

What jobs do Polish companies offer to Ukrainian refugees? The role of occupational heterogeneity and dynamic changes over the war

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Harnessing web data for next-generation skills intelligence,
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- Large-scale inflow of Ukrainian refugees to Poland after 2022.
- ~ 1.5 million Ukrainian refugees in Poland by 2025.
- EU Temporary Protection Directive opened labour markets quickly.
- Most research is about refugee outcomes; much less on employer behaviour, especially over time.
- Lack of data on employers' recruitment preferences
- Some job boards mark job offers with "help for refugees"

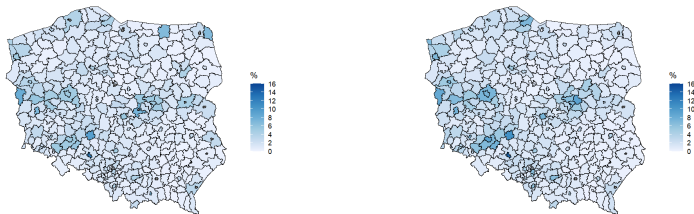
- What is the scope of job openings targeted to refugees?
- Which occupations do Polish employers target for Ukrainian refugees?
- How do these occupational patterns change over time and across regions?
- Do job characteristics (contracts, work mode, schedule) differ for refugee-targeted offers?
- Are advertised wages different in refugee-targeted postings, overall and by occupation?

Ukrainian refugees in Poland

- Strong feminisation (women with children) ([Andrews et al., 2023](#); [Kohlenberger et al., 2023](#); [van Tubergen et al., 2024](#))
- Positive self-selection ([van Tubergen et al., 2024](#); [Andrews et al., 2023](#))
 - Qualifications
 - Labour market information and networks
 - Resources and mobility
 - Labour market attachment and motivation
- Risk of occupational downgrading and skills mismatch ([Strzelecki, 2024](#); [Brücker et al., 2023](#))
- Uncertainty regarding long-term settlement and return intentions
- Labour market segmentation in other countries ([Aigner et al., 2025](#))
- Labour shortages in Poland ([Rollnik-Sadowska et al., 2024](#))
- Potential issues with refugee absorption in smaller municipalities ([Bielewska et al., 2025](#); [Pachocka et al., 2025](#))

Data: Ukrainian workers across regions

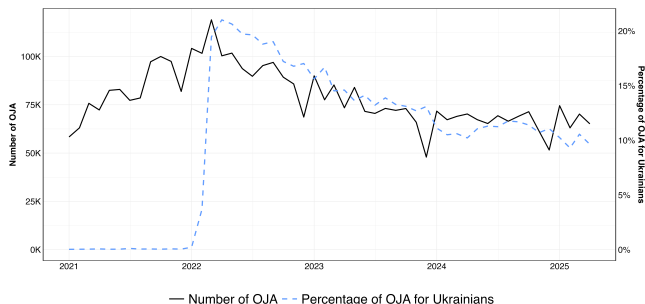
- Before the war 62% of work legalisation documents for Ukrainians issued to men; 42% in 2023-2024
- In 2022 work in manufacturing (29.5%), transport/storage (18.2%), admin. and support services (17 percent), and construction (9.8%)
- Work in elementary occupations, craft and related trades, plant and machine operation, clerical support, and service and sales
- Shift from eastern to central and western urban areas



Share of Ukrainian workers in working-age population by county
Source: Social Insurance Institution

Data: Online job postings

- 2.5 million job postings from pracuj.pl, March 2022–April 2025
- Dedicated tag: "we invite workers from Ukraine" and postings in Cyrillic
- Detailed information: occupation, region, contract type, work mode and schedule, job position level, wages (in 19% of OJAs).



Overall number of OJA and the share of UA-friendly OJA

Methods: Identifying refugee-targeted offers

- A multi-step web scraping application that collects, extracts, processes, and classifies OJAs using dedicated machine learning models ([Beręsewicz et al., 2024](#))
- *occupation* Multilingual hierarchical classifier (ISCO/KZiS codes) by ([Beręsewicz et al., 2026](#))
- *contract type* (traditional employment contract, flexible arrangements including contract of mandate and contract for a specific work, agency contract, contract for substitution, temporary contract, and internship)
- *work mode* (on-site, hybrid, remote, mobile)
- *work schedule* (full-time, part-time, additional work)
- *job position level* (trainee to executive)
- *wage* (presence of wage data and level of advertised wages).

Methods: Modelling strategy

To model the probability of a job specifically targeted to Ukrainian workers we use logistic regression with log odds

$$\log \left(\frac{\Pr(U_i = 1)}{1 - \Pr(U_i = 1)} \right) = \alpha_0 + \sum_t \theta_t + \sum_r \alpha_r V_{r,i} + \sum_k \alpha_k O_{k,i} + \sum_j \alpha_j M_{j,i} + \sum_b \alpha_b C_{b,i} + \sum_p \alpha_p L_{p,i} + \sum_a \alpha_a S_{a,i} + \sum_{t,k} \alpha_{t,k} \theta_t O_{k,i} + \sum_{t,r} \alpha_{t,r} \theta_t V_{r,i} + \sum_{k,r} \alpha_{k,r} O_{k,i} V_{r,i}, \quad (1)$$

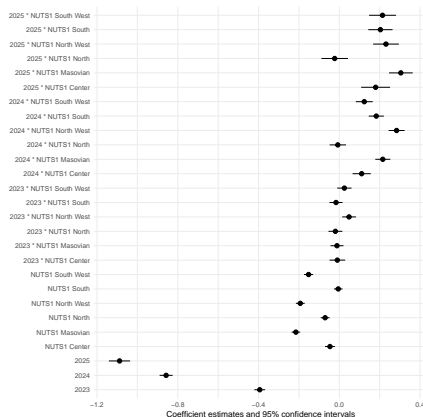
The second model relates log of offered wages to job requirements

$$\log W_i = \alpha_0 + \alpha_1 U_i + \sum_t \theta_t + \sum_r \alpha_r V_{r,i} + \sum_k \alpha_k O_{k,i} + \sum_j \alpha_j M_{j,i} + \sum_b \alpha_b C_{b,i} + \sum_p \alpha_p L_{p,i} + \sum_a \alpha_a S_{a,i} + \sum_k \alpha_k U_i O_{k,i} + \epsilon_i. \quad (2)$$

$U_i = 1$ if OJA i is offered to a Ukrainian ($U_i = 0$ otherwise), $\log W_i$ offered in all job offers on pracuj.pl in Poland. Means are taken for job offers in which wages were given in intervals (min and max), θ_t time (2022-2025), V_r region, occupation group O_k according to ISCO classification (9 major groups from 1 to 9, excluding group 0 – armed forces), work mode M_j (traditional – office, remote – home office, hybrid, and mobile), type of contract C_b (traditional contract of employment, B2B, contract of mandate, contract for a specific work, agency, substitution, internship contract, and temporary staffing agreement), work schedule S_a (full time, part time, and additional/temporary), job position level L_p (trainee, manual worker, assistant, junior, mid, senior, expert, manager, director, executive).

Results: Regional demand for Ukrainians

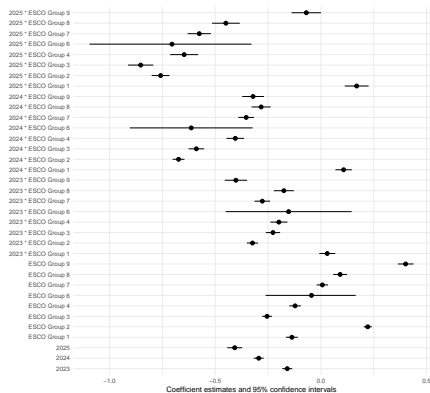
- Early 2022: higher demand in eastern and south-eastern regions.
- Over time: increasing demand in central and western urban regions.
- Consistent with refugee dispersion and stronger labour markets in large cities.



Model (1) Regional demand over time
(Eastern & 2022 = reference)

Results: Occupational demand over time

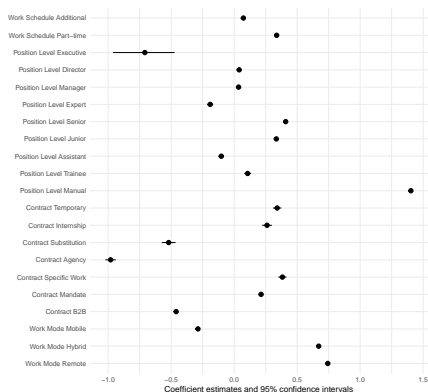
- Early phase: relatively more high-skilled postings (IT, professional services).
- Later phase: shift toward elementary occupations, plant and machine operators, sales.
- Employers increasingly use refugees to fill persistent shortages in lower- and mid-skilled jobs.



Model (1) Occupational demand over time
(Salespersons & 2022 = reference)

Results: Job characteristics of refugee-targeted offers

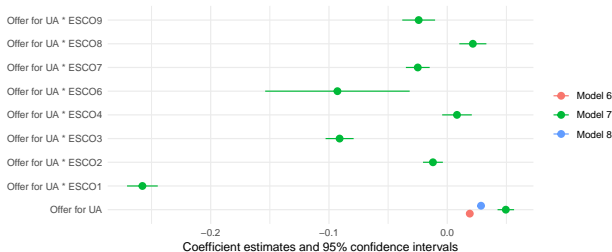
- Flexible contracts (e.g. contract of mandate)
- Remote or hybrid work in high-skilled occupations
- Shift or irregular schedules in lower-skilled occupations



Model (1) Occupational demand over time
(Traditional, full-time, mid-level job = reference)

Results: Wage setting

- No uniform wage penalty for refugee-targeted postings
- In several mid-skilled occupations (e.g. salespersons, machine operators & assemblers, clerical support) refugee-targeted postings offer *higher* advertised wages than comparable non-targeted OJAs
- In high-skilled (managers, specialists) and certificate-related (vocational) occupations wage differences are in favour of natives
- In low-skill occupations wages for refugees slightly lower



Model (2) Occupational demand over time (Salespersons & non-UA = reference)

- Regional patterns follow both refugee settlement and local labour demand.
- Employers actively shape occupational downgrading and segmentation. Shift from high-skilled to lower- and mid-skilled roles over time.
- Job design (contracts, work mode, schedule) reflects interaction of employer needs and refugee constraints.
- Wage patterns suggest complementarity in some highly-demanded mid-skilled occupations.

- Employers analysis reveals new facts about refugee integration.
- Job-posting data reveal dynamic, demand-side adjustments not visible in standard data.
- Refugee recruitment targeted initially high-skilled, later focused on shortage occupations.
- Often involves flexible contracts and differentiated wage strategies.
- Policies should consider employer incentives and job design, not only refugee characteristics.

- Link job postings to realised employment and earnings.
- Firm-level heterogeneity in recruitment strategies.
- Cross-country comparisons of employer responses to Ukrainian refugees.
- Combine job-posting data with qualitative work on employer perceptions.

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Thank you for listening!

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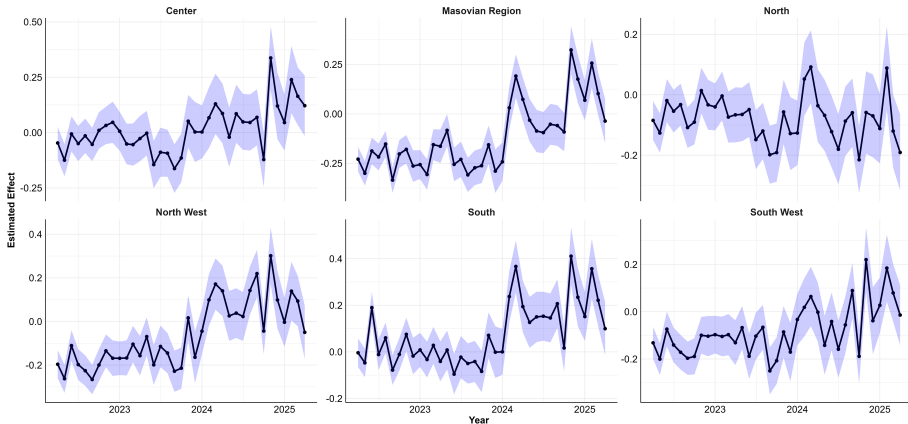
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Appendix: Regions over time

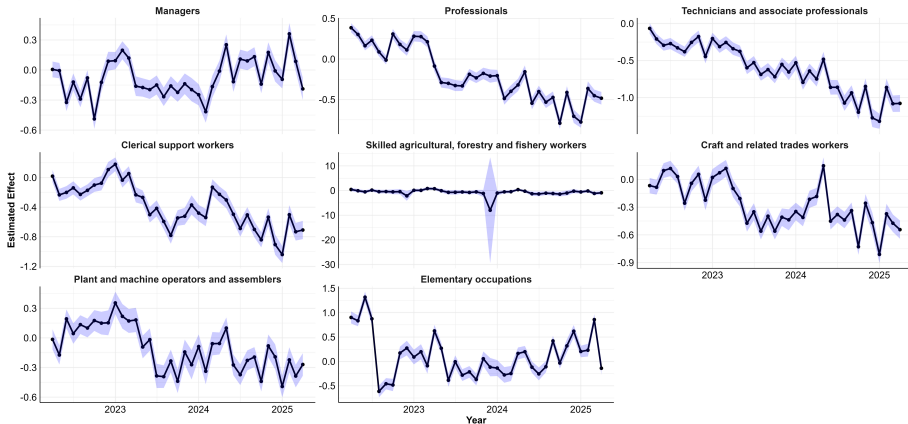
Overall Effects of Regions Over Time
Including 95% Confidence Intervals



Regional demand over time (Eastern region & 2022M3 = reference)

Appendix: Occupations over time

Overall Effects of Occupation Groups Over Time
Including 95% Confidence Intervals



Occupational demand over time (Salespersons & 2022M3 = reference)