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The Value of Formal Host-Country Education for the Labour Market Position of Refugees: Evidence from Austria

Lars Ludolph

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Abstract

Refugees hosted across the developed world often work in low-quality jobs, regardless of education previously attained in their country of origin. In this paper, I analyse the long-term value of formal host-country education for refugees using the example of forcefully displaced Bosnians who arrived in Austria during the 1992-1995 Bosnian war. Deploying 22 years of Austrian microcensus data, I exploit the age at the time of forced migration as an instrument for the probability of receiving host-country instead of origin country education to recover local average treatment effects of education attained in Austria vis-à-vis Bosnia on labour market outcomes for refugees aged around schooling thresholds. These estimates show that attaining a formal degree in the host-country significantly reduces the probability of work below educational attainment and low-skill employment over the entire observation period. Income differences between Austrian and Bosnian degree holders are visible after more than two decades of stay in Austria. The discount on Bosnian education declines over time for men but not for women, suggesting that host-country degrees are particularly important to groups that faced cultural barriers to quality employment in their country of origin.

Keywords: refugees, labour market integration, education.

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1 Introduction

One of the key characteristics of refugee employment across the developed 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 attained before being forced to flee their country of origin [Bloch, 2008, Ruiz and Vargas-Silva, 2018, Zwysen, 2019, Brell et al., 2020]. The magnitude of this phenomenon is sizeable: Dumont et al. [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 10 percentage points lower likelihood to work below educational attainment compared to Bosnians who had attained similar education in Bosnia. Similarly, it led to a 9 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 slowly closes over time, but differences are visible even two decades after Bosnians first entered Austria as refugees. Refugees who did not receive any formal education in Austria 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.

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 jobs even compared to other migrant groups [Bloch, 2008, Connor, 2010, Damas de Matos and Liebig, 2014, Dumont et al., 2016, Ruiz and Vargas-Silva, 2018, Zwysen, 2019, Brell et al., 2020]. 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 and Tritah, 2013, Chiswick and 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 and Xenogiani, 2014, Dumont and Monso, 2007, Hanushek and 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 [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 acqui-

sition 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 et al. [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 [Chiswick, 1991, Chiswick and Miller, 1995, Dustmann and Van Soest, 2002, Berman et al., 2003, Dustmann and Fabbri, 2003, Bleakley and Chin, 2004, Lochmann et al., 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 and Keller, 2018, Hainmueller et al., 2019, Govind, 2021]. 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]. It is important to note that formal host-country education is likely to include the benefits of language training, and likely captures some of the signalling value provided by naturalisation.

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, Damas de Matos and Liebig, 2014, Dumont et al., 2016, 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 and 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.[1]

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 educa-

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[1]A tempting solution in a regression framework would be to simply control for the age at the time of forced migration; however, due to the very high correlation between the age at the time of forced migration and the attainment of host-country education, this approach would introduce collinearity and it would no longer be possible to interpret estimated coefficients on these variables.

tion 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 uncovers an additional factor that likely drives the low-quality employment of refugee populations in the developed world: Cultural legacy factors pertaining to female employment. 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 almost four times more than for male Bosnians over the observation period of five to 27 years after arrival. These differences are driven by the later years of stay in Austria when men managed to overcome their discounted Bosnian education, while women did not. In former Yugoslavia, women traditionally held low-level positions on the labour market, regardless of their educational attainment [Pascall and Manning, 2000, Darville and Reeves, 1992]. In Austria, where the institutional setting discouraged host-country education for those who had finished their education in Bosnia, it is likely that women reverted to jobs traditionally open to them in Bosnia. The finding suggests that the education system can play a decisive role in overcoming cultural barriers in the labour

market.

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 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 and 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 and Ramet, 2011]. Depending on estimates, between 86,500 [Valenta and Ramet, 2011] and 95,000 [Bendl, 2014] Bosnians arrived in Austria, making it the main recipient country relative to its population size.[2] 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

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[2]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.

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.

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 1: Education categories in Austria

Depending on their age upon 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] .[3] 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,

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[3]Kauffmann et al. [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.

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 appendix B. I show in appendix C.3 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 figure 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 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.

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].

Table 2: Education in pre-war Bosnia

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 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 figure 1.
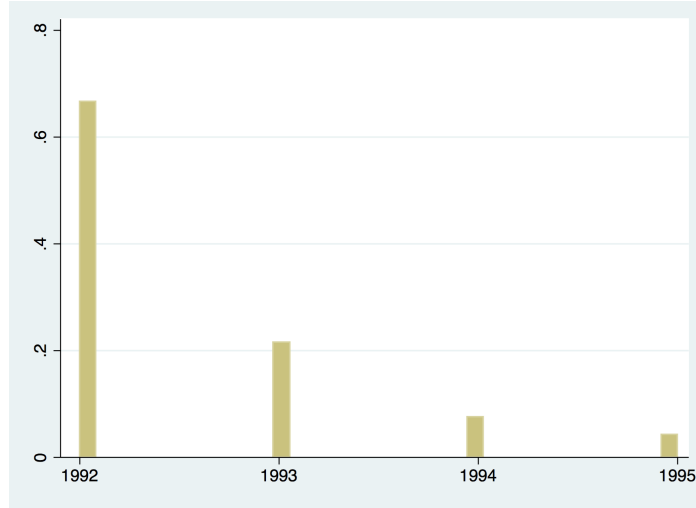

Figure 1: Bosnian war refugees by their year of arrival in Austria

Note: N=5283; T=1998-2019; Pooled sample of Austrian microcensus.

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 and 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. Altogether, the sample consists of 5,559 unique observations over the 22 year observation period.

3.1 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 figure 2.
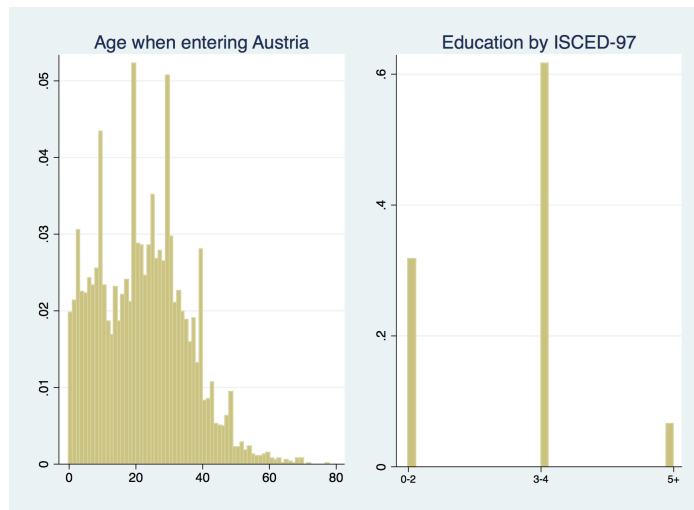
Figure 2: Bosnian war refugees by age at the time of migration and education level

Note: N=5283; T=1998-2019; Pooled sample of Austrian microcensus.

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 forcefully displaced [Sawyer et al., 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]. Subsection 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.

Variable	Mean	Std. Dev.	Min.	Max.	N
Low education	0.306	0.461	0	1	1354
Medium education	0.663	0.473	0	1	1354
High education	0.03	0.171	0	1	1354
Age	33.927	6.674	18	48	1354
Age-squared	1195.544	455.627	324	2304	1354
Age at forced migration	17.99	2.923	13	22	1354
Female	0.572	0.495	0	1	1354
Household size	3.701	1.231	1	8	1354
Married (head)	0.747	0.435	0	1	1354
Single (head)	0.208	0.406	0	1	1354
Widowed (head)	0.046	0.209	0	1	1354
Number of children in household	1.792	0.921	0	6	1211
Number of children < 6	0.693	0.825	0	4	1211

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

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 subsection 5.5.

3.2 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 realized matches procedure in the following way [Chiswick and Miller, 2009, Aleksynska and Tritah, 2013]:

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

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. 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 realized matching procedure is based on relatively little variation - a more direct measure of working in a low-skill occupation is also calculated:

$$LowSkill_{n,t} = \begin{cases} 1, if & Mode(Education_{n,t}) \leq ISCED - 97, \text{level } 2 \\ \\ 0, if & Mode(Education_{n,t}) > ISCED - 97, \text{level } 2 \end{cases} \qquad (2)$$

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.

Variable	Mean	Std. Dev.	Min.	Max.	N	Sample restrictions
Employed	0.815	0.389	0	1	1354	None
Work in low-skill job	0.143	0.35	0	1	1103	Employed only
Work below education	0.112	0.316	0	1	783	Employed only, no low-educated
Hourly net wage	11.89	5.28	2.40	52.26	262	Employed only, years 2011-2018

Table 4: Main outcome variables

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. Subsection 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

$$Y_{i,t,e} = \beta_t + \kappa_e + \eta EducationInAustria_{i,t} + \zeta IndividualCharacteristics_{i,t} + \epsilon_{i,t}, \quad (3)$$

where $Y_{i,t,e}$ is the integration outcome of interest for individual i in education category e at time t. $Y_{i,t,e}$ 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, $Y_{i,t,e}$ is continuous. $EducationInAustria_{i,t}$ is a binary variable equal to 1 if individual i attained his/her highest education in Austria and 0 if education was attained in Bosnia. Its estimated coefficient is the main coefficient of interest, η. β_t and κ_e are survey year and (simplified) ISCED-97 education category fixed effects respectively. The inclusion of κ_e is a key feature of 3 since it restricts variation to within education categories such that the only difference between individuals is whether that education was attained in Austria or Bosnia. $IndividualCharacteristics_{i,t}$ is a vector of control variables, including a dummy for female Bosnians, the time spent in Austria in years and federal state fixed effects. The latter are included 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 (the small) differences in the

presence of co-ethnic networks and variation in local labour market conditions discussed in appendix A. $\epsilon_{i,t,e}$ 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.

Finally, since the quality of employment is only observed for employed individuals, this initial selection could be different for humanitarian migrants who attained education from 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. Appendix C.1 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 and shows that this correction does not alter the obtained results.

4.2 Instrumental variable approach

Estimates obtained from equation 3 provide an association between holding a diploma from Austria compared to a similar degree from Bosnia. 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 and 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.

The instrumental variable approach exploits the fact that many Bosnian refugees were of young age when they entered Austria. Since Bosnians were displaced forcefully 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 (figure 3).
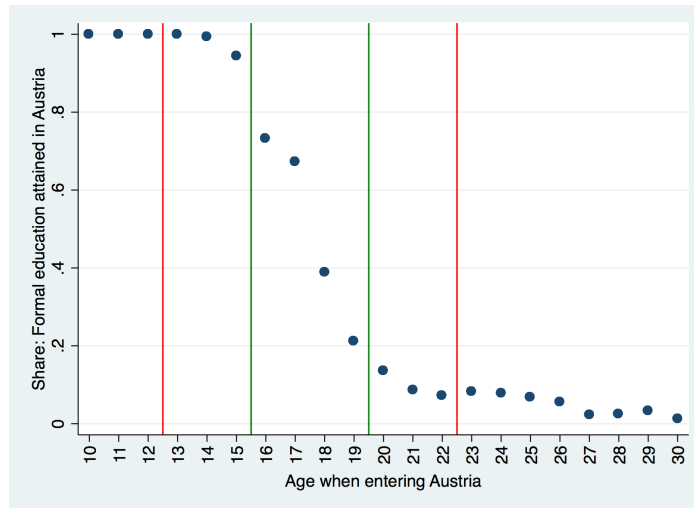

Figure 3: Education in Austria and the age at the time of forced displacement

Note: N=2865; T=1998-2019; pooled sample. The green lines indicate education cutoffs. The red lines indicate the bandwidth chosen for the main regression analyses.

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

$$EducationInAustria_{i,t,e} = \beta_t + \kappa_e + \eta AgeAtTimeOfArrival_{i,t} + \zeta IndividualCharacteristics_{i,t} + \nu_{i,t},$$

(4)

where $AgeAtTimeOfArrival_{i,t}$ is used to predict the probability of having received education in Austria instead of Bosnia, $EducationInAustria_{i,t,e}$.

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 education, and thus serves as a valid instrument, likely only holds for an age bandwidth that is sufficiently narrow. Two main rationals guide the choice of the bandwidth. The first rational follows from the literature on displacement studies. Since age is a direct determinant of psycho-social development, the forced migration experience could have had heterogenous effects on migrants across different age brackets, with potential differing repercussions on mental well-being [Porter and Haslam, 2005]. Mental well-being itself could in turn affect the performance on the labour market [Freitas-Monteiro and 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 et al. [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 forceful 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 rational 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 et al., 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 heterogenous 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 appendix C.2 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 et al. [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 appendix C.4, 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 forcefully 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 appendix C.3, 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

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[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.

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 figure 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.
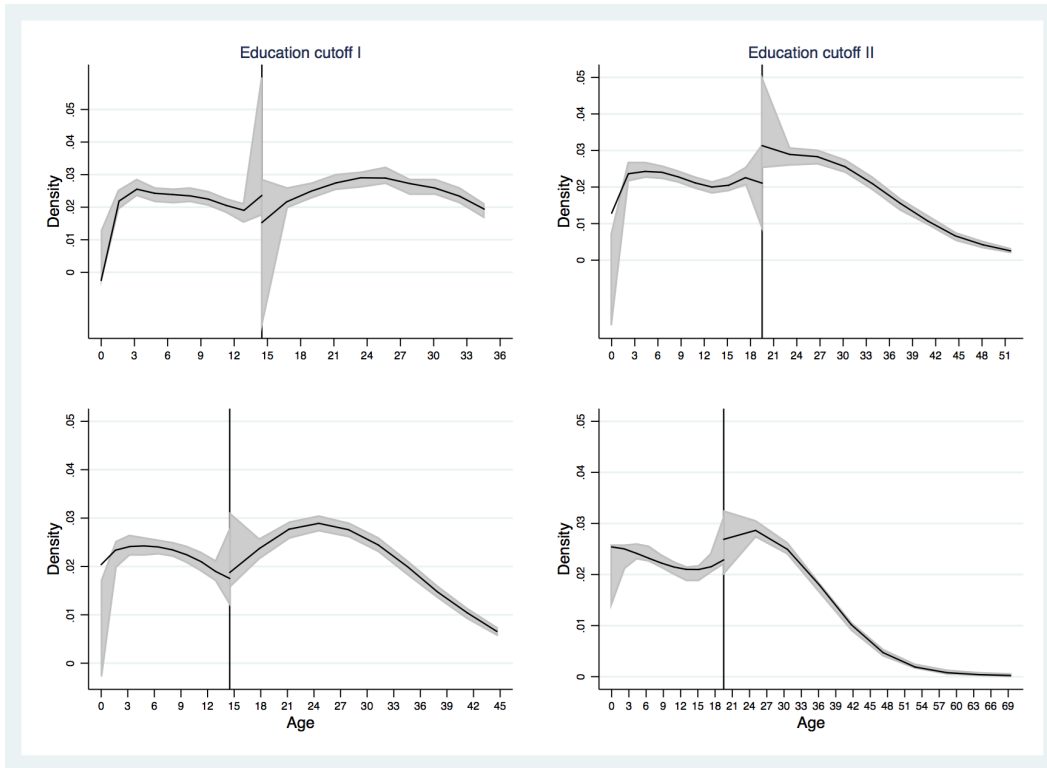
Figure 4: McCrary test for manipulation at age thresholds

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.

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 and 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 figure 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.

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[5]If, for example, holders of Austrian degrees were less likely to return to Bosnia, this share would increase systematically over time.
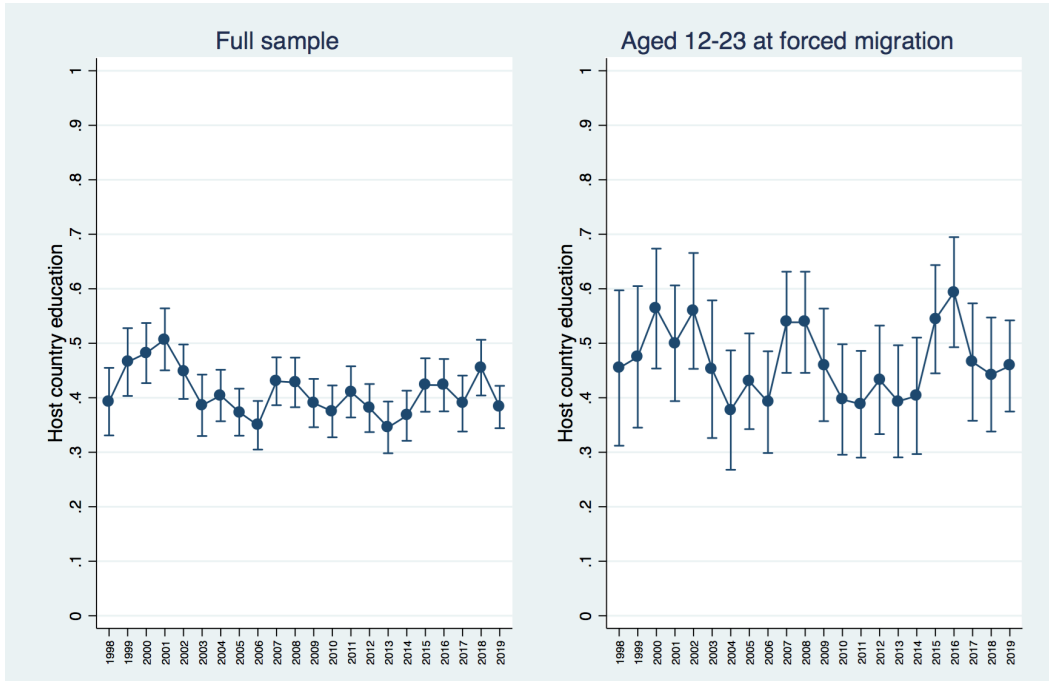
Figure 5: Relative attrition rates in the Austrian microcensus by country of educational attainment

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.

Finally, 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.

5   Results

This section presents the results. It is structured as follows. Subsection 5.1 shows the link between age at the time of arrival in Bosnia and labour market outcomes descriptively. Subsection 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. Subsection 5.3 shows how these estimates change over the duration of stay in Austria. Subsection 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, subsection 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   Descriptive results

Figure 6 plots the different outcomes of interest over three brackets of "time spent in Austria" (in years) separately for three groups: Bosnians aged 13 to 15 when being forced to migrate to Austria, Bosnians aged 16 to 19 when being forced to migrate to Austria and Bosnians aged 20 to 22 at the time of migration.
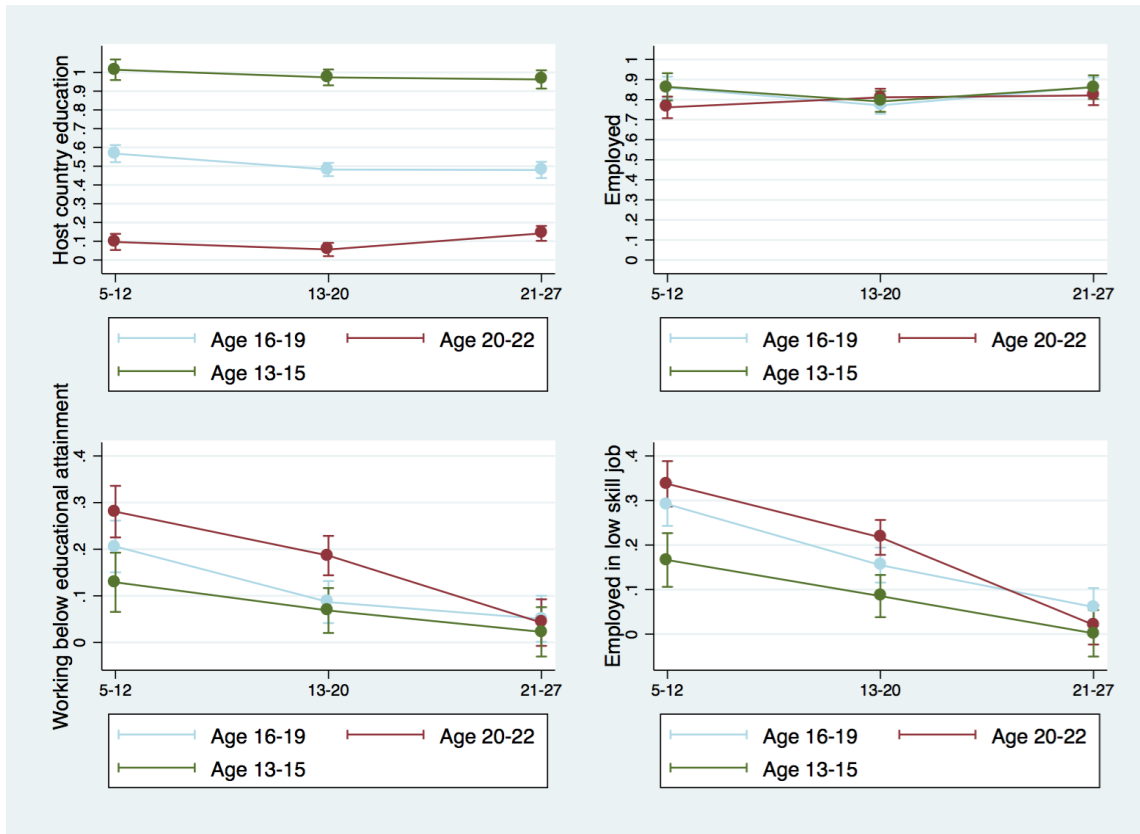
Figure 6: Host-country education, employment and employment quality over years of stay in Austria, comparison of age groups

Note: The x-axis displays years since immigration to Austria in three brackets. Age measured when entering Austria as a humanitarian migrant. Margins are derived from a linear regression of a binary outcome indicator on a categorical fixed effects term indicating the "years since migration" brackets, interacted with the "age at the time of arrival" bracket. "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. Employed is a dummy variable taking the value 1 if an individual is employed, and 0 otherwise. The regression with employment as an outcome is 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 equation 2. 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 equation 1. Estimates conditional on gender. Only within-ISCED category variation is considered. The bars show 90% confidence intervals.

The upper left panel shows that over the entire observation period, these age brackets are highly associated with the likelihood of having attained a formal degree in Austria instead of Bosnia. Two observations are striking. First, throughout the observation period from having spent five to 27 years in the country, employment rates are close to indistinguishable between the three groups (upper right panel). Second, the group aged 13 to 15 at arrival performs significantly better on both measures of employment quality than the 20 to 22 year-olds up until the second "time spent in Austria" bracket, when Bosnians had spent between 13 and 20 years in Austria (lower left and lower right panel). After five to twelve years in the country, the conditional share of Bosnians aged 20 to 22 years at arrival who worked below their educational attainment or in a low-skill job stood at 28% and 34% respectively, compared to 13% and 17% among Bosnians aged 13 to 15 at displacement. The 16 to 19 year-olds fall in between. The share of Bosnians in working below educational attainment and working in low-skill jobs then declines gradually over time in all "age at the time of arrival" groups, with shares in age groups that initially experienced a higher incidence of low-quality employment dropping slightly faster, such that the gap becomes small 21 to 27 years after migration.

5.2   Main results

We next turn to the regression results when pooling the working sample over the five to 27 year observation period in table 5, which displays both the OLS and the 2SLS results of the regression models described in equation 3 and 4.

	Employed		Work in low-skill job		Work below education	
	(1)	(2)	(3)	(4)	(5)	(6)
Host-country education	0.045*	0.016	-0.077***	-0.085***	-0.111***	-0.103***
	(0.025)	(0.033)	(0.022)	(0.029)	(0.023)	(0.028)
Time spent in Austria	-0.005	-0.005	-0.002	-0.003	-0.008	-0.008
	(0.015)	(0.015)	(0.011)	(0.010)	(0.012)	(0.011)
Female	-0.041*	-0.045*	0.169***	0.167***	0.106***	0.107***
	(0.024)	(0.024)	(0.020)	(0.020)	(0.022)	(0.022)
N	1354	1354	1103	1103	783	783
R^2	0.048	0.005	0.238	0.083	0.242	0.075
Estimation method	OLS	2SLS	OLS	2SLS	OLS	2SLS
Time FE	Year	Year	Year	Year	Year	Year
Federal state FE	Yes	Yes	Yes	Yes	Yes	Yes
Education category FE	Yes	Yes	Yes	Yes	Yes	Yes
First-stage F-test		1743.729		1250.340		1158.215

Standard errors clustered at the household level in parentheses.

* $p<0.10$, ** $p<0.05$, *** $p<0.01$

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 equation 2. 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 equation 1. "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. "Time spent in Austria" is a continuous variable measured in years. 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.

Table 5: Main results

The large F-statistics (>1000) 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 1.6 percentage points, but the coefficient is not significant at any conventional 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 and Fullin, 2011, Zwysen, 2019]. Host-country education has a strong negative effect on both the employment quality outcomes (columns (4) and (6)), confirming the descriptive results of subsection 5.1 as well as the coefficients estimated by OLS that are shown in columns (3) and (5) of table 5. 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 8.5 percentage points and 10.3 percentage points respectively. The confidence intervals are tightly estimated around these coefficients ($p<0.01$).

Appendices C.1, C.2 and C.2 show that these main results are further robust to (i) a Heckman correction for employment participation, (ii) widening and narrowing down the working sample by including and excluding individuals of different age at the time of arrival and (iii) to excluding individuals where the forced displacement may have led to differences in education choices respectively.

Finally, the time spent in the host country is negatively associated with the probability of being employed in low-quality occupations throughout all specifications. We note that

the likely reason for the low statistical precision of these estimates is the little arrival-cohort variation these are estimated on when survey year fixed effects are included in the regression; thus, the magnitude of these coefficients should be treated with care. It is further noteworthy that females are less likely to be employed (columns 1 and 2) and are more likely to hold low-quality jobs (columns 3-6). We turn to the characteristics of female employment in more detail in section 6.

5.3   Quality of employment over time

The estimation of the effect of host-country vis-à-vis origin country education over time is done in two ways. First, equation 3 is augmented by a term that interacts the $EducationInAustria_{i,t}$ variable with a continuous "time spent in Austria" variable, measured in years. The latter is then instrumented by a term that interacts the $AgeAtTimeOfArrival_{i,t}$ variable with the same time spent in Austria. The underlying assumption of the approach is that the adjustment path is linear, meaning that any initial discount Bosnian refugees faced on their Bosnian education decreases linearly over time. The results are illustrated in figure 7.
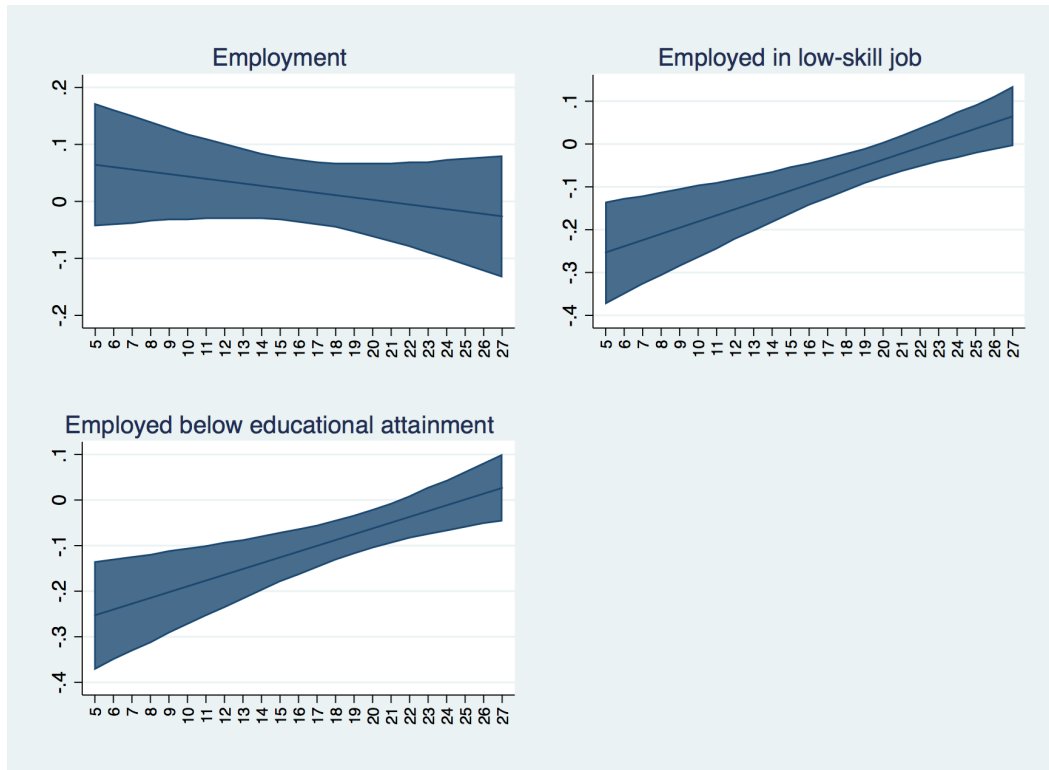
Figure 7: The effect of host-country education on employment and employment quality over time of stay

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 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. 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 equation 2. 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 equation 1. The shaded areas show 90% confidence intervals.

While employment rates among Bosnians educated in Austria do not differ significantly from Bosnians educated in Bosnia at any point of stay, the plots show that the average effects over time mask an adjustment process of employment quality. 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 90% confidence intervals only start to include zero after about two decades.

To allow for more flexibility in the adjustment over time, a second approach splits the sample by different "time spent in Austria" brackets, similar to figure 6. Table 6 shows how the results of the preferred 2SLS model.

Table 6: The effect of host-country education on employment and employment quality over time of stay - split sample regressions

	Employed			Work in low-skill job			Work below education		
	(1) 5-12 years	(2) 13-20 years	(3) 21-27 years	(4) 5-12 years	(5) 13-20 years	(6) 21-27 years	(7) 5-12 years	(8) 13-20 years	(9) 21-27 years
Host-country education	0.086	-0.063	0.077	-0.152**	-0.093**	-0.044*	-0.165**	-0.097**	-0.070**
	(0.059)	(0.050)	(0.065)	(0.066)	(0.043)	(0.026)	(0.068)	(0.041)	(0.033)
Time spent in Austria	0.012	-0.030	-0.012	0.022	-0.020	-0.019	0.037	-0.038*	-0.019
	(0.040)	(0.024)	(0.026)	(0.036)	(0.019)	(0.013)	(0.037)	(0.022)	(0.012)
Female	0.028	-0.112***	-0.017	0.247***	0.235***	0.037***	0.183***	0.139***	0.005
	(0.049)	(0.035)	(0.041)	(0.053)	(0.030)	(0.012)	(0.056)	(0.035)	(0.020)
N	340	573	425	280	453	359	199	327	250
R^2	0.015	0.012	0.009	0.129	0.136	0.029	0.123	0.101	0.014
Estimation method	2SLS	2SLS	2SLS	2SLS	2SLS	2SLS	2SLS	2SLS	2SLS
Time FE	Year	Year	Year	Year	Year	Year	Year	Year	Year
Federal state FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Education category FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
First-stage F-test	573.537	836.100	331.162	470.033	581.076	240.038	469.522	524.932	196.256

Standard errors clustered at the household level in parentheses.

* $p<0.10$, ** $p<0.05$, *** $p<0.01$

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 equation 2. 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 equation 1. "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. "Time spent in Austria" is a continuous variable measured in years. 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.

Columns (1) to (3) again confirm that employment is unaffected by formal host-country education. Columns (4) to (6) and (7) to (9), on the other hand, yield two additional results compared to the pooled sample regressions of table 5. First, for Bosnians who stayed in Austria for five to 12 years, holding a comparable Bosnian degree rather than an Austrian degree led to a 15.2pp increase in the probability of low-skill employment for the whole sample of employed Bosnians. For Bosnians educated at an upper secondary level and above, an Austrian degree decreased the likelihood of working below educational attainment by 16.5pp (p<0.05). To put these numbers in perspective, consider that between 1998 and 2019, a stable share of close to 6% of native-born Austrians of upper secondary education and above worked below educational attainment. Among Bosnians holding a foreign degree in the working sample, the unconditional share stood at 32% after five to 12 years of stay. Thus, not holding an Austrian degree still explained more than half of the gap in overeducation between Austrians and Bosnian refugees after around a decade in the country. Second, after more time spent in the country (columns 5, 6, 8 and 9), the discount on foreign education decreases until it reaches 4.4pp (p<0.1) for the probability of working in a low-skill job and 7pp for the probability to work below educational attainment (p<0.05) after more than two decades. These findings are well in line with previous descriptive studies that document a similar convergence in employment quality over the duration of stay among refugees in Europe [Damas de Matos and Liebig, 2014, Zwysen, 2019].

5.4   Net hourly wages

The strong positive effect of formal host-country education on employment quality among Bosnian refugees uncovered in subsections 5.2 and 5.3 is likely to have direct implications for earned income: In 2018, employed Bosnians earned, on average, EUR 1948 in net terms when working in an occupation not classified as low-skill according to equation 2. 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 net hourly wage of EUR 9.46, compared to EUR 12.46 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 "time-spent-in-Austria" bracket of table 6. These estimates are shown in table 7 below for the whole sample of the employed, thus comparable to column (6) of table 6 and the sample of Bosnians educated at upper secondary level and above, comparable to column (9) of table 6.[7]

	Hourly wage income		Hourly wage income - no low-educated	
	(1)	(2)	(3)	(4)
Host-country education	0.087*	0.082	0.125**	0.158**
	(0.045)	(0.058)	(0.053)	(0.068)
Time spent in Austria	0.003	0.003	0.011	0.011
	(0.025)	(0.024)	(0.035)	(0.033)
Female	-0.145***	-0.146***	-0.175***	-0.168***
	(0.040)	(0.038)	(0.052)	(0.050)
N	262	262	175	175
R^2	0.187	0.071	0.247	0.126
Estimation method	OLS	2SLS	OLS	2SLS
Time FE	Year	Year	Year	Year
Federal state FE	Yes	Yes	Yes	Yes
Education category FE	Yes	Yes	Yes	Yes
First-stage F-test		138.312		101.625

Standard errors clustered on the household level in parentheses.
* $p<0.10$, ** $p<0.05$, *** $p<0.01$

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. "Time spent in Austria" is a continuous variable measured in years. The sample consists of individuals who stayed in Austria for between 21 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-à-vis Bosnia.

Table 7: Hourly wage income

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 8.2% higher for Austrian degree holders ($p<0.2$; column 2) among all employed Bosnians and 15.8% higher for Austrian degree holders among

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[6]Data are unweighted averages calculated based on the 2018 Austrian microcensus.
[7]Missing values in the reported hours worked and monthly income lead to a slightly smaller sample size compared to table 6.

employed Bosnian refugees educated at upper secondary level and above (p<0.05; column 4). Interpreting these results in conjunction with the finding of employment quality convergence between Austrian and Bosnian degree holders over time (see table 6) further suggests that the income gap between the two groups was 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 subsection 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. Appendix C.2 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 table 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 9).

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 in Austria [Dumont et al., 2016]. Table 8 shows the results of a linear probability model as formally defined in equation 3, but estimated on the pooled sample

of tertiary Bosnians aged 25 to 64.[8] Of the 293 total individuals observed, 184 individuals had attained their tertiary degrees in Bosnia and 109 individuals attained their degrees in Austria, after forceful displacement.

	(1)	(2)	(3)
	Employed	*Low-skill job*	*Work below education*
Host-country education	0.027	-0.037	-0.200**
	(0.068)	(0.027)	(0.084)
Time spent in Austria	0.036	-0.025	-0.022
	(0.040)	(0.028)	(0.048)
Female	-0.052	0.060**	0.049
	(0.059)	(0.026)	(0.068)
N	293	225	225
R^2	0.090	0.209	0.260
Estimation method	OLS	OLS	OLS
Time FE	Year	Year	Year
Federal state FE	Yes	Yes	Yes

Standard errors clustered at the household level in parentheses.
* $p<0.10$, ** $p<0.05$, *** $p<0.01$

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 equation 2. 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 equation 1. "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. "Time spent in Austria" is a continuous variable measured in years.

Table 8: Tertiary educated

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. Second, while tertiary-educated Bosnians with degrees from Bosnia are indeed 20pp 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 refuges face on their tertiary education [Damas de Matos and Liebig, 2014, Dumont et al.,

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[8]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.

2016].

6 Cultural legacy: Differentiating male and female refugees and the role of female employment in former Yugoslavia

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 5). 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 and Manning, 2000]. A second feature of female employment is stressed in historical research on gendered work in former Yugoslavia: Women were predominantly employed in low-skill jobs and rarely held high positions in factories or politics [Pascall and Manning, 2000, Darville and Reeves, 1992].

In the following, we therefore 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 attained their education in Bosnia.

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

	Females			Males		
	(1)	(2)	(3)	(4)	(5)	(6)
	Employed	Low-skill job	Below educ.	Employed	Low-skill job	Below educ.
Host-country education	0.003	-0.130***	-0.159***	0.037	-0.024	-0.042**
	(0.047)	(0.048)	(0.050)	(0.046)	(0.019)	(0.020)
Time spent in Austria	-0.014	-0.015	-0.018	0.006	0.004	-0.003
	(0.021)	(0.019)	(0.022)	(0.020)	(0.005)	(0.007)
N	775	612	387	579	491	396
R^2	0.001	0.018	0.063	0.005	0.006	0.016
Estimation method	2SLS	2SLS	2SLS	2SLS	2SLS	2SLS
Time FE	Year	Year	Year	Year	Year	Year
Federal state FE	Yes	Yes	Yes	Yes	Yes	Yes
Education category FE	Yes	Yes	Yes	Yes	Yes	Yes
First-stage F-test	974.654	713.255	631.615	695.869	512.956	454.371

Standard errors clustered at the household level in parentheses.

* p<0.10, ** p<0.05, *** p<0.01

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 equation 2. 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 equation 1. "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. "Time spent in Austria" is a continuous variable measured in years. 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.

Table 9: Main results split by males and females

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 13.0pp and 15.9pp 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 em-

ployment 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 4.2pp for males ($p<0.05$), but the magnitude of the coefficient is less than 30% of the effect in females.

Figure 8 shows that these differences only emerge in the later years of refugees' stay in Austria.
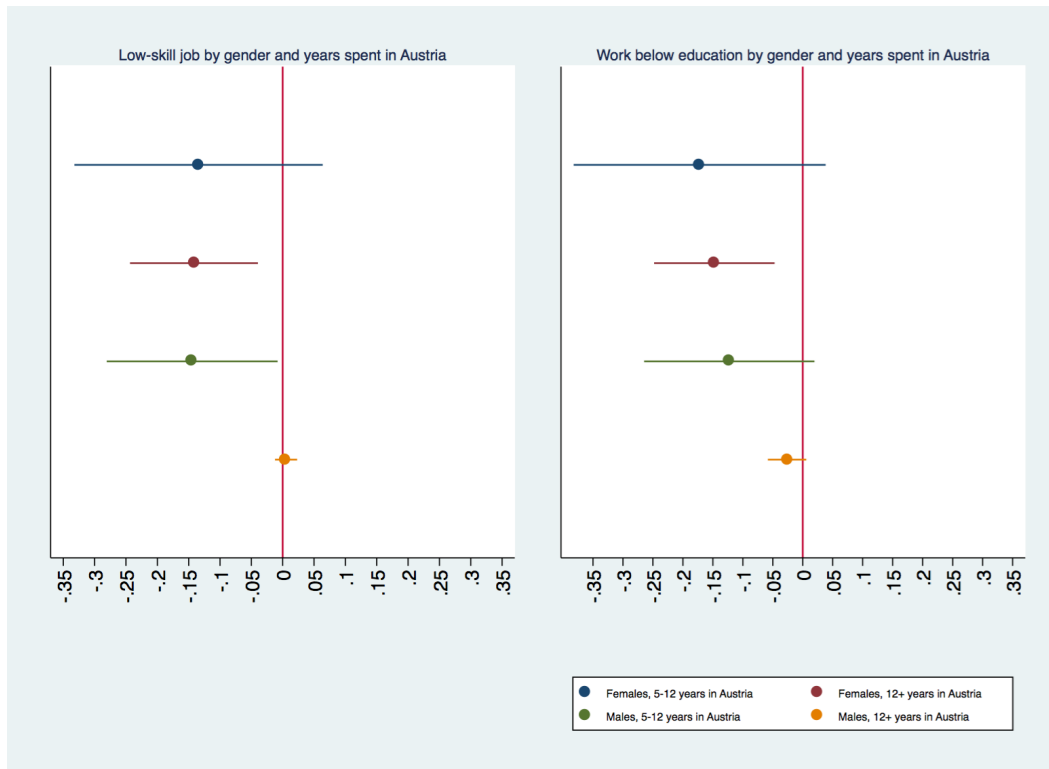

Figure 8: Employment quality - females and males over time of stay

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.

While after five to 12 years of stay in Austria, both male and female Bosnian refugees faced a large discount on their education, men managed to close the gap in the later years of stay while females did not. The cultural legacy of working in low-skill occupations among women in former Yugoslavia 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, women faced the additional difference in female work culture between the countries. While agnostic on the precise mechanisms at play, these results thus lend strong support to the hypothesis that host-country education can help overcome cultural barriers to the labour market. Additionally, the results could reflect that Bosnian women were more strongly affected by the institutional setting that incentivised them to enter into employment shortly upon arrival. Qualitative research on the situation of Bosnian women in Austria during the Bosnian war years conducted by Franz [2005] emphasises the important role of Bosnian women in securing "their families' residence rights as well as such social benefits as health insurance" (p.55) when Bosnians first came to settle in Austria. Thus, the institutional structure in Austria that discouraged humanitarian migrants from attaining formal education beyond a certain age may well have exacerbated existing cultural effects.

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 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 [Hanushek and Woessmann, 2011, Bonfanti and Xenogiani, 2014]. For these inflows, the estimates obtained in this paper are thus likely to present a lower bound. Supporting asylum 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 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 et al., 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 benefitted 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. The cultural background of Bosnians, where women traditionally held low-level positions on the labour market may thus well have translated into worse employment outcomes in Austria, where the institutional setting discouraged host-country education. The finding suggests that the education system can play a decisive role in overcoming cultural barriers in the labour market. This is important going forward as the gender dimension of labour market integration is likely to play 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 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 mi-

grants, 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 [Duleep and Regets, 1999, Cortes, 2004]. 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 [Commission, 2016a].[9] 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.[10] 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.[11] Second, if there is a policy preference towards an economic integration and insufficient infrastructure to support humanitarian migrants to integrate into education sys-

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[9]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).

[10]Calculations based on Eurostat data, 2008-2017.

[11]Residence permits granted to recognised Geneva Convention refugees are initially limited to three to five years in the majority of European countries [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 et al., 2017a].

tems, this presents a relative increase in the cost of human capital investment compared to taking up low-skill labour.[12]

Finally, this paper focuses on the economic aspects of integrating humanitarian migrants into host-country education systems. Policymaking 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 [Freedman et al., 2018, Couttenier et al., 2019]. 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.

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[12]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 [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" [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 and Kocanova, 2019, p.24].

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Appendices

A   Facilitators of early employment of Bosnian refuges

Two mediating channels may have had a positive impact on the integration of Bosnian refugees into Austrian labour markets. First, due to large guest worker movements from Bosnia in the preceding decades, Bosnians had extensive co-ethnic 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 and Reeger, 2008]. The shares in table 10 below are calculated based on Austrian microcensus data from 1995 and therefore capture only those Bosnians still present in the country in 1995 who had migrated to Austria before 1992.

Federal state (NUTS-2)	Population share (1991)	Share Bosnians (1991)	Share Bosnian refugees
Burgenland	0.04	0.02	0.02
Kärnten	0.07	0.06	0.07
Niederösterreich	0.19	0.1	0.09
Oberösterreich	0.17	0.23	0.25
Salzburg	0.06	0.12	0.1
Steiermark	0.15	0.1	0.13
Tirol	0.08	0.07	0.08
Vorarlberg	0.04	0.04	0.01
Wien	0.2	0.27	0.25

Notes: Table based on the total sampled population by federal state and unweighted counts of Bosnians who had migrated to Austria in 1991 or before as reported in the 1995 Austrian microcensus. Columns (1), (2) and (3) show the share of the Austrian population residing in each federal state, the share of Bosnians who arrived in 1991 or before in total Bosnians who arrived in 1991 or before residing in each federal state and the share of Bosnian refugees in total Bosnian refugees residing in each federal state respectively.

Table 10: Bosnians in Austria before the start of the Bosnian war

The existence of co-ethnic networks in the destination country have been linked to higher earnings among refugees in previous research. In particular informal channels facilitate better job market matches [Damm, 2009, Edin et al., 2003]. On the other hand, Battisti et al. [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. It remains unclear if co-ethnic networks are structural parameters in the human capital investment decision or should rather be considered a facilitator of an underlying preference for employment. In this context, it should further be noted that the large co-ethnic networks Bosnians could draw on in Austria may have led to a negative selection of refugees from Bosnia along their education levels [Beine et al., 2011].

Second, the labour market conditions in Austria were extremely favourable throughout the 1990s with very small regional and annual deviation from the national mean unemployment rate of around 4 percent. Official Austrian statistics did not report regional unemployment rates but the total number of unemployed by federal state. Table 11 shows calculated unemployed-to-population ratios for each federal state. Thus, unemployment was largely low and homogenous across the country. These favourable labour market conditions likely benefitted Bosnians in particular in the beginning when barriers to the labour market were still in place.

Federal state (NUTS-2)	Unemployment-to-population 1992-1995
Burgenland	2%
Kärnten	3%
Niederösterreich	2%
Oberösterreich	2%
Salzburg	2%
Steiermark	3%
Tirol	2%
Vorarlberg	2%
Wien	4%

Notes: Calculations based on the number of unemployed and total federal state population reported by Statistics Austria. Statistics averaged over the 1992 to 1995 period.

Table 11: Unemployment-to-population ratios in Austrian federal states between 1992 and 1995

B   Labour market access of Bosnian refugees in Austria during and after the Bosnian war

A wider access to the labour market was granted with some initial limitations as Bosnian refugees were initially placed last in a priority system that favoured native-born Austrians, EU migrants and other third-country nationals. Table 12 provides a comprehensive overview of the timeline of labour market access that was gradually granted to Bosnian refugees in Austria. The initial restrictions led to informal employment in the early years [Franz, 2003]. However, formal employment rates then picked up quickly [Barslund et al., 2017a].

1992	1993	1994	1995	1996-1998
July: First access via a special contingent but only temporary employment of up to three months with municipalities and registered charities	July: Full access to the labour market but within a priority system that put Bosnians last after Austrians and other migrants	August: Still last in the priority system but Austrian employment services start to support Bosnians in finding work	First work permits issued; initially only 2000 but steadily increasing	All Bosnians obtain work permits
October: The above time limit gets gradually extended but still only municipalities and charities legally allowed to hire Bosnians				
Maximum quota of foreign workers not to exceed 8-9% of the total work force				

Notes: Table based on Tretter [2000].

Table 12: Labour market access of Bosnian refugees in Austria over time

An important institutional feature that incentivised Bosnians to integrate into the formal labour market quickly despite some early barriers was the fact that their residence status could be converted into a more permanent status through employment if earnings where sufficient to sustain themselves and their families. Around 30,000 to 40,000 Bosnian refugees

managed to get a permanent residence status through employment under this so-called Aliens Act [Tretter, 2000].

C Further robustness tests

This section presents further robustness tests. Subsection C.1 shows the results when selection into employment is accounted for. Subsection C.2 shows the results for different definitions of the working sample. Subsection C.3 analyses the effect of the forced displacement experience on the level of educational attainment in Austria. Finally, subsection C.4 discusses the validity of the IV approach in light of the importance of the external versus the internal margin of schooling in Austria.

C.1 Heckman correction for employment participation

We first use the entire sample of Bosnians, including those not in employment, to estimate a selection equation of the form

$$Probit : Pr(Employed = 1|x_i)_{i,t} = \Phi(\Pi_0 + \Pi_1 EducationInAustria_{i,t} + \delta Z_{i,t} + \xi_i), \quad (5)$$

where x_i is a list of regressors and Φ is the cumulative distribution function of the standard normal distribution. We further note that the matrix of control variables, $Z_{i,t}$, differs slightly from $IndividualCharacteristics_{i,t}$ in equation 3 since we are now explicitly modelling participation in employment instead of employment quality. The general decision to obtain employment may, in addition to the individual level characteristics, also depend on household characteristics such as the relationship status, the number of persons in the household or the number of children in the household. These variables are used to identify 5. Due to some

missing values in these variables, the sample size is reduced slightly.

Obtained from equation 5, the estimated inverse Mills ratio (IMR) denoted by λ is a standard hazard function computed for each individual i by

$$\hat{\lambda}_i = \frac{-\phi(x_i)}{\Phi(x_i}, \tag{6}$$

where ϕ is the probability density function. $\hat{\lambda}_i$ is then included in equations 3 and 4 as a regressor. Since the IMR is estimated and not known, standard errors in the regressions are cluster bootstrapped, based on 1000 bootstrap iterations.

The results of the regressions that include the Heckman corrections are shown in table 13.

	Employed		Work in low-skill job		Work below education	
	(1)	(2)	(3)	(4)	(5)	(6)
Host-country education	0.045*	0.016	-0.051**	-0.087***	-0.069***	-0.090***
	(0.025)	(0.033)	(0.024)	(0.031)	(0.025)	(0.031)
Time spent in Austria	-0.005	-0.005	-0.007	-0.007	-0.010	-0.011
	(0.015)	(0.015)	(0.011)	(0.011)	(0.011)	(0.011)
Female	-0.041*	-0.045*	0.147***	0.147***	0.076***	0.077***
	(0.024)	(0.024)	(0.020)	(0.020)	(0.022)	(0.022)
Lambda			0.326***	0.255*	0.512***	0.463***
			(0.119)	(0.130)	(0.142)	(0.153)
N	1354	1354	1089	1089	775	775
R^2	0.048	0.005	0.246	0.087	0.263	0.097
Estimation method	OLS	2SLS	OLS	2SLS	OLS	2SLS
Time FE	Year	Year	Year	Year	Year	Year
Federal state FE	Yes	Yes	Yes	Yes	Yes	Yes
Education category FE	Yes	Yes	Yes	Yes	Yes	Yes
First-stage F-test		1743.729		1729.983		1460.857

Standard errors cluster bootstrapped at the household level in parentheses.

* p<0.10, ** p<0.05, *** p<0.01

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 equation 2. 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 equation 1. "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. "Time spent in Austria" is a continuous variable measured in years. "Lambda" is the inverse Mills ratio obtained from a probit regression formally described in 5 and corrects for employment participation. 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.

Table 13: Baseline results with Heckman correction for employment participation

C.2 Adjusting the age bandwidth

The sample selection of 12 to 23 year olds is an arbitrary choice that balances the validity of the instrument against the sample size. Figure 9 shows that the main results are robust to different choices of the bandwidth.

Figure 9: The effect of host-country education on employment and employment quality for different bandwidths

Note: The plots show margins derived from 2SLS regressions as formally described in equations 3 and 4 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. The bandwidths chosen correspond to the age at the time of arrival in Austria. 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 equation 2. 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 equation 1. The horizontal bars show 95% confidence intervals.

C.3 Accounting for potential differences in educational attainment by age

Figure 10 shows the conditional shares of low-educated, medium-educated and highly-educated Bosnians in Austria by the precise age at forced migration. The green line shows the sample mean for each education group among Bosnians aged 10 to 30 years at the time of migration.
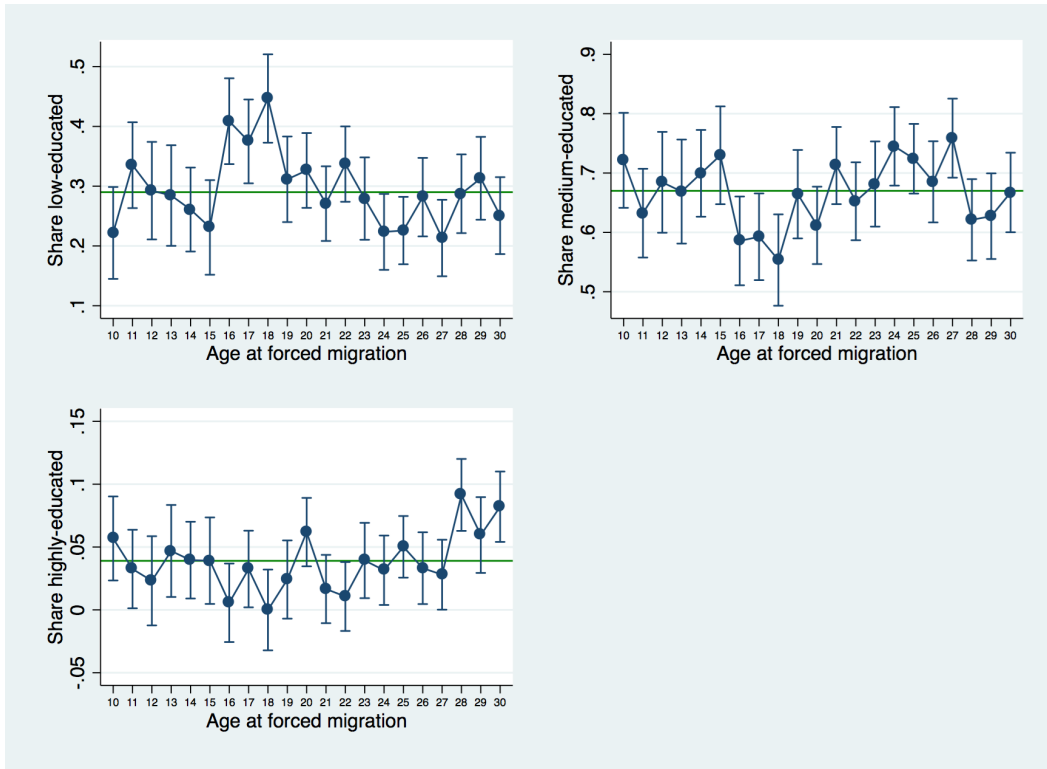

Figure 10: Educational attainment by age

Note: The sample for the shown margins consists of all individuals aged between 10 and 30. Margins are derived from an OLS regression of a binary indicator that takes the value one if an individual fell into the respective education category (and zero otherwise) on a fixed effects term capturing age at the time of forced displacement. The estimates are conditioned on a dummy variable for females, a continuous indicator for time spent in Austria (in years), survey year and federal state fixed effects. The green lines show the sample mean for each education group. The vertical bars show 95% confidence intervals.

The figure shows that Bosnians aged 16, 17 and 18 at the time of forced displacement were significantly more likely to be educated at a low level (upper left panel) than at a medium level (upper right panel), compared to the sample average of Bosnians aged 10 to 30 years

at the time of migration. Excluding individuals aged 16, 17 and 18 at the time of forced displacement yields the results shown in table 14.

	Employed		Work in low-skill job		Work below education	
	(1)	(2)	(3)	(4)	(5)	(6)
Host-country education	0.042	0.023	-0.066***	-0.062**	-0.087***	-0.091***
	(0.028)	(0.033)	(0.024)	(0.028)	(0.025)	(0.030)
Time spent in Austria	0.002	0.002	0.001	0.001	-0.009	-0.009
	(0.018)	(0.018)	(0.013)	(0.012)	(0.013)	(0.013)
Female	-0.045	-0.048*	0.202***	0.202***	0.138***	0.137***
	(0.028)	(0.028)	(0.024)	(0.023)	(0.026)	(0.026)
N	996	996	807	807	590	590
R^2	0.054	0.006	0.255	0.102	0.252	0.077
Estimation method	OLS	2SLS	OLS	2SLS	OLS	2SLS
Time FE	Year	Year	Year	Year	Year	Year
Federal state FE	Yes	Yes	Yes	Yes	Yes	Yes
Education category FE	Yes	Yes	Yes	Yes	Yes	Yes
First-stage F-test		2235.278		1524.061		1249.213

Standard errors clustered at the household level in parentheses.

* p<0.10, ** p<0.05, *** p<0.01

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 but excludes those aged 16, 17 and 18. 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 equation 2. 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 equation 1. "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. "Time spent in Austria" is a continuous variable measured in years. 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.

Table 14: Main results excluding 16 to 18 year olds

C.4 External versus internal margin of schooling

The instrumental variable approach described in section 4.2 makes the implicit assumption that the age at the time of forced displacement is a valid instrument for having received attained a degree from Austria vis-à-vis Bosnia (the external margin). This implies that the years of schooling in Austria (the internal margin when total schooling is held constant), does not predict employment quality in the particular setting at hand. The years of schooling received is not directly reported in the Austrian microcensus such that these regressions cannot be run using a 2SLS regression model. However, to test the assumption, we can

restrict the sample to humanitarian migrants who attained formal education in Austria and specify a model of the form

$$Y_{i,t,e} = \beta_t + \kappa_e + \gamma AgeWhenEnteringAustria_{i,t} + \zeta IndividualCharacteristics_{i,t} + \epsilon_{i,t}, \ (7)$$

where γ, the coefficient estimated on the continuous $AgeWhenEnteringAustria_{i,t}$ variable is the coefficient of interest as it may potentially predict the number of years of schooling individuals received. Model 7 includes the same controls as model 3. It is estimated by OLS.

Table 15 shows the results for the working sample, aged 13-22 at forced migration, and a sample of 10 to 14 year olds at the time of forced migration, where the linear $AgeWhenEnteringAustria_{i,t}$ variable serves as a more precise proxy for the years of schooling attained in Austria vis-à-vis Bosnia.

	Aged 13-22 at forced migration			Aged 10-14 at forced migration		
	(1)	(2)	(3)	(4)	(5)	(6)
	Employed	Low-skill job	Below educ.	Employed	Low-skill job	Below educ.
Age when entering Austria	0.008	-0.001	0.006	0.015	0.004	0.005
	(0.006)	(0.005)	(0.006)	(0.011)	(0.009)	(0.009)
Time spent in Austria	-0.018	0.005	-0.001	0.002	-0.006	0.005
	(0.019)	(0.011)	(0.014)	(0.024)	(0.014)	(0.010)
Female	-0.048	0.100***	0.045*	-0.077**	0.062**	0.066***
	(0.032)	(0.023)	(0.025)	(0.035)	(0.025)	(0.024)
N	630	535	476	582	472	397
R^2	0.075	0.197	0.257	0.106	0.145	0.134
Estimation method	OLS	OLS	OLS	OLS	OLS	OLS
Time FE	Year	Year	Year	Year	Year	Year
Federal state FE	Yes	Yes	Yes	Yes	Yes	Yes
Education category FE	Yes	Yes	Yes	Yes	Yes	Yes

Standard errors clustered at the household level in parentheses.

* p<0.10, ** p<0.05, *** p<0.01

Notes: The sample consists of individuals aged between 13 and 22 (columns 1-3) or between 10 and 14 (columns 4-6) 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 equation 2. 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 equation 1. "Age when entering Austria" is a continuous variable. "Time spent in Austria" is a continuous variable measured in years.

Table 15: Years of schooling

No significant association between the age when entering Austria and employment or employment quality indicators is detected. This holds for the working sample (columns 1-3) and the sample aged 10 to 14 (columns 4-6).