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Bridging Origin and Destination: Contextualising Human Capital in Refugee Labour-Market Trajectories

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Abstract

Refugees face substantial barriers to labor markets integration. A key issue is that the human capital acquired and used in origin-country institutional settings may be of limited value in host-country contexts. Using longitudinal registry data of refugees from 37 origin countries in Austria, this study assesses employment and earnings trajectories for the first five years after recognition. It examines how pre-migration educational qualifications, origin-country educational-system performance and gender norms, as well as destination-region migrant population concentrations are associated with labour market outcomes. Educational attainment is only weakly related to employment and earnings, particularly among men, whereas vocational qualifications tend to be more beneficial, especially among women. Origin-country contexts are primarily related to women's employment: higher educational-system performance is associated with higher employment shares, and more egalitarian origin-country gender norms with steeper earnings trajectories. Residence in regions with high and growing co-origin population concentrations is associated with less favourable outcomes. The findings suggest that the labour-market value of pre-migration human capital is depends on context, and, in vocationally structured labour markets, may depend more on compatibility with host-country institutions than on formal education alone. They also underscore the gendered links between origin-country contexts and refugee incorporation.

Keywords: refugees; labor market integration; human capital; vocational training; gender norms; local settlement context.

1. Introduction

The economic integration of refugees is a central dimension of their broader incorporation into host societies (see Kalter 2022). Employment is particularly important because it promotes self-sufficiency while creating opportunities for language acquisition, social interaction, and familiarity with host-country institutions. Yet refugees often face labor market barriers that differ from those encountered by natives or other immigrant groups. Having migrated primarily for protection rather than economic opportunity, they may be less prepared than voluntary migrants to navigate the demands of destination-country labor markets (Kogan and Kosyakova 2023). At the same time, many refugees express a strong desire to work and eventually transition to permanent residence in the host society (Samers and Collyer 2017; Solheim and La Parra-Casado 2019). Their successful labor market integration likely depends on whether the human capital they bring with them can be productively used and rewarded in the destination country. A central question is therefore how effectively the educational credentials, skills, and work experience refugees acquired before migration can be converted into labor market success after arrival.

This study addresses this question by examining refugees' employment transitions and outcomes, focusing on employment uptake, stability, and earnings. Using comprehensive longitudinal administrative data covering refugees from 37 origin countries granted humanitarian protection in Austria between 2009 and 2018, we follow their labor market trajectories during the first five years after recognition. Austria constitutes a particularly informative case because its labor market is strongly organized around occupational credentials and vocational qualifications (Vogtenhuber et al. 2021), making it well suited for studying the transferability of human capital acquired in different institutional environments. Similar institutional features characterize several other Western European refugee-receiving countries, including Germany, Switzerland, and Denmark, suggesting that the findings may have relevance beyond Austria. Moreover, because admission is primarily based on protection needs

rather than applicants' labor-market characteristics, refugees provide a useful population for studying how pre-migration resources are translated into post-migration labor-market outcomes (Borjas 1987; Chiswick 1999; Kogan and Kosyakova 2023).

We examine the associations of individual human capital, origin-country contexts, and local destination contexts with refugee labor market integration. Individual resources such as education, vocational qualifications, work experience, and job-related skills are well-established predictors of labor market success, yet foreign-acquired human capital often suffers from limited transferability and imperfect recognition in destination-country labor markets (Chiswick 1978). The extent of this transferability may also depend on the context in which the human capital was acquired: the labor-market value of foreign educational credentials may vary with the quality of origin-country education systems. Refugees' employment trajectories may also be associated with origin-country normative contexts (Coleman 1988; Portes 1995). For example, more egalitarian gender norms in origin countries have been associated with higher labor-market participation among migrant women after migration (e.g. Antecol 2000). Finally, opportunities for labor market integration are embedded in local contexts. The size and growth of immigrant populations may facilitate labor-market entry through social ties and information flows, but may also be associated with more limited contact with the native-born population and access to broader employment opportunities (Aksoy, Poutvaara, and Schikora 2023; Beiser and Hou 2017; Kalter and Kogan 2014).

By jointly examining individual human capital, origin-country institutions and norms, and local destination contexts, this study extends existing research that has often examined these dimensions separately. The analysis contributes to migration and integration research by assessing how pre-migration resources are translated into labor market outcomes within Austria's credentialized and vocationally structured labor market. More broadly, it speaks to a fundamental question in migration research: how is the economic value of pre-migration human capital translated within destination-country institutional settings? To address this question, the

next section develops a theoretical framework that integrates human capital, socio-cultural, and institutional perspectives on refugee labor market integration.

2. Theoretical Framework: Human Capital in Context

This study builds on a human capital perspective that views the economic value of skills and qualifications as embedded in social and institutional contexts (Becker, 1964; Coleman, 1988). Refugees' labor market integration depends not only on the education, skills, and work experience they acquired before migration, but also on the environments in which these resources were formed and the institutional conditions under which they are utilized after migration. Human capital is therefore neither universally transferable nor equally rewarded across contexts. Instead, labor market outcomes reflect the interplay among individual resources, origin-country conditions that shape skill formation, and host-country structures that determine the degree to which those skills can be recognized and used productively.

2.1 Human Capital and Origin-Country Skill Formation

Human capital theory posits that education, training, and work experience increase individuals' productive capacities and thereby improve labor market prospects (Becker 1964). For migrants and refugees, however, the value of human capital often depends on its transferability across institutional contexts (Chiswick, 1978; Chiswick & Miller, 2009; Friedberg, 2000).

Educational credentials and occupational skills acquired abroad may lose value after migration because they were obtained in educational systems, labor markets, and occupational structures that differ from those of the host country. Employers frequently lack information about the quality of foreign qualifications and may therefore discount them in hiring and wage-setting decisions. Furthermore, occupational skills developed in one institutional environment are not necessarily compatible with the technological standards, professional regulations, or workplace practices of another (Bonikowska et al., 2008; Borjas, 1994; Buzdugan & Halli, 2009; Kalter, 2022; Kosyakova & Kogan, 2022).

Language proficiency constitutes an especially important component of transferable human capital because it facilitates communication, signals adaptability, and enables the effective deployment of existing skills (Chiswick 1991; Esser 2006; Kogan and Kosyakova 2023). Refugees with stronger host-country language skills are therefore generally better positioned to convert pre-migration qualifications into labor market success.

Beyond differences in the transferability of human capital, refugees also differ substantially in the amount and type of human capital accumulated before migration. Educational attainment, vocational qualifications, work experience, and age are all likely to shape labor market integration. However, the returns to these resources may unfold only gradually. Highly educated refugees, for instance, may benefit from delaying labor market entry while investing in language acquisition, credential recognition, or additional training necessary to obtain positions that match their qualifications (Damelang and Kosyakova 2021). Consequently, some forms of pre-migration human capital, particularly general educational credentials, may initially be associated with slower labor market entry but more favorable outcomes in the longer term.

2.2 Origin-Country Contexts: Skill Formation and Gender Norms

The formation of human capital is itself embedded in social and institutional contexts. Educational systems vary substantially across countries in their quality and effectiveness, implying that equal levels of formal schooling may not necessarily reflect equivalent skills and competencies (Bratsberg and Terrell 2002; Li and Sweetman 2014). Refugees from countries with higher-quality educational systems may therefore possess forms of human capital that are more readily transferable to host-country labor markets than refugees with formally comparable qualifications obtained in weaker educational systems.

Beyond educational institutions, gendered normative contexts may be associated with both the acquisition and utilization of human capital. Gender norms can shape educational investments, labor market aspirations, and opportunities for labor force participation. Where gender-role

expectations assign women primary responsibility for family and care work, they may constrain participation in formal education and employment. Research has found that origin-country gender norms are associated with women's labor market behavior after migration (Antecol 2001; Blau, Kahn, and Papps 2011; Blau and Kahn 2015; Bredtmann and Otten 2023; Read 2004; Heering, van der Erf, and van Wissen 2004). Women originating from societies with lower levels of female labor force participation often exhibit lower employment rates in host-country labor markets, even after accounting for individual characteristics. These patterns are consistent with the possibility that origin-country gender regimes are associated with labor market integration not only through differences in human capital accumulation but also through gendered orientations and constraints related to paid work and care. Country-level indicators, however, cannot identify individual beliefs or the mechanisms through which they operate and should therefore be interpreted as contextual measures rather than as attributes of individuals.

Although these associations are likely to be particularly important for women, origin-country contexts may also be associated with men's labor market outcomes through other channels, including access to social networks, bridging ties, and exposure to discrimination. Origin-country contexts may thus be related to labor market integration both through human capital formation and through pathways not captured by individual measures of human capital.

2.3 Host-Country Institutions and Opportunity Structures

The economic value of refugees' human capital is also shaped by the institutional and social context of the receiving society. Labor markets differ substantially in how qualifications are recognized, how occupations are structured, and which skills are rewarded. In highly credentialized labor markets, access to employment often depends on formally recognized qualifications rather than on general educational attainment alone.

Austria represents such a context. Like several other continental European countries, it is characterized by strong linkages between occupational credentials and labor market allocation,

particularly through vocational education and training pathways (Bol et al. 2019; DiPrete et al. 2017; Vogtenhuber 2014). In these settings, foreign qualifications may be difficult to assess, and occupational skills may not easily translate into recognized credentials, potentially reducing the labor market returns to pre-migration human capital.

Refugees' opportunities are also shaped by the local social environments in which they settle. Higher local concentrations of populations from refugee-origin countries may facilitate labor market entry when they provide access to information, job referrals, and social support (Aksoy, Poutvaara, and Schikora 2023; Beiser and Hou 2017). At the same time, higher local concentrations may also be associated with more limited contact with native-born residents and broader labor market opportunities, as well as with concentration in segmented labor market niches (Kalter and Kogan 2014). Local migrant communities may therefore constitute both a resource and a constraint, depending on their size, growth, and composition. More broadly, regional concentrations of populations from refugee-origin countries capture a broader local settlement context that may shape opportunities for contact with members of refugees' own and other migrant communities, as well as with the native-born population. They should not be interpreted as a direct measure of individual network ties.

More generally, local labor market conditions influence the opportunities available to refugees. Access to jobs, training opportunities, public services, and social contacts varies across local contexts and may either facilitate or impede the effective utilization of refugees' human capital. Labor market integration is thus shaped not only by the resources refugees bring with them, but also by the institutional and opportunity structures they encounter after arrival.

3. Hypotheses

Building on the theoretical framework, this study examines how labor market integration is associated with individual human capital, origin-country contexts, and local destination contexts. Human capital theory suggests that education and skills facilitate labor market success, but their value depends on the institutional and socio-cultural environments in which

they were acquired and subsequently utilized. We therefore expect refugees' employment trajectories and earnings to reflect not only individual endowments but also differences in origin-country skill formation, gender norms, and local destination contexts.

Individual-Level Human Capital

Refugees with higher levels of education generally possess greater productive skills and learning capacities. Although highly educated refugees may initially delay labor market entry to invest in language acquisition, credential recognition, or additional training, they should ultimately achieve more favorable labor market outcomes including higher earnings.

(H1) Higher educational attainment is associated with higher employment shares during the first five after recognition.

(H2) Higher educational attainment is associated with higher earnings, and the returns to education increase over time.

Origin-Country Contexts: Skill Formation and Gender Norms

The value of educational credentials depends not only on their level but also on the quality of the institutional environments in which they were obtained. Refugees from countries with stronger educational systems may therefore possess, on average, skills that are more readily transferable to the host-country labor market.

(H3) Refugees from countries with higher-quality educational systems are expected to have more favorable employment and earnings outcomes.

Origin-country gender norms may further be associated with market integration through gendered differences in pre-migration employment experience and orientations toward paid work and care.

(H4) Female refugees from origin countries characterized by more egalitarian gender norms are expected to have more favourable employment and earnings trajectories.

Local Destination Contexts

The labor market value of refugees' human capital is also shaped by the local contexts in which integration takes place. Local concentrations of populations from refugee-origin countries may be associated with access to information, social support, and employment opportunities, but may also reinforce labor market segmentation and limit opportunities for developing bridging ties to the native population.

(H5) The size and subsequent growth of local populations from refugee-origin countries are associated with refugees' labor market outcomes. Higher levels of local concentration may be associated with access to social and employment resources, whereas stronger subsequent growth may be associated with less favorable employment and earnings trajectories where it coincides with more limited access to broader labor market opportunities.

4. Data and Methods

This study draws on linked administrative data from the Austrian social security system and the Public Employment Service (Labor market database, AMDB; AMS - BMASGPK 2025). The data cover the entire resident population and provide complete daily records of employment, unemployment, and inactivity spells. A key advantage is the availability of detailed information on educational attainment and occupations from PES caseworker assessments. The analytical sample comprises about 58,000 refugees aged 20–54 from 37 origin countries who were granted international protection in Austria between 2009 and 2018. Individuals are observed for up to five years following the granting of protection, with labor market outcomes measured through the end of 2023.

We analyze two main indicators of labor market integration. The first is the annual share of days spent in employment, ranging from 0 (no employment during the year) to 1 (continuous employment throughout the year). The second is the natural logarithm of annual earnings among person-years with positive employment earnings. As robustness checks, we use two

alternative outcomes: (1) a binary indicator of stable employment, defined as at least 90 days of employment above the marginal earnings threshold within a given year, and (2) the logarithm of daily earnings, calculated as annual earnings divided by the number of days employed. As the administrative data does not record working hours, we cannot use hourly wages as an alternative measure. Annual earnings are derived from social security records and sum earnings across all employers within a year. Although earnings are top coded at the statutory contribution ceiling, this affects only 50 observations (33 men) and is therefore inconsequential for the analysis.

Human capital is measured primarily through educational attainment, coded in five levels (1-less than compulsory, 2-compulsory, 3-vocational upper secondary, 4-general upper secondary with qualification granting access to tertiary education (matriculation), and 5-tertiary education), the main individual-level predictor in H1 and H2.

To capture differences in educational-system performance, we use Rindermann's (2018) country-level cognitive ability indicator. Although not a direct measure of school quality, it is strongly correlated with internationally standardized educational assessments and provides a broadly comparable measure of educational system performance across countries.

Origin-country gender norms are measured using the female-to-male labor force participation ratio in origin countries derived from World Bank Indicators, coded so that higher values indicate more egalitarian gender norms.

We capture the local settlement context by the share of the district population originating from the countries of origin represented in our sample. This measure captures the regional concentration of residents from refugee-origin countries, but it does not measure individual network ties. Measuring population size and its growth separately for each country of origin is not feasible because the corresponding populations are very small or even absent in many districts, particularly in the baseline year. To distinguish established migrant communities from subsequent changes in their size, we decompose this measure into its baseline level in 2009 and

annual deviations from that baseline. As a separate indicator of regional labor market conditions, we use the unemployment-to-vacancy ratio to capture local labor market slackness and the balance between labor supply and demand.

4.1 Empirical strategy

To examine employment trajectories, we estimate mixed-effects fractional logistic growth models for the share of days employed per year. Annual earnings are analyzed using mixed-effects linear growth models with inverse probability weights based on estimated employment shares. To test Hypotheses 1 and 2, we estimate individual growth models of the form:

$$y_{ti} = \gamma_{00} + \gamma_{10} time_{ti} + \gamma_{01} edu_i + \gamma_{11} edu_i time_{ti} + X_i\gamma + u_{1i} time_{ti} + u_{0i} + e_{ti} \quad (1)$$

where y_{ti} denotes employment or earnings for individual i in labor market year t. The model includes educational attainment, interactions between education and time, and control variables for calendar year, age group, marital status, and asylum procedure duration. Random intercepts and random slopes capture individual variation in initial labor market positions and subsequent trajectories.

To test Hypotheses 3–5, we estimate cross-classified multilevel models in which individuals are simultaneously nested within 37 countries of origin o and 84 residential host-country districts r. These models include origin-country educational-system performance, origin-country gender norms, baseline populations from refugee-origin countries and their subsequent growth in the host-country residential district, as well as interactions between each contextual variable and years in the labor market:

$$y_{i(or)} = \gamma_{00} + \gamma_{10} time_{i(or)} + \gamma_{01} qual_o + \gamma_{02} gend_o + \gamma_{03} ethn_{r,2010} +$$
$$\gamma_{04}(ethn_{r\tau} - ethn_{r,2010}) + \gamma_{11} time_{i(or)} qual_o + \gamma_{12} time_{i(or)} gend_o +$$
$$\gamma_{13} time_{i(or)}(ethn_{r,2010}) + \gamma_{14} time_{i(or)}(ethn_{r\tau} - ethn_{r,2010}) + X_{i(or)}\gamma + Z_{r\tau}\delta +$$
$$u_{1o} time_{i(or)} + v_{1r} time_{i(or)} + u_o + v_r + e_{i(or)} \quad (2)$$

Random intercepts are specified for both origin countries and residential districts, and random slopes for years in the labor market are included at both contextual levels following recommendations for multilevel interaction models (Heisig and Schaeffer 2019). The decomposition of potential migrant networks into a baseline level (2009) and subsequent change separates associations with established settlement patterns from associations with subsequent changes. Using the baseline allows us to distinguish the associations of established settlement structures from subsequent changes. These estimates should therefore be interpreted as associations with local settlement contexts, rather than as direct effects of migrant networks. All models are estimated separately for women and men. In addition to the contextual variables of interest, the models include individual-level controls and time-varying regional labor market conditions. Residential district is measured annually, and district-level covariates are matched accordingly.

4.2 Robustness Checks

Several robustness checks were conducted to assess the sensitivity of the findings. First, all analyses were replicated using the alternative employment and earnings measures described above. Second, the educational attainment models were re-estimated using alternative specifications that account for changes in refugees' educational attainment during the first five years after recognition, including analyses based on education measured at labor market entry, at the end of the observation period, and among refugees whose educational attainment remained unchanged throughout. Third, the contextual analyses were re-estimated after excluding refugees from Syria—the largest and potentially most influential origin group—and after restricting the sample to more recent refugee cohorts to assess the sensitivity of the estimated individual- and contextual-level associations to changes in the refugee population.

5. Results

First, we describe the educational endowments of prime-age refugees who obtained labor market access between 2009 and 2018 (Table 1). According to administrative data from the Public Employment Service (PES), most refugees have no education beyond the compulsory level. lack the qualifications typically required for skilled employment. This applies to more than 70%, while only 22% have attained at least upper-secondary education. Information on educational attainment is missing for 11% of women and 3% of men, who have no PES record. Particularly noteworthy is the very small share of refugees holding upper-secondary vocational qualifications. This is consequential because the Austrian labor market is strongly structured around vocational credentials, which provide a close match to employers' skill requirements. Indeed, some of the most severe labor shortages in recent years have occurred in skilled craft and trade occupations (Mühlböck et al. 2023; Vogtenhuber, Brunner, and Mühlböck 2024).

Table 1: Educational attainment among 20- to 54-year-old refugees (%)

	Women	Men	Total
less than compulsory	24.9	20.9	22.3
compulsory	44.2	53.0	49.9
upper secondary (vocational)	2.7	4.2	3.7
upper secondary (matriculation)	10.7	11.6	11.3
tertiary	6.9	6.9	6.9
Missing* (no PES client)	10.7	3.4	5.9
Total	100% (20,235)	100% (37,758)	100% (57,993)

57,993 refugees who were granted humanitarian protection between 2009 and 2018 in Austria, and therefore full access to the labor market. Source: Labor market database (*AMDB*).

Educational attainment varies considerably across origin countries (Table A3 in the Appendix). More than 30% of refugees from several Arab countries, Iran, and Tajikistan have completed upper-secondary education, compared with fewer than 10% among refugees from Afghanistan and ten other origin countries. Indicators of educational system quality also differ substantially, ranging from 60 points in Gambia to 96 points in Belarus, with major origin countries such as Syria occupying an intermediate position (82) and Afghanistan ranking near the lower end (71). Similar variation exists in gender norms. The female-to-male labor force participation ratio

ranges between 15 and 23 in most Arab countries, Iran, and Afghanistan, but exceeds 90 in several sub-Saharan African and Eastern European countries, where women's labor force participation approaches that of men.

5.1 Educational correlates with employment shares (H1) and earnings (H2)

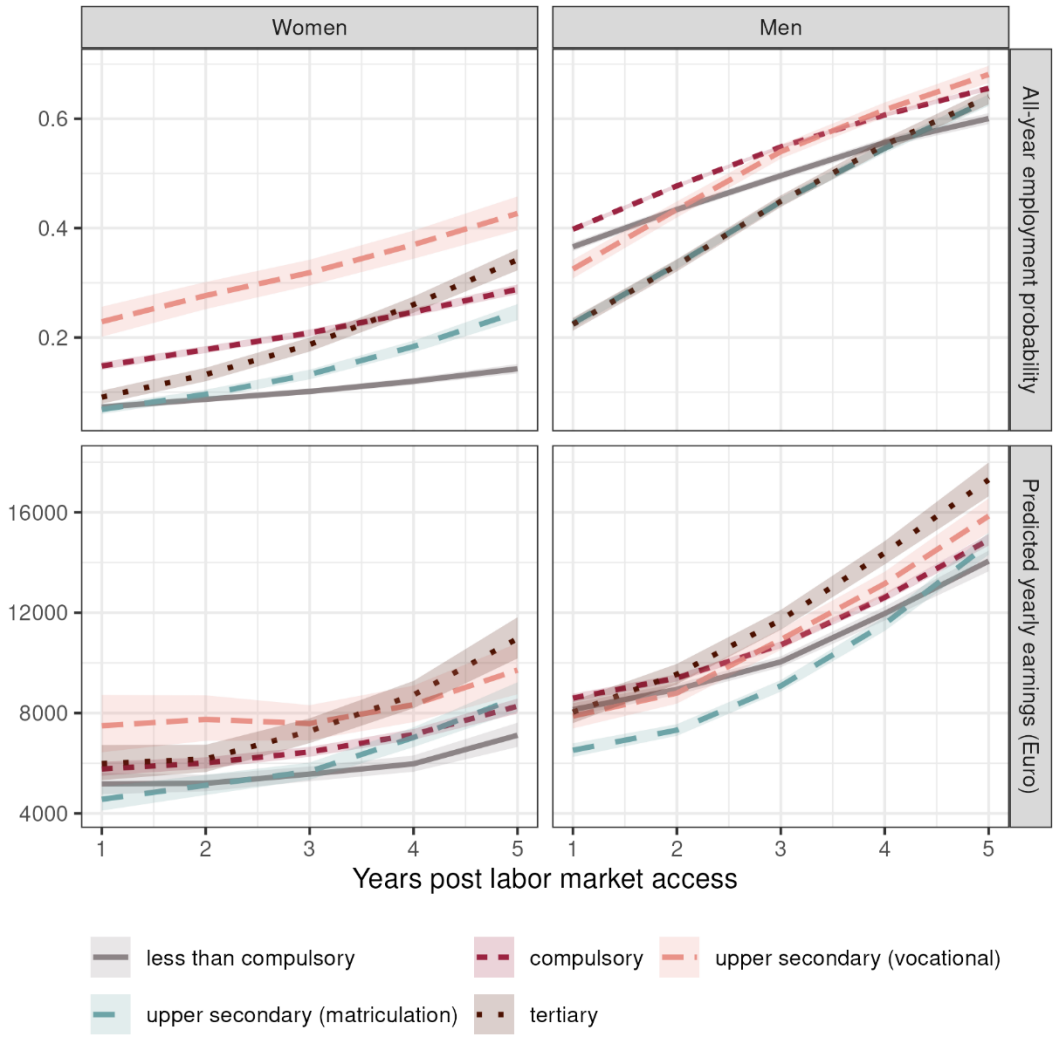
Employment trajectories differ markedly by educational attainment and exhibit clear gender-specific patterns. Overall, female refugees tend to enter employment more slowly than their male counterparts and are less likely to achieve year-round employment during the first five years after obtaining labor market access. Among women, those with upper-secondary vocational qualifications integrate most rapidly. Their predicted share of days spent in employment is 23% in the first year and rises to 43% by year five (Figure 1; Table 2), outperforming all other educational groups throughout the observation period. Women with tertiary education, by contrast, exhibit delayed labor market entry. Their predicted share of days spent in employment is only 9% in the first year—lower than that of women with compulsory education—but increases steadily thereafter, reaching 34% by year five. Female refugees with less than compulsory education, who account for nearly one quarter of all refugee women, display the lowest employment shares and the slowest subsequent improvement.

Among men, educational differences are considerably smaller and diminishing over time. Men with only compulsory education or less show the highest initial employment uptake, with a predicted first-year employment probability of 40%. Men with tertiary or general upper-secondary education enter employment more slowly, with predicted employment rates of only 22–23% in the first year. Over time, however, these differences narrow substantially, and employment shares converge across educational levels to between 60% and 68% by year five.

Taken together, these findings provide only partial support for Hypothesis 1. They do not show a uniform positive educational gradient in employment trajectories. Instead, upper-secondary vocational qualifications are most consistently associated with favourable employment

trajectories, especially among women. Tertiary and general upper-secondary education are associated with slower initial employment uptake, but these differences narrow over time. This pattern highlights the value of vocational credentials in an occupationally structured labour market.

Figure 1: Average marginal predicted annual employment share and annual earnings by education, gender, and years in the labor market



57,993 refugees who were granted humanitarian protection and labor market access between 2009 and 2018 in Austria. Predictions from mixed effects fractional logit models explaining the probability of year-round employment (fraction of days employed over days per year), and mixed effects linear models explaining log annual earnings. For regression results, see Table A4 and A5 in the Annex, for predicted values with 95% confidence intervals see Table 2 and Table 3. Source: Labor market database (*AMDB*).

Table 2: Average marginal predicted shares of days spent in employment during the first five years following humanitarian protection and labor market access, by education and gender

Education	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**
Women					
less than compulsory	7.3% (6.7%-7.9%)	8.7% (8.2%-9.2%)	10.1% (9.6%-10.7%)	12.0% (11.4%-12.6%)	14.3% (13.4%-15.1%)
compulsory	14.8% (14.1%-15.5%)	17.8% (17.2%-18.4%)	20.8% (20.2%-21.4%)	24.7% (24.0%-25.4%)	28.8% (27.9%-29.7%)
upper secondary (vocational)	22.9% (20.2%-25.6%)	27.7% (25.2%-30.1%)	31.9% (29.5%-34.2%)	37.0% (34.4%-39.5%)	42.7% (39.6%-45.8%)
upper secondary (matriculation)	6.8% (6.0%-7.7%)	9.6% (8.8%-10.4%)	13.2% (12.4%-14.1%)	18.4% (17.3%-19.4%)	24.6% (23.2%-26.1%)
tertiary	9.1% (7.9%-10.3%)	13.2% (12.0%-14.5%)	18.7% (17.4%-20.0%)	26.0% (24.5%-27.5%)	34.2% (32.3%-36.1%)
Men					
less than compulsory	36.6% (35.7%-37.4%)	43.4% (42.6%-44.1%)	49.6% (48.8%-50.3%)	55.7% (54.8%-56.5%)	60.0% (58.9%-61.1%)
compulsory	39.8% (39.2%-40.4%)	47.7% (47.4%-48.3%)	54.9% (54.4%-55.3%)	60.7% (60.2%-61.2%)	65.6% (65.0%-66.2%)
upper secondary (vocational)	32.6% (30.8%-34.3%)	43.4% (42.0%-44.9%)	54.0% (52.7%-55.3%)	61.6% (60.3%-63.0%)	68.1% (66.5%-69.7%)
upper secondary (matriculation)	22.6% (21.6%-23.5%)	33.4% (32.4%-34.3%)	44.9% (44.0%-45.7%)	54.6% (53.6%-55.6%)	63.4% (62.3%-64.6%)
tertiary	22.4% (21.2%-23.7%)	33.2% (32.1%-34.3%)	44.9% (43.8%-46.0%)	55.2% (54.0%-56.4%)	64.0% (62.5%-65.4%)

Predictions from mixed effects fractional logistic regression models. Model results are reported in Table A4 in the appendix.

Once employed, earnings align more closely with the predictions of human capital theory. By the fifth year after recognition, tertiary-educated refugees earn more on average than all other educational groups. Predicted annual earnings reach approximately 11,000 Euros among women, and 17,300 Euros among men (Table 3). In the early years, however, women with vocational qualifications earn more than tertiary-educated women, reflecting their faster transition into stable employment. A similar pattern is observed among men with compulsory education or less, whose annual earnings initially match or exceed those of better-educated men. These early earnings advantages are driven by higher employment levels rather than higher wages. This interpretation is confirmed by analyses of daily earnings. When earnings are measured per day worked, a clear educational gradient is evident from the outset: tertiary-educated refugees consistently earn higher wages than those with lower educational attainment (Figure A1 and Table A9 in the Appendix). The annual earnings hierarchy emerges only

gradually as higher-educated refugees establish more stable and continuous employment careers.

Overall, the results provide substantial support for Hypothesis 2. Higher educational attainment is associated with higher earnings, and these returns become increasingly pronounced over time. Nevertheless, earnings remain well below those of native workers even after five years in the labor market. In 2023, the median annual earnings of native full-time, year-round workers amounted to 41,200 Euros among blue-collar workers and 61,100 Euros among white-collar workers (Rechnungshof Österreich 2024), substantially exceeding the earnings observed among refugee men and women. These persistent gaps likely reflect continued employment instability, seasonal and part-time work, imperfect transferability of foreign-acquired skills, and the concentration of refugees in lower-paying segments of the labor market.

Table 3: Average marginal predicted annual earnings (1000 Euro) for the first five years following humanitarian protection and labor market access, by education and gender

Education	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**
Women					
less than compulsory	5.2 (4.8-5.6)	5.2 (4.9-5.5)	5.6 (5.3-5.9)	6.0 (5.7-6.3)	7.1 (6.7-7.6)
compulsory	5.8 (5.5-6.1)	6.0 (5.8-6.2)	6.5 (6.3-6.7)	7.1 (6.9-7.4)	8.3 (8.0-8.6)
upper secondary (vocational)	7.5 (6.4-8.7)	7.7 (6.9-8.7)	7.6 (6.9-8.3)	8.3 (7.6-9.1)	9.7 (8.8-10.8)
upper secondary (matriculation)	4.6 (4.1-5.1)	5.1 (4.7-5.5)	5.7 (5.3-6.0)	7.0 (6.6-7.4)	8.6 (8.1-9.2)
tertiary	6.0 (5.3-6.7)	6.2 (5.7-6.7)	7.3 (6.8-7.8)	8.7 (8.2-9.3)	11.0 (10.2-11.8)
Men					
less than compulsory	8.1 (7.9-8.4)	8.9 (8.7-9.2)	10.0 (9.8-10.3)	12.0 (11.7-12.2)	14.1 (13.7-14.5)
compulsory	8.6 (8.4-8.8)	9.4 (9.3-9.5)	10.7 (10.6-10.9)	12.6 (12.5-12.8)	14.9 (14.7-15.1)
upper secondary (vocational)	7.9 (7.4-8.4)	8.8 (8.4-9.2)	10.9 (10.5-11.3)	13.2 (12.7-13.6)	15.9 (15.2-16.6)
upper secondary (matriculation)	6.5 (6.3-6.8)	7.3 (7.1-7.6)	9.1 (8.9-9.3)	11.6 (11.3-11.8)	14.7 (14.3-15.2)
tertiary	8.0 (7.6-8.5)	9.5 (9.1-10.0)	11.7 (11.3-12.1)	14.4 (13.9-14.9)	17.3 (16.6-18.0)

Predictions from mixed effects linear regression models. Model results are reported in Table A5 in the appendix.

5.2 Origin Country Educational-System Performance (H3) and Gender Norms (H4)

This gendered pattern also emerges when examining the two origin-country contextual variables— educational-system performance and female-to-male labor force participation ratio (LFPR), used here as a proxy for gender norms—and their association with refugees' labor market outcomes. Origin-country educational-system performance is positively associated with female refugees' employment prospects. Women originating from countries with higher-quality education systems exhibit consistently higher employment shares throughout the observation period (upper-left panel of Figure 2). For example, predicted year-round employment increases from roughly 16% in the first year among women from low-quality school systems to approximately 30% among those from the highest-quality systems, with this gap remaining substantial over time.

By contrast, educational-system performance is unrelated to women's earnings (lower-left panel of Figure 2). Although point estimates vary somewhat across origin country groups, the differences are small and confidence intervals overlap throughout most of the observation period. Thus, once employed, women from countries with higher-quality educational systems do not earn systematically more than those from countries with weaker educational systems.

For men, no systematic relationship is observed between origin-country educational-system performance and labor market outcomes. Educational gaps in employment shares are small, statistically insignificant, and diminish over time (upper-left panel of Figure 3). Similarly, earnings do not vary significantly with educational-system performance (lower-left panel of Figure 3). Taken together, these results suggest that educational-system performance in the country of origin matters for women's employment integration but has no measurable association with men's labor market outcomes.

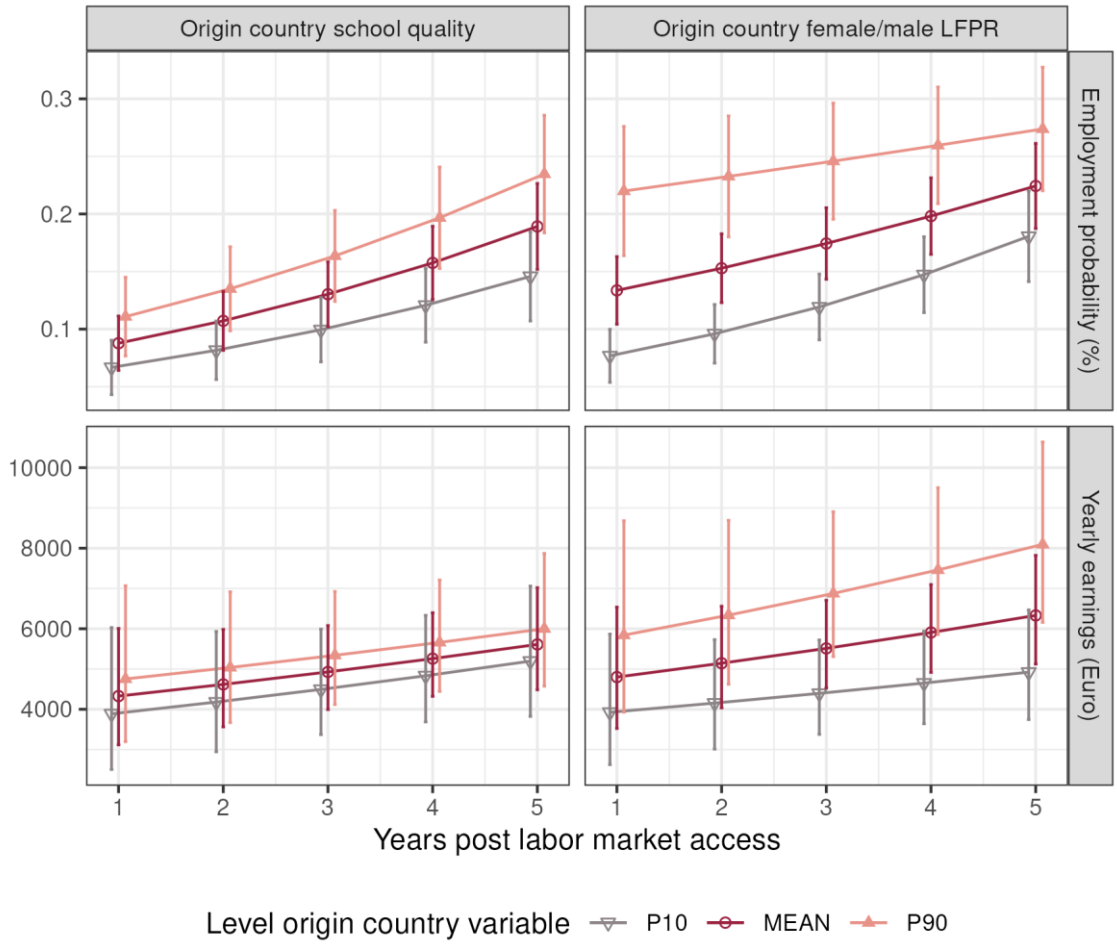
The female-to-male labour-force-participation ratio, used as a contextual proxy for origin-country gender norms, is strongly associated with the employment trajectories of refugee

women. At labor market entry, differences are substantial: women from countries with high female-to-male LFPR exhibit employment shares close to 30%, compared with less than 10% among women from low-LFPR countries (upper-right panel of Figure 2). This gap persists throughout the observation period, even as employment rates increase across all groups. A similar pattern is evident for earnings, although it emerges more gradually. At labor market entry, earnings differences across origin-country gender norms are small and statistically insignificant. Over time, however, women from more gender-egalitarian societies experience stronger earnings growth, resulting in increasingly pronounced and statistically significant disparities in later years (lower-right panel of Figure 2).

In line with expectations, origin-country gender norms are not systematically associated with men's labor market outcomes. Although minor differences in employment shares are visible initially, they are not statistically significant and largely disappear over time (upper-right panel of Figure 3). The same applies to earnings, for which no statistically significant differences by origin-country gender norms are observed (lower-right panel of Figure 3).

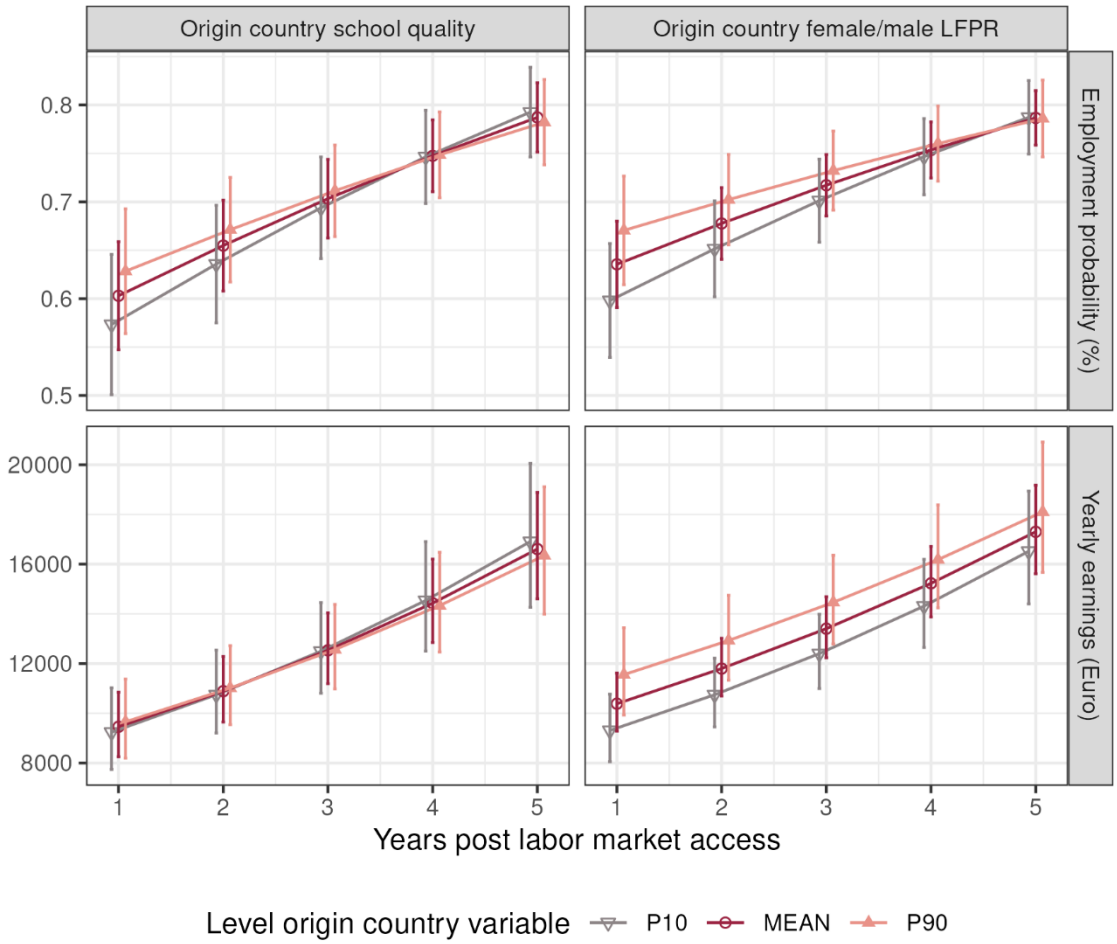
Overall, the findings support H4: female refugees from origin countries with higher female-to-male labour-force-participation ratios have more favourable employment trajectories and, over time, higher annual earnings. H3 receives limited support, as origin-country educational-system performance is associated with women's employment outcomes but not with their earnings or with men's outcomes.

Figure 2: Average marginal predicted employment outcomes by origin-country characteristics, women



20,235 female refugees who were granted humanitarian protection and labor market access between 2009 and 2018 in Austria. Predictions for different levels of origin-country variables (P10, MEAN, P90). For regression results, see Table A10 in the Appendix, for predicted values see Tables A12 and A13. Source: Labor market database (*AMDB*).

Figure 3: Average marginal predicted employment outcomes by origin-country characteristics, men



37,758 male refugees who were granted humanitarian protection and labor market access between 2009 and 2018 in Austria. Predictions for different levels of origin-country variables (P10, MEAN, P90). For the regression table, see Table A10 in the Appendix, for predicted values see Tables A12 and A13. Source: Labor market database (*AMDB*).

5.3 Host-Country Local Migrant Concentration and Opportunities (H5)

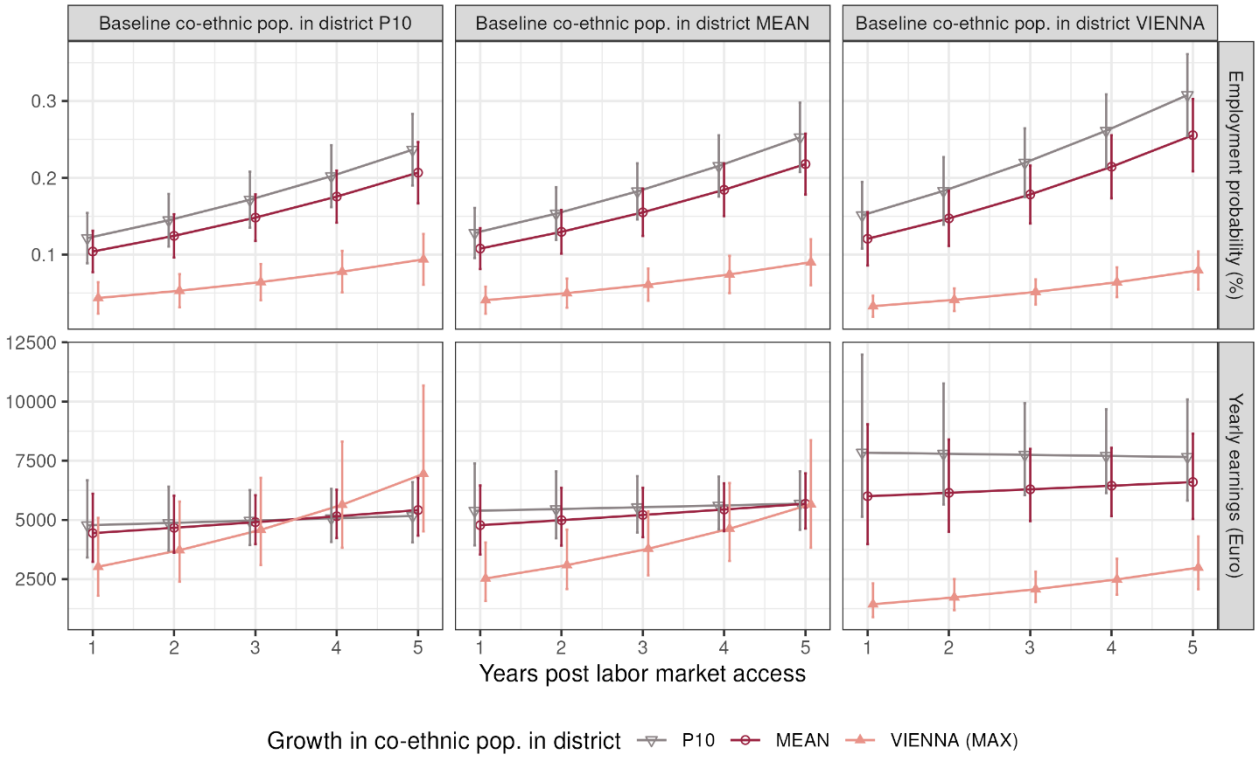
Figures 4 and 5 present predicted employment shares and annual earnings by the baseline size of local populations from refugee-origin countries, measured in 2009 (cf. comparing the level of outcomes across the three horizontal panels) and their subsequent growth over the observation period (cf. comparing the three lines within each graph). Baseline concentration shows only a weak association with labour-market outcomes, providing little support for the expectation that established local populations from refugee-origin countries are associated with more favourable outcomes. The findings therefore provide little support for the expectation that

more established populations from refugee-origin countries are associated with more favorable labor market outcomes through the resources potentially available through migrant networks. Instead, the subsequent growth of these populations emerges as the more consequential contextual factor. For both women and men, refugees residing in districts with the strongest growth exhibit substantially lower employment shares than those living in districts where the concentration increased only modestly. This pattern is remarkably consistent across districts with initially low, average, and high concentrations of populations from refugee-origin countries. The negative association between migrant population growth and employment therefore appears largely independent of the initial settlement context.

The earnings results are somewhat more nuanced. Among men, stronger population growth is consistently associated with lower annual earnings throughout the first five years after recognition, with only minor differences across baseline concentration levels. Among women, by contrast, the relationship between migrant population growth and earnings is less pronounced. In districts with low or average initial concentrations, annual earnings differ little according to subsequent population growth. Only in districts with initially high concentrations do women living in districts with hypothetically limited subsequent growth achieve somewhat higher earnings than those residing in districts experiencing stronger growth. Given the overlapping confidence intervals, however, these differences are indicative and should not be overinterpreted.

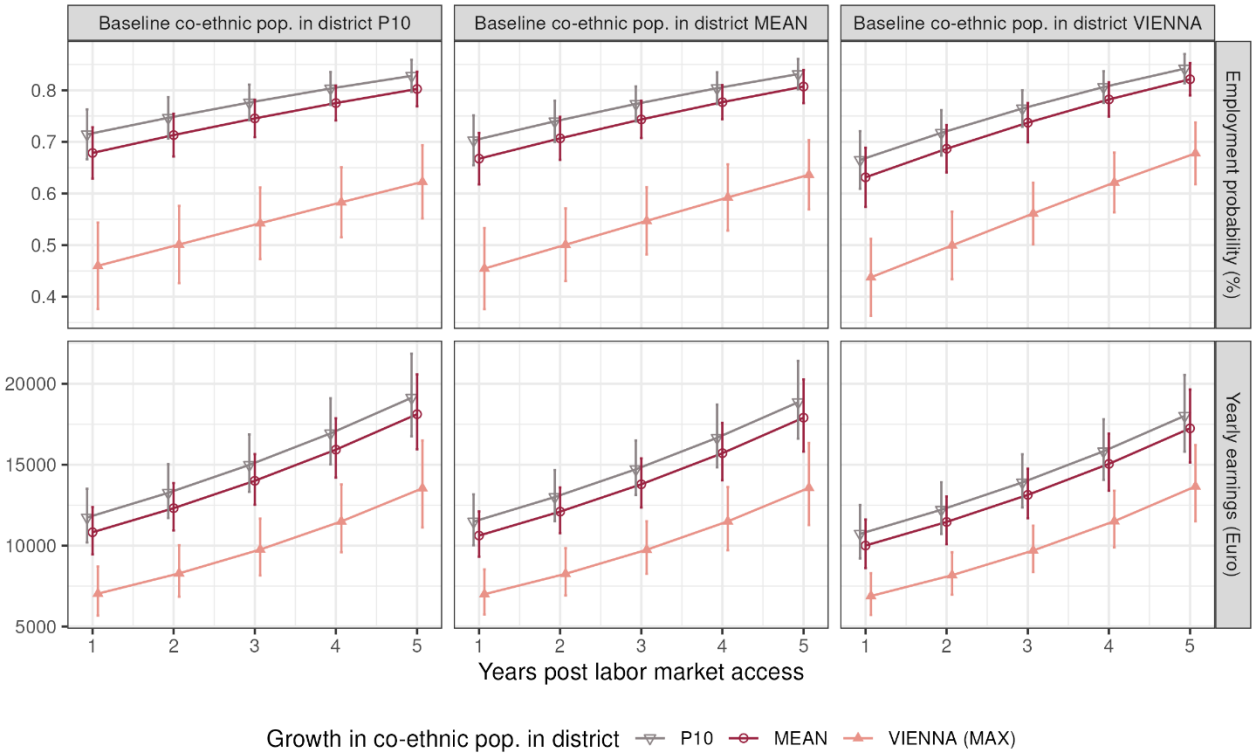
Overall, the findings provide little support for an association between the established size of local populations from refugee-origin countries and refugees' labour-market integration. They do, however, indicate that subsequent population growth is associated with less favourable employment trajectories and, among men, lower annual earnings. H5 therefore receives partial support. These associations may reflect local settlement contexts characterized by more limited access to broader labour-market opportunities, but the observational design cannot identify the underlying mechanisms or rule out selective settlement.

Figure 4: Average marginal predicted employment outcomes by local populations from refugee-origin countries in host country districts, women



20,235 female refugees who were granted humanitarian protection and labor market access between 2009 and 2018 in Austria. Predictions for different levels of local migrant populations (P10, MEAN, MAX, i.e., Vienna). For regression tables, see Table A10 in the Appendix, for predicted values see Table A14. Source: Labor market database (*AMDB*).

Figure 5: Average marginal predicted employment outcomes by local populations from refugee-origin countries in host country districts, men



37,758 male refugees who were granted humanitarian protection and labor market access between 2009 and 2018 in Austria. Predictions for different levels of local migrant populations (P10, MEAN, MAX, i.e., Vienna). For regression tables, see Table A10 in the Appendix, for predicted values see Table A15. Source: Labor market database (AMDB).

5.4 Alternative Outcome Measures and Robustness Checks

To assess the robustness of the main findings, we replicated the analyses using two alternative outcome measures: an indicator coded 1 if an individual was employed for at least 90 days above the marginal earnings threshold during year t (0 otherwise), and the daily earnings associated with that employment. Overall, the results closely mirror those reported above, strengthening confidence in the conclusions drawn from the hypothesis tests.

As expected, predicted employment shares are consistently higher for the 90-day employment measure than for year-round employment, while the overall trajectories remain highly similar. The main difference is that employment profiles are somewhat steeper among men when measured using the 90-day indicator (compare, for example, the upper-right panels of Figure 1 and Figure A1 in the Appendix). The two earnings measures reveal some noteworthy differences. Daily earnings show a clear educational gradient already at labor market entry, whereas for annual earnings this hierarchy becomes apparent only after three to four years, when employment becomes more stable and extends over a larger part of the year. This pattern suggests that educational advantages initially translate into higher wages conditional on employment, while differences in annual earnings emerge only as more educated refugees catch up with their less educated counterparts in terms of employment duration and stability.

The associations between origin-country characteristics— educational-system performance and female labor force participation—and employment outcomes are generally robust across both sets of measures (see Figure A2 and A3 in the Appendix). One exception concerns the relationship between gender norms and women's earnings. Whereas women from countries with higher female-to-male labor force participation ratios eventually attain higher annual earnings, no comparable pattern emerges for daily earnings. This finding suggests that the

association runs primarily through more continuous and stable labor market attachment rather than through higher wages conditional on employment.

A similar distinction emerges with respect to local populations from refugee-origin countries. Among women, the negative association between annual earnings and residence in districts characterized by both high baseline concentrations and strong subsequent growth of refugee-origin populations is not observed when daily earnings are considered (Figure A4 in the Appendix). Moreover, in districts with initially low or medium concentrations, stronger subsequent growth is associated with somewhat higher daily earnings. Taken together, these findings again suggest that employment stability and the extent of year-round labor market integration, rather than differences in earnings conditional on employment, account for much of the observed variation in annual earnings.

Additional robustness checks further support the stability of the results. Approximately 12% of refugees in the sample upgraded their educational attainment during the first five years after entering the labor market. Re-estimating the models for Hypotheses 1 and 2 using educational attainment measured either at labor market entry (year 1) or at the end of the observation period (year 5) yields virtually identical results (Figures A6 and A7 in the Appendix). The findings are equally robust when the analysis is restricted to refugees whose educational attainment remained unchanged throughout the observation period, thereby excluding all educationally mobile individuals (Figure A8).

Likewise, excluding refugees from Syria—the largest and potentially most influential origin group—does not alter the substantive conclusions (Figures A9–A13). The results also remain stable when the analysis is limited to more recent refugee cohorts, for whom inflows increased substantially and Syrians constituted the dominant origin group (Figures A14–A18). Collectively, these robustness checks indicate that the main findings are not driven by educational mobility, the composition of origin-country groups, or the specific operationalization of labor market outcomes.

6 Discussion and Conclusion

This study examined how individual resources, origin-country characteristics, and host-country contextual conditions are associated with the labour-market integration of refugees in Austria. The results reveal substantial heterogeneity in employment trajectories and earnings and indicate that integration outcomes cannot be understood solely as a function of individual human capital. Instead, they are associated with refugees' pre-migration resources and the institutional and social contexts in which integration unfolds.

A central finding is the uneven transferability of human capital acquired prior to migration. Although higher educational attainment is associated with higher annual earnings over time, it is not associated with uniformly more favourable employment trajectories. Educational gradients in employment are modest and gender-specific, while origin-country educational-system performance is associated with women's employment outcomes but not with their earnings or with men's outcomes. These findings point to a central challenge of refugee integration: educational credentials and work experience acquired abroad are only imperfectly transferable across institutional contexts.

This limited transferability is hardly surprising given the substantial institutional differences between countries. Educational credentials are embedded in national systems of training, certification, occupational regulation, and employer expectations. Skills that are productive and formally recognized in one setting may be difficult for employers to assess and reward in another. Refugees additionally face interrupted employment careers, limited host-country language proficiency, and often prolonged periods outside the labor market, all of which further reduce the value of pre-migration human capital. In this sense, the uneven returns to foreign education observed in the analyses do not necessarily imply that refugees lack skills. Rather, they indicate that these skills are only partially recognized and rewarded within the Austrian institutional context.

Against this backdrop, the findings on vocational qualifications are particularly noteworthy. Refugees with vocational credentials consistently achieved substantially better employment outcomes than those with general upper-secondary education and, during the early years, often even better outcomes than those with tertiary education. This pattern highlights the value of vocationally oriented qualifications in Austria's occupationally structured labour market. Austria is strongly organized around occupational credentials and the dual apprenticeship system, which combines formal instruction with workplace-based training. Qualifications that are recognized within, aligned with, or supplemented by this framework may be especially legible to employers and facilitate access to stable employment.

Only a small minority of refugees in the sample hold upper-secondary vocational qualifications. The results therefore suggest that limited access to pathways that help refugees acquire, demonstrate, or have occupational skills recognized may contribute to persistent employment and earnings disadvantages. Expanding access to vocational training, apprenticeships, bridging programmes, and credential-recognition procedures may help refugees acquire or translate skills into forms that are more readily evaluated by employers.

The contextual findings provide further insight into why some refugees are better positioned than others to benefit from these opportunities. Among women, labour-market outcomes are strongly associated with the female-to-male labour-force-participation ratio in the country of origin, used here as a contextual proxy for gender norms. Women from countries with higher ratios have higher employment shares and, over time, higher annual earnings in Austria. The gradual emergence of earnings differences suggests that these associations reflect stronger and more stable labour-market attachment rather than higher earnings per day worked. Similarly, women from countries with higher educational-system performance exhibit higher employment shares, although not higher earnings. These country-level associations cannot identify individual beliefs or mechanisms, but are consistent with the importance of gendered pre-migration contexts for women's post-migration labour-market trajectories. For men, by

contrast, neither origin-country educational-system performance nor the gender-norm proxy is systematically associated with labour-market outcomes.

The host-country findings likewise underscore the importance of contextual opportunities and constraints. Refugees residing in regions with stronger growth in populations from refugee-origin countries generally experience less favorable employment trajectories and, among men, lower earnings. This finding contrasts with the expectation that established migrant communities may facilitate integration by providing information, social support, and access to employment opportunities. The fact that baseline concentrations show comparatively little association, whereas subsequent population growth is more consistently related to less favorable outcomes, may therefore point to the dynamics of local settlement contexts rather than the mere presence of migrant communities. One possible interpretation is that rapid growth is associated with local settlement contexts in which access to broader labour-market opportunities is more limited. However, the analysis cannot identify the mechanisms involved or exclude selective settlement and unobserved local conditions.

Taken together, the findings suggest that labour-market integration depends not simply on the direct transfer of pre-migration human capital, but also on the extent to which skills and qualifications can be recognized, supplemented, and used within the host-country institutional context. Individual education, origin-country educational-system performance, origin-country gender norms, and local settlement contexts are associated with outcomes, but their relevance is conditioned by the institutional framework of the receiving country. Refugee integration is therefore usefully understood as a process of translating, adapting, and validating skills within a new institutional environment.

The implications of these findings may extend beyond Austria. Several Western European countries that have received substantial numbers of refugees from the same origin countries—notably Germany, Switzerland, Denmark, and, to a lesser extent, the Netherlands and Belgium—share key institutional features, including regulated labor markets, strong

occupational labor market structures, and vocational education and training systems based on dual apprenticeships or school-based vocational pathways. In such settings, employers rely heavily on nationally recognized credentials and occupation-specific qualifications when evaluating job applicants. Refugees are therefore likely to encounter similar challenges in converting foreign education and work experience into labor market success. For refugee-receiving societies with comparable institutional arrangements, the findings suggest that the value of human capital depends not only on its level but also on how readily it can be recognized and used within destination-country institutions. In highly credentialized and occupationally structured labor markets, policies that facilitate access to vocational training, apprenticeships, credential recognition, and bridging programs may be more effective than those focused solely on rapid labor market entry. At the same time, integration policies should account for gender-specific barriers and regional opportunity structures, as both shape refugees' ability to establish stable and sustained employment. The study highlights that refugee labor market integration emerges from the interaction between human capital, socio-cultural orientations, institutional arrangements, and local opportunity structures. Understanding these interactions is essential for explaining variation in integration outcomes and for designing policies that enable refugees to make fuller use of the skills and experiences they bring with them.

Despite extensive robustness checks and sensitivity analyses, the conclusions of this study should be interpreted with appropriate caution. Although the analyses combine a rigorous longitudinal design with comprehensive administrative register data and account for a broad range of individual, origin-country, and regional host-country characteristics, the estimates may still be influenced by unobserved factors such as cognitive ability, motivation, health, or other individual characteristics related to both educational attainment and labor market outcomes. The results should therefore not be interpreted as identifying causal effects. Rather, they document systematic associations that are broadly consistent with the theoretical framework developed here. The main contribution of the study lies in integrating individual human capital

with origin-country and host-country contexts within a single longitudinal framework, thereby providing a more comprehensive account of the factors associated with refugee labor market integration. As such, the findings offer a valuable empirical foundation for future research seeking to identify the causal mechanisms underlying these relationships and for designing policies aimed at improving refugees' labor market opportunities.

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APPENDICES

Table A1: Descriptive Statistics: working age refugees (20-54) from 37 countries of origin

Variable	Women N = 20,235[1]	Men N = 37,758[1]
Employed 90+ days a year (Dummy)		
0	16,558 (82%)	17,360 (46%)
1	3,677 (18%)	20,398 (54%)
Share of days in paid employment per year	0.1 (0.3)	0.4 (0.4)
Education attainment level		
less than compulsory	5,040 (25%)	7,902 (21%)
Compulsory	8,944 (44%)	20,009 (53%)
upper secondary (vocational)	539 (2.7%)	1,589 (4.2%)
upper secondary (matriculation)	2,160 (11%)	4,385 (12%)
Tertiary	1,392 (6.9%)	2,606 (6.9%)
Missing	2,160 (11%)	1,267 (3.4%)
Age group		
20-29	7,985 (39%)	19,100 (51%)
30-39	7,724 (38%)	12,058 (32%)
40-49	3,588 (18%)	5,420 (14%)
50-54	938 (4.6%)	1,180 (3.1%)
Marital status		
single	2,855 (14%)	16,802 (44%)
married	11,923 (59%)	15,539 (41%)
cohab	486 (2.4%)	703 (1.9%)
marr-sep	484 (2.4%)	2,150 (5.7%)
divorced	796 (3.9%)	542 (1.4%)
widowed	524 (2.6%)	74 (0.2%)
missing	3,167 (16%)	1,948 (5.2%)
Duration asylum application procedure		
up to 270 days (Q1)	5,970 (30%)	6,166 (16%)
271-529 days (Q2)	4,369 (22%)	9,672 (26%)
530-1177 days (Q3)	5,603 (28%)	12,644 (33%)
more than 1177 days (Q4)	4,293 (21%)	9,276 (25%)
Year of labor market access		
2009	871 (4.3%)	1,435 (3.8%)
2010	908 (4.5%)	1,506 (4.0%)
2011	1,173 (5.8%)	1,889 (5.0%)
2012	1,078 (5.3%)	1,700 (4.5%)
2013	907 (4.5%)	1,635 (4.3%)
2014	1,205 (6.0%)	2,624 (6.9%)
2015	2,113 (10%)	6,085 (16%)
2016	3,901 (19%)	8,871 (23%)
2017	4,495 (22%)	6,837 (18%)
2018	3,584 (18%)	5,176 (14%)

[1] n (% of N); Mean (SD)

57,993 refugees aged 20-54 who got humanitarian protection between 2009 and 2018 in Austria. Source: Labor market database (*AMDB des AMS Österreich und des BMASGPK*).

Table A2: Descriptive Statistics: employed working age refugees (20-54) from 37 countries of origin

Variable	Women N = 9,042[1]	Men N = 31,232[1]
Daily rate (Euro)	40.1 (20.7)	52.6 (31.0)
Days in paid employment	170.9 (123.3)	192.8 (125.2)
Education attainment level		
less than compulsory	1,520 (17%)	6,024 (19%)
compulsory	4,611 (51%)	16,670 (53%)
upper secondary (vocational)	412 (4.6%)	1,510 (4.8%)
upper secondary (matriculation)	1,173 (13%)	4,041 (13%)
tertiary	920 (10%)	2,385 (7.6%)
missing	406 (4.5%)	602 (1.9%)
Age group		
20-29	3,098 (34%)	16,257 (52%)
30-39	3,719 (41%)	10,293 (33%)
40-49	1,855 (21%)	4,005 (13%)
50-54	370 (4.1%)	677 (2.2%)
Marital status		
single	1,805 (20%)	14,323 (46%)
married	5,109 (57%)	13,145 (42%)
cohab	337 (3.7%)	614 (2.0%)
marr-sep	237 (2.6%)	1,597 (5.1%)
divorced	589 (6.5%)	535 (1.7%)
widowed	276 (3.1%)	61 (0.2%)
missing	689 (7.6%)	957 (3.1%)
Duration asylum application procedure		
up to 270 days (Q1)	1,764 (20%)	4,773 (15%)
271-529 days (Q2)	1,524 (17%)	7,901 (25%)
530-1177 days (Q3)	2,714 (30%)	10,577 (34%)
more than 1177 days (Q4)	3,040 (34%)	7,981 (26%)
Year of labor market access		
2009	470 (5.2%)	1,120 (3.6%)
2010	502 (5.6%)	1,205 (3.9%)
2011	744 (8.2%)	1,585 (5.1%)
2012	621 (6.9%)	1,449 (4.6%)
2013	481 (5.3%)	1,395 (4.5%)
2014	599 (6.6%)	2,179 (7.0%)
2015	760 (8.4%)	5,010 (16%)
2016	1,363 (15%)	7,317 (23%)
2017	1,772 (20%)	5,709 (18%)
2018	1,730 (19%)	4,263 (14%)
Employment contract		
white-collar	2,282 (25%)	3,359 (11%)
blue-collar	6,760 (75%)	27,873 (89%)
Economic sector		
agriculture, forestry and fishing	26 (0.3%)	269 (0.9%)
manufacturing, mining, electricity, water supply*	395 (4.4%)	3,144 (10%)
construction	51 (0.6%)	1,977 (6.3%)
wholesale, retail; motor v. repair	1,146 (13%)	3,451 (11%)
transportation and storage	133 (1.5%)	1,719 (5.5%)
accommodation and food service	2,074 (23%)	7,313 (23%)
information and communication	42 (0.5%)	155 (0.5%)
finane and insurance	29 (0.3%)	43 (0.1%)
real estate	59 (0.7%)	140 (0.4%)
professional, scientific and technical	163 (1.8%)	509 (1.6%)
administration and support service	2,354 (26%)	8,564 (27%)
public admin., defence; social security	355 (3.9%)	365 (1.2%)
education	236 (2.6%)	218 (0.7%)
human health and social work	1,469 (16%)	2,283 (7.3%)
arts, entertainment and recreation	45 (0.5%)	200 (0.6%)
other service activities	427 (4.7%)	857 (2.7%)

Variable	Women N = 9,042[1]	Men N = 31,232[1]
households as employers	38 (0.4%)	25 (<0.1%)

40,274 refugees aged 20-54 in blue- or white-collar employment (freelance- and apprenticeship-contracts as well as self-employment excluded). Source: Labor market database (*AMDB des AMS Österreich und des BMASGPK*).

Table A3: Descriptive statistics of 37 countries of origin

Country of origin	% Sec II	educational-system performance	LFPR f	LFPR m	LFPR f/m	n
Syria	32.0	82.0	18.0	78.6	22.9	24,313
Afghanistan	7.8	71.0	17.2	79.0	21.9	11,227
Iran	36.5	85.0	15.0	73.9	20.4	3,654
Iraq	28.1	86.0	11.4	76.7	15.0	3,547
Russia*	10.3	80.3	67.7	77.7	63.4	3,125
Somalia	5.4	68.0	21.8	48.7	44.8	2,233
Nigeria	6.8	75.0	55.3	63.5	87.1	1,194
Kosovo	7.8	84.5†	20.0	50.0	40.0	1,119
Armenia	12.2	90.0	64.7	76.3	84.8	1,060
Turkey	6.7	87.0	31.4	76.5	41.0	1,028
Georgia	17.7	87.0	61.0	79.4	76.9	706
Serbia	8.6	91.0	56.2	73.4	76.6	629
Mongolia	11.2	91.0	58.3	67.6	86.3	455
Bangladesh	18.6	80.0	31.4	86.8	36.3	458
Ukraine	27.0	93.0	65.0	70.9	91.8	378
Egypt	30.4	84.0	22.5	74.1	30.3	227
Azerbaijan	9.6	88.0	70.7	77.4	91.5	230
Eritrea	11.1	74.0	73.8	87.7	84.2	190
North Maced.	4.7	86.0	50.4	75.1	67.0	170
Sudan	20.7	76.0	28.9	71.9	40.3	164
Algeria	17.6	84.0	14.6	74.9	19.7	148
Cameroon	14.7	67.0	74.7	83.7	89.3	150
Albania	11.1	83.0	56.6	76.3	74.3	144
Gambia	6.1	60.0	50.7	69.2	73.4	132
Kyrgyzstan	19.7	77.0	56.4	78.3	72.0	137
Lebanon	13.1	83.0	24.6	71.7	34.2	122
Bosnia/Herzeg.	13.2	92.0	38.8	65.4	59.3	114
Tajikistan	30.3	82.0	32.6	58.6	55.7	109
Ethiopia	16.0	67.0	73.8	89.3	82.7	106
Congo	15.2	71.0	67.6	70.3	96.2	105
Moldova	17.3	90.0	52.9	56.5	93.5	98
Yemen	36.8	69.0	13.5	71.7	18.6	95
Ghana	5.3	64.0	71.5	76.3	93.6	95
Dem. Rep. Congo	16.8	67.0	68.6	72.1	95.1	95
Belarus	18.8	96.0	69.9	76.8	90.9	80
Morocco	17.9	76.0	25.6	77.8	32.9	78
Niger	7.7	66.0	68.3	88.7	76.9	78

% Sec II: share of 20- to 54-year-old refugees who have attained at least upper secondary education. educational-system performancerefers to the corrected cognitive ability measure based on student assessment studies and psychometric intelligence test studies. LFPR is the labor force participation rate of 18- to 65-year-olds (modeled ILO estimates taken from World Bank Indicators). *Virtually all refugees of Russian origin are ethnic Chechens. Therefore, for the country level indicators of educational-system performance and LFPR the average of Tajikistan and Kyrgyzstan is taken due to similarities in education, culture, and religion. †Quality measure of Kosovo is the mean of Albania and North Macedonia. Source: Labor market database (AMDB des AMS Österreich und des BMASGPK).

Table A4: Mixed effects fractional logistic regression results modelling all-year employment for the first five years following the right to stay

	Women 1		Women 2		Men 1		Men 2	
Predictors	Log-Odds	SE	Log-Odds	SE	Log-Odds	SE	Log-Odds	SE
(Intercept)	-1.13 ***	0.15	-3.64 ***	0.44	0.17 *	0.07	0.55 *	0.23
Year (1 – 5)	0.55 ***	0.02	0.19 ***	0.02	0.29 ***	0.01	0.28 ***	0.01
Education attainment levels (ref: compulsory)								
less than compulsory	-1.20 ***	0.06	-0.60 ***	0.05	-0.20 ***	0.03	-0.15 ***	0.02
upper secondary (vocational)	0.91 ***	0.11	0.63 ***	0.10	-0.09 *	0.04	0.14 ***	0.04
upper secondary (matriculation)	-0.42 ***	0.07	0.20 **	0.07	-0.57 ***	0.03	0.00	0.03
tertiary	0.10	0.08	0.43 ***	0.07	-0.57 ***	0.04	-0.03	0.03
Interaction of year x education attainment levels (ref: compulsory)								
year x less than compulsory	-0.05 *	0.02	-0.08 ***	0.02	-0.04 ***	0.01	-0.05 ***	0.01
year x upper secondary (vocational)	-0.01	0.04	0.01	0.04	0.09 ***	0.02	0.07 ***	0.02
year x upper secondary (matriculation)	0.18 ***	0.03	0.16 ***	0.03	0.19 ***	0.01	0.17 ***	0.01
year x tertiary	0.27 ***	0.03	0.25 ***	0.03	0.22 ***	0.02	0.21 ***	0.02
Calendar year fixed effects	*X*		*X*		*X*		*X*	
Additional fixed effects†			*X*				*X*	
Random Effects								
σ^2 residual (fixed at $\pi^2/3$)	3.29		3.29		3.29		3.29	
σ_{u0}^2 intercept (person)	6.40		4.37		2.37		1.72	
σ_{u1}^2 slope (year)	0.05		0.05		0.01		0.01	
r_{u01}	-0.14		0.54		1.00		0.99	
ICC	0.66		0.58		0.42		0.35	
N persons	20,235		20,235		37,758		37,758	
Observations (year x persons)	101,175		101,175		188,790		188,790	
Marginal R^2 / Conditional R^2	0.121 / 0.704		0.372 / 0.702		0.079 / 0.467		0.229 / 0.477	

57,993 refugees who got humanitarian protection between 2009 and 2018 in Austria, and therefore full access to the labor market are observed for the first five years in the labor market. Source: Labor market database (AMDB des AMS Österreich und des BMASGPK).* p<0.05 ** p<0.01 *** p<0.001; † additional fixed effects are age groups (four 10-year categories), family status (seven categories), length of asylum application procedure (four quartile groups), countries of origin (37), and districts of residence (84).

Table A5: Mixed effects linear regression results modelling log annual earnings from paid employment for the first five years following the right to stay

	Women 1		Women 2		Men 1		Men 2	
Predictors	Est.	SE	Est.	SE	Est.	SE	Est.	SE
(Intercept)	8.55 ***	0.08	7.82 ***	0.22	8.88 ***	0.04	8.94 ***	0.12
Year (1 – 5)	0.16 ***	0.01	0.12 ***	0.01	0.14 ***	0.00	0.14 ***	0.00
Education attainment levels (ref: compulsory)								
less than compulsory	-0.20 ***	0.03	-0.12 ***	0.03	-0.02	0.01	-0.00	0.01
upper secondary (vocational)	0.22 ***	0.05	0.18 ***	0.05	0.01	0.02	0.09 ***	0.02
upper secondary (matriculation)	-0.13 ***	0.04	-0.01	0.04	-0.24 ***	0.02	-0.04 **	0.01
tertiary	0.04	0.04	0.12 **	0.04	-0.06 **	0.02	0.18 ***	0.02
Interaction of year x education attainment levels (ref: compulsory)								
year x less than compulsory	-0.01	0.02	-0.01	0.02	-0.01	0.01	-0.01	0.01
year x upper secondary (vocational)	-0.02	0.02	-0.02	0.02	0.04 ***	0.01	0.03 **	0.01
year x upper secondary (matriculation)	0.08 ***	0.02	0.07 ***	0.02	0.09 ***	0.01	0.10 ***	0.01
year x tertiary	0.10 ***	0.02	0.10 ***	0.02	0.08 ***	0.01	0.08 ***	0.01
Calendar year fixed effects	*X*		*X*		*X*		*X*	
Additional fixed effects†			*X*				*X*	
Random Effects								
σ^2	0.71		0.70		0.55		0.55	
σ^2_{u0} intercept (person)	0.94		0.83		0.76		0.60	
σ^2_{u1} slope (year)	0.09		0.09		0.08		0.08	
r_{u01}	-0.25		-0.23		-0.30		-0.28	
ICC	0.60		0.58		0.62		0.57	
N persons	9183		9183		32975		32975	
Observations (year x persons)	26400		26400		121328		121328	
Marginal R^2 / Conditional R^2	0.050 / 0.622		0.103 / 0.623		0.075 / 0.646		0.159 / 0.639	

57,993 refugees who got humanitarian protection between 2009 and 2018 in Austria, and therefore full access to the labor market are observed for the first five years in the labor market. Source: Labor market database (AMDB des AMS Österreich und des BMASGPK).* p<0.05 ** p<0.01 *** p<0.001; † additional fixed effects are age groups (four 10-year categories), family status (seven categories), length of asylum application procedure (four quartile groups), countries of origin (37), and districts of residence (84).

Table A6: Mixed effects logistic regression results modelling employment of at least 90 days per year for the first five years following the right to stay

	Women 1		Women 2		Men 1		Men 2	
Predictors	Log-Odds	SE	Log-Odds	SE	Log-Odds	SE	Log-Odds	SE
(Intercept)	-0.02		0.20	-2.23 ***	0.59	1.69 ***	0.11	1.41 *** 0.39
Year (1 – 5)	0.61 ***		0.02	0.32 ***	0.02	0.48 ***	0.01	0.50 *** 0.01
Education attainment levels (ref: compulsory)								
less than compulsory	-1.11 ***		0.08	-0.62 ***	0.07	-0.30 ***	0.05	-0.22 *** 0.04
upper secondary (vocational)	1.15 ***		0.15	0.86 ***	0.13	0.15 *	0.07	0.40 *** 0.07
upper secondary (matriculation)	-0.21 *		0.09	0.28 ***	0.08	-0.56 ***	0.05	0.04 0.05
tertiary	0.25 *		0.11	0.55 ***	0.10	-0.77 ***	0.07	0.04 0.06
Interaction of year x education attainment levels (ref: compulsory)								
year x less than compulsory	-0.03		0.03	-0.06	0.03	-0.01	0.02	-0.01 0.02
year x upper secondary (vocational)	0.03		0.06	0.08	0.06	0.17 ***	0.04	0.14 *** 0.04
year x upper secondary (matriculation)	0.12 **		0.04	0.10 **	0.04	0.19 ***	0.02	0.17 *** 0.02
year x tertiary	0.23 ***		0.05	0.23 ***	0.04	0.23 ***	0.03	0.22 *** 0.03
Calender year fixed effects	*X*		*X*		*X*		*X*	
Additional fixed effects†			*X*				*X*	
Random Effects								
σ^2 residual (fixed at $\pi^2/3$)	3.29		3.29		3.29		3.29	
σ^2_{u0} intercept (person)	15.76		9.80		10.70		7.15	
σ^2_{u1} slope (year)	0.90		0.93		0.93		0.88	
r_{u01}	-0.04		0.32		0.39		0.48	
ICC	0.84		0.78		0.79		0.73	
N persons	20,235		20,235		37,758		37,758	
Observations (year x persons)	101,175		101,175		188,790		188,790	
Marginal R^2 / Conditional R^2	0.070 / 0.853		0.226 / 0.830		0.061 / 0.805		0.201 / 0.785	

57,993 refugees who got humanitarian protection between 2009 and 2018 in Austria, and therefore full access to the labor market are observed for the first five years in the labor market. Source: Labor market database (AMDB des AMS Österreich und des BMASGPK).* p<0.05 ** p<0.01 *** p<0.001; † additional fixed effects are age groups (four 10-year categories), family status (seven categories), length of asylum application procedure (four quartile groups), countries of origin (37), and districts of residence (84).

Table A7: Mixed effects linear regression results modelling log daily earnings from paid employment of at least 90 days per year for the first five years following the right to stay

	Women 1		Women 2		Men 1		Men 2	
Predictors	Est.	SE	Est.	SE	Est.	SE	Est.	SE
(Intercept)	3.42 ***	0.02	3.45 ***	0.07	3.75 ***	0.01	3.69 ***	0.04
year	0.02 ***	0.00	0.02 ***	0.00	0.03 ***	0.00	0.03 ***	0.00
less than compulsory	-0.05 ***	0.01	-0.05 ***	0.01	-0.03 ***	0.00	-0.02 ***	0.00
upper secondary (vocational)	0.08 ***	0.02	0.06 ***	0.02	0.03 ***	0.01	0.05 ***	0.01
upper secondary (matriculation)	0.05 ***	0.01	0.03 *	0.01	-0.04 ***	0.00	0.01 **	0.00
tertiary	0.13 ***	0.01	0.11 ***	0.01	0.04 ***	0.01	0.10 ***	0.01
year x less than compulsory	-0.01	0.01	-0.00	0.01	-0.00	0.00	-0.00 *	0.00
year x upper secondary (vocational)	0.01	0.01	0.01	0.01	0.01 **	0.00	0.01 **	0.00
year x upper secondary (matriculation)	0.01	0.01	0.01	0.01	0.01 ***	0.00	0.01 ***	0.00
year x tertiary	0.02 **	0.01	0.02 **	0.01	0.01 ***	0.00	0.02 ***	0.00
Random Effects								
σ^2	0.06		0.06		0.04		0.04	
σ^2_{u0} intercept (person)	0.10		0.10		0.09		0.07	
σ^2_{u1} slope (year)	0.01		0.01		0.01		0.01	
r_{u01}	0.03		0.02		-0.07		-0.09	
ICC	0.68		0.67		0.72		0.68	
N	9183		9183		32975		32975	
Observations	26400		26400		121328		121328	
Marginal R^2 / Conditional R^2	0.119 / 0.720		0.165 / 0.723		0.114 / 0.751		0.192 / 0.744	

57,993 refugees who got humanitarian protection between 2009 and 2018 in Austria, and therefore full access to the labor market are observed for the first five years in the labor market. Source: Labor market database (AMDB des AMS Österreich und des BMASGPK).* p<0.05 ** p<0.01 *** p<0.001; † additional fixed effects are age groups (four 10-year categories), family status (seven categories), length of asylum application procedure (four quartile groups), countries of origin (37), and districts of residence (84).

Table A8: Average marginal predicted probability of employment of at least 90 days per year for the first five years following the right to stay by education and gender

Education	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**
Women					
less than compulsory	13.7% (13.0%-14.5%)	15.4% (14.7%-16.1%)	17.7% (17.0%-18.4%)	21.0% (20.2%-21.9%)	23.9% (22.9%-25.0%)
compulsory	25.2% (24.4%-25.9%)	28.6% (28.0%-29.3%)	32.8% (32.1%-33.5%)	38.0% (37.2%-38.8%)	41.9% (41.1%-42.8%)
upper secondary (vocational)	34.7% (31.9%-37.5%)	41.7% (39.0%-44.4%)	47.8% (45.1%-50.5%)	53.5% (50.7%-56.3%)	58.3% (55.2%-61.3%)
upper secondary (matriculation)	15.0% (13.9%-16.2%)	18.9% (17.7%-20.1%)	24.7% (23.5%-26.0%)	31.9% (30.4%-33.3%)	38.0% (36.4%-39.7%)
tertiary	18.2% (16.6%-19.8%)	23.8% (22.1%-25.4%)	31.9% (30.2%-33.6%)	40.7% (38.8%-42.5%)	47.3% (45.2%-49.3%)
Men					
less than compulsory	55.9% (55.0%-56.9%)	64.0% (63.2%-64.8%)	69.9% (69.2%-70.7%)	73.9% (73.0%-74.7%)	73.7% (72.7%-74.6%)
compulsory	60.1% (59.6%-60.7%)	69.1% (68.6%-69.6%)	75.7% (75.3%-76.2%)	79.1% (78.7%-79.6%)	79.2% (78.7%-79.7%)
upper secondary (vocational)	51.3% (49.3%-53.3%)	64.1% (62.5%-65.7%)	74.9% (73.6%-76.2%)	80.3% (79.0%-81.5%)	81.9% (80.5%-83.3%)
upper secondary (matriculation)	42.7% (41.4%-44.0%)	56.3% (55.2%-57.4%)	68.4% (67.4%-69.4%)	74.9% (73.9%-75.9%)	77.0% (76.0%-78.1%)
tertiary	39.2% (37.7%-40.8%)	51.8% (50.5%-53.2%)	64.2% (62.9%-65.4%)	71.9% (70.6%-73.1%)	74.8% (73.5%-76.2%)

Predictions from mixed effects fractional logistic regression models. 95% CI in parentheses. Model results are reported in Table A6.

Table A9: Average marginal predicted daily earnings from paid employment (Euro) for the first five years following the right to stay by education and gender

Education	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**
Women					
less than compulsory	33.9 (33.1-34.8)	35.4 (34.7-36.0)	36.9 (36.3-37.5)	39.2 (38.5-39.9)	41.6 (40.6-42.6)
compulsory	34.7 (34.2-35.2)	36.4 (36.0-36.8)	38.1 (37.7-38.5)	40.2 (39.8-40.6)	42.9 (42.3-43.4)
upper secondary (vocational)	38.3 (36.5-40.1)	40.6 (39.2-42.1)	42.9 (41.6-44.2)	45.4 (44.0-46.8)	47.6 (45.8-49.4)
upper secondary (matriculation)	38.3 (37.1-39.6)	40.4 (39.5-41.4)	42.8 (42.0-43.7)	45.3 (44.5-46.2)	48.1 (47.0-49.3)
tertiary	42.2 (40.8-43.8)	44.6 (43.4-45.8)	47.8 (46.8-48.9)	50.7 (49.6-51.8)	54.4 (53.0-55.9)
Men					
less than compulsory	48.2 (47.8-48.7)	50.6 (50.2-50.9)	53.1 (52.7-53.5)	56.8 (56.4-57.3)	60.6 (60.0-61.2)
compulsory	49.7 (49.4-50.0)	52.4 (52.1-52.6)	55.4 (55.2-55.6)	59.2 (58.9-59.5)	63.3 (63.0-63.6)
upper secondary (vocational)	49.8 (48.9-50.7)	52.7 (51.9-53.5)	57.3 (56.6-58.0)	62.3 (61.5-63.0)	67.0 (66.1-68.0)
upper secondary (matriculation)	49.1 (48.5-49.7)	51.5 (51.0-52.0)	54.7 (54.2-55.1)	59.0 (58.5-59.4)	63.5 (62.9-64.2)
tertiary	52.2 (51.3-53.1)	56.4 (55.7-57.2)	60.4 (59.7-61.1)	65.2 (64.5-65.9)	69.9 (69.0-70.9)

Predictions from mixed effects linear regression models. 95% CI in parentheses. Model results are reported in Table A7.

Table A10: Mixed effects fractional logistic (all-year employment) and linear (log annual earnings) regression results for the first five years following the right to stay

	W: employment		W: earnings		M: employment		M: earnings	
Predictors	Log-Odds	SE	Estimates	SE	Log-Odds	SE	Estimates	SE
(Intercept)	-1.77 ***	0.14	7.73 ***	0.13	-0.11	0.10	8.72 ***	0.06
time	0.14 ***	0.02	0.05	0.04	0.15 ***	0.02	0.12 ***	0.01
Origin-country school quality	0.23 ***	0.07	0.07	0.07	0.03	0.06	0.00	0.03
time x school quality	0.00	0.02	-0.01	0.03	-0.03	0.02	-0.01	0.01
Origin-country female/male LFPR	0.35 ***	0.07	0.18 *	0.07	0.06	0.05	0.06	0.03
time x female/male LFPR	-0.07 ***	0.02	0.01	0.03	-0.03	0.02	-0.01	0.01
baseline co-ethnic networks	0.01 **	0.00	0.01 *	0.01	-0.00	0.00	-0.00 *	0.00
time x baseline networks	0.00	0.00	-0.00	0.00	0.00 ***	0.00	0.00	0.00
growth in co-ethnic networks	-0.28 ***	0.04	-0.09 *	0.04	-0.24 ***	0.03	-0.09 ***	0.02
time x growth in networks	0.00	0.01	0.04 **	0.01	0.00	0.01	0.01	0.01
baseline x growth in networks	-0.01 **	0.00	-0.02 ***	0.00	0.00	0.00	0.00	0.00
Random Effects								
σ^2		3.29		10.05		3.29		2.83
σ^2_{v0} intercept (host-country district)		0.20		0.14		0.14		0.05
σ^2_{u0} intercept (origin country)		0.14		0.16		0.10		0.03
σ^2_{v1} slope (time in district)		0.00		0.05		0.01		0.00
σ^2_{u1} slope (time in origin country)		0.00		0.02		0.01		0.00
r_{u01} int slope time (district)		-0.50		-0.65		-0.70		-0.48
r_{v01} int slope time (origin country)		-0.39		-0.47		-0.00		-0.04
ICC		0.10		0.04		0.08		0.03
N districts		84		84		84		84
N countries of origin		37		37		37		37
Observations		101175		26400		188790		121328
Marginal R^2 / Conditional R^2	0.212 / 0.287		0.017 / 0.053		0.111 / 0.179		0.049 / 0.177	

57,993 refugees who got humanitarian protection between 2009 and 2018 in Austria, and therefore full access to the labor market are observed for the first five years in the labor market. Source: Labor market database (AMDB des AMS Österreich und des BMASGPK).* p<0.05 ** p<0.01 *** p<0.001; † additional fixed effects are age groups (four 10-year categories), family status (seven categories), length of asylum application procedure (four quartile groups), countries of origin (37), and districts of residence (84).

Table A11: Mixed effects logistic (employment of min 90 days per year) and linear (log daily earnings) regression results for the first five years following the right to stay

	W: employment		W: earnings		M: employment		M: earnings	
Predictors	Log-Odds	SE	Estimates	SE	Log-Odds	SE	Estimates	SE
(Intercept)	-0.88 ***	0.14	3.37 ***	0.04	0.76 ***	0.11	3.75 ***	0.02
time	0.10 ***	0.02	0.00	0.01	0.11 ***	0.03	0.03 ***	0.00
Origin-country school quality	0.19 *	0.08	-0.01	0.02	0.03	0.07	-0.01	0.01
time x school quality	-0.01	0.02	-0.01	0.01	-0.05 *	0.02	0.00	0.00
Origin-country female/male LFPR	0.33 ***	0.07	-0.01	0.02	0.02	0.06	0.02	0.01
time x female/male LFPR	-0.06 ***	0.02	0.00	0.01	-0.04 *	0.02	0.00	0.00
baseline co-ethnic networks	0.00	0.00	0.00 *	0.00	0.01 *	0.00	-0.00 ***	0.00
time x baseline networks	0.01 ***	0.00	0.00 **	0.00	0.01 ***	0.00	0.00	0.00
growth in co-ethnic networks	-0.24 ***	0.04	0.05 ***	0.01	-0.12 ***	0.03	-0.01	0.01
time x growth in networks	-0.01	0.01	0.01 **	0.00	0.00	0.01	-0.00	0.00
baseline x growth in networks	-0.01 ***	0.00	-0.00 ***	0.00	-0.01 ***	0.00	-0.00	0.00
Random Effects								
σ^2		3.29		0.92		3.29		0.34
σ^2_{v0} intercept (host-country district)		0.24		0.00		0.23		0.01
σ^2_{u0} intercept (origin country)		0.18		0.01		0.14		0.00
σ^2_{v1} slope (time in district)		0.01		0.00		0.02		0.00
σ^2_{u1} slope (time in origin country)		0.01		0.00		0.01		0.00
r_{u01} int slope time (district)		-0.62		-0.53		-0.53		-0.06
r_{v01} int slope time (origin country)		-0.37		0.23		0.12		-0.28
ICC		0.12		0.02		0.11		0.04
N districts		84		84		84		84
N countries of origin		37		37		37		37
Observations		101175		26400		188790		121328
Marginal R^2 / Conditional R^2	0.246 / 0.336		0.034 / 0.052		0.160 / 0.255		0.064 / 0.101	

57,993 refugees who got humanitarian protection between 2009 and 2018 in Austria, and therefore full access to the labor market are observed for the first five years in the labor market. Source: Labor market database (AMDB des AMS Österreich und des BMASGPK).* p<0.05 ** p<0.01 *** p<0.001; † additional fixed effects are age groups (four 10-year categories), family status (seven categories), length of asylum application procedure (four quartile groups), countries of origin (37), and districts of residence (84).

Table A12: Average marginal predicted share of days spent in employment and average marginal predicted annual earnings for the first five years following the right to stay by origin country educational-system performance and gender

educational-system performance	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**
Employment probability women					
P10	6.7% (4.3%-9.0%)	8.2% (5.6%-10.7%)	9.9% (7.2%-12.7%)	12.1% (8.9%-15.3%)	14.6% (10.7%-18.4%)
MEAN	8.8% (6.4%-11.1%)	10.7% (8.2%-13.3%)	13.0% (10.2%-15.8%)	15.7% (12.6%-18.9%)	18.9% (15.2%-22.6%)
P90	11.1% (7.7%-14.5%)	13.5% (9.9%-17.2%)	16.4% (12.4%-20.3%)	19.7% (15.3%-24.1%)	23.5% (18.4%-28.6%)
Employment probability men					
P10	57.3% (50.1%-64.6%)	63.6% (57.5%-69.6%)	69.4% (64.1%-74.6%)	74.6% (69.8%-79.5%)	79.3% (74.6%-83.9%)
MEAN	60.3% (54.7%-65.9%)	65.5% (60.8%-70.2%)	70.3% (66.3%-74.4%)	74.7% (71.0%-78.5%)	78.7% (75.1%-82.3%)
P90	62.8% (56.4%-69.3%)	67.1% (61.7%-72.5%)	71.1% (66.4%-75.9%)	74.8% (70.4%-79.3%)	78.2% (73.8%-82.6%)
Annual earnings (in 1,000 Euro) women					
P10	3.9 (2.5-6.0)	4.2 (2.9-5.9)	4.5 (3.4-6.0)	4.8 (3.7-6.3)	5.2 (3.8-7.1)
MEAN	4.3 (3.1-6.0)	4.6 (3.6-6.0)	4.9 (4.0-6.1)	5.3 (4.3-6.4)	5.6 (4.5-7.0)
P90	4.8 (3.2-7.1)	5.0 (3.7-6.9)	5.3 (4.1-6.9)	5.7 (4.4-7.2)	6.0 (4.6-7.9)
Annual earnings (in 1,000 Euro) men					
P10	9.2 (7.7-11.0)	10.7 (9.2-12.5)	12.5 (10.8-14.5)	14.5 (12.5-16.9)	16.9 (14.3-20.1)
MEAN	9.5 (8.2-10.8)	10.9 (9.6-12.3)	12.5 (11.2-14.0)	14.4 (12.8-16.2)	16.6 (14.6-18.9)
P90	9.7 (8.2-11.4)	11.0 (9.5-12.7)	12.6 (11.0-14.4)	14.3 (12.5-16.5)	16.3 (14.0-19.1)

Predictions from mixed effects fractional logistic regression models and mixed effects linear models for different levels of origin-country variables (P10, MEAN, P90). 95% CI in parentheses. Model results are reported in Table A10 in the appendix.

Table A13: Average marginal predicted share of days spent in employment and average marginal predicted annual earnings for the first five years following the right to stay by origin country gender norms (female/male LFPR) and gender

Female/male LFPR	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**
Employment probability women					
P10	7.7% (5.4%-10.0%)	9.6% (7.0%-12.1%)	11.9% (9.1%-14.8%)	14.7% (11.4%-18.0%)	18.1% (14.1%-22.0%)
MEAN	13.4% (10.4%-16.3%)	15.3% (12.3%-18.3%)	17.4% (14.3%-20.5%)	19.8% (16.5%-23.1%)	22.4% (18.7%-26.1%)
P90	22.0% (16.4%-27.6%)	23.3% (18.0%-28.5%)	24.6% (19.5%-29.6%)	26.0% (20.9%-31.0%)	27.4% (22.0%-32.7%)
Employment probability men					
P10	59.8% (53.9%-65.7%)	65.1% (60.2%-70.1%)	70.1% (65.8%-74.4%)	74.7% (70.7%-78.6%)	78.7% (74.9%-82.5%)
MEAN	63.5% (59.1%-68.0%)	67.8% (64.1%-71.5%)	71.7% (68.5%-74.9%)	75.4% (72.5%-78.2%)	78.7% (75.8%-81.5%)
P90	67.0% (61.4%-72.7%)	70.2% (65.6%-74.9%)	73.2% (69.1%-77.3%)	76.0% (72.1%-79.9%)	78.6% (74.6%-82.6%)
Annual earnings (in 1,000 Euro) women					
P10	3.9 (2.6-5.9)	4.2 (3.0-5.7)	4.4 (3.4-5.7)	4.7 (3.6-5.9)	4.9 (3.7-6.5)
MEAN	4.8 (3.5-6.5)	5.1 (4.0-6.6)	5.5 (4.5-6.7)	5.9 (4.9-7.1)	6.3 (5.1-7.8)
P90	5.8 (3.9-8.7)	6.3 (4.6-8.7)	6.9 (5.3-8.9)	7.5 (5.9-9.5)	8.1 (6.2-10.6)
Annual earnings (in 1,000 Euro) men					
P10	9.3 (8.1-10.8)	10.7 (9.5-12.2)	12.4 (11.0-14.0)	14.3 (12.6-16.2)	16.5 (14.4-18.9)
MEAN	10.4 (9.3-11.6)	11.8 (10.7-13.0)	13.4 (12.2-14.7)	15.2 (13.9-16.7)	17.3 (15.6-19.2)
P90	11.6 (9.9-13.4)	12.9 (11.3-14.7)	14.5 (12.8-16.4)	16.2 (14.2-18.4)	18.1 (15.7-20.9)

Predictions from mixed effects fractional logistic regression models and mixed effects linear models for different levels of origin-country variables (P10, MEAN, P90). 95% CI in parentheses. Model results are reported in Table A10 in the appendix.

Table A14: Average marginal predicted share of days spent in employment and annual earnings by local populations from refugee-origin countries in host-country districts for women

Growth in foreign pop.	***Year 1***	***Year 2***	***Year 3***	***Year 4***	***Year 5***
Employment probability: Baseline co-ethnic networks P10					
P10	*12.2% (8.9%-15.4%)*	*14.5% (11.1%-17.9%)*	*17.2% (13.5%-20.8%)*	*20.2% (16.2%-24.3%)*	*23.7% (19.0%-28.3%)*
MEAN	*10.4% (7.7%-13.1%)*	*12.4% (9.6%-15.3%)*	*14.8% (11.8%-17.9%)*	*17.6% (14.2%-21.0%)*	*20.7% (16.7%-24.7%)*
VIENNA (MAX)	*4.4% (2.3%-6.4%)*	*5.3% (3.1%-7.5%)*	*6.4% (4.1%-8.8%)*	*7.8% (5.1%-10.5%)*	*9.4% (6.1%-12.7%)*
Employment probability: Baseline co-ethnic networks MEAN					
P10	*12.8% (9.6%-16.1%)*	*15.3% (11.9%-18.8%)*	*18.2% (14.6%-21.9%)*	*21.5% (17.6%-25.5%)*	*25.3% (20.8%-29.8%)*
MEAN	*10.8% (8.1%-13.5%)*	*13.0% (10.1%-15.8%)*	*15.5% (12.4%-18.6%)*	*18.4% (15.0%-21.9%)*	*21.8% (17.8%-25.7%)*
VIENNA (MAX)	*4.1% (2.3%-5.8%)*	*5.0% (3.1%-6.9%)*	*6.1% (4.0%-8.2%)*	*7.4% (5.0%-9.8%)*	*9.0% (6.0%-12.0%)*
Employment probability: Baseline co-ethnic networks MAX (VIENNA)					
P10	*15.1% (10.8%-19.5%)*	*18.3% (13.9%-22.7%)*	*22.0% (17.5%-26.5%)*	*26.1% (21.4%-30.9%)*	*30.8% (25.4%-36.1%)*
MEAN	*12.1% (8.6%-15.5%)*	*14.7% (11.1%-18.3%)*	*17.8% (14.1%-21.6%)*	*21.4% (17.3%-25.5%)*	*25.6% (20.8%-30.3%)*
VIENNA (MAX)	*3.3% (1.9%-4.7%)*	*4.1% (2.7%-5.6%)*	*5.1% (3.5%-6.8%)*	*6.4% (4.5%-8.3%)*	*7.9% (5.5%-10.4%)*
Annual earnings (in 1,000 Euros): Baseline co-ethnic networks P10					
P10	*4.8 (3.4-6.7)*	*4.9 (3.7-6.4)*	*5.0 (3.9-6.3)*	*5.1 (4.1-6.3)*	*5.2 (4.1-6.6)*
MEAN	*4.4 (3.2-6.1)*	*4.7 (3.6-6.0)*	*4.9 (4.0-6.0)*	*5.2 (4.2-6.3)*	*5.4 (4.3-6.8)*
VIENNA (MAX)	*3.0 (1.8-5.1)*	*3.7 (2.4-5.8)*	*4.6 (3.1-6.8)*	*5.6 (3.8-8.3)*	*6.9 (4.5-10.7)*
Annual earnings (in 1,000 Euros): Baseline co-ethnic networks MEAN					
P10	*5.4 (3.9-7.4)*	*5.5 (4.2-7.1)*	*5.5 (4.5-6.8)*	*5.6 (4.6-6.8)*	*5.7 (4.6-7.1)*
MEAN	*4.8 (3.5-6.5)*	*5.0 (3.9-6.4)*	*5.2 (4.3-6.4)*	*5.4 (4.5-6.5)*	*5.7 (4.6-7.0)*
VIENNA (MAX)	*2.5 (1.6-4.0)*	*3.1 (2.1-4.6)*	*3.8 (2.7-5.4)*	*4.6 (3.3-6.6)*	*5.7 (3.8-8.4)*
Annual earnings (in 1,000 Euros): Baseline co-ethnic networks MAX (VIENNA)					
P10	*7.8 (5.1-12.0)*	*7.8 (5.6-10.8)*	*7.7 (6.0-9.9)*	*7.7 (6.1-9.7)*	*7.7 (5.8-10.1)*
MEAN	*6.0 (4.0-9.0)*	*6.1 (4.5-8.4)*	*6.3 (4.9-8.0)*	*6.4 (5.2-8.1)*	*6.6 (5.0-8.6)*
VIENNA (MAX)	*1.4 (0.9-2.3)*	*1.7 (1.2-2.5)*	*2.1 (1.5-2.8)*	*2.5 (1.8-3.4)*	*3.0 (2.1-4.3)*

Predictions from mixed effects fractional logistic regression models and mixed effects linear models for different levels of local migrant populations (P10, MEAN, MAX, i.e., Vienna). 95% CI in parentheses. Model results are reported in Table A10 in the appendix.

Table A15: Average marginal predicted share of days spent in employment and annual earnings by local populations from refugee-origin countries in host-country districts for men

Growth in foreign pop.	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**
Employment probability: Baseline co-ethnic networks P10					
P10	71.5% (66.6%-76.3%)	74.7% (70.7%-78.7%)	77.6% (74.2%-81.1%)	80.3% (77.2%-83.5%)	82.8% (79.7%-85.9%)
MEAN	67.9% (62.9%-72.8%)	71.3% (67.2%-75.5%)	74.5% (70.9%-78.2%)	77.5% (74.1%-80.9%)	80.2% (76.9%-83.6%)
VIENNA (MAX)	46.0% (37.6%-54.4%)	50.1% (42.6%-57.6%)	54.2% (47.3%-61.2%)	58.3% (51.5%-65.1%)	62.3% (55.2%-69.3%)
Employment probability: Baseline co-ethnic networks MEAN					
P10	70.3% (65.5%-75.1%)	74.0% (70.0%-78.0%)	77.3% (73.9%-80.8%)	80.4% (77.3%-83.5%)	83.1% (80.2%-86.1%)
MEAN	66.7% (61.8%-71.7%)	70.7% (66.5%-74.9%)	74.3% (70.7%-78.0%)	77.7% (74.4%-81.0%)	80.7% (77.5%-83.9%)
VIENNA (MAX)	45.4% (37.6%-53.3%)	50.1% (43.0%-57.1%)	54.7% (48.2%-61.2%)	59.2% (52.8%-65.7%)	63.6% (56.9%-70.3%)
Employment probability: Baseline co-ethnic networks MAX (VIENNA)					
P10	66.5% (60.9%-72.1%)	71.8% (67.3%-76.2%)	76.5% (72.9%-80.0%)	80.6% (77.5%-83.7%)	84.2% (81.3%-87.0%)
MEAN	63.1% (57.4%-68.9%)	68.7% (64.1%-73.3%)	73.7% (69.9%-77.5%)	78.2% (74.9%-81.6%)	82.1% (79.0%-85.3%)
VIENNA (MAX)	43.8% (36.3%-51.2%)	49.9% (43.4%-56.5%)	56.1% (50.2%-62.1%)	62.1% (56.3%-67.9%)	67.8% (61.8%-73.8%)
Annual earnings (in 1,000 Euros): Baseline co-ethnic networks P10					
P10	11.7 (10.2-13.5)	13.3 (11.7-15.0)	15.0 (13.3-16.9)	16.9 (15.0-19.1)	19.1 (16.8-21.9)
MEAN	10.8 (9.5-12.4)	12.3 (10.9-13.9)	14.0 (12.5-15.7)	15.9 (14.2-17.9)	18.1 (16.0-20.6)
VIENNA (MAX)	7.0 (5.7-8.7)	8.3 (6.8-10.0)	9.8 (8.2-11.7)	11.5 (9.6-13.8)	13.5 (11.1-16.5)
Annual earnings (in 1,000 Euros): Baseline co-ethnic networks MEAN					
P10	11.5 (10.0-13.2)	13.0 (11.5-14.7)	14.7 (13.1-16.5)	16.7 (14.8-18.7)	18.9 (16.6-21.4)
MEAN	10.6 (9.3-12.1)	12.1 (10.8-13.6)	13.8 (12.4-15.4)	15.7 (14.0-17.6)	17.9 (15.8-20.3)
VIENNA (MAX)	7.0 (5.7-8.5)	8.3 (6.9-9.8)	9.7 (8.3-11.5)	11.5 (9.7-13.6)	13.6 (11.3-16.3)
Annual earnings (in 1,000 Euros): Baseline co-ethnic networks MAX (VIENNA)					
P10	10.7 (9.2-12.5)	12.2 (10.7-13.9)	13.9 (12.4-15.6)	15.8 (14.1-17.8)	18.0 (15.8-20.5)
MEAN	10.0 (8.6-11.6)	11.5 (10.1-13.0)	13.1 (11.7-14.8)	15.1 (13.4-16.9)	17.2 (15.1-19.7)
VIENNA (MAX)	6.9 (5.7-8.3)	8.2 (7.0-9.6)	9.7 (8.4-11.2)	11.5 (9.9-13.4)	13.7 (11.5-16.2)

Predictions from mixed effects fractional logistic regression models and mixed effects linear models for different levels of local migrant populations (P10, MEAN, MAX, i.e., Vienna). 95% CI in parentheses. Model results are reported in Table A10 in the appendix.

Table A16: Average marginal predicted probability of employment (min 90 days per year) and average marginal predicted daily earnings for the first five years following the right to stay by level of origin country educational-system performanceand gender

educational-system performance	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**
Employment probability women					
P10	12.5% (8.1%-16.9%)	15.2% (10.5%-19.8%)	18.3% (13.3%-23.4%)	22.0% (16.4%-27.6%)	26.2% (19.7%-32.6%)
MEAN	15.9% (11.7%-20.1%)	19.0% (14.7%-23.4%)	22.6% (18.0%-27.2%)	26.6% (21.7%-31.6%)	31.1% (25.7%-36.5%)
P90	19.5% (13.7%-25.3%)	23.0% (17.0%-28.9%)	26.9% (20.8%-32.9%)	31.2% (24.8%-37.6%)	35.8% (28.8%-42.8%)
Employment probability men					
P10	81.6% (76.5%-86.7%)	85.7% (81.9%-89.4%)	88.9% (86.0%-91.8%)	91.5% (89.1%-93.9%)	93.6% (91.5%-95.7%)
MEAN	84.3% (80.6%-87.9%)	87.0% (84.3%-89.8%)	89.4% (87.2%-91.6%)	91.3% (89.4%-93.3%)	93.0% (91.2%-94.7%)
P90	86.3% (82.5%-90.1%)	88.1% (85.2%-91.1%)	89.8% (87.2%-92.3%)	91.2% (88.9%-93.5%)	92.4% (90.2%-94.7%)
Daily earnings (in Euro) women					
P10	36.3 (33.2-39.8)	37.7 (35.1-40.5)	39.2 (36.7-41.8)	40.7 (37.7-43.8)	42.2 (38.4-46.5)
MEAN	36.5 (34.1-39.1)	37.6 (35.6-39.7)	38.7 (37.0-40.6)	39.9 (37.9-42.1)	41.1 (38.4-44.0)
P90	36.7 (33.8-39.7)	37.5 (35.2-40.0)	38.4 (36.2-40.7)	39.3 (36.8-42.0)	40.2 (36.9-43.7)
Daily earnings (in Euro) men					
P10	52.2 (49.2-55.4)	54.1 (51.3-57.2)	56.2 (53.3-59.2)	58.3 (55.3-61.4)	60.5 (57.2-63.9)
MEAN	51.6 (49.2-54.0)	53.6 (51.4-56.0)	55.8 (53.5-58.2)	58.0 (55.6-60.5)	60.3 (57.7-63.1)
P90	51.0 (48.3-53.9)	53.2 (50.5-56.0)	55.4 (52.8-58.2)	57.8 (55.0-60.7)	60.2 (57.2-63.4)

Predictions from mixed effects fractional logistic regression models and mixed effects linear models for different levels of origin-country variables (P10, MEAN, P90). 95% CI in parentheses. Model results are reported in Table A11 in the appendix.

Table A17: Average marginal predicted probability of employment (min 90 days per year) and average marginal predicted daily earnings for the first five years following the right to stay by level of origin country gender norms (female/male LFPR) and gender

Female/male LFPR	Year 1	Year 2	Year 3	Year 4	Year 5
Employment probability women					
P10	14.2% (10.0%-18.4%)	17.3% (12.8%-21.8%)	21.0% (16.2%-25.8%)	25.2% (19.9%-30.4%)	29.9% (24.0%-35.8%)
MEAN	22.7% (18.0%-27.4%)	25.6% (21.0%-30.2%)	28.7% (24.2%-33.3%)	32.0% (27.4%-36.7%)	35.6% (30.6%-40.5%)
P90	34.1% (26.2%-41.9%)	35.9% (28.7%-43.1%)	37.7% (30.9%-44.5%)	39.6% (32.9%-46.2%)	41.5% (34.6%-48.4%)
Employment probability men					
P10	84.0% (80.2%-87.8%)	86.9% (84.0%-89.8%)	89.3% (87.0%-91.7%)	91.4% (89.4%-93.4%)	93.0% (91.2%-94.9%)
MEAN	85.8% (83.0%-88.6%)	87.8% (85.7%-90.0%)	89.6% (87.9%-91.4%)	91.2% (89.6%-92.7%)	92.5% (91.0%-94.0%)
P90	87.3% (84.1%-90.6%)	88.7% (86.0%-91.3%)	89.9% (87.6%-92.1%)	91.0% (88.8%-93.1%)	92.0% (89.8%-94.2%)
Daily earnings (in Euro) women					
P10	37.0 (34.1-40.1)	37.9 (35.6-40.5)	38.9 (36.7-41.3)	39.9 (37.3-42.7)	40.9 (37.6-44.6)
MEAN	36.2 (33.9-38.7)	37.3 (35.5-39.3)	38.5 (36.8-40.2)	39.7 (37.8-41.7)	41.0 (38.5-43.6)
P90	35.4 (32.7-38.4)	36.7 (34.5-39.1)	38.1 (36.0-40.3)	39.5 (37.0-42.2)	41.0 (37.7-44.6)
Daily earnings (in Euro) men					
P10	51.5 (49.0-54.1)	53.5 (51.1-56.0)	55.6 (53.2-58.2)	57.9 (55.4-60.5)	60.2 (57.4-63.0)
MEAN	52.5 (50.5-54.6)	54.6 (52.7-56.6)	56.8 (54.9-58.8)	59.1 (57.0-61.2)	61.4 (59.1-63.9)
P90	53.6 (50.9-56.4)	55.7 (53.2-58.4)	58.0 (55.4-60.6)	60.3 (57.6-63.1)	62.7 (59.7-65.9)

Predictions from mixed effects fractional logistic regression models and mixed effects linear models for different levels of origin-country variables (P10, MEAN, P90). 95% CI in parentheses. Model results are reported in Table A10 in the appendix.

Table A18: Average marginal predicted probability of employment (min 90 days per year) and daily earnings by local populations from refugee-origin countries in host-country districts for women

Growth in foreign pop.	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**
Employment probability: Baseline co-ethnic networks P10					
P10	25.0% (19.0%-30.9%)	27.6% (21.8%-33.3%)	30.3% (24.7%-36.0%)	33.2% (27.5%-39.0%)	36.3% (30.2%-42.4%)
MEAN	22.8% (17.5%-28.2%)	25.1% (20.0%-30.3%)	27.5% (22.5%-32.6%)	30.1% (24.9%-35.3%)	32.8% (27.3%-38.4%)
VIENNA (MAX)	13.7% (8.0%-19.3%)	14.6% (9.3%-19.9%)	15.6% (10.5%-20.7%)	16.7% (11.5%-21.9%)	17.7% (12.0%-23.5%)
Employment probability: Baseline co-ethnic networks MEAN					
P10	24.4% (18.8%-30.1%)	27.7% (22.2%-33.3%)	31.3% (25.7%-36.8%)	35.0% (29.4%-40.6%)	39.0% (33.1%-44.9%)
MEAN	21.8% (16.8%-26.8%)	24.7% (19.7%-29.6%)	27.8% (22.8%-32.8%)	31.1% (26.0%-36.3%)	34.7% (29.2%-40.2%)
VIENNA (MAX)	11.1% (6.7%-15.6%)	12.3% (8.0%-16.6%)	13.6% (9.3%-17.8%)	15.0% (10.5%-19.5%)	16.5% (11.4%-21.6%)
Employment probability: Baseline co-ethnic networks MAX (VIENNA)					
P10	22.9% (16.7%-29.1%)	28.2% (22.0%-34.4%)	34.3% (28.2%-40.4%)	40.9% (34.8%-47.1%)	47.9% (41.4%-54.3%)
MEAN	18.7% (13.5%-24.0%)	23.3% (17.9%-28.6%)	28.5% (23.0%-34.0%)	34.4% (28.7%-40.1%)	40.8% (34.6%-47.0%)
VIENNA (MAX)	5.7% (3.4%-8.0%)	7.0% (4.6%-9.4%)	8.6% (6.0%-11.3%)	10.6% (7.5%-13.7%)	12.9% (9.0%-16.8%)
Daily earnings (in Euros): Baseline co-ethnic networks P10					
P10	36.4 (33.9-39.2)	35.7 (33.6-38.0)	35.1 (33.2-37.1)	34.4 (32.4-36.5)	33.7 (31.3-36.3)
MEAN	37.5 (35.1-40.1)	37.1 (35.1-39.1)	36.7 (34.9-38.5)	36.2 (34.3-38.3)	35.8 (33.5-38.4)
VIENNA (MAX)	43.8 (38.4-50.0)	45.2 (40.4-50.5)	46.6 (42.2-51.4)	48.0 (43.4-53.2)	49.5 (44.0-55.8)
Daily earnings (in Euros): Baseline co-ethnic networks MEAN					
P10	36.5 (34.2-39.1)	36.3 (34.4-38.3)	36.0 (34.3-37.9)	35.8 (33.9-37.8)	35.6 (33.3-38.0)
MEAN	37.2 (35.0-39.5)	37.2 (35.4-39.1)	37.2 (35.6-39.0)	37.3 (35.4-39.2)	37.3 (35.0-39.8)
VIENNA (MAX)	40.6 (36.1-45.7)	42.4 (38.5-46.7)	44.3 (40.6-48.3)	46.3 (42.2-50.7)	48.3 (43.3-53.8)
Daily earnings (in Euros): Baseline co-ethnic networks MAX (VIENNA)					
P10	36.9 (33.4-40.8)	38.1 (35.4-41.0)	39.4 (37.1-41.7)	40.6 (38.2-43.2)	42.0 (38.7-45.6)
MEAN	36.1 (32.8-39.7)	37.6 (35.0-40.3)	39.1 (37.0-41.4)	40.7 (38.4-43.2)	42.4 (39.1-45.9)
VIENNA (MAX)	32.1 (28.5-36.2)	34.9 (31.9-38.1)	37.9 (35.2-40.7)	41.1 (38.0-44.5)	44.6 (40.2-49.5)

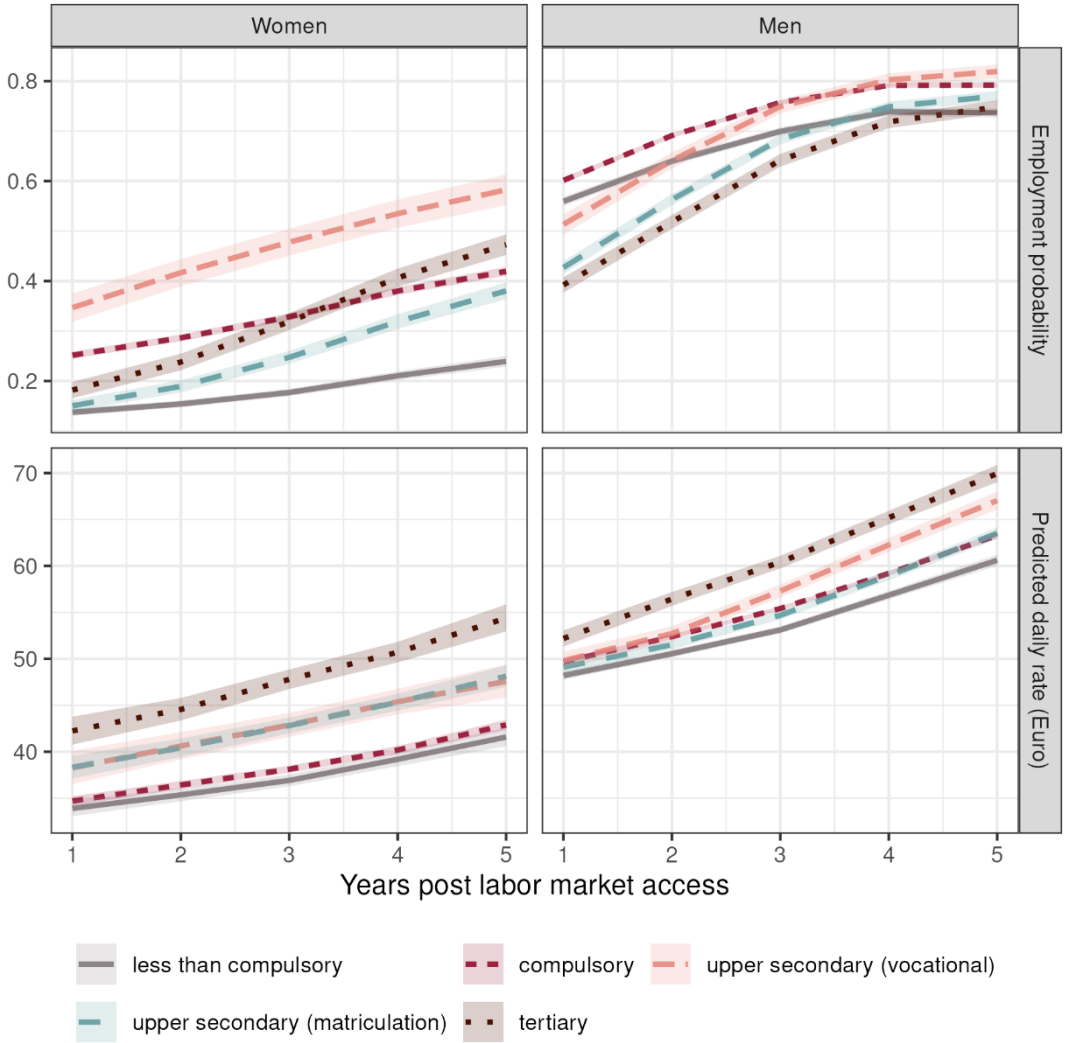
Predictions from mixed effects fractional logistic regression models and mixed effects linear models for different levels of local migrant populations (P10, MEAN, MAX, i.e., Vienna). 95% CI in parentheses. Model results are reported in Table A11 in the appendix.

Table A19: Average marginal predicted probability of employment (min 90 days per year) and daily earnings by local populations from refugee-origin countries in host-country districts for men

Growth in foreign pop.	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**
Employment probability: Baseline co-ethnic networks P10					
P10	88.3% (85.5%-91.2%)	89.6% (87.3%-91.9%)	90.7% (88.7%-92.7%)	91.7% (89.9%-93.6%)	92.6% (90.8%-94.5%)
MEAN	87.7% (84.8%-90.6%)	89.0% (86.7%-91.3%)	90.2% (88.2%-92.2%)	91.3% (89.4%-93.2%)	92.2% (90.4%-94.1%)
VIENNA (MAX)	83.8% (78.4%-89.1%)	85.5% (81.1%-89.9%)	87.1% (83.3%-90.8%)	88.5% (85.0%-92.0%)	89.8% (86.3%-93.2%)
Employment probability: Baseline co-ethnic networks MEAN					
P10	88.2% (85.3%-91.0%)	89.7% (87.5%-92.0%)	91.1% (89.3%-93.0%)	92.3% (90.7%-94.0%)	93.4% (91.8%-95.0%)
MEAN	87.2% (84.3%-90.1%)	88.9% (86.6%-91.2%)	90.4% (88.5%-92.4%)	91.7% (89.9%-93.5%)	92.9% (91.2%-94.6%)
VIENNA (MAX)	81.1% (75.5%-86.7%)	83.5% (79.0%-88.1%)	85.7% (81.8%-89.6%)	87.6% (84.0%-91.2%)	89.3% (85.8%-92.8%)
Employment probability: Baseline co-ethnic networks MAX (VIENNA)					
P10	87.6% (84.4%-90.8%)	90.2% (88.0%-92.5%)	92.3% (90.7%-94.0%)	94.0% (92.7%-95.4%)	95.4% (94.2%-96.5%)
MEAN	85.7% (82.1%-89.2%)	88.6% (86.1%-91.2%)	91.1% (89.2%-93.0%)	93.0% (91.4%-94.6%)	94.6% (93.2%-95.9%)
VIENNA (MAX)	70.7% (63.5%-77.9%)	76.0% (70.4%-81.5%)	80.6% (76.1%-85.1%)	84.5% (80.5%-88.4%)	87.7% (84.0%-91.4%)
Daily earnings (in Euros): Baseline co-ethnic networks P10					
P10	55.2 (52.6-57.9)	57.0 (54.5-59.6)	58.8 (56.3-61.4)	60.7 (58.1-63.3)	62.6 (59.8-65.5)
MEAN	55.1 (52.6-57.7)	56.9 (54.5-59.3)	58.7 (56.3-61.1)	60.5 (58.1-63.1)	62.5 (59.8-65.2)
VIENNA (MAX)	54.7 (50.8-58.9)	56.4 (52.6-60.4)	58.1 (54.4-62.1)	59.9 (56.0-64.1)	61.8 (57.5-66.4)
Annual earnings (in 1,000 Euros): Baseline co-ethnic networks MEAN					
P10	54.1 (51.7-56.7)	56.0 (53.6-58.5)	58.0 (55.6-60.5)	60.0 (57.6-62.6)	62.1 (59.5-64.9)
MEAN	54.0 (51.6-56.4)	55.8 (53.5-58.2)	57.8 (55.5-60.2)	59.8 (57.4-62.3)	61.9 (59.3-64.5)
VIENNA (MAX)	53.0 (49.5-56.8)	54.8 (51.4-58.4)	56.7 (53.3-60.2)	58.6 (55.0-62.4)	60.6 (56.6-64.8)
Daily earnings (in Euros): Baseline co-ethnic networks MAX (VIENNA)					
P10	51.0 (48.3-53.8)	53.2 (50.8-55.8)	55.6 (53.3-58.1)	58.1 (55.7-60.6)	60.7 (58.0-63.5)
MEAN	50.5 (47.9-53.2)	52.7 (50.4-55.2)	55.1 (52.8-57.5)	57.5 (55.1-60.0)	60.1 (57.4-62.8)
VIENNA (MAX)	48.0 (45.0-51.2)	50.1 (47.3-53.1)	52.3 (49.5-55.2)	54.6 (51.6-57.7)	56.9 (53.5-60.6)

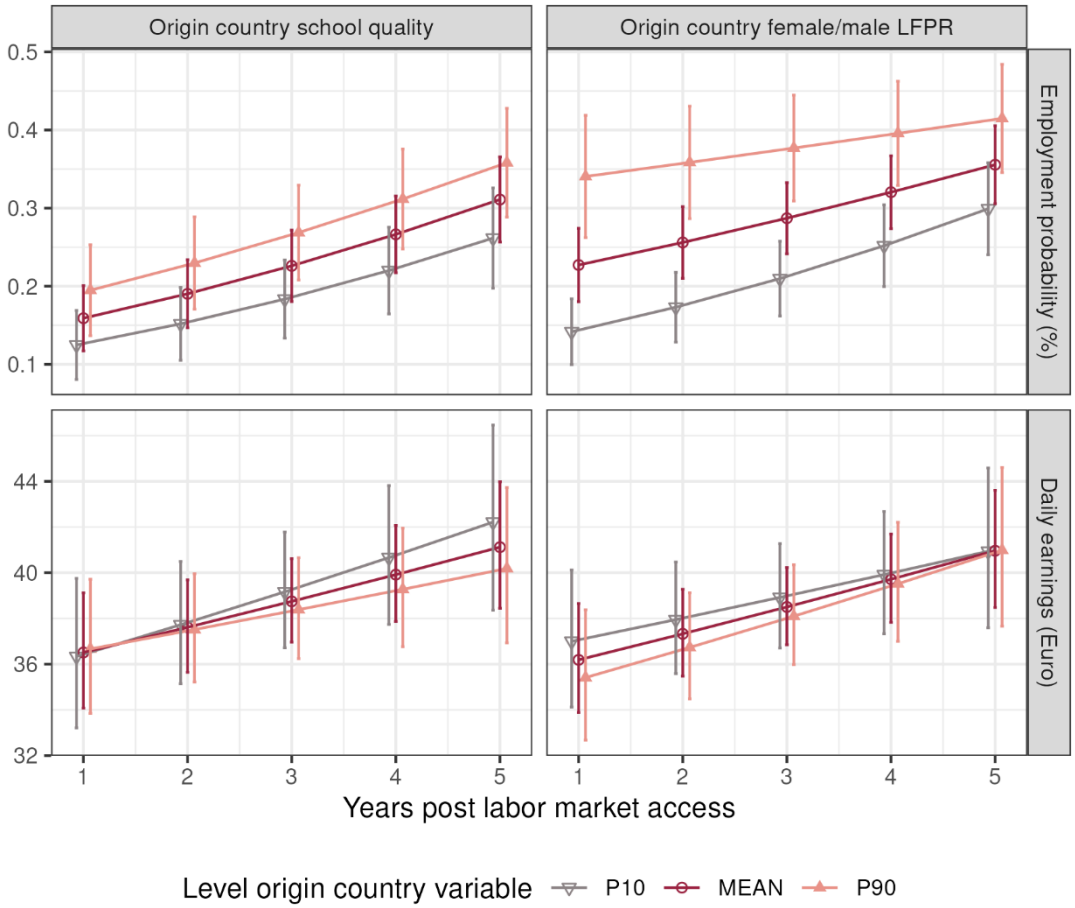
Predictions from mixed effects fractional logistic regression models and mixed effects linear models for different levels of local migrant populations (P10, MEAN, MAX, i.e., Vienna). 95% CI in parentheses. Model results are reported in Table A11 in the appendix.

Figure A1: Average marginal predicted employment probability (min. 90 days per year) and daily earnings by education, gender, and years in the labor market



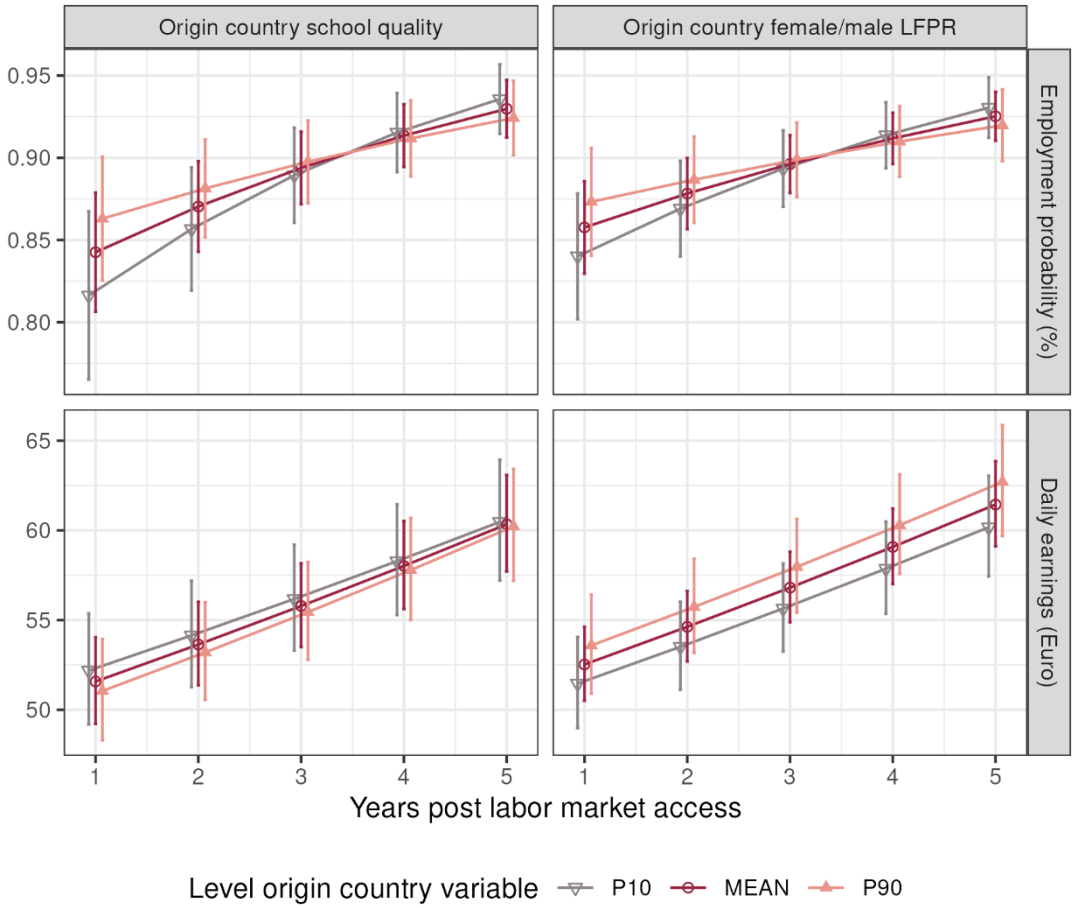
57,993 refugees who got humanitarian protection between 2009 and 2018 in Austria. Predictions from mixed effects logit models explaining the probability to be employed for at least 90 days per year beyond the marginal earnings threshold (0/1), and mixed effects linear models explaining daily rates in Euro. For regression results, see Tables A6 and A7 in the Appendix, for predicted values, see Tables A8 and A9. Source: Labor market database (*AMDB des AMS Österreich und des BMASGPK*).

Figure A2: Average marginal predicted employment probability (min. 90 days per year) and daily earnings by origin-country characteristics, women



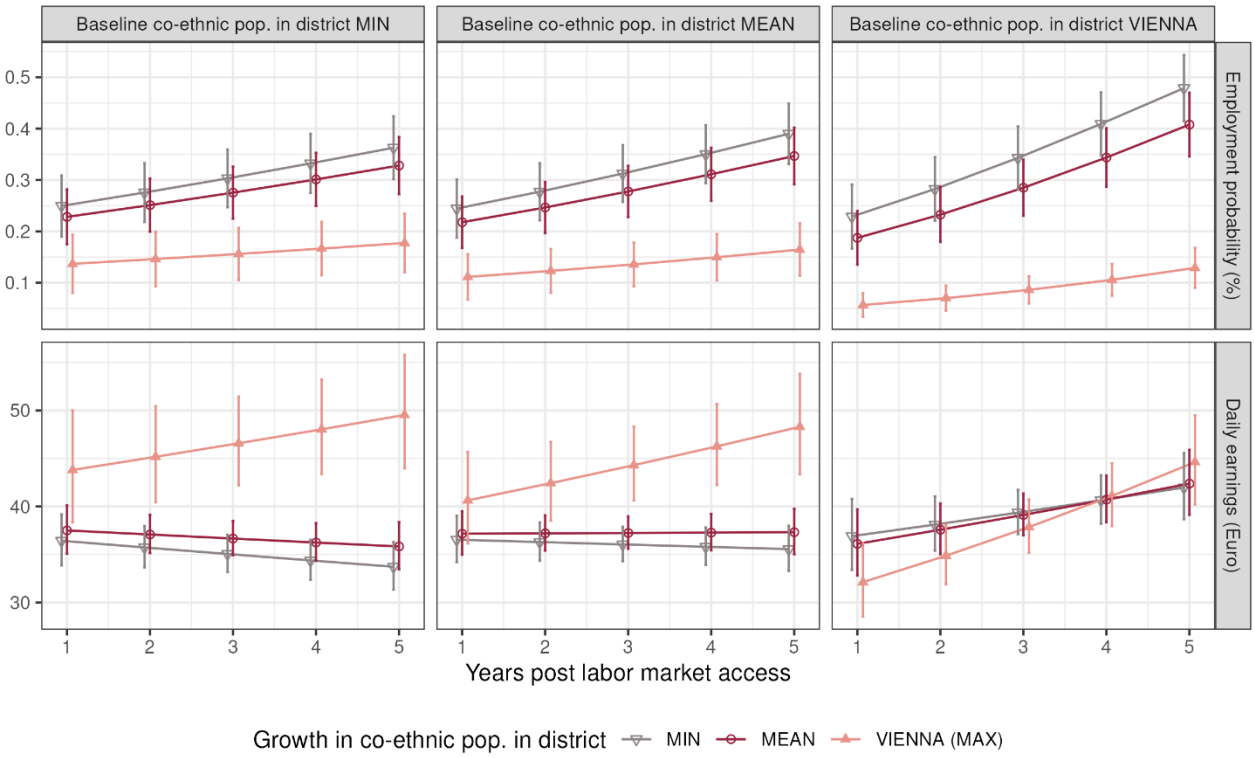
20,235 female refugees who got humanitarian protection between 2009 and 2018 in Austria. Predictions from mixed effects logit models explaining employment of at least 90 days a year (0/1), and mixed effects linear models explaining daily earnings. For regression results, see Table A11 in the Appendix, for predicted values see Tables A16 and A17. Source: Labor market database (*AMDB des AMS Österreich und des BMASGPK*).

Figure A3: Average marginal predicted employment probability (min. 90 days per year) and daily earnings by origin-country characteristics, men



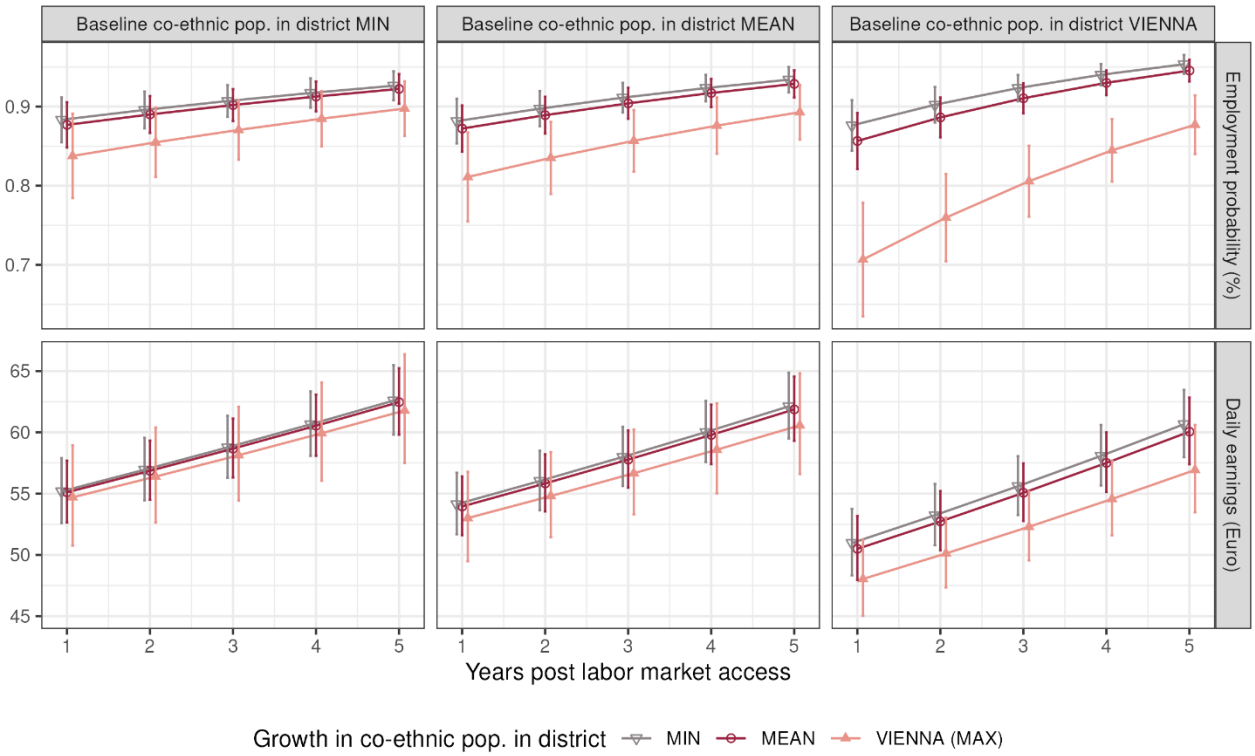
37,758 male refugees who got humanitarian protection between 2009 and 2018 in Austria. Predictions from mixed effects logit models explaining employment of at least 90 days a year (0/1), and mixed effects linear models explaining daily earnings. For regression results, see Table A11 in the Appendix, for predicted values see Tables A16 and A17. Source: Labor market database (*AMDB des AMS Österreich und des BMASGPK*).

Figure A4: Average marginal predicted employment probability (min. 90 days per year) and daily earnings by local populations from refugee-origin countries in host country districts, women



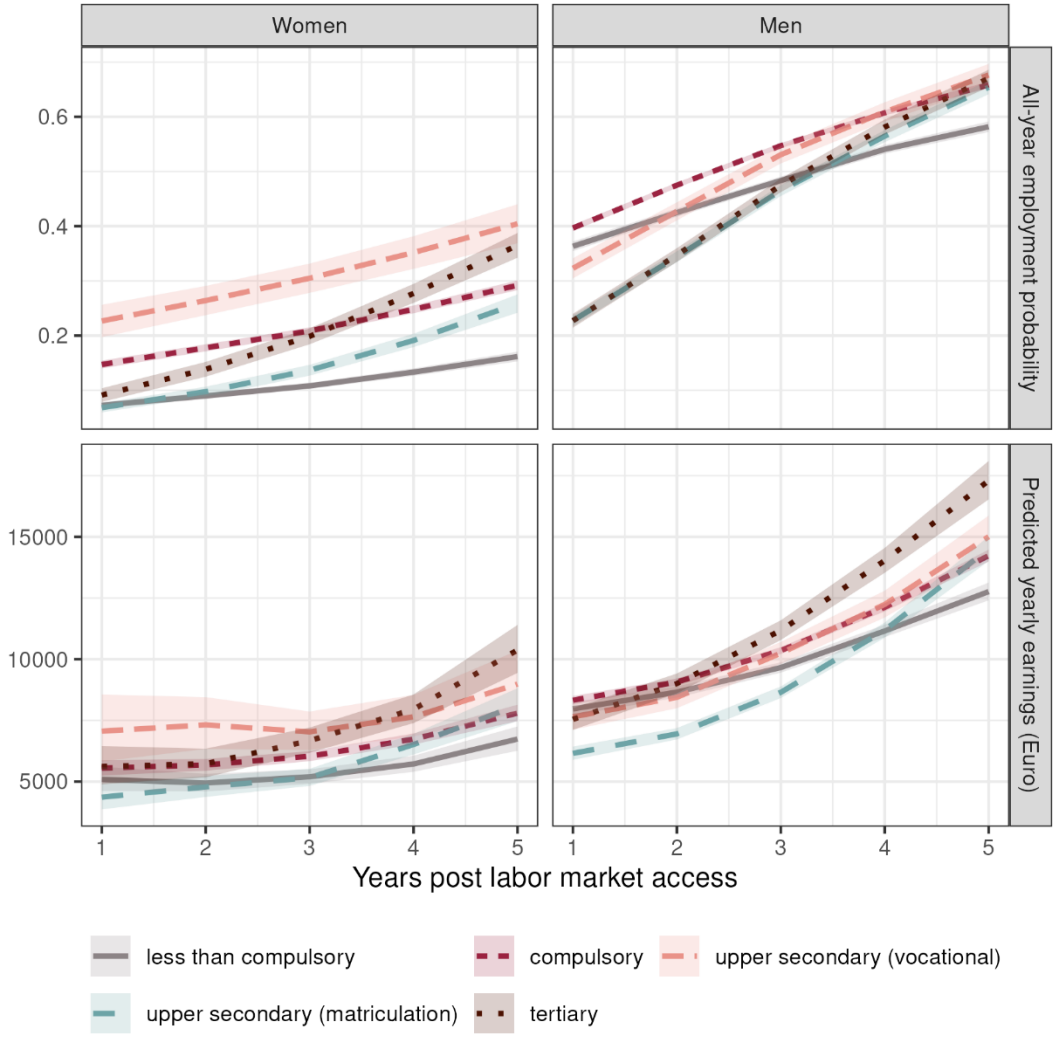
20,235 female refugees who got humanitarian protection between 2009 and 2018 in Austria. Predictions from mixed effects logit models explaining employment of at least 90 days a year (0/1), and mixed effects linear models explaining daily earnings. For regression results, see Table A11 in the Appendix, for predicted values see Table A18. Source: Labor market database (*AMDB des AMS Österreich und des BMASGPK*).

Figure A5: Average marginal predicted employment probability(min. 90 days per year) and daily earnings by local populations from refugee-origin countries in host country districts, men



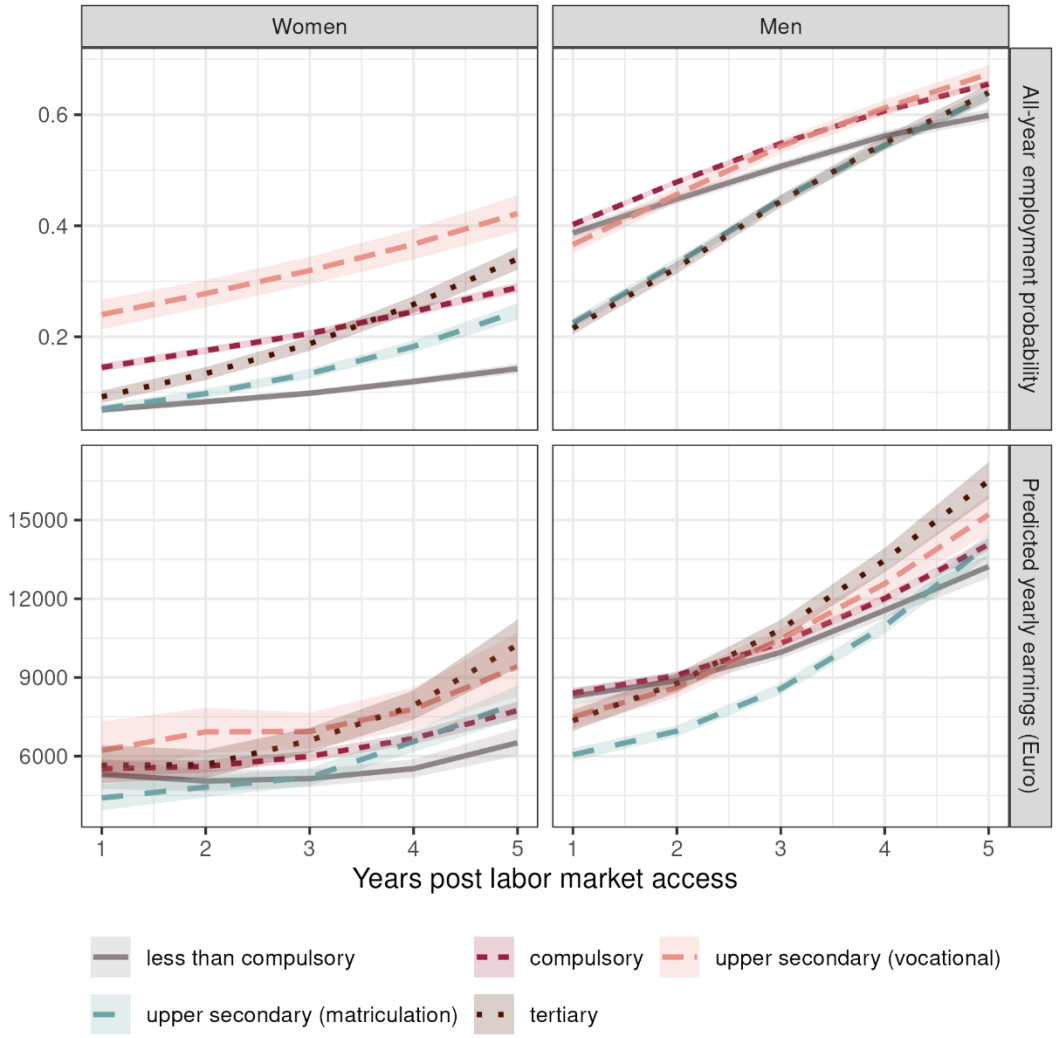
37,758 male refugees who got humanitarian protection between 2009 and 2018 in Austria Predictions from mixed effects logit models explaining employment of at least 90 days a year (0/1), and mixed effects linear models explaining daily earnings. For regression results, see Table A11 in the Appendix, for predicted values see Table A18. Source: Labor market database (*AMDB des AMS Österreich und des BMASGPK*).

Figure A6: Average marginal predicted annual employment share and annual earnings by origin education at labor market entry, gender, and years in the labor market



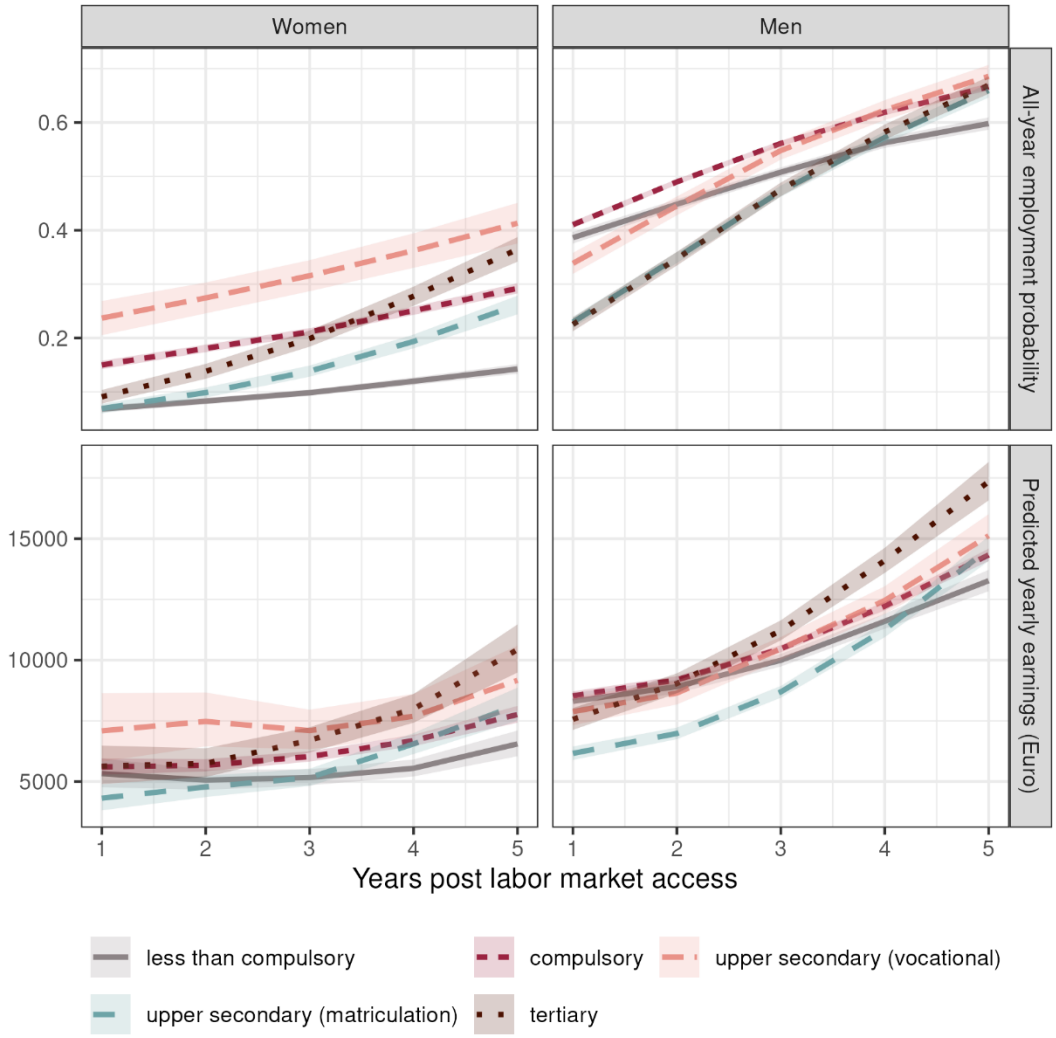
57,993 refugees who got humanitarian protection between 2009 and 2018 in Austria. Predictions from mixed effects fractional logit models explaining the probability of year-round employment (fraction of days employed over days per year), and mixed effects linear models explaining log annual earnings. Source: Labor market database (*AMDB des AMS Österreich und des BMASGPK*).

Figure A7: Average marginal predicted annual employment share and annual earnings by destination education (after 5 years in the labor market), gender, and years



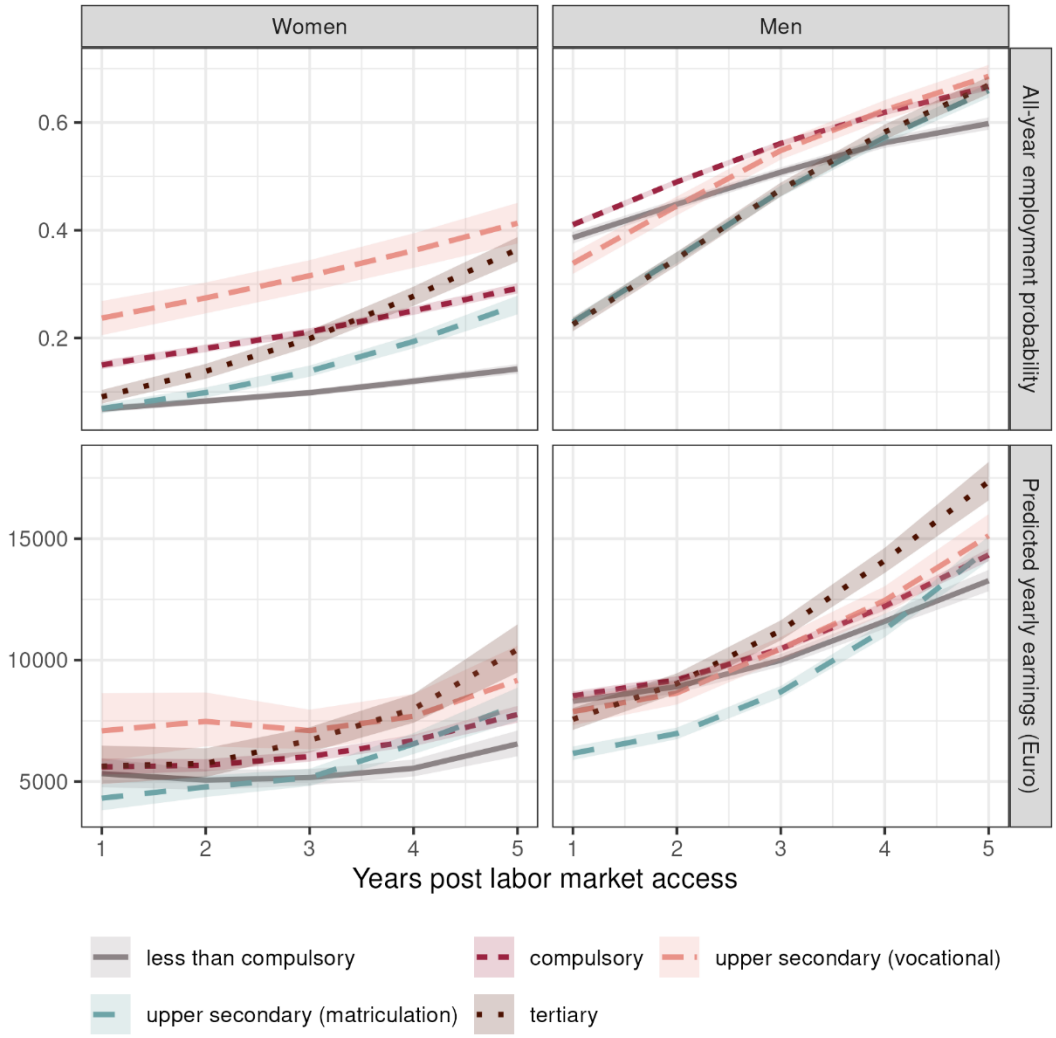
57,993 refugees who got humanitarian protection between 2009 and 2018 in Austria. Predictions from mixed effects fractional logit models explaining the probability of year-round employment (fraction of days employed over days per year), and mixed effects linear models explaining log annual earnings. Source: Labor market database (*AMDB des AMS Österreich und des BMASGPK*).

Figure A8: Average marginal predicted annual employment share and annual earnings by education (stable education only), gender, and years in the labor market



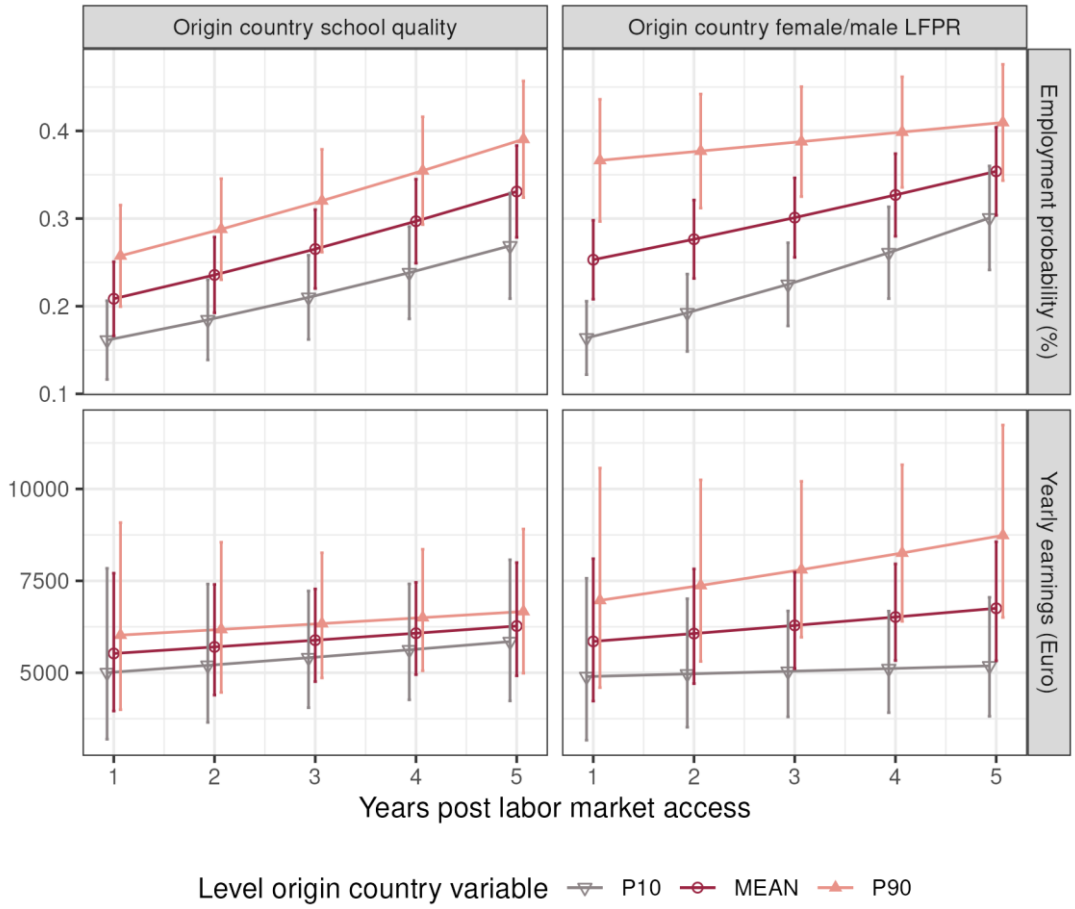
50,863 refugees who got humanitarian protection between 2009 and 2018 in Austria and had the same education throughout the first five years on the labor market. Predictions from mixed effects fractional logit models explaining the probability of year-round employment (fraction of days employed over days per year), and mixed effects linear models explaining log annual earnings. Source: Labor market database (*AMDB des AMS Österreich und des BMASGPK*).

Figure A9: Average marginal predicted annual employment share and annual earnings by education, gender, and years in the labor market (without refugees from Syria)



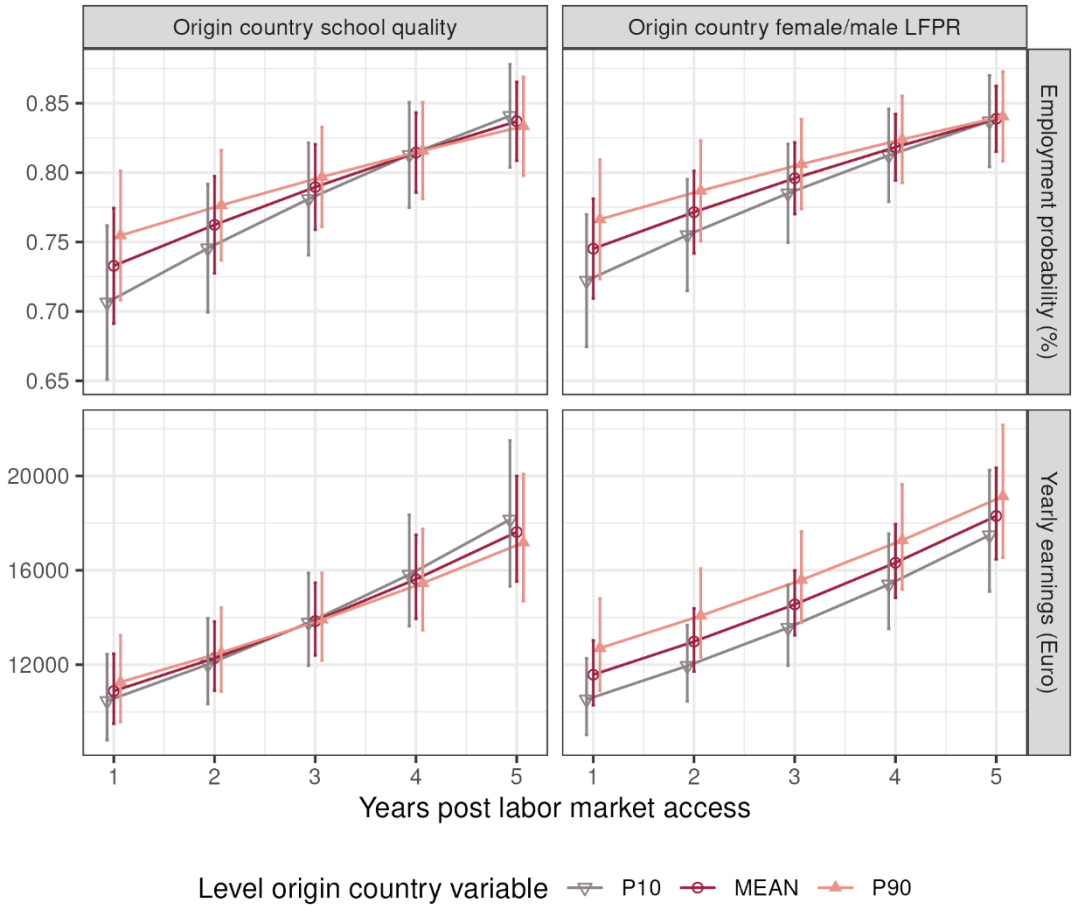
33,677 refugees who got humanitarian protection between 2009 and 2018 in Austria and had the same education throughout the first five years on the labor market. Predictions from mixed effects fractional logit models explaining the probability of year-round employment (fraction of days employed over days per year), and mixed effects linear models explaining log annual earnings. Source: Labor market database (*AMDB des AMS Österreich und des BMASGPK*).

Figure A10: Average marginal predicted employment outcomes by origin-country characteristics, women (without refugees from Syria)



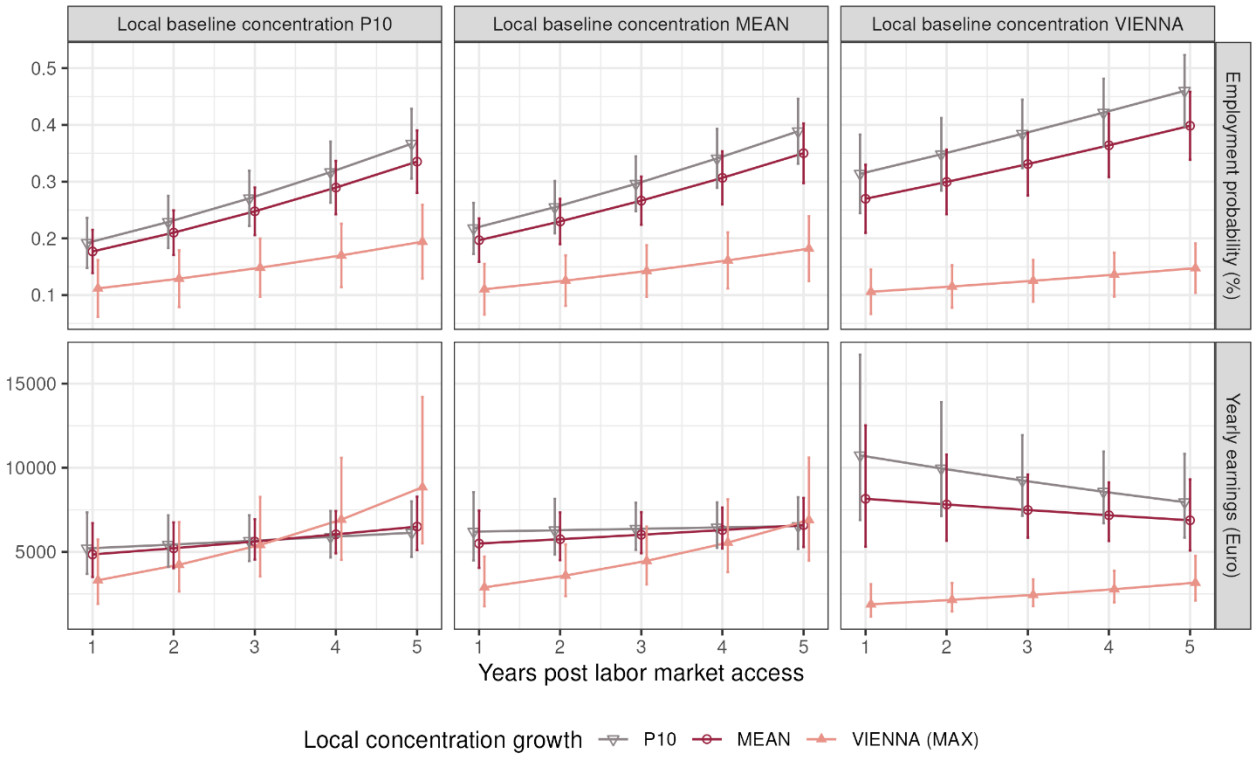
11,941 female refugees who got humanitarian protection between 2009 and 2018 in Austria. Predictions from mixed effects fractional logit models explaining the probability of year-round employed beyond the marginal earnings threshold (fraction of days employed over days per year), and mixed effects linear models explaining annual earnings. Source: Labor market database (*AMDB des AMS Österreich und des BMASGPK*).

Figure A11: Average marginal predicted employment outcomes by origin-country characteristics, men (without refugees from Syria)



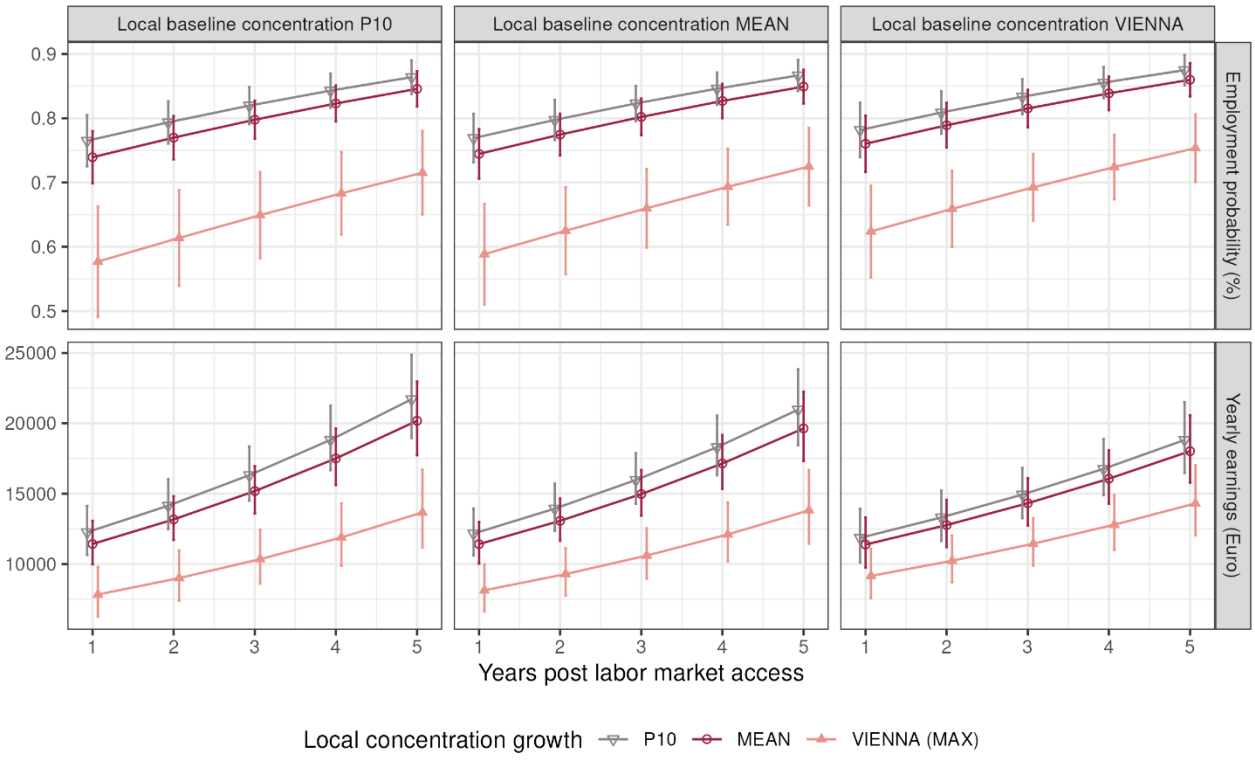
21,773 refugees who got humanitarian protection between 2009 and 2018 in Austria. Predictions from mixed effects fractional logit models explaining the probability to be employed all year beyond the marginal earnings threshold (fraction of days employed over days per year), and mixed effects linear models explaining annual earnings. Source: Labor market database (*AMDB des AMS Österreich und des BMASGPK*).

Figure A12: Predicted employment shares by local populations from refugee-origin countries in host country districts, women (without refugees from Syria)



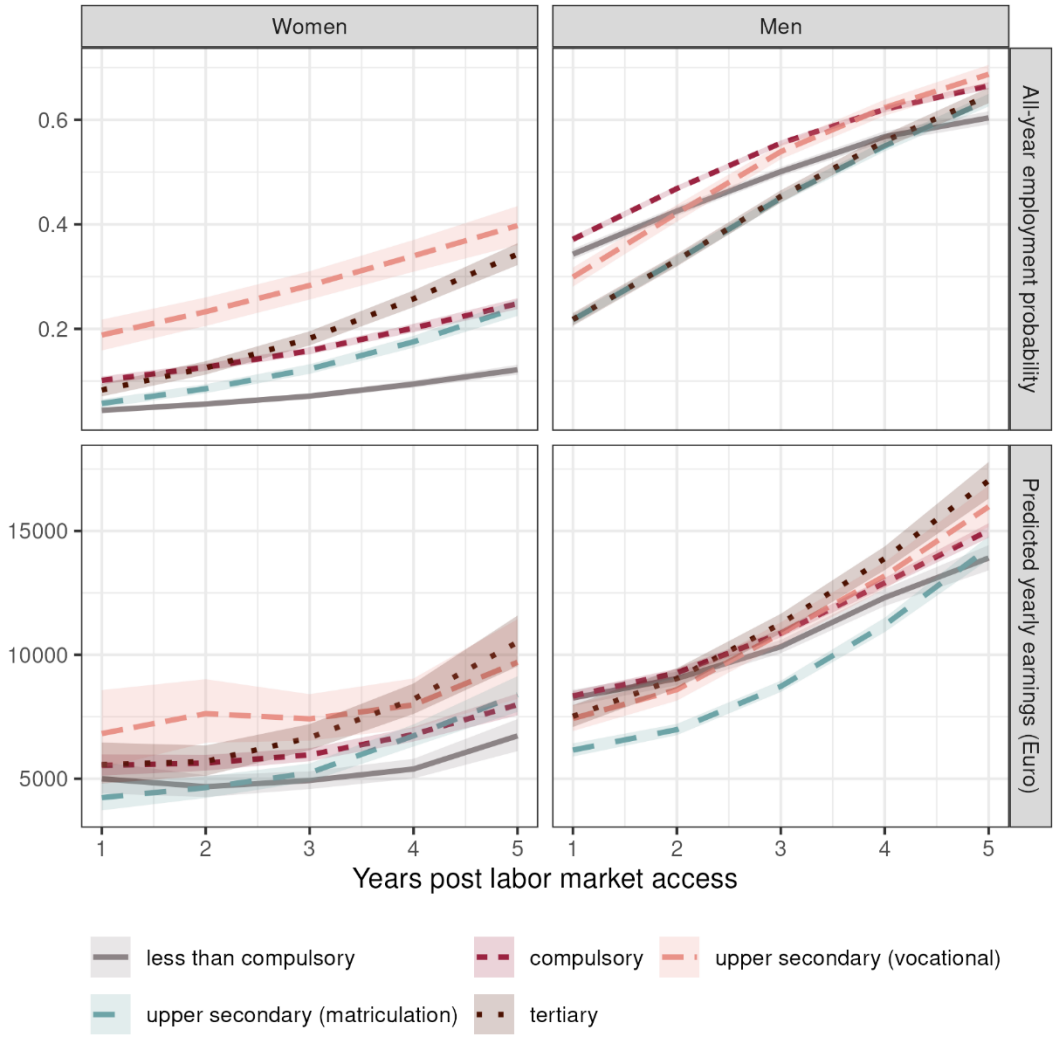
11,941 female refugees who got humanitarian protection between 2009 and 2018 in Austria. Predictions from mixed effects fractional logit models explaining the probability of year-round employed beyond the marginal earnings threshold (fraction of days employed over days per year), and mixed effects linear models explaining annual earnings. Source: Labor market database (*AMDB des AMS Österreich und des BMASGPK*).

Figure A13: Predicted employment shares by local populations from refugee-origin countries in host country districts, men (without refugees from Syria)



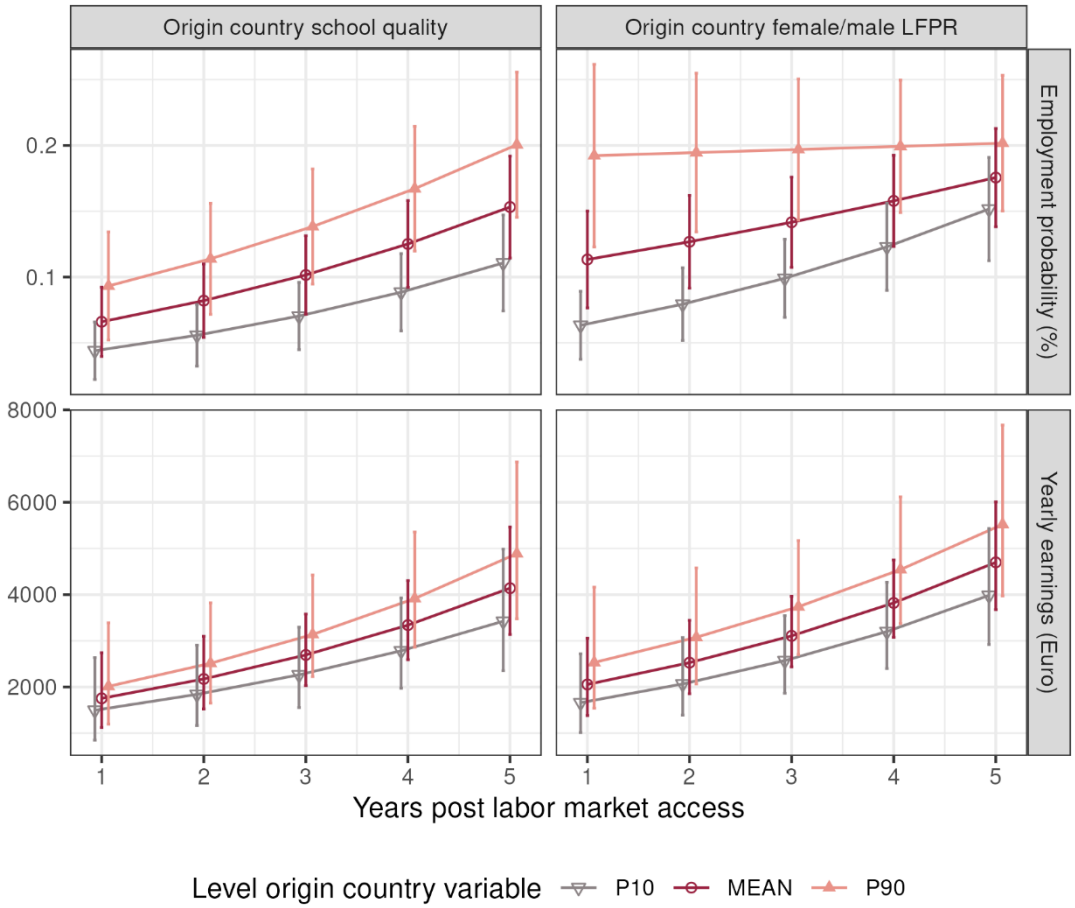
21,773 refugees who got humanitarian protection between 2009 and 2018 in Austria. Predictions from mixed effects fractional logit models explaining the probability to be employed all year beyond the marginal earnings threshold (fraction of days employed over days per year), and mixed effects linear models explaining annual earnings. Source: Labor market database (*AMDB des AMS Österreich und des BMASGPK*).

Figure A14: Average marginal predicted annual employment share and annual earnings by education, gender, and years in the labor market (2014-18 cohorts)



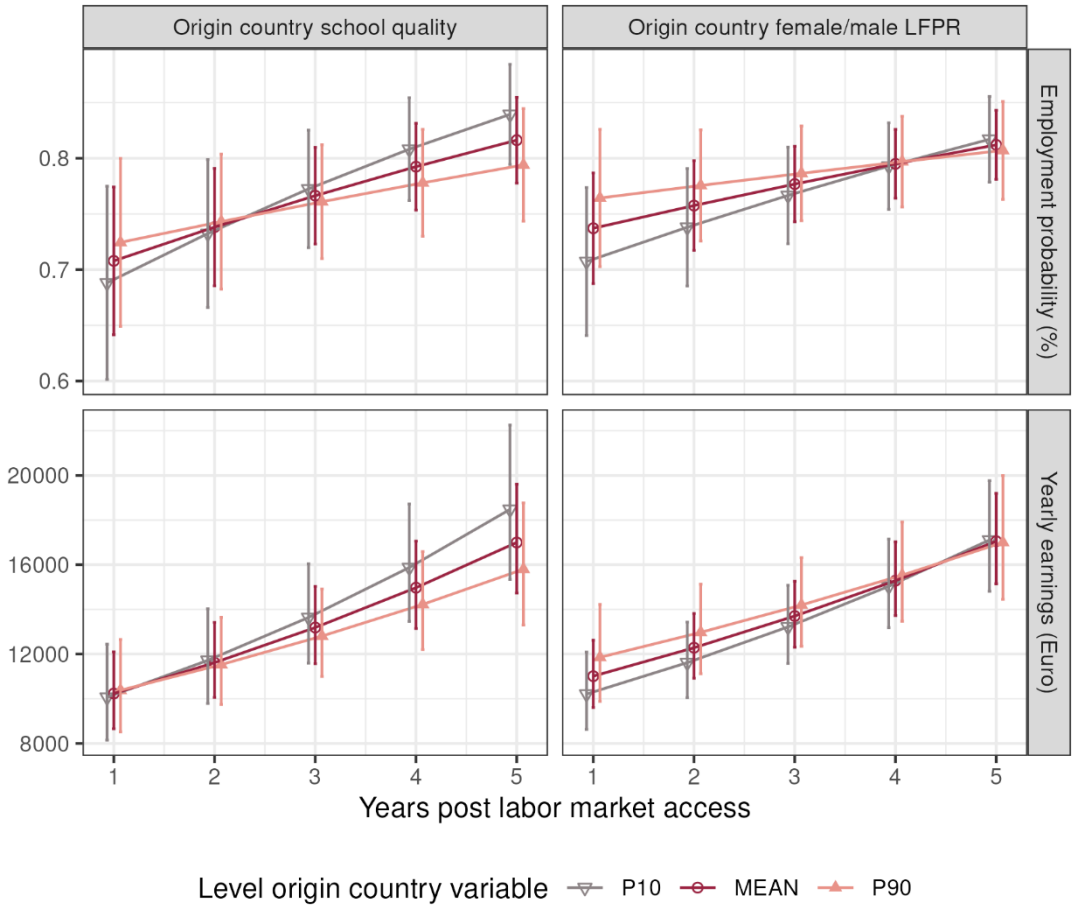
44,888 refugees who got humanitarian protection between 2014 and 2018 in Austria and had the same education throughout the first five years on the labor market. Predictions from mixed effects fractional logit models explaining the probability of year-round employment (fraction of days employed over days per year), and mixed effects linear models explaining log annual earnings. Source: Labor market database (*AMDB des AMS Österreich und des BMASGPK*).

Figure A15: Average marginal predicted employment outcomes by origin-country characteristics, women (2014-18 cohorts)



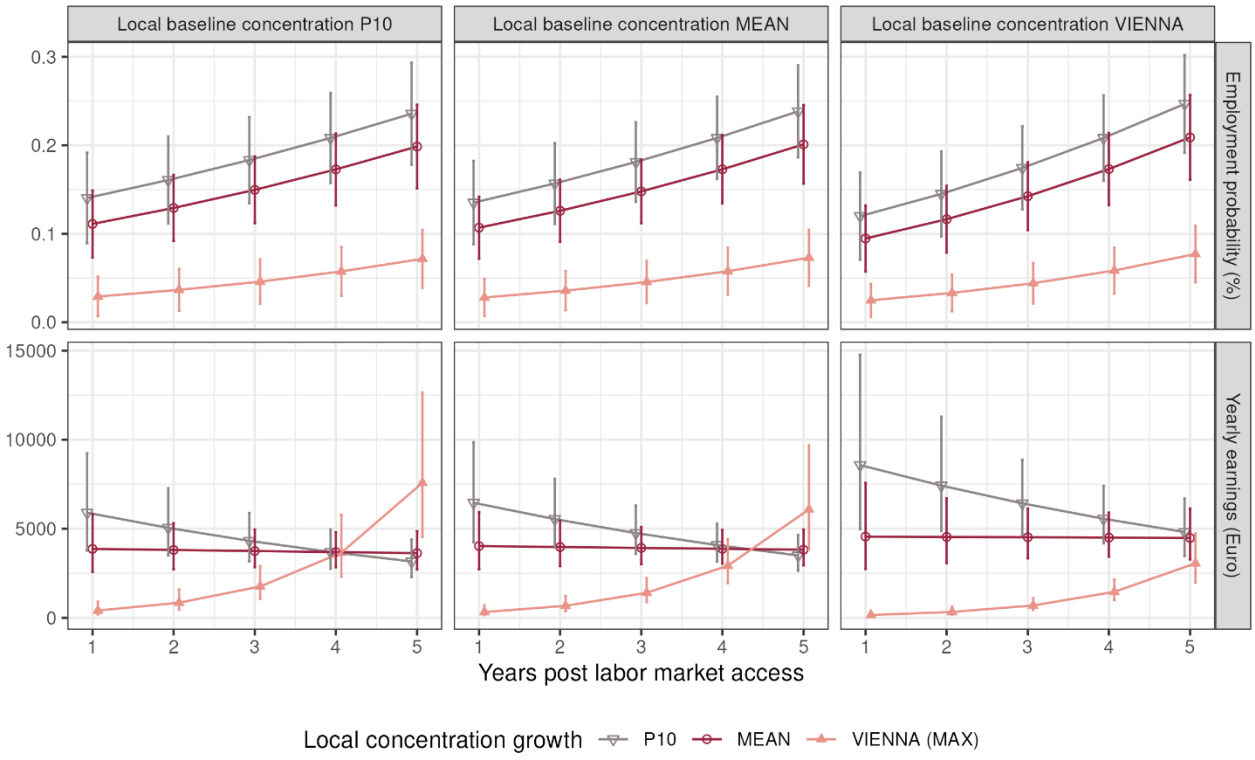
15,295 female refugees who got humanitarian protection between 2014 and 2018 in Austria. Predictions from mixed effects fractional logit models explaining the probability of year-round employed beyond the marginal earnings threshold (fraction of days employed over days per year), and mixed effects linear models explaining annual earnings. Source: Labor market database (*AMDB des AMS Österreich und des BMASGPK*).

Figure A16: Average marginal predicted employment outcomes by origin-country characteristics, men (2014-18 cohorts)



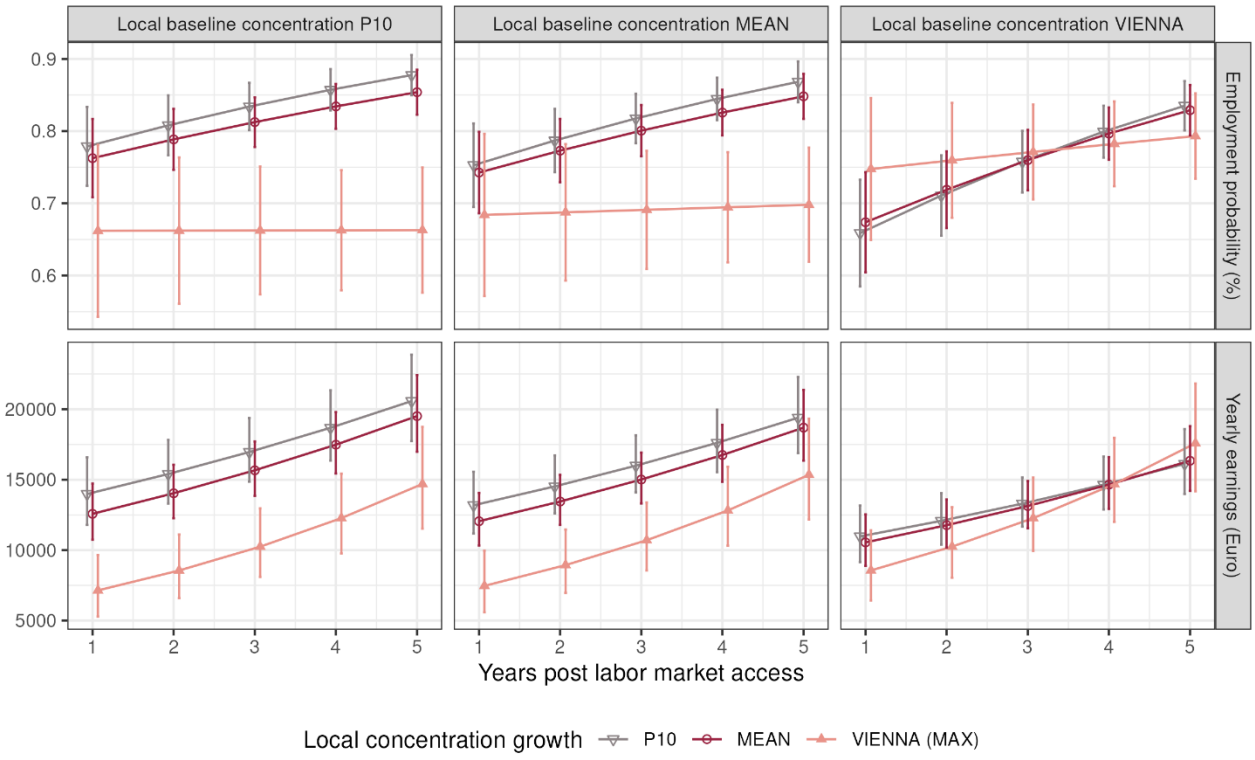
29,590 male refugees who got humanitarian protection between 2014 and 2018 in Austria. Predictions from mixed effects fractional logit models explaining the probability of year-round employed beyond the marginal earnings threshold (fraction of days employed over days per year), and mixed effects linear models explaining annual earnings. Source: Labor market database (*AMDB des AMS Österreich und des BMASGPK*).

Figure A17: Predicted employment shares by local populations from refugee-origin countries in host country districts, women (2014-18 cohorts)



15,295 female refugees who got humanitarian protection between 2014 and 2018 in Austria. Predictions from mixed effects fractional logit models explaining the probability of year-round employed beyond the marginal earnings threshold (fraction of days employed over days per year), and mixed effects linear models explaining annual earnings. Source: Labor market database (*AMDB des AMS Österreich und des BMASGPK*).

Figure A18: Predicted employment shares by local populations from refugee-origin countries in host country districts, men (2014-18 cohorts)



29,590 male refugees who got humanitarian protection between 2014 and 2018 in Austria. Predictions from mixed effects fractional logit models explaining the probability of year-round employed beyond the marginal earnings threshold (fraction of days employed over days per year), and mixed effects linear models explaining annual earnings. Source: Labor market database (*AMDB des AMS Österreich und des BMASGPK*).



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