most of the previous work is based on backward reported data from a single cross-section, estimates over time necessarily compare different refugee cohorts (Connor, 2010; Dumont et al., 2016; Damas de Matos & Liebig, 2014; Zwysen, 2019). Pursuing a degree in the host-country could further capture unobservable individual characteristics such as motivation and intelligence or household level characteristics such as parental education, which could lead to a bias in the estimated coefficients on where the education was attained (Willis & Rosen, 1979). Comparing the value of formal host-country education to education attained in the country of origin across the whole age range exacerbates this issue: Among refugees of more advanced age, the self-selection into host-country education is likely to reflect different characteristics than for young refugees who simply continue their interrupted education in a different country.

This paper is the first to provide causal estimates of the long-term value of formal host-country education vis-à-vis similar education in the country of origin. The Austrian setting fulfils the three main criteria that allow to study the effect of formal host-country education on long-term economic outcomes of humanitarian migrants. First, a large

number of young refugees entered into the host country at approximately the same time, such that all migrants migrated into similar labour market conditions and there is sufficient variation between young new arrivals who attained education in Austria and those who had attained similar education in Bosnia. Second, the acquisition of formal host-country human capital was to a large extent exogenously assigned to young humanitarian migrants by their age at the time of arrival, a non-manipulatable parameter. Thus, it allows the researcher to identify causal estimates of formal host-country education vis-à-vis origin country education within an age bandwidth of sufficiently similar treated and untreated units. Finally, out and return–migration (repatriation) rates were sufficiently low and, importantly, did not differ significantly between Bosnian and Austrian degree holders of similar educational attainment over time. The 22 years of Austrian microcensus data utilised for this study allow for testing this important requirement.

While the mechanisms that lead to a discount on foreign degrees are well-documented, the research conducted within this study sheds light on two additional factors that likely drive the low-quality employment of refugee populations in the developed world. The first factor relates to female employment in general and the potential role of cultural legacy in particular. The results show that host-country education decreased the likelihood of female Bosnian refugees in Austria to work in low-skill professions and below their educational attainment more than four times more than for male Bosnians over the observation period of five to 27 years after arrival. In the former Yugoslavia (FY), women traditionally held low-level positions on the labour market, regardless of their educational attainment (Darville & Reeves, 1992; Pascall & Manning, 2000). In Austria, where the institutional setting discouraged host-country education for those who had finished their education in Bosnia, the findings suggest that women may have reverted to jobs traditionally open to them in Bosnia. The second factor relates to the pre-existing share of foreigners in the region of residence. The results show that Bosnians were less likely to be overeducated for their work if they resided in an Austrian region that hosted a larger share of FY citizenship holders prior to the arrival of Bosnian refugees. While endogenous sorting may explain this finding in parts, the effects are sizeable: A one percentage point increase in the share of FY citizens in 1991 decreases the probability of work below educational attainment in later years by slightly less than 2 percentage points for Bosnian but not Austrian degree holders. The finding suggests that the precision of the productivity signal conveyed by foreign education may at least in parts be a function of local employers' prior exposure to education attained abroad. Differently put, overeducation among refugees is unlikely to be explained solely by quality differences in education between the country of origin and the hosting country.

The remainder of this paper is structured as follows. Section 2 provides background information on the institutional conditions Bosnian refugees faced when arriving to Austria, with a focus on a comparison between the Austrian and Bosnian education systems. Section 3 describes the data used for this study, shows basic summary statistics of the working sample and defines the outcome variables. Section 4 lays out the empirical strategy. Section 5 shows the main results and Section 6 discusses the role of Bosnian women and the region of residence as a driver of these. Finally, Section 7 provides a concluding discussion.

## 2. Institutional setting in Austria at the time of the Bosnian war

The Bosnian war lasted from April 1992 to December 1995 and forced around 1.2 million Bosnians to flee their country (Valenta & Strabac, 2013). Due to the specific ethnic composition of Bosnia–Herzegovina and their geographical proximity, about half of these humanitarian migrants sought refuge in neighbouring Serbia, Montenegro and Croatia. The other half, mostly consisting of Muslim Bosniaks, fled to Western Europe where the main recipient countries were – similar to more current inflows of asylum seekers – Austria, Germany and Sweden (Valenta & Ramet, 2011). Depending on estimates, between 86,500 (Valenta & Ramet, 2011) and 95,000 (Bendl, 2014) Bosnians arrived in Austria, making it the main recipient country relative to its population size.[1] For political reasons, Bosnians were granted temporary protection without asylum procedures as soon as they arrived (Tretter, 2000). This initial temporary protection status imposed large uncertainty on Bosnian refugees, closely resembling the uncertainty during long-winded asylum procedures and time restrictions put on residence permits today. The right of residence was initially granted until June 1994 and was then continuously extended until July 1998, when most Bosnians gained permanent residence status (Hageboutros, 2017).

### 2.1. Bosnian refugees and their access to education in Austria

The temporary protection status gave Bosnian refugees immediate access to the Austrian education system. Since no specific regulation governed refugees' rights to education, Austrian authorities simply applied existing general laws to young Bosnians (Tretter, 2000). A simplified overview of the Austrian education system around the time of the Bosnian war is shown in Table 1. The categories based on the ISCED-97 are consistently reported in the Austrian microcensus throughout all observation years from 1998 to 2019.

Depending on their age at the time of arrival in Austria, the probability of attaining Austrian education therefore differed sharply across age cohorts. Three general groups of young Bosnians can be distinguished depending on the age at displacement from Bosnia. First, Bosnians within the compulsory schooling threshold of age 15 were immediately integrated into Austrian schools. This cut-off age for compulsory schooling was strictly implemented (Tretter, 2000).[2] This meant both de jure and de facto that all Bosnians aged below 15 were guaranteed to attain an Austrian degree. Second, those above the age of 15 who had completed compulsory schooling in Bosnia had access to upper secondary schooling. For most Bosnians, this meant entering into the Austrian dual education system which offers various options of vocational training. Some restrictions applied in the early years of arrival as the maximum quota of foreign workers of 8 percent (later 9 percent) included employment within degree-granting apprenticeships, an institutional feature discussed in more detail in online appendix A. I show in online appendix B.4 that these initial limitations did not systematically alter the educational trajectories of young Bosnians compared to the slightly older cohort. The upper secondary schooling also included access to the academic secondary schools ("AHS Oberstufe") which, after graduation, grant students access to tertiary university education. However, like older cohorts in Bosnia and likely further aggravated by language barriers (Kauffmann et al., 2002), the share of Bosnians who pursued university education was very low (see also Fig. 2). Finally, the situation for Bosnian refugees who had finished their education before displacement stood in stark contrast to that of younger arrivals. Bosnians of adult age had access to language courses organised locally but did not receive structured additional support to integrate into the Austrian education system (Tretter, 2000).

One of the challenges when placing foreign degrees into the domestic education system is the comparability of degrees. In the Austrian microcensus, respondents and trained interviewers determine the Austrian degree that most closely corresponds to the foreign degree held by

[1] Bosnians in Austria never received full refugee status and were always considered de-facto refugees (Tretter, 2000). For the remainder of this paper, I will use the term refugee to refer to Bosnian de-facto refugees.

[2] Kauffmann, Knapp, Novotny, and Schoch (2002) present anecdotal evidence of Austrian bureaucratic practices at the time, supporting the case that no exceptions were made for Bosnian children who attempted to enter into schooling that was not deemed appropriate for their age.

**Table 1**
Education categories in Austria.

| Expected age at completion | Type of schools and degrees | ISCED-97 | Simplified ISCED categories |
|---|---|---|---|
| 15 (entry: age 6) | Compulsory schooling or below | 0-2 | Low |
| 18 | Academic Secondary School - Upper Cycle | 3A | Medium |
| 16-19 | Dual education (vocational school + apprenticeship); Intermediate Vocational Education | 3B | Medium |
| 19 | Higher Vocational Education | 4 | Medium |
| 20+ | University Education | 5A | High |
| 20+ | Other tertiary education (e.g. Post-Secondary VET, Industrial Master College) | 5B | High |

Notes: Own table based on microcensus Austria, which includes Pre-vocational School ("Polytechnische Schule") in ISCED-97 category 2.

**Table 2**
Education in pre-war Bosnia.

| Expected age at completion | Type of schools and degrees | Simplified ISCED categories |
|---|---|---|
| 15 (entry: age 7) | Compulsory schooling or below | Low |
| 16 | Technical Qualification Intermediate Vocational Education (basic diploma) | Medium |
| 17 | Intermediate Vocational Education (vocational diploma) | Medium |
| 18 | Intermediate Vocational Education (full diploma) | Medium |
| 19 | Intermediate Vocational Education (vocational baccalaureate diploma) | Medium |
| 19 | Academic secondary school | Medium |
| 20+ | University Education | High |
| 20+ | Other tertiary education (e.g. Professional Studies following voc. baccalaureate, Advanced Vocational Studies) | High |

Notes: Own table based on Georgeoff (1982).

the respondent. The information is then used to assign the respondent to a category within the International Standard Classification of Education System (ISCED). For the purposes of this study, ISCED refers to its 1997 system, which came into existence before the start of the observation period in 1998. Greussing (2016) analyses the reporting of foreign degrees in the Austrian microcensus and shows that misreporting is a concern for immigrants from South and East Europe – where Bosnians constitute the major group – that fall into the secondary education category. Her results suggest that misreporting is otherwise low. These findings are corroborated by the comparison of the education systems in Austria and Bosnia at the time of the Bosnian war: While the education systems were very similar along broader education categories, the types of degrees granted within ISCED categories 3 and 4 offer multiple possible translations within and across these medium levels of education. Table 2 shows the pre-war education system in Bosnia. While overall, both the broader high and low education categories very closely resemble the Austrian system shown in Table 1, drawing the line between ISCED categories 3 and 4 based on basic and advanced vocational education is not unambiguous.

For these reasons, the analyses in this paper will make use of simplified ISCED categories – low, medium and high – that can be accurately compared between Austria and Bosnia before, during and after the time of the Bosnian war.

## 3. Data

The analyses in this paper draw on Austrian microcensus data from 1995 to 2019, with the main sample consisting of the years 1998 to 2019 when information on the country where the highest educational degree was attained is available. The Austrian microcensus draws a 1 percent representative sample from the Austrian population and a module is conducted by in-person interviews once every quarter. It is designed as a rotating panel with individuals staying in the panel for five quarters.

For the purposes of this study, Bosnian refugees are identified on the basis of their country of origin reported as "Bosnia and Herzegovina" and the year of migration to Austria. Since the war in Bosnia officially lasted from 6 April 1992 until 14 December 1995, all migrants who arrived in Austria between 1992 and 1995 from Bosnia and Herzegovina

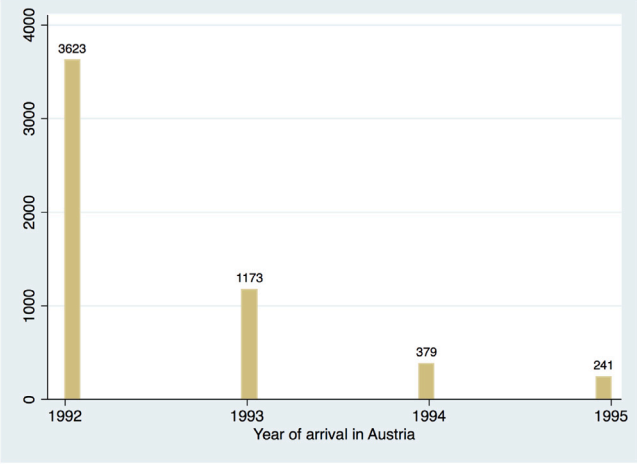


**Fig. 1.** Bosnian war refugees by their year of arrival in Austria.
Note: N = 5416; T = 1998–2019; Pooled sample of Austrian microcensus.

are classified as refugees. The majority of these humanitarian migrants arrived in Austria in the first year of the war. The distribution across arrival years is displayed in Fig. 1.

Between 1995 and 2003, the questions on the year of arrival and the precise information on the country of origin are only included in the first module of every year (Q1). For consistency, I therefore also only include respondents from the first quarter in the analysis for subsequent years 2004 to 2019. In theory, every surveyed person should be included in Q1 of a year at least once. However, any sample attrition could theoretically limit the sample size this way and quarter 2 (Q2) respondents are therefore included if they do not appear in any Q1. By design, a few individuals appear in two Q1 waves of subsequent years. Seven percent of all individuals appear a second time. The Austrian microcensus only includes a question on whether the highest education was attained in Austria or pre-migration from 1998 onwards. All analyses in this study is therefore carried out on the 1998 to 2019 sample.

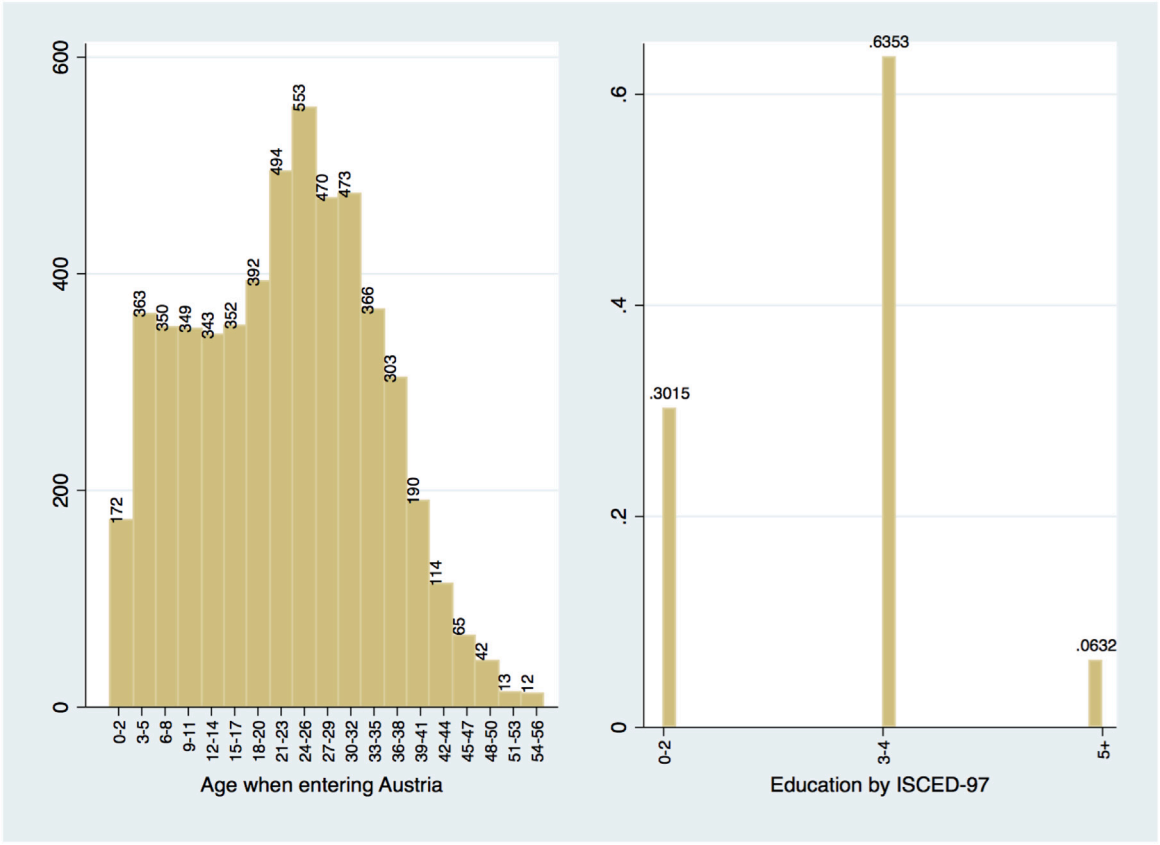


**Fig. 2.** Bosnian war refugees by age at the time of migration and education level. Note: N = 5416; T = 1998–2019; Pooled sample of Austrian microcensus.

### *3.1. Variable of interest: Highest formal education attained in the host country*

The main variable of interest throughout the analyses in this paper is a binary indicator on whether the highest formal education was attained in Bosnia or Austria. From 1998 onwards, the Austrian microcensus reports both the year of arrival in Austria and the year when the highest education was attained. All Bosnians who report having attained their highest formal degree at least one year after their migration to Austria are categorised as holding host-country education. All individuals who report completion of their formal education in the same year or before migration are categorised as not holding a host-country degree. Formally,

$$Host-country\ Education_i = \begin{cases} 1, if & Year_{Highest\ Formal\ Education} > Year_{Arrival\ in\ Austria} \\ 0, if & Year_{Highest\ Formal\ Education} \leq Year_{Arrival\ in\ Austria}. \end{cases} \quad (1)$$

### *3.2. Working sample*

The most striking feature of Bosnian refugees at the time of first arrival in Austria is the young age of migrants, a distribution closely resembling that of humanitarian migrants arriving to the EU in more recent years. More detailed age at the time of forced migration and the education distribution corresponding to the simplified ISCED categories are shown in Fig. 2.

Over the pooled sample, the average age of Bosnians migrating to Austria during the Bosnian war stood at 23.1 years. Most Bosnian refugees were educated at a medium level at the time when their respective interview was conducted, corresponding to ISCED categories 3 and 4.

The left skew of the age distribution allows to define a sufficiently large working sample of Bosnians aged 13 to 22 at the time of forced migration to Austria that fulfils two main criteria. First, the bandwidth of the sample does not move too far away from the main education thresholds such that attaining education in Austria is highly correlated with the age at forced migration within the group. Second, the age group falls within the boundaries of adolescence, such that individuals were at a similar phase of psycho-social development when forcibly displaced (Sawyer, Azzopardi, Wickremarathne, & Patton, 2018). The adolescent age group has been shown to be relatively more resilient to displacement (and potential war) experiences than other age groups (Green et al., 1991). Section 4.2 discusses the choice of the working sample in more detail in the context of the instrumental variable strategy. Table 3 summarises the main characteristics of the working sample. Altogether, the total sample consists of 5,279 observations over the 22 year observation period; the working sample of those aged 13 to 22 consists of 1336 observations. Table A8 of online appendix C.1 summarises the different steps in the sampling. Online appendix C.2 shows additional summary statistics for the full sample. Online appendix C.3 reports summary statistics for both the full sample and the working sample split by gender.

One of the caveats of choosing a relatively narrow age at forced migration bandwidth is that the 3.0% share of highly-educated Bosnians among those displaced between 13 and 22 is slightly lower than the sample average of 5.5%. The main reason is that few Bosnians had completed their tertiary education by age 22 before displacement. We turn to the issue of employment quality among the tertiary educated in Section 5.5.

A second striking feature of Table 3 is the larger share of women compared to men. This common feature of refugee flows into nearby neighbouring countries was exacerbated during the war in Bosnia by forced conscription of draft-age men (Lischer, 1999).

**Table 3**
Working sample: Aged 13 to 22 at displacement.

| Variable | Mean | Std. dev. | Min. | Max. | N |
|---|---|---|---|---|---|
| Low education | 0.304 | 0.46 | 0 | 1 | 1336 |
| Medium education | 0.665 | 0.472 | 0 | 1 | 1336 |
| High education | 0.031 | 0.173 | 0 | 1 | 1336 |
| Host-country education = Yes | 0.468 | 0.499 | 0 | 1 | 1336 |
| Austrian citizenship | 0.399 | 0.49 | 0 | 1 | 1336 |
| Age | 34.061 | 6.615 | 18 | 48 | 1336 |
| Age-squared | 1203.853 | 452.891 | 324 | 2304 | 1336 |
| Age at forced migration | 17.965 | 2.925 | 13 | 22 | 1336 |
| Female | 0.573 | 0.495 | 0 | 1 | 1336 |
| Household size | 3.708 | 1.231 | 1 | 8 | 1336 |
| Married (head) | 0.748 | 0.434 | 0 | 1 | 1336 |
| Single (head) | 0.206 | 0.404 | 0 | 1 | 1336 |
| Widowed (head) | 0.046 | 0.21 | 0 | 1 | 1336 |
| Number of children in household | 1.791 | 0.922 | 0 | 6 | 1207 |
| Number of children < 6 | 0.688 | 0.821 | 0 | 4 | 1207 |

### 3.3. Measuring employment quality

Three different measures of employment quality are calculated to assess the labour market position of Bosnian refugees holding a degree from Austria to those holding a comparable degree from Bosnia. The quality of employment measures that can be consistently produced from the Austrian microcensus between 1998 and 2019 are measures of working below educational attainment and a parsimonious measure of working in a low-skill profession. Information on net hourly wages available in the microcensus between 2011 and 2018 is then used to complement these measures.

The overeducation measure follows the economics of education literature and is calculated using a simplified realised matches procedure in the following way (Aleksynska & Tritah, 2013; Chiswick & Miller, 2009):

$$Overeducated_{i,n,t,c} = \begin{cases} 1, if & Education_{i,n,t,c} > Mode(Education_{n,t,c}) \\ 0, if & Education_{i,n,t,c} \leq Mode(Education_{n,t,c}) \end{cases} \quad (2)$$

That is, an individual is overeducated if individual $i$'s education who works in occupation $n$ in year $t$ is above the modal education of the respective occupation, measured based on the simplified ISCED-97 categories, low, medium and high. Separate modes are calculated for three different age brackets $c$ (age 15 to 29, age 30 to 49 and age above 50) to avoid a cohort mismatch. For example, it is conceivable that young individuals who are at the early stages of their career are more likely to be overeducated for their occupation due to a general increase in education over time. The Austrian microcensus reports professions based on Austria's mapping of national occupations statistics on the International Standard Classification of Occupation 88 (ISCO-88) at the three digit level. The total number of different occupations reported in the Austrian ISCO-88 is 116. From 2011, the Austrian microcensus switches to ISCO-08 where, at the three digit level, 130 occupations are differentiated. Thus, in a first step, the modal educational level is calculated for each ISCO occupation in every year using the entire sample of employed individuals in the Austrian microcensus. The sample size in the Austrian microcensus is sufficiently large to produce reliable modes. In 1998, the first observation year, the total number of employed individuals stood at 29,833. In 2019, the last observation year, the total number of employed stood at 88,166. In a second step, the education level of each employed Bosnian refugee is then compared to the calculated mode of their respective profession to determine overeducation.

Since the Austrian microcensus only reports education categories rather than years of schooling – and thus the realised matching procedure is based on relatively little variation – a more direct measure of working in a low-skill occupation is also calculated:

$$Low\ Skill\ Job_{n,t} = \begin{cases} 1, if & Mode(Education_{n,t}) \leq ISCED-97,\ \text{level 2} \\ 0, if & Mode(Education_{n,t}) > ISCED-97,\ \text{level 2} \end{cases} \quad (3)$$

That is, an occupation is classified as low-skill if the modal education level of workers within the occupation is equal to or below 2 in the ISCED-97 classification or low on the simplified ISCED measure, calculated separately for every survey year t. Thus, all occupations that are primarily carried out by workers with either no education or only compulsory education are classified as low-skill. This measure differs from the overeducation measure in two ways: First, it can be calculated for all individuals, not just those educated above level 2 of the ISCED-97 scale. Second, it relies less heavily on the accuracy of reported education by Bosnian refugees and its translation into the Austrian system. The most frequent occupations Bosnian refugees worked in that the above procedure classifies as low-skill are (i) domestic aid workers, (ii) cleaning staff, (iii) salesperson/supermarket staff, (iv) unskilled labourer in manufacturing and other industries and (iv) construction workers.

From 2011 to 2018, the microcensus data includes information on monthly earnings and monthly hours worked. These information are used to calculate an hourly net wage for each individual to further quantify the long-term value of an Austrian degree vis-à-vis a comparable Bosnian degree.

The main outcome variables are summarised in Table 4, pertaining to the period average of Bosnians who had spent five to 27 years in Austria.

## 4. Empirical strategy

This section describes the empirical strategy to estimate the value of education attained in Austria compared to similar levels of education attained in Bosnia for labour market outcomes. Section 4.1 starts with the baseline specification and 4.2 then discusses the instrumental variable approach in detail.

### 4.1. Baseline specification

The baseline specification estimated by ordinary least squares (OLS) takes the form

$$Y_{i,e} = \eta EducationInAustria_i + \zeta IndividualCharacteristics_i + \kappa_e + \epsilon_i, \quad (4)$$

where $Y_{i,e}$ is the integration outcome of interest for individual $i$ in education category $e$. $Y_{i,e}$ is a binary variable equal to 1 if individual $i$ is employed, works in a low-skill occupation or works in an occupation he/she is overeducated for respectively. For outcomes related to net hourly wages, $Y_{i,e}$ is continuous. $EducationInAustria_i$ is a binary variable equal to 1 if individual $i$ attained his/her highest education in Austria and 0 if the highest education was attained in Bosnia. Its estimated coefficient is the main coefficient of interest, $\eta$. $\kappa_e$ is a categorical variable capturing (simplified) ISCED-97 education categories. The inclusion of $\kappa_e$ is a key feature of (4) since it restricts variation to within education categories such that the only difference between individuals is whether the highest education was attained in Austria or Bosnia. $IndividualCharacteristics_i$ is a vector of control variables, including a dummy for female Bosnians and the time spent in Austria in six four-year brackets (6–9; 10–13; 14–17; 18–21; 22–25; 26+) to allow for a non-linear adjustment path over time while being mindful of maintaining a sufficient sample size in each bracket. We note that to allow interpretability of the coefficients estimated on the time spent in Austria brackets, the baseline regression model does not include survey year fixed effects. As survey year fixed effects could be helpful in accounting for systematic trends in the repeated cross-sectional data,

**Table 4**
Main outcome variables.

| Variable | Mean | Std. dev. | Min. | Max. | N | Sample restrictions |
|---|---|---|---|---|---|---|
| Employed | 0.817 | 0.387 | 0 | 1 | 1336 | None |
| Work in low-skill job | 0.141 | 0.348 | 0 | 1 | 1091 | Employed only |
| Work below education | 0.102 | 0.303 | 0 | 1 | 775 | Employed only, no low-educated |
| Hourly net wage | 11.925 | 5.308 | 2.399 | 52.263 | 219 | Employed only, years 2011–2018 |

online appendix B.1 shows the main results including such a term. Federal state fixed effects are included in the baseline specification to account for the fact that Bosnian refugees were initially only allowed to take up employment in the federal state they resided in Tretter (2000). The federal state fixed effects also help to control for differences in the presence of co-ethnic networks and (the small) variation in local labour market conditions discussed further in Section 6 and online appendix A. $IndividualCharacteristics_i$ also includes a binary indicator of Austrian citizenship following previous literature that has linked host-country citizenship to a better labour market integration among refugees (Gathmann & Keller, 2018; Govind, 2021; Hainmueller et al., 2019). However, the coefficient estimated on the Austrian citizenship indicator should be interpreted with some care: One limitation of the empirical strategy discussed in this section is the lack of a control variable that captures German language skills. Host-country language skills have been shown to have a strong positive effect on labour market outcomes among immigrants (Berman et al., 2003; Bleakley & Chin, 2004; Chiswick, 1991; Chiswick & Miller, 1995; Dustmann & Fabbri, 2003; Dustmann & Van Soest, 2002; Lochmann et al., 2019). In Austria, acquiring Austrian citizenship requires intermediate German language skills.[3] The Austrian citizenship indicator included in the regression analyses therefore proxies for both, basic German language skills and other benefits of acquiring host-country citizenship such as overcoming statistical discrimination. Finally, $\epsilon_i$ is the error term that is clustered on the household level to account for unobserved correlations between household members if members from the same household were interviewed.

Since the quality of employment is only observed for employed individuals, this initial selection could be different for humanitarian migrants who attained education in Bosnia and those who attained education in Austria. For example, in an extreme case where Bosnian degrees are heavily discounted, very few Bosnians without host-country education may find employment. The employed sample of these migrants without host-country education would then differ significantly from the sample of Bosnians who attained host-country education. Online appendix B.2 explains the corresponding Heckman selection procedure following Heckman (1979) to adjust the estimated coefficients for the probability of each observation to be included in the sample of the employed. It shows that this correction does not alter the obtained results.

### 4.2. Instrumental variable approach

Estimates obtained from Eq. (4) provide an association between labour market outcomes and the origin of the highest formal education attained. An issue that needs to be addressed to more accurately capture the causal relation between host-country education and the various employment outcomes is the endogeneity of attaining host-country education resulting from omitted variable bias and reverse causality. Pursuing a degree in Austria could capture unobservable individual characteristics such as motivation and intelligence or household level characteristics such as parental education, which would potentially bias the estimated coefficients. The direction of such bias is a priori ambiguous and has occupied scholars for decades (Willis & Rosen, 1979). In the context of humanitarian migration, it is possible that more capable individuals are able to assess the value of pursuing host-country education more accurately, or that less capable individuals are discouraged from attaining education due to the higher barriers to entry caused by, for example, the different language. This kind of self-selection could potentially lead to an upward bias in the estimated coefficients. On the other hand, if host-country education is seen as a last resort following an unsuccessful entry into the labour market, we may observe a downward bias in coefficients when estimating the value of host-country education for employment and employment quality. This endogeneity problem of attaining education in Austria is tackled by an instrumental variable approach.

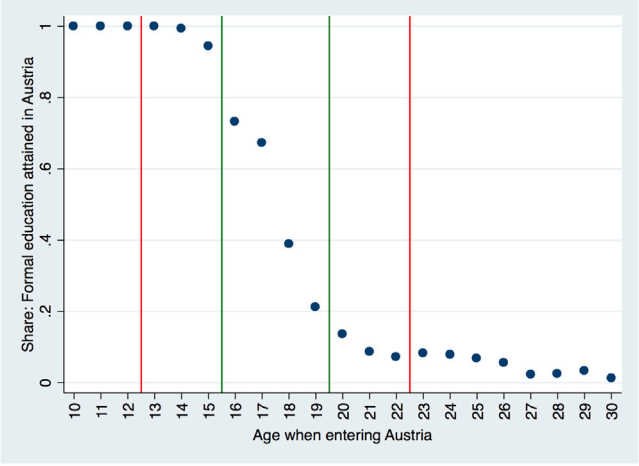


**Fig. 3.** Education in Austria and the age at the time of forced displacement.
Note: N = 3007; T = 1998–2019; pooled sample. The green lines indicate education cutoffs. The red lines indicate the bandwidth chosen for the main regression analyses.

The instrumental variable approach exploits the fact that many Bosnian refugees were of young age when they entered Austria. Since Bosnians were displaced forcibly and unexpectedly, they had no control over their age when migrating. The immediate access to education that was granted to Bosnians and the strictly implemented education laws explained in detail in Section 2.1 thus led to a strong correlation between the age at the time of arrival and the probability of attaining host-country education (Fig. 3).

In the corresponding instrumental variable regressions, the first stage of the two-stage least squares (2SLS) model then takes the form:

$$EducationInAustria_{i,e} = \eta AgeAtTimeOfArrival_i + \zeta IndividualCharacteristics_i + \kappa_e + \nu_i, \quad (5)$$

where the categorical variable $AgeAtTimeOfArrival_i$ is used to predict the probability of an individual having received their highest education in Austria instead of Bosnia, $EducationInAustria_{i,e}$.

The suggested instrumental variable approach laid out above requires a careful reflection. The identifying assumption that age at the time of forced displacement only affects labour market outcome through its effect on where the highest education was attained, and thus

[3] Regulated by §10a of the Austrian Citizenship Act (Staatsbürgerschaftsgesetz) and the Austrian Integration Act (Integrationsgesetz), acquiring Austrian citizenship after six years of stay in Austria requires language skills at the B1 level (Common European Framework of Reference for Languages) or the B2 level, depending on other parameters measuring integration.

serves as a valid instrument, likely only holds for an age bandwidth that is sufficiently narrow. Two main rationales guide the choice of the bandwidth. The first rationale follows from the literature on displacement studies. Since age is a direct determinant of psycho-social development, the forced migration experience could have had heterogeneous effects on migrants across different age brackets, with potential differing repercussions on mental well-being (Porter & Haslam, 2005). Mental well-being itself could in turn affect the performance on the labour market (Freitas-Monteiro & Ludolph, 2021). The age group relevant to the research question at hand is that of adolescents, an age group defined by the medical literature to range from 10 to 24 years (Sawyer et al., 2018). Medical studies on adolescent refugees displaced and hosted in high-income countries are indeed typically conducted on a population aged between 11 and 24 (see Fazel, Reed, Panter-Brick, and Stein (2012) for a meta-analysis). One of the key reasons for separating adolescents and children from older populations is their relatively higher resilience to stresses of displacement (Green et al., 1991). Thus, under the assumption of homogeneity in adolescents' psychological response to forced displacement, the bandwidth can then be chosen based on the institutional setting refugees faced in Austria at the time of arrival. The important education cutoffs for Bosnian refugees as shown in Table 1 were 15, the age when compulsory schooling is completed, and 19, when upper secondary schooling is completed. Thus, Bosnians would typically start upper secondary education at age 16. In our preferred specification, we therefore move, symmetrically, three years to the left and three years to the right of these cutoffs, such that the working sample consists of those aged 13 to 22 at the time of displacement, leaving a total pooled sample of 1354 individuals.

The second related rationale for the choice of the bandwidth is technical. For any given bandwidth, estimates are subject to the bias versus precision trade-off faced in regression discontinuity designs (Hahn, Todd, & Van der Klaauw, 2001). The chosen bandwidth of Bosnians aged 13 to 22 reflects this tradeoff. On the one hand, it leaves a working sample sufficiently large to precisely estimate the effects of interest and study heterogeneous treatment effects across time and groups. On the other hand, it does not move too far away from the education cutoffs, avoiding the inclusion of relatively younger and older individuals outside the group of adolescents, where the exclusion restriction is less likely to hold.

Despite these careful considerations, the definition of the bandwidth remains arbitrary. It is therefore important to show that the main results are not dependent on this choice. To do so, I show in online appendix B.3 that the main results hold when the bandwidth is widened to any range between 10 to 25 (and thus, to cover the whole spectrum of adolescent age) or narrowed down to 16 to 19, in line with some of the more conservative age band choices of studies on adolescent refugees (see for example Sujoldžić, Peternel, Kulenović, and Terzić (2006)).

A second consideration related to the validity of the instrument pertains to the external versus the internal margin of schooling attained in Austria. The chosen bandwidth makes the implicit assumption that it is the Austrian degree per se, rather than the internal margin of Austrian schooling measured by the years of schooling in Austria, that predicts employment quality. The institutional setting in Austria makes this assumption likely to hold for all individuals aged above compulsory schooling age: Bosnians who did not finish their upper secondary education in Bosnia were unlikely to get their incomplete upper secondary training acknowledged and had to start over on this part of their education (Tretter, 2000). For those aged within compulsory schooling age, the preferred working sample of 13 to 22 year olds only includes individuals who received a maximum of three years of compulsory education. Nevertheless, in online appendix B.6, I show that it is indeed likely to be the Austrian degree, rather than years of school attendance, that drive the main results in both the working sample and among those who migrated when still being subject to compulsory schooling.

A third important requirement of the IV approach is to account for the possibility that forced migration altered education choices in the host country. For example, having attained a level of education above basic compulsory education for those aged slightly above compulsory schooling age in Bosnia when forcibly displaced is unlikely. Those who were displaced at that age could have chosen to pursue higher education in Bosnia but, due to the altered institutional structure, did not do so in Austria. Similarly, incentives to attain education could have been altered for younger cohorts if, for example, young Bosnians or their parents were aware of the value of Austrian education for the job market prospects of their children. Accounting for these potential alterations by conditioning estimates on education category fixed effects is therefore necessary and to a large extend remedies the concern. However, even when variation is restricted to within education categories, the quality of graduates within each education category could be altered compared to a counterfactual of no forceful displacement when different individuals select into the different education categories. In online appendix B.4, I analyse this potential issue in more detail and show that those aged between 16 and 18 at the time of forced migration were indeed less likely to be educated beyond compulsory schooling compared to Bosnians slightly older and slightly younger at the time of displacement. The section further shows the results of robustness tests that excludes this age group from the analysis.[4]

The fourth concern pertains to the accurate reporting of age. In theory, if humanitarian migrants knew that a lower age could increase their chances of receiving a residence permit or access to education, manipulation could become desirable. Two observations mitigate this risk. First, the majority of Bosnians entered Austria within the 1965 Austrian–Yugoslav agreement on Visa Policies, which allowed visa-free entry into Austria for three months but required a legal crossing of the Austrian border, suggesting that Austrian authorities had evidence of their age (Franz, 2003). Second, a conventional manipulation at the threshold test following McCrary (2008) is presented in Fig. 4 for the various relevant age thresholds where these manipulations could have occurred. These tests show no evidence for systematic misreporting of age at the time of arrival.

A fifth requirement for the validity of the instrument is that differences in out and return–migration (repatriation) rates between treated and untreated units must be sufficiently low so the sample composition does not change over time. If sample attrition varied between Bosnians holding an Austrian degree and those who do not due to differing success rates on the labour market, the estimated coefficients on the value of Austrian vis-à-vis Bosnian degrees could be downward biased. Two observations mitigate the concern. First, a key feature of the humanitarian migration flows from Bosnia to Austria during the Bosnian war is that return migration to Bosnia was generally low in its aftermath. A displaced population study carried out by the Bosnian government in 2005 estimated the official number of refugees still present in Austria to be around 82% of those originally displaced (Valenta & Ramet, 2011). Second, a test comparing the share of Austrian degree holders among Bosnian refugees in the Austrian microcensus over time shows that this share is constant.[5] This is shown in Fig. 5, where the margins are derived from a probit regression of a binary indicator that takes the value one if education was attained in Austria (and zero otherwise) on a categorical survey year fixed effects term.

[4] A very subtle further assumption the suggested approach makes is that there are no differences in how those with a higher innate ability behave at any given age relative to others. For example, if an 18-year old highly capable Bosnian who completed education in Bosnia decided that re-doing their education is worthwhile, while a similarly highly capable 19-year old would not, and all less capable Bosnians aged 18 and 19 would never re-do their education, the age at the time of arrival would partly predict innate ability.

[5] If, for example, holders of Austrian degrees were less likely to return to Bosnia, this share would increase systematically over time.

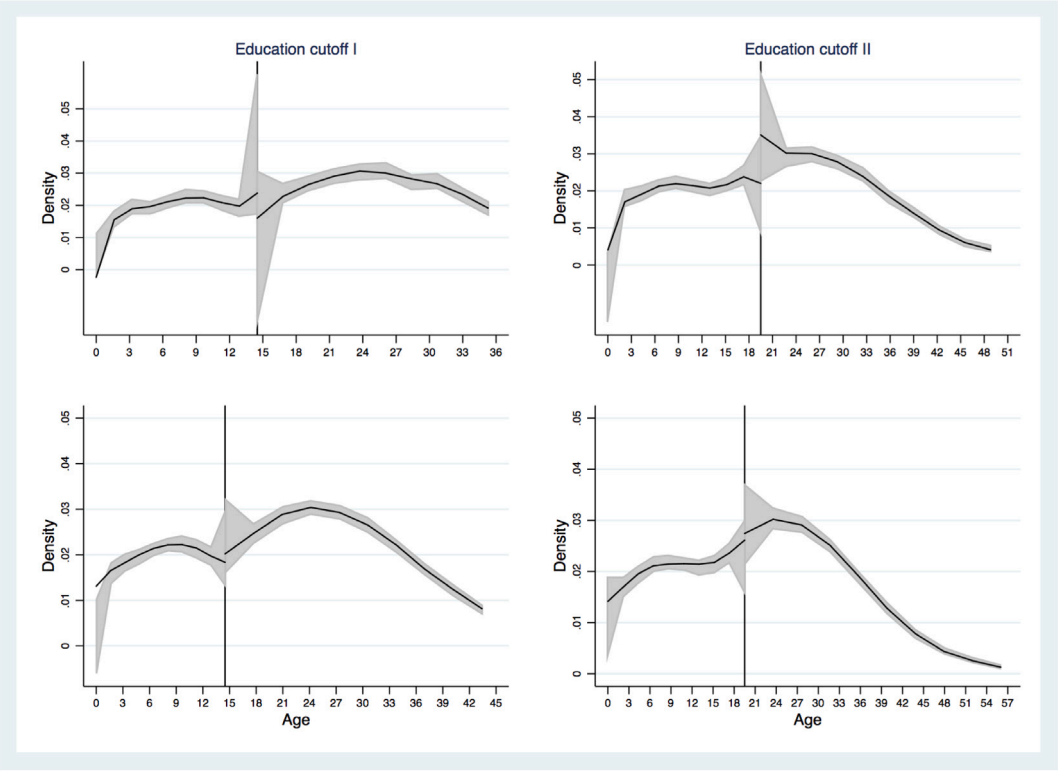


**Fig. 4.** McCrary test for manipulation at age thresholds.
Note: Education cutoff I refers to the age of arrival between 14 and 15, just before the end of compulsory schooling in Austria. Education cutoff II refers to the age above 19. 19 is the age when all upper secondary education is typically completed and beyond which entering into vocational education may be considered inappropriate by employers. The top graphs show 4th order local polynomials. The bottom graphs show 3rd order local polynomials. The shaded area shows 95% confidence intervals. Age range differs due to data-driven bandwidth selectors.

We note that in the 2SLS procedure, conditioning estimates on covariates such as age and potential work experience is neither possible nor desirable since these variables would be highly correlated with the instrument by construction.

Finally, tables A13, A14 and A15 of online appendix C.4 further report differences in individual-level and household characteristics between Bosnians aged 13 to 22 at forced displacement who attained formal education (FE) in Austria vis-à-vis those who did not by three age-at-migration cohorts (13–15, 16–19 and 20–22) to further facilitate the interpretation of the local average treatment effects estimated by the 2SLS model.

### *4.3. Reduced-form model: Linking labour market outcomes to the age at forced migration*

Section and 4.2 lay out the estimation strategy that links the attainment of host-country education to labour market outcomes in the host country. The key idea described in Section 4.2 is that the decision to attain formal education was to a large degree determined exogenously for young Bosnian refugees who integrated into the Austrian schooling system depending on their age at the time of forced migration. To complement the 2SLS approach described in Section 4.2, a reduced-form model that links the main labour market outcomes to the age at the time of forced migration directly is estimated. While this approach does not allow for drawing definite conclusions regarding the link between labour market outcomes and host-country education, it has the advantage that no further assumptions are required to give these estimates a causal interpretation.

The specification to estimate the reduced-form model takes the following form:

$$Y_{i,e} = \eta AgeAtTimeOfArrival_i + \zeta IndividualCharacteristics_i + \epsilon_i, \quad (6)$$

where the main variable of interest, $AgeAtTimeOfArrival_i$, is included as either a continuous or categorical variable. It is used to predict if individual $i$ is employed, works in a low-skill occupation or works in an occupation he/she is overeducated for respectively. The full results of this exercise are shown in Section 5.1.

## 5. Results

This section presents the results. It is structured as follows. Section 5.1 starts by showing and discussing the results of a reduced-form regression that links the age at the time of arrival in Austria to labour market outcomes. Section 5.2 shows the main results of a pooled sample regression of the employment and employment quality indicators on the variable indicating whether or not the individual attained formal education in Austria. Section 5.3 shows how these estimates change over the duration of stay in Austria. Section 5.4 then shows the effect host-country education vis-à-vis origin country education had on wages after more than two decades of stay in Austria. Finally, Section 5.5 provides a descriptive discussion on the labour market position of the small number of tertiary educated Bosnians that may not be entirely captured by the suggested IV approach.

### *5.1. Reduced-form estimates: The relation between employment outcomes and the age at the time of forced migration*

This section discusses the results obtained from a reduced-form pooled OLS regression of employment and the two employment quality measures on the age at the time of forced migration as specified in Eq. (6). Table 5 first shows the results for the working sample aged 13 to 22 with the "Age when entering Austria (AT)" variable defined a continuous.

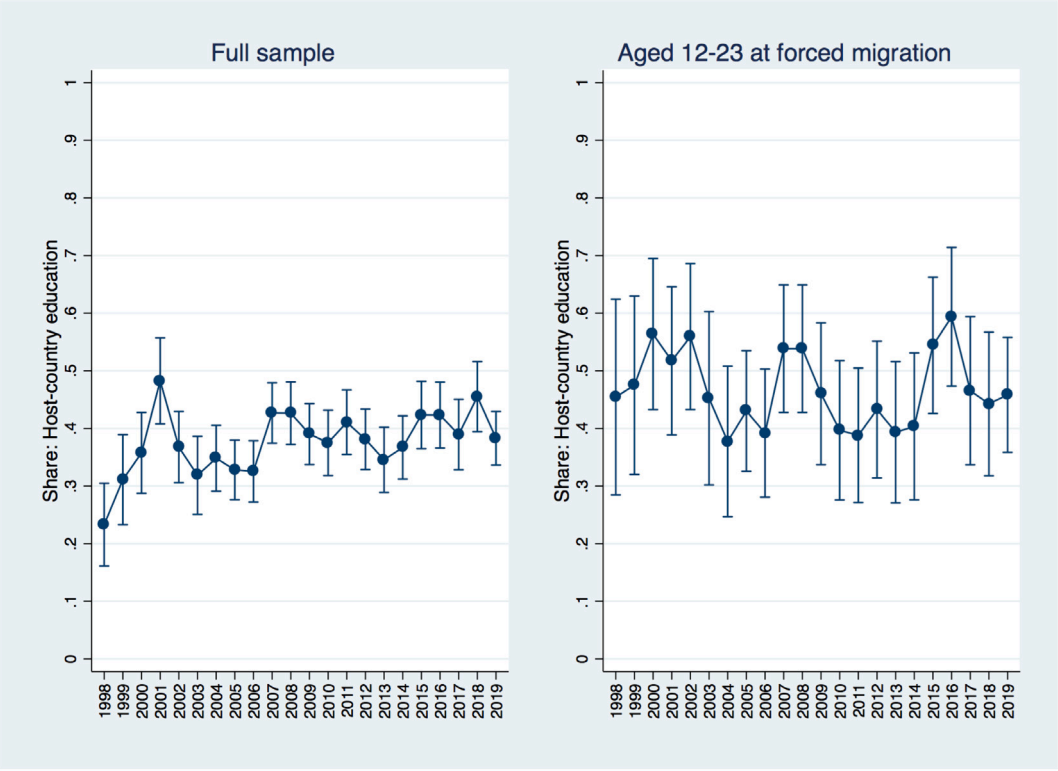


**Fig. 5.** Relative attrition rates in the Austrian microcensus by country of educational attainment.
Note: Full sample (left hand side) and working sample of those aged 13 to 22 at the time of forced migration (right hand side). The $x$-axis shows the microcensus survey year. Margins are derived from a probit regression of a binary indicator that takes the value one if education was attained in Austria (and zero otherwise) on a categorical survey year fixed effects term. The vertical bars show 95% confidence intervals.

Column (1) of Table 5 shows that the age when entering Austria does not affect the probability of obtaining employment for individuals aged between 13 and 22 at the time of forced displacement. The estimated coefficient is close to zero and not significant at any conventional statistical level. Columns (2) and (3) show that the age at time of forced displacement is negatively associated with employment quality. The results show that an additional year of age at the time of forced migration increases the probability of working in a low-skill job and below educational attainment by 0.9 percentage points and 1.2 percentage points respectively over the pooled observation period from 1998 to 2019.

A limitation of the above approach is that it does not allow for non-linearities in the age at forced migration variable. To allow more flexibility in the effect of age at forced displacement on labour market outcomes for different age at forced migration cohorts, the same pooled regressions are estimated with the "Age when entering AT" variable defined as categorical. The estimated coefficients are shown in Fig. 6. For illustrative purposes, results are shown for a wider age range, with the area between the red vertical lines constituting the working sample used for subsequent analyses.

We observe no distinctive differences in the estimated probability of employment over different age at time of forced migration cohorts (top left panel). The top right panel and the bottom left panel show the results for the two employment quality indicators. These mirror Fig. 3: The probability of working in a low-skill occupation and working below educational attainment is constant for the youngest age group up to age 15 at forced migration, in which almost all Bosnian refugees attained education in Austria; the probability of working in low-quality jobs then starts rising between age 16 and 23, after which it flattens out on a higher level.

### *5.2. Main results: The effect of host-country education on labour market outcomes*

We now turn to the regression results when pooling the working sample over the five to 27 year observation period in Table 6, which displays both the OLS and the 2SLS results of the regression models described in equations (4) and (5).

The large F-statistics (>170) in the first stage of the 2SLS regressions confirm the relevance of age as a strong predictor for having attained host-country education for the sample of among Bosnians aged 13 to 22 when migrating to Austria. Overall, the effect of host country education vis-à-vis similar education attained in the country of origin on the probability of being employed is close to zero on average over the observation period. The coefficient estimated by 2SLS (column 2) implies that host-country education increases the probability of employment by 1.8 percentage points, but the coefficient is not significant at any conventional statistical level. We note that the reason for this small and insignificant effect could be the result of two opposing forces: On the one hand, the higher value of the Austrian degree may encourage employment and labour market participation more broadly as it opens up new opportunities on the labour market. On the other hand, a resulting increase in reservation wages may have a negative effect on employment rates of Austrian vis-à-vis Bosnian degree holders (Reyneri & Fullin, 2011; Zwysen, 2019). The 2SLS results show that host-country education has a strong negative effect on both the employment quality outcomes (columns 4 and 6), confirming the OLS results shown in columns (3) and (5) of Table 6. On average over the observation period, the age at the time of arrival induced host-country education vis-à-vis similar education attained in the country of origin decreases the probability of working in low-skill employment and below educational attainment by 8.3 percentage points and 10.8 percentage points respectively. The confidence intervals are tightly estimated around these coefficients ($p < 0.01$).

**Table 5**
The relationship between age at forced migration and employment outcomes I.

| | (1) *Employed* | (2) *Low-skill job* | (3) *Work below education* |
|---|---|---|---|
| Age when entering AT | −0.001 | 0.009*** | 0.012*** |
| | (0.004) | (0.003) | (0.003) |
| Years spent in Austria (baseline: 6–9 years) | | | |
| 10–13 years | −0.048 | −0.096** | −0.061 |
| | (0.039) | (0.049) | (0.050) |
| 14–17 years | −0.024 | −0.131*** | −0.089* |
| | (0.040) | (0.047) | (0.047) |
| 18–21 years | −0.030 | −0.170*** | −0.172*** |
| | (0.041) | (0.046) | (0.044) |
| 22–25 years | −0.001 | −0.271*** | −0.135*** |
| | (0.040) | (0.044) | (0.045) |
| 26+ years | 0.014 | −0.257*** | −0.207*** |
| | (0.046) | (0.045) | (0.044) |
| Female | −0.046* | 0.184*** | 0.099*** |
| | (0.024) | (0.021) | (0.022) |
| Austrian citizenship | 0.031 | −0.051** | −0.047** |
| | (0.024) | (0.022) | (0.021) |
| $N$ | 1336 | 1091 | 775 |
| $R^2$ | 0.032 | 0.220 | 0.219 |
| Model | OLS | OLS | OLS |
| Federal state FE | Yes | Yes | Yes |
| Education category FE | Yes | Yes | Yes |

Standard errors in parentheses.
Notes: The sample consists of individuals aged between 13 and 22 when arriving in Austria during the war in Bosnia that lasted from 1992 to 1995. The pooled observation period is 1998 to 2019. Employed is a dummy variable taking the value 1 if an individual is employed, and 0 otherwise. Regressions with employment as an outcome are estimated on the whole sample of Bosnians. The outcome "work in low-skill job" is estimated on the sample of all employed individuals. The variable takes the value 1 if the employed individual works in an occupation that primarily employs low-educated workers as formally defined in Eq. (3). The outcome "work below education" is estimated on the sample of all employed individuals with at least a medium level of education. The variable takes the value one if the individual works in an occupation that is primarily carried out by workers of lower educational attainment as formally defined in Eq. (2). The variable "Age when entering AT" is a continuous variable.
*p<0.10.
**p<0.05.
***p<0.01.

Online appendices B.1, B.2, B.3 and B.4 show that these main results are further robust to (i) the inclusion of survey year fixed effects, (ii) a Heckman correction for employment participation, (iii) widening and narrowing down the working sample by including and excluding individuals of different age at the time of arrival and (iv) to excluding individuals where the forced displacement may have led to differences in education choices respectively. Online appendix B.5 further shows that the explanatory power of unobserved confounders would have to be large for the coefficients estimated on the host-country education indicator to be zero in the OLS regressions, which may explain the similar magnitude of the coefficients estimated by OLS and 2SLS in columns (3) to (6).

All other control variables are of the expected sign. The time spent in the host country, measured in different brackets, is negatively associated with the probability of being employed in low-quality occupations throughout all specifications (3) to (6). The longer Bosnian refugees spent in Austria, the lower the incidence of working in low-skill jobs and below educational attainment. It is further noteworthy that females are less likely to be employed (columns 1 and 2) and are significantly more likely to hold low-quality jobs (columns 3–6; $p < 0.01$). We turn to the characteristics of female employment in more detail in Section 6. Finally, holding Austrian citizenship is associated with a 4pp to 5pp decrease in the incidence of low-quality employment (columns 3–6; $p < 0.05$), a finding in line with previous studies (Gathmann & Keller, 2018; Govind, 2021; Hainmueller et al., 2019).

### 5.3. Quality of employment over time

The results of Section 5.2 show that the discount Bosnian refugees faced on their education attained in the country of origin was large. Taken together with the result that the incidence of low-quality employment declines over time raises the question whether the discount on education attained in Bosnia may also diminish with the time of stay in Austria. To test the effect of host-country vis-à-vis origin country education over time, Eq. (4) is augmented by a term that interacts the $EducationInAustria_i$ variable with the categorical "time spent in Austria" variable, measured in six four-year brackets (6–9; 10–13; 14–17; 18–21; 22–25; 26+). The latter is then instrumented by a term that interacts the $AgeAtTimeOfArrival_i$ variable with the same "time spent in Austria" variable. The approach allows the adjustment path to be non-linear. The results are illustrated in Fig. 7.

While employment rates among Bosnians educated in Austria do not differ significantly from Bosnians educated in Bosnia at any duration of stay, the plots show that the average effects shown in Table 6 mask an adjustment process of employment quality over the time of stay in the host country. Both the rates of employment in low-skill occupations (upper right panel) and employment below educational attainment (bottom left panel) among Bosnians with Bosnian degrees start out at a very high level. After five years of stay, the gap to Austrian degree holders stands at 25pp on both indicators. The gap then closes over time, with the 90% confidence intervals only starting to include zero after about two decades of stay.

### 5.4. Net hourly wages

The strong positive effect of formal host-country education on employment quality among Bosnian refugees uncovered in Sections 5.2 and 5.3 is likely to have direct implications for earned income: In 2018, employed Bosnians earned, on average, EUR 1941 in net terms when working in an occupation not classified as low-skill according to Eq. (3). Within low-skill occupations, the average net income stood at EUR 1119. Accounting for differences in hours worked does not change this observation: In 2018, Bosnians in low-skill occupations were paid a

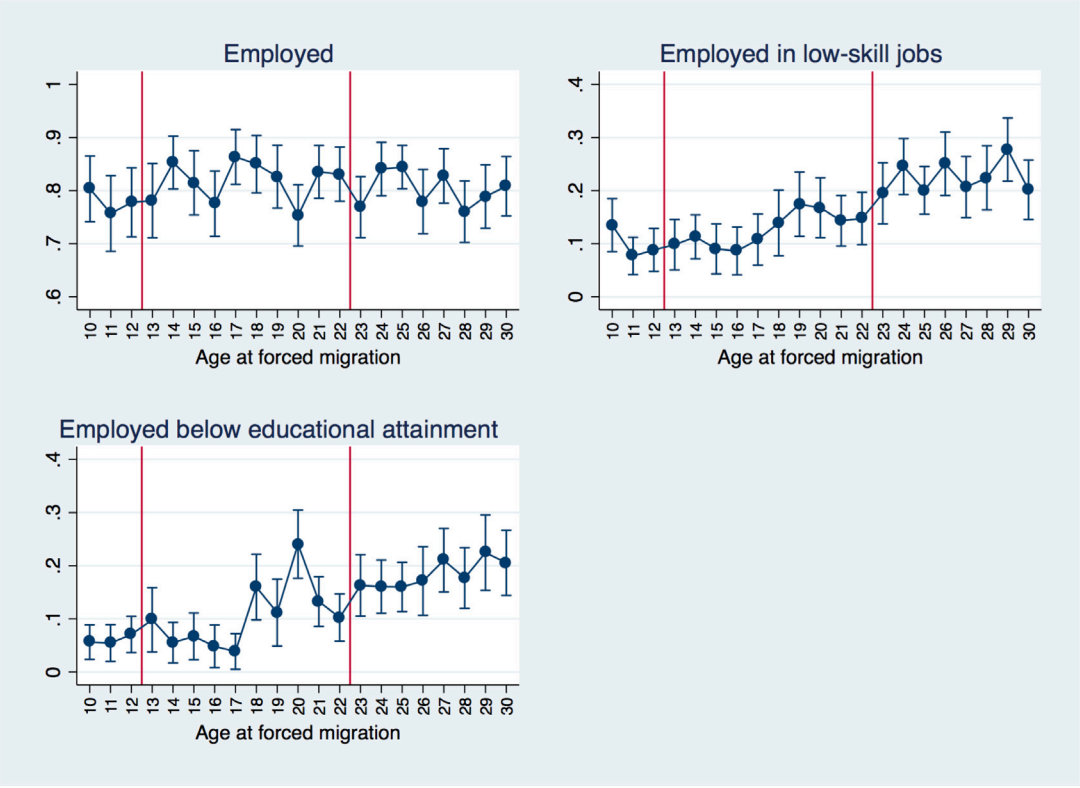


**Fig. 6.** The relation between the age at forced migration and employment outcomes II.
Note: The figure plots the coefficients on the categorical age at forced migration variable obtained from the model specified in (6) with "Age when entering AT" defined as a categorical variable. The area between the red vertical lines constitute the working sample of individuals aged between 13 and 22 at the time of forced displacement. Pooled sample,1998–2019.

net hourly wage of EUR 9.46, compared to EUR 12.41 in non-low-skill occupations.[6]

Data on net monthly income and monthly hours worked are only available from 2011 to 2018 in the Austrian microcensus. Estimates comparable to the other employment indicators can therefore only be produced for the last two "time spent in Austria" brackets of Fig. 7, 22–25 and more than 26 years of stay. We note that Fig. 7 indicates that having attained host-country education no longer affects the quality of employment measured by working in low-skill jobs and below educational attainment two decades after forced migration. However, it is conceivable that the longer work experience gained in skilled professions by Austrian degree holders positively affects wages beyond this period. We test this hypothesis by regressing the measure of log hourly wage income on the binary indicator of whether the highest education was attained in Austria.

The results of this exercise are shown in Table 7 below for both the whole sample of the employed and the sample of Bosnians educated at upper secondary level and above.

The results confirm that, even after more than two decades, the age at the time of forced migration induced higher probability to attain formal host-country education led to larger net wages. The estimated coefficient on the "host-country education" indicator in the 2SLS regressions show that net hourly income was 9.3% higher for Austrian degree holders ($p < 0.2$; column 2) among all employed Bosnians and 15.3% higher for Austrian degree holders among employed Bosnian refugees educated at upper secondary level and above ($p < 0.05$; column 4). The finding leads to two important conclusions. First, working below educational attainment indeed translates into lower wages among the affected even once the initial disadvantage has been overcome. Second, interpreting these results in conjunction with the finding of employment quality convergence between Austrian and Bosnian degree holders over time shown in Fig. 7 further suggests that the income gap between the two groups was likely even larger in the earlier years of stay.

### 5.5. The discount on tertiary education

One of the limitations of the working sample of those aged 13 to 22 at the time of forced migration is that it includes a relatively smaller share of tertiary Bosnians with education attained in Bosnia before displacement. Within the sample of Bosnians displaced when aged between 13 and 22, the share of tertiary educated stood at 3.1%, compared to 6.1% among all Bosnians aged between 25 and 64 years that are observed across all microcensus survey years. Thus, while the total number of tertiary educated Bosnians who migrated to Austria was therefore very low, the main working sample still includes relatively fewer tertiary educated. The reasons for the choice of the relatively narrow age bandwidth are related to the exclusion restriction of the suggested IV approach. They are discussed in detail in Section 4.2. A less conservative choice of the bandwidth would therefore partly remedy the issue by including Bosnians that were older at the time of forced migration. Online appendix B.3 shows that widening the bandwidth – such that more tertiary educated Bosnians who attained their degrees in Bosnia are included – does not change the main results shown in Section 5.2; in fact, widening the bandwidth to include Bosnians aged up to 25 at the time of displacement yields point estimates on the employment quality indicators of identical magnitude compared to the main working sample (figure A1 in the online appendix).

Despite these observations, the high incidence of working below educational attainment among tertiary-educated refugees in Europe justifies a descriptive analysis of the group of tertiary-educated Bosnians

[6] Data are unweighted averages calculated based on the 2018 Austrian microcensus.

**Table 6**
Main results.

| | *Employed* | | *Work in low-skill job* | | *Work below education* | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Host-country education | 0.045* | 0.018 | −0.067*** | −0.083*** | −0.090*** | −0.108*** |
| | (0.025) | (0.033) | (0.022) | (0.028) | (0.021) | (0.024) |
| Female | −0.040* | −0.044* | 0.181*** | 0.179*** | 0.096*** | 0.093*** |
| | (0.024) | (0.024) | (0.021) | (0.021) | (0.022) | (0.022) |
| Austrian citizenship | 0.029 | 0.030 | −0.050** | −0.050** | −0.044** | −0.043** |
| | (0.024) | (0.024) | (0.022) | (0.022) | (0.021) | (0.021) |
| Years spent in Austria (baseline: 6–9 years) | | | | | | |
| 10–13 years | −0.043 | −0.046 | −0.102** | −0.104** | −0.064 | −0.066 |
| | (0.039) | (0.039) | (0.049) | (0.048) | (0.050) | (0.049) |
| 14–17 years | −0.022 | −0.023 | −0.135*** | −0.137*** | −0.089* | −0.090* |
| | (0.040) | (0.040) | (0.047) | (0.046) | (0.047) | (0.046) |
| 18–21 years | −0.022 | −0.027 | −0.177*** | −0.180*** | −0.176*** | −0.179*** |
| | (0.042) | (0.041) | (0.046) | (0.046) | (0.043) | (0.043) |
| 22–25 years | 0.001 | −0.000 | −0.275*** | −0.276*** | −0.134*** | −0.134*** |
| | (0.040) | (0.040) | (0.044) | (0.043) | (0.044) | (0.044) |
| 26+ years | 0.020 | 0.017 | −0.264*** | −0.267*** | −0.210*** | −0.213*** |
| | (0.047) | (0.047) | (0.046) | (0.045) | (0.044) | (0.044) |
| *N* | 1336 | 1336 | 1091 | 1091 | 775 | 775 |
| $R^2$ | 0.035 | 0.009 | 0.222 | 0.159 | 0.226 | 0.117 |
| Model | OLS | 2SLS | OLS | 2SLS | OLS | 2SLS |
| Federal state FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Education category FE | Yes | Yes | Yes | Yes | Yes | Yes |
| First-stage F-test | | 232.835 | | 170.686 | | 206.005 |

Standard errors clustered at the household level in parentheses.
Notes: The sample consists of individuals aged between 13 and 22 when arriving in Austria during the war in Bosnia that lasted from 1992 to 1995. The observation period is 1998 to 2019. Employed is a dummy variable taking the value 1 if an individual is employed, and 0 otherwise. Regressions with employment as an outcome are estimated on the whole sample of Bosnians. The outcome "work in low-skill job" is estimated on the sample of all employed individuals. The variable takes the value 1 if the employed individual works in an occupation that primarily employs low-educated workers as formally defined in Eq. (3). The outcome "work below education" is estimated on the sample of all employed individuals with at least a medium level of education. The variable takes the value one if the individual works in an occupation that is primarily carried out by workers of lower educational attainment as formally defined in Eq. (2). "Host-country education" is a dummy variable that takes the value 1 if the highest education was attained in Austria and the value 0 if it was attained in Bosnia. The first-stage F-test refers to the Kleibergen-Paap rk Wald F-statistic obtained from the first stage of an instrumental variable regression with age at the time of forced displacement as the instrument for educational attainment in Austria vis-à-vis Bosnia.
*p<0.10.
**p<0.05.
***p<0.01.

**Table 7**
Hourly wage income.

| | *Hourly wage income* | | *Hourly wage income - no low-educated* | |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| Host-country education | 0.074 | 0.093 | 0.093* | 0.153** |
| | (0.046) | (0.061) | (0.056) | (0.065) |
| Female | −0.187*** | −0.183*** | −0.266*** | −0.247*** |
| | (0.051) | (0.047) | (0.070) | (0.066) |
| Austrian citizenship | 0.079 | 0.076 | 0.156** | 0.141** |
| | (0.049) | (0.047) | (0.062) | (0.057) |
| Years spent in Austria (baseline: 22–25 years) | | | | |
| 26+ years | 0.095* | 0.097** | 0.154** | 0.165** |
| | (0.049) | (0.047) | (0.069) | (0.064) |
| *N* | 219 | 219 | 147 | 147 |
| $R^2$ | 0.180 | 0.102 | 0.300 | 0.211 |
| Model | OLS | 2SLS | OLS | 2SLS |
| Federal state FE | Yes | Yes | Yes | Yes |
| Education category FE | Yes | Yes | Yes | Yes |
| First-stage F-test | | 25.661 | | 17.762 |

Standard errors clustered on the household level in parentheses.
Notes: The sample consists of individuals aged between 13 and 22 when arriving in Austria during the war in Bosnia that lasted from 1992 to 1995. Hourly wage income refers to the logarithm of the hourly wage individuals earned in the month prior to the interview. The sample consists of individuals who stayed in Austria for between 22 and 27 years and is based on microcensus data from between 2011 and 2018. The first-stage F-test refers to the Kleibergen-Paap rk Wald F-statistic obtained from the first stage of an instrumental variable regression with age at the time of forced displacement as the instrument for educational attainment in Austria vis-á-vis Bosnia.
*p<0.10.
**p<0.05.
***p<0.01.

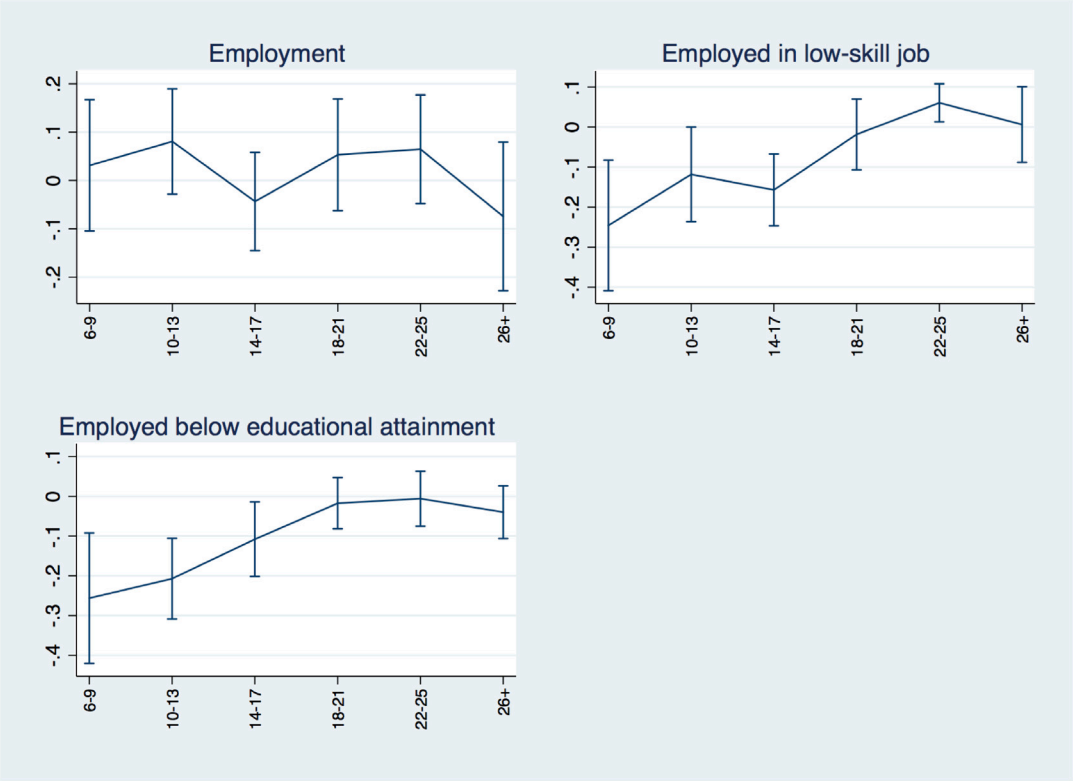


**Fig. 7.** The effect of host-country education on employment and employment quality over time of stay.
Note: The plots show margins derived from 2SLS regressions for the estimated coefficients on a dummy variable that takes the value 1 if the highest education was attained in Austria and the value 0 if it was attained in Bosnia, as well as the interaction term of the indicator with the time spent in Austria (measured in years). The *y*-axis thus shows the difference in employment and employment quality between Bosnians who attained their highest education in Austria and those who attained their highest degree in Bosnia. The *x*-axis shows the time spent in Austria in years. Employed is a dummy variable taking the value 1 if an individual is employed, and 0 otherwise. Regressions with employment as an outcome are estimated on the whole sample of Bosnians. The outcome "work in low-skill job" is estimated on the sample of all employed individuals. The variable takes the value 1 if the employed individual works in an occupation that primarily employs low-educated workers as formally defined in Eq. (3). The outcome "work below education" is estimated on the sample of all employed individuals with at least a medium level of education. The variable takes the value one if the individual works in an occupation that is primarily carried out by workers of lower educational attainment as formally defined in Eq. (2). The horizontal bars show 90% confidence intervals. The sample consists of individuals aged between 13 and 22 when arriving in Austria during the war in Bosnia that lasted from 1992 to 1995. The observation period is 1998 to 2019.

in Austria (Dumont et al., 2016). Table 8 shows the results of a linear probability model as formally defined in Eq. (4), but estimated on the pooled sample of tertiary Bosnians aged 25 to 64.[7] Of the 292 total individuals observed, 184 individuals had attained their tertiary degrees in Bosnia and 115 individuals attained their degrees in Austria, after forced displacement.

Despite the relatively small sample of tertiary-educated Bosnians, the results uncover some noteworthy findings. First, the probability of employment is again not associated with whether education was attained over the pooled observation period at any conventional level of statistical significance. Second, while tertiary-educated Bosnians with degrees from Bosnia are indeed 17pp more likely to work below their educational attainment than Bosnians completing tertiary education in Austria (column 3), their downgrading appears to happen mostly into medium-skill, rather than low-skill jobs (column 2).

The results of Table 8 thus confirm previous analyses that document a large discount refugees face on their tertiary education (Dumont et al., 2016; Damas de Matos & Liebig, 2014).

[7] Unlike in the previous regressions on the smaller subsample of Bosnians aged 13 to 22 at the time of arrival in Austria, controlling for age (and its squared term) is possible in the regressions on the larger sample of individuals aged 25 to 64. However, these controls did not change the point estimates and were therefore left out to ensure comparability across analyses.

## 6. Heterogeneous effects by sex and location

One of the striking features throughout the analyses in Section 5 is the large magnitude of the negative coefficient on the female migrant indicator in regressions related to the quality of employment (see for example Table 6). This difference in labour market integration outcomes and trajectories between male and female migrants is often observed and has led scholars to routinely analyse these groups separately (Dustmann, 1997, 1999).

In the context of forced migration from Bosnia to Austria and the research question of refugee labour market integration, this is particularly interesting for a number of reasons. First, in 1991, the year before the start of the war, estimates from the International Labour Organisation (ILO) indicate that female labour market participation of people aged 15 and above stood at 41% (males: 63%) in Bosnia. The female-to-male ratio of labour market participation thus closely resembled that of Austria in the same year (female: 44%; male: 70%). The relatively high labour market participation rate among women was most likely a relic from socialist times in the former Yugoslavia, where workplaces often provided housing, child care and health care (Pascall & Manning, 2000). A second feature of female employment is stressed in historical research on gendered work in the former Yugoslavia: Women were predominantly employed in low-skill jobs and rarely held high positions in factories or politics (Darville & Reeves, 1992; Pascall & Manning, 2000). Table A11 of online appendix C suggests that these lower (expected) returns to education among Bosnian women led women to invest less into their education than men. However, a

**Table 8**
Tertiary educated.

| | (1) *Employed* | (2) *Low-skill job* | (3) *Work below education* |
|---|---|---|---|
| Host-country education | 0.051 | −0.037 | −0.173** |
| | (0.063) | (0.027) | (0.073) |
| Female | −0.068 | 0.079*** | 0.083 |
| | (0.057) | (0.028) | (0.063) |
| Austrian citizenship | 0.127** | −0.062* | −0.165** |
| | (0.059) | (0.033) | (0.072) |
| Years spent in Austria (baseline: 6–9 years) | | | |
| 10–13 years | 0.157 | −0.022 | 0.190 |
| | (0.105) | (0.064) | (0.141) |
| 14–17 years | 0.150 | 0.027 | 0.319** |
| | (0.107) | (0.068) | (0.132) |
| 18–21 years | 0.079 | −0.054 | 0.161 |
| | (0.114) | (0.066) | (0.168) |
| 22–25 years | 0.156 | −0.007 | 0.319** |
| | (0.106) | (0.063) | (0.148) |
| 26+ years | 0.091 | −0.005 | −0.156 |
| | (0.120) | (0.059) | (0.147) |
| *N* | 292 | 224 | 224 |
| $R^2$ | 0.065 | 0.130 | 0.232 |
| Estimation method | OLS | OLS | OLS |
| Federal state FE | Yes | Yes | Yes |

Standard errors clustered at the household level in parentheses.
Notes: The sample consists of individuals aged between 25 and 64 that are educated at a high level (ISCED-97 level above 4). The observation period is 1998 to 2019. Employed is a dummy variable taking the value 1 if an individual is employed, and 0 otherwise. The variable "work in low-skill job" takes the value 1 if the employed individual works in an occupation that primarily employs low-educated workers as formally defined in Eq. (3). The variable "work below education" takes the value 1 if the individual works in an occupation that is primarily carried out by workers of lower educational attainment as formally defined in Eq. (2). "Host-country education" is a dummy variable that takes the value 1 if the highest education was attained in Austria and the value 0 if it was attained in Bosnia.
*p<0.10.
**p<0.05.
***p<0.01.

further analysis of educational attainment by broader age cohorts at the time of arrival in Austria shows that this only holds true for older cohorts of Bosnian women, not those who had invested more recently into their education before being forced to flee. Bosnian females aged between 31 and 40 at the time of forced displacement were more likely to be low educated (53%) than cohorts aged between 21 and 30 (36% low educated) or between 11 and 20 (37% low educated) at the time of forced displacement. This cohort difference is much larger than for men, where these numbers stood at 23% (aged 31 to 40 at forced migration), 16% (21–30) and 21% (11–20).

In the following, we analyse whether these pre-migration characteristics of female employment are observed on the Austrian labour market and if the attainment of host-country education could alter outcomes vis-à-vis those who entered the Austrian labour market immediately upon arrival and had attained their education in Bosnia.

Table 9 shows the regression results for female migrants and male migrants respectively.

It is striking that the total observed effect of host-country education is particularly driven by female Bosnians. Just like for males, the effect of host-country education vis-à-vis education attained in Bosnia is small and not clearly distinguishable from a zero effect. However, the magnitude of the effect of Austrian vis-à-vis Bosnian education on the employment quality indicators is striking: For Bosnian women, host-country education decreases the probability of working in low-skill employment and below educational attainment by 11.9pp and 17.4pp respectively on average over the 22 year observation period (columns 2 and 3). A closer look at the data reveals that in any given year of the observation period, Bosnian women who entered Austria when aged between 18 and 22 were predominantly employed in the domestic work and cleaning sectors, while their female counterparts aged 13 to 17 upon arrival worked in a wide range of professions.

On the other hand, host-country education appears to have less of an effect on the employment quality of male migrants on average (columns 5 and 6). The sign of the estimated coefficients is still negative but the magnitude of these coefficients is smaller and conventional confidence intervals now include zero for the "low-skill job" indicator (column 5). Host-country education still decreases the probability of working below educational attainment by 3.9pp for males ($p < 0.05$), but the magnitude of the coefficient is more than four times smaller compared to the effect in females.

Fig. 8 shows that these differences between females and males mostly emerge in the later years of refugees' stay in Austria.

While after five to 12 years of stay in Austria, female Bosnian refugees with a degree attained in FY were already slightly more likely to work in low-skill occupations (left panel) and more likely to work below educational attainment than men (right panel), men with origin-country degrees managed to close the gap entirely in the later years of stay, while females did not. The cultural legacy of working in low-skill occupations among women in FY may have played a role for the stickiness of low-quality employment: While both men and women faced an initial discount on their education in Bosnia, likely due to a mix of quality differences in education between Bosnia and Austria and the related lower signalling value of Bosnian degrees, this discount was more persistent for female refugees. Agnostic on the precise mechanisms at play, these results could be interpreted as lending support to the hypothesis that host-country education can help overcome cultural barriers to the labour market faced by refugees.

We turn to location next. Two mediating channels related to local initial conditions may have had a positive impact on the integration of Bosnian refugees into Austrian labour markets. First, initial local labour market conditions at the time of arrival have been shown to affect refugees' employment and earnings even in the long term (Åslund & Rooth, 2007). However, labour market conditions were largely homogeneous across Austrian NUTS-2 regions (Table A2 of online appendix A) and are therefore unlikely to have led to measurable variation in employment (quality) outcomes.

Second, due to large guest worker movements from Bosnia to Austria in the decades preceding the war, Bosnians had extensive co-ethnic

**Table 9**
Main results split by males and females.

| | *Females* | | | *Males* | | |
|---|---|---|---|---|---|---|
| | (1) Employed | (2) Low-skill job | (3) Below educ. | (4) Employed | (5) Low-skill job | (6) Below educ. |
| Host-country education | 0.003 | −0.119** | −0.174*** | 0.030 | −0.024 | −0.039** |
| | (0.046) | (0.047) | (0.043) | (0.045) | (0.019) | (0.019) |
| Austrian citizenship | 0.014 | −0.073** | −0.054 | 0.061** | 0.013 | −0.005 |
| | (0.036) | (0.036) | (0.043) | (0.031) | (0.014) | (0.017) |
| Years spent in Austria | | | | | | |
| 10–13 years | −0.064 | −0.126* | −0.080 | −0.001 | −0.073 | −0.024 |
| | (0.050) | (0.070) | (0.075) | (0.067) | (0.058) | (0.051) |
| 14–17 years | −0.075 | −0.150** | −0.139* | 0.061 | −0.122** | −0.033 |
| | (0.056) | (0.070) | (0.076) | (0.061) | (0.053) | (0.047) |
| 18–21 years | −0.065 | −0.224*** | −0.287*** | 0.043 | −0.131** | −0.078* |
| | (0.059) | (0.071) | (0.072) | (0.064) | (0.051) | (0.045) |
| 22–25 years | 0.003 | −0.392*** | −0.214*** | 0.019 | −0.127** | −0.059 |
| | (0.052) | (0.065) | (0.077) | (0.065) | (0.050) | (0.042) |
| 26+ years | −0.000 | −0.371*** | −0.305*** | 0.056 | −0.134** | −0.115** |
| | (0.064) | (0.067) | (0.070) | (0.073) | (0.054) | (0.052) |
| *N* | 765 | 608 | 383 | 571 | 483 | 392 |
| $R^2$ | 0.008 | 0.139 | 0.137 | 0.017 | 0.070 | 0.046 |
| Model | 2SLS | 2SLS | 2SLS | 2SLS | 2SLS | 2SLS |
| Federal state FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Education category FE | Yes | Yes | Yes | Yes | Yes | Yes |
| First-stage F-test | 140.573 | 102.506 | 107.129 | 101.562 | 77.467 | 103.659 |

Standard errors clustered at the household level in parentheses.
Notes: The sample consists of individuals aged between 13 and 22 when arriving in Austria during the war in Bosnia that lasted from 1992 to 1995. The observation period is 1998 to 2019. Employed is a dummy variable taking the value 1 if an individual is employed, and 0 otherwise. The base category of the categorical "years spent in Austria" variable is 6 to 9 years. Regressions with employment as an outcome are estimated on the whole sample of Bosnians. The outcome "work in low-skill job" is estimated on the sample of all employed individuals. The variable takes the value 1 if the employed individual works in an occupation that primarily employs low-educated workers as formally defined in Eq. (3). The outcome "work below education" is estimated on the sample of all employed individuals with at least a medium level of education. The variable takes the value one if the individual works in an occupation that is primarily carried out by workers of lower educational attainment as formally defined in Eq. (2). "Host-country education" is a dummy variable that takes the value 1 if the highest education was attained in Austria and the value 0 if it was attained in Bosnia. The first-stage F-test refers to the Kleibergen-Paap rk Wald F-statistic obtained from the first stage of an instrumental variable regression with age at the time of forced displacement as the instrument for educational attainment in Austria vis-à-vis Bosnia.
*p<0.10.
**p<0.05.
***p<0.01.

networks to draw on all across Austria; even during the peak time of humanitarian inflows into Austria, only about 50 percent of Bosnians relied on publicly organised accommodation (Bendl, 2014). In total, about 198,000 foreigners born in the former Yugoslavia resided in Austria before the start of the war in 1991 (Fassmann & Reeger, 2008). The existence of co-ethnic networks in the destination country have been linked to higher earnings among refugees in previous research. Informal channels may facilitate better job market matches (Damm, 2009; Edin, Fredriksson, & Åslund, 2003). On the other hand, Battisti, Peri, and Romiti (2016) show that the existence of co-ethnic networks not only leads to a faster integration of refugees into the labour market, but is also linked to lower host-country human capital investments. Location-specific variation in local employers' exposure to Former Yugoslav nationals prior to the arrival of Bosnians may have also affected the position of Bosnian refugees on the Austrian labour market. Previous research shows that statistical discrimination lowers the returns to foreign education among migrants. Such statistical discrimination can occur if foreign education is unknown to employers who instead rely on group-level indicators of human capital, penalising migrants who are educated above the group-level mean (Tani, 2017). To test whether place-specific variation in co-ethnic networks and local employers' previous exposure to foreign education affected the discount on Bosnian education, data from the 1991 Austrian Census is used to construct a measure for the share of foreign citizenship holders in the total local population for each Austrian NUTS-2 region, summarised in Table 10.

The model estimated to test the relationship between the local share of FY citizens in 1991, its interaction with education attained in the host-country and labour market outcomes, the baseline model (4) is amended in the following way:

$$Y_{i,e,p} = \eta EducationInAustria_i + \beta ShareFormerYugoslavia_p$$

**Table 10**
Share of citizens from the former Yugoslavia in 1991 by Austrian NUTS-2 region.

| NUTS-2 region | Share citizens from FY in 1991 | Observations working sample |
|---|---|---|
| Burgenland | .004 | 38 |
| Steiermark | .007 | 122 |
| Kärnten | .012 | 151 |
| Niederösterreich | .013 | 119 |
| Oberösterreich | .020 | 226 |
| Tirol | .020 | 105 |
| Salzburg | .034 | 254 |
| Voralberg | .042 | 88 |
| Wien | .057 | 233 |

$$+\gamma ShareFormerYugoslavia_p \times EducationInAustria_i$$
$$+\zeta IndividualCharacteristics_i + \kappa_e + \epsilon_i, \quad (7)$$

where $shareFormerYugoslavia_p$ is the regional share of FY citizens in the total population in 1991 and $\gamma$ is the coefficient that captures its interaction with the binary indicator that takes the value 1 if the highest education was attained in Austria. We note that since $shareFormerYugoslavia_p$ is time-invariant and measured on the state level, the federal state fixed effects are dropped in the model outlined in Eq. (7).

Two caveats apply to the methodology and data applied to test the significance of co-ethnic networks and local employers' past exposure to Bosnian degrees. First, the share of FY citizenship holders reported in the 1991 Austrian Census is a good measure of employers' exposure to Bosnian degrees but an imperfect measure of the local existence of co-ethnic networks since FY consisted of Bosnia and Herzegovina, Croatia, Macedonia, Montenegro, Serbia and Slovenia. It is unlikely

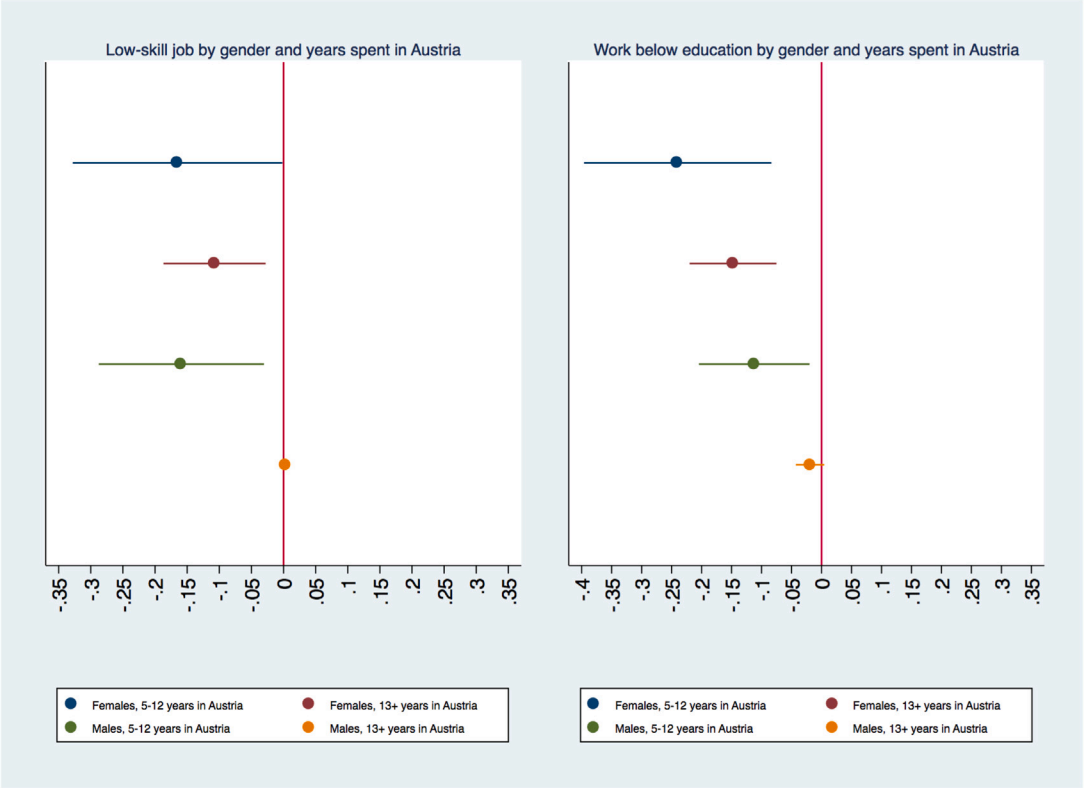


**Fig. 8.** Employment quality - females and males over time of stay.
Note: The figure plots the coefficients from the same regressions as in Table 9 but splitting the sample into females and males who had spent 5 to 12 years in Austria and females and males who spent more than 12 years in Austria.

that nationals from other FY countries constituted networks that facilitated employment of Bosnians. Second, the Austrian microcensus only reports the current residence rather than the location at the time of arrival. It is unclear to what extent Bosnians moved in between their arrival and the time when they were surveyed. In light of potential endogenous sorting, the results should therefore not be given a causal interpretation.

Table 11 reports the results for both the simple OLS regression and the results from instrumental variable regressions where the age at the time of forced migration again serves as an instrument for the attainment of host-country education.

Two results are noteworthy. First, some support is found in favour of the hypothesis that more extensive local co-ethnic networks led to higher quality employment among Bosnian refugees over the pooled observation period. Albeit marginally above conventional levels of statistical significance, columns (2) to (6) show that larger co-ethnic networks are associated with a lower incidence of work in low-skill employment and work below educational attainment. Results from the preferred 2SLS regressions indicate that the magnitude of the effect is not negligible: A one percentage point increase in the share of FY citizens in 1991 decreases the probability of low-skill employment and work below educational attainment in later years by 1.8pp ($p < 0.15$) and 1.7pp ($p < 0.15$) respectively.

Second, the results provide suggestive evidence in favour of a statistical discrimination effect due to a lack of employers' previous exposure to FY degrees. The results based on the preferred specification in columns 4 and 6 show that the higher the 1991 share of FY citizens in the local population, the lower the discount Bosnians face on their education attained in Bosnia. Put more precisely, the results show that a one percentage point increase in the share of FY citizens in 1991 is associated with a higher probability of low-skill employment and work below educational attainment among *Austrian degree holders* by 2.3pp ($p < 0.15$) and 1.9pp ($p < 0.15$) respectively. Interpreted in combination with the baseline effect of the share of FY citizens on the quality of employment among Bosnians, the obtained results suggest that prior exposure to FY degree holders benefited those Bosnian refugees who did not attain formal education in Austria. On the other hand, a larger pre-existing local FY diaspora neither benefited nor impaired the labour market position of Bosnian refugees who attained Austrian education.

## 7. Concluding discussion

In this paper, I contribute to the question of how labour market outcomes of humanitarian migrants are shaped by the institutional setting they migrate into. Using the example of Bosnian refugees in Austria, I show that, vis-à-vis similar levels of education attained from the country of origin, a degree from the host country dramatically improves the labour market position of humanitarian migrants. The main conclusion of this paper therefore echoes recommendations derived from previous policy work that identifies human-capital investment as a key tool to improve migrants' integration into the labour market (Bratsberg, Raaum, & Roed, 2017).

The causal results obtained from instrumental variable regressions recover local average treatment effects only valid among the young humanitarian migrant population. However, young humanitarian migrants from less developed regions seeking asylum in EU member states were not only a highly relevant group in the past but also feature prominently in current inflows of asylum seekers. 81% of the 5.7 million migrants who lodged an asylum application in an EU member state between 2008 and 2018 were aged below 35, originating predominantly from Syria, Afghanistan and Iraq. The gap between the quality of education differs widely between EU destination countries and these more recent countries of origin Bonfanti and Xenogiani (2014), Hanushek and Woessmann (2011). For these inflows, the estimates obtained in this paper are thus likely to present a lower bound. Supporting asylum

**Table 11**
Results by pre-arrival share of citizens from the former Yugoslavia in the region of residence.

| | *Employed* | | *Work in low-skill job* | | *Work below education* | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Host-country education | 0.030 | 0.050 | −0.082** | −0.147*** | −0.086** | −0.162*** |
| | (0.048) | (0.063) | (0.036) | (0.048) | (0.039) | (0.043) |
| Share Yugoslav citizens 1991 | 0.230 | 0.899 | −2.934 | −1.766 | −0.703 | −1.737 |
| | (1.148) | (1.223) | (2.244) | (1.107) | (1.047) | (1.085) |
| Host-c. educ. x share FY citizens 1991 | 0.396 | −1.353 | 0.544 | 2.287 | −0.279 | 1.871 |
| | (1.434) | (1.951) | (1.139) | (1.531) | (1.186) | (1.276) |
| Female | −0.045* | −0.047* | 0.181*** | 0.176*** | 0.098*** | 0.093*** |
| | (0.024) | (0.024) | (0.021) | (0.021) | (0.022) | (0.021) |
| Austrian citizenship | 0.026 | 0.028 | −0.051** | −0.052** | −0.047** | −0.048** |
| | (0.025) | (0.025) | (0.022) | (0.022) | (0.022) | (0.021) |
| Years spent in Austria | | | | | | |
| 10–13 years | −0.059 | −0.061 | −0.102** | −0.113** | −0.074 | −0.077 |
| | (0.039) | (0.039) | (0.048) | (0.048) | (0.049) | (0.049) |
| 14–17 years | −0.041 | −0.040 | −0.136*** | −0.144*** | −0.097** | −0.100** |
| | (0.039) | (0.039) | (0.047) | (0.046) | (0.047) | (0.046) |
| 18–21 years | −0.033 | −0.036 | −0.178*** | −0.189*** | −0.184*** | −0.188*** |
| | (0.041) | (0.041) | (0.046) | (0.046) | (0.044) | (0.044) |
| 22–25 years | −0.015 | −0.014 | −0.276*** | −0.285*** | −0.143*** | −0.145*** |
| | (0.039) | (0.039) | (0.044) | (0.043) | (0.044) | (0.044) |
| 26+ years | −0.001 | −0.000 | −0.266*** | −0.283*** | −0.217*** | −0.225*** |
| | (0.047) | (0.046) | (0.046) | (0.046) | (0.044) | (0.045) |
| *N* | 1336 | 1336 | 1091 | 1091 | 775 | 775 |
| $R^2$ | 0.015 | 0.007 | 0.223 | 0.162 | 0.216 | 0.124 |
| Model | OLS | 2SLS | OLS | 2SLS | OLS | 2SLS |
| Federal state FE | No | No | No | No | No | No |
| Education category FE | Yes | Yes | Yes | Yes | Yes | Yes |
| First-stage F-test (H.-c. educ.) | | 135.85 | | 104.28 | | 185.92 |
| First-stage F-test (H.-c. educ. x Share FY) | | 198.37 | | 213.20 | | 529.96 |

Standard errors clustered at the household level in parentheses.
Notes: The sample consists of individuals aged between 13 and 22 when arriving in Austria during the war in Bosnia that lasted from 1992 to 1995. The observation period is 1998 to 2019. Employed is a dummy variable taking the value 1 if an individual is employed, and 0 otherwise. Regressions with employment as an outcome are estimated on the whole sample of Bosnians. The outcome "work in low-skill job" is estimated on the sample of all employed individuals. The variable takes the value 1 if the employed individual works in an occupation that primarily employs low-educated workers as formally defined in Eq. (3). The outcome "work below education" is estimated on the sample of all employed individuals with at least a medium level of education. The variable takes the value one if the individual works in an occupation that is primarily carried out by workers of lower educational attainment as formally defined in Eq. (2). "Host-country education" is a dummy variable that takes the value 1 if the highest education was attained in Austria and the value 0 if it was attained in Bosnia. Share Yugoslav citizens 1991 refers to the 1991 share of the local population holding FY citizenship in a given NUTS-2 region in Austria. The baseline category for the variable "years spent in Austria" is 6–9 years. The two first-stage F-tests refer to the Kleibergen-Paap rk Wald F-statistic obtained from the separate first stages of the instrumental variable regression with age at the time of forced displacement as the instrument for educational attainment in Austria vis-à-vis Bosnia.
*p<0.10.
**p<0.05.
***p<0.01.

seekers to attain host-country education would likely have larger payoffs to migrants when the origin–destination distance in human capital is large; on the other hand, the public investment required is a similarly positive function of this distance.

It is important to note that the analyses in the paper do not require humanitarian migrants to upgrade their education. The study makes the simple point that, if humanitarian migrants were to be integrated into the host-country education system until they achieve the same qualification they had previously attained in their country of origin, this would dramatically improve their position on the labour market. The estimates should thus not be interpreted as returns to schooling estimates as in, for example, Oreopoulos (2006), but as explicitly comparing the value of the highest formal education in the country of origin to the destination country for humanitarian migrants. Thus, they combine the theoretical effects of quality differences in education, signalling, screening and potential peer effects.

A natural follow-up question is to what extent it is realistic to integrate humanitarian migrants into the host-country education system swiftly upon arrival. An efficient policy approach would allocate significant resources into thorough assessments of existing skills. Austrian authorities did not invest into procedures to assess and recognise degrees from Bosnia when refugees started arriving during the Bosnian war, leaving many new-arrivals with few options on the labour market (Tretter, 2000). An acknowledgement of foreign degrees or an assessment of shortcomings vis-à-vis an equivalent degree in the host country could be followed by training in host-country specific language skills. Humanitarian migrants would then be able to enter the host-country education system at an appropriate level.

In this context, the external validity of the results found in this study require a careful reflection: Depending on the design of policy interventions that aim to increase host-country education among refugees, the treatment effects may differ depending on policy parameters that determine the depth of integration into the host-country education system. For example, in Austria, no parallel education system existed that kept humanitarian migrants separate from the native population (Tretter, 2000). If, instead, migrants are taught in classes separate from the host-country population, this could potentially diminish the positive effect on their future performance on the labour market. The literature on peer effects in schools shows that these are generally complex across different student sub-groups (Lavy, Silva, & Weinhardt, 2012). However, network formation with host-country students may be relatively more important for humanitarian migrants than for the general population. Further research is required on the mechanism that guides the impact of host-country education on future labour market performance through exposure to native peers.

A key finding of this study is that host-country education benefited female Bosnian refugees significantly more regarding their labour market position than their male counterparts. Attaining education in the host-country drastically remedies the education–employment mismatch for women. One potential explanation is that the cultural background

of Bosnians, where women traditionally held low-level positions on the labour market may have translated into worse employment outcomes in Austria, where the institutional setting discouraged host-country education. This is important going forward as the gender dimension of labour market integration plays an even more important role for more recent inflows of humanitarian migrant in Europe. For example, less than 15% of Syrian women were economically active prior to the breakout of the civil war in Syria that caused more than a million Syrians to flee to Europe (Barslund, Di Bartolomeo, Ludolph et al., 2017b). Policy measures specifically targeted towards women are thus inevitable and host-country education could play a crucial role in the efficient labour market integration of female humanitarian migrants.

The findings of this study further raise the question why even young humanitarian migrants, who are (made) aware that their education is discounted upon arrival, may still decide not to invest into formal host-country human capital. The answer is twofold and lies in the incentive structures created by institutions in the European context. First, humanitarian migrants face significant uncertainty regarding the duration of stay in EU host-countries which has been shown to be an important determinant of migrants' human capital investment decisions (Cortes, 2004; Dustmann, 1997, 1999). If migrants expect to stay in the host-country with high certainty, they undertake costly investments into human capital as they anticipate that short-term foregone income will be more than compensated for by higher future earning potential (Cortes, 2004; Duleep & Regets, 1999). In the EU, a large share of humanitarian migrants faces uncertainty regarding the length of their stay in EU member states. Upon arrival, asylum seekers go through asylum procedures of unknown outcome where even the first instance lasts between six and twelve months on average (European Commission, 2016a).[8] Since only 50 percent of asylum seekers ultimately gain humanitarian protection, it is rational to discount the probability of an extended stay. After these asylum procedures, the share of asylum seekers receiving full Geneva Convention refugee status, the status that grants humanitarian migrants the most rights, is small in the EU and stood at less than 25 percent of all asylum applicants over the past decade.[9] Thus, even for those 50 percent of asylum seekers who ultimately obtain protection, this does not necessarily mean certainty: A range of different protection regimes exist across the EU and even in the best possible outcome when asylum seekers gain full Geneva convention refugee status, the length of stay is far from certain.[10] Second, if there is a policy preference towards an economic integration and insufficient infrastructure to support humanitarian migrants to integrate into education systems, this presents a relative increase in the cost of human capital investment compared to taking up low-skill labour.[11]

Finally, this paper focuses on the economic aspects of integrating humanitarian migrants into host-country education systems. Policy-making may benefit from a deeper understanding of the long-term societal costs a potential systematic clustering of specific migrant groups in predominantly low-skill, low-income occupations incurs. For example, studies have analysed the relation between immigrants' access to the labour market and crime rates, finding a strong negative link between the two (Couttenier, Petrencu, Rohner, & Thoenig, 2019; Freedman, Owens, & Bohn, 2018). Future research could specifically look into the effect of the clustering of migrants in low-quality employment on measures of social cohesion in the host country.

## CRediT authorship contribution statement

**Lars Ludolph:** Study conception and design, Data collection, Analysis and interpretation of results, Manuscript preparation.

## Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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## Appendix A. Online appendices and supplementary material

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[8] If an asylum decision is rejected, asylum seekers have the chance to appeal this decision. Around 13 percent of all asylum applications were granted after the asylum seeker had appealed the initial rejection between 2008 and 2017 (Eurostat data).

[9] Calculations based on Eurostat data,2008–2017.

[10] Residence permits granted to recognised Geneva Convention refugees are initially limited to three to five years in the majority of European countries (European Commission, 2016a). Very large cross-country differences in the management of humanitarian migrants of the same protection status across EU member states further add to the uncertainty regarding the probability of stay. For example, when Bosnian refugees entered various European countries following the war in Bosnia in the early 1990s, they initially received temporary protection in all host countries. As soon as the war ended in 1995, Germany repatriated almost all refugees. On the other end of the spectrum, Sweden granted refugees permanent residency soon after arrival. Other main recipient countries such as Austria, Denmark or the Netherlands fell in between (Barslund, Busse, Lenaerts, Ludolph, & Renman, 2017a).

[11] In Europe, the prioritisation of integrating humanitarian new arrivals into the labour market over an integration into the host-country educational system manifests itself in several practical dimensions. In its 2019 evaluation of the Recast QD, the European Commission concludes that 20 out of 29 EU member states grant refugees access to adult education under the same conditions as legally residing adult third-country nationals (European Commission, 2016b). However, unlike employment assistance, only a "limited number of Member States have provided beneficiaries of international protection with additional support to facilitate access to the national education system" (European Commission, 2016b, p.213). Neither the European Statistical Office (Eurostat) nor any EU member state currently collects data on the number of beneficiaries of humanitarian protection accessing host-country education, with the exception of Slovenia where the number of beneficiaries in the country is small and the total number of adults and minors accessing education stood at 62 in 2015. Reports on more specific aspects of integration into the education system reach similar conclusions. For example, a recent review of asylum seekers' access to (higher) education by the European Commission concludes that "the majority of [EU] countries have no specific policy approach to integrate asylum seekers and refugees into higher education" (Crosier & Kocanova, 2019, p.24).

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