

Labor Markets during War Time: Evidence from Online Job Advertisements

Tho Pham¹ Oleksandr Talavera² Zhuangchen Wu²

¹University of York

²University of Birmingham

22 June 2023

Road Map

1 Research questions

2 Data

- Online vacancies
- Job titles
- Skills requirements

3 Empirical analysis

- Number of vacancies
- Offered wages

4 Conclusion

According to the UN Refugee Agency (2023):

- 6 mil. people have been internally displaced and more than 8 mil. people, mostly women and children, have crossed into neighboring countries
- Poland has hosted nearly 60% of all refugees from Ukraine

⇒ Challenges: access to schooling, gender-based violence, human trafficking, **integration into the local labor markets.**

War, refugees, and receiving countries' labor markets

- creating new jobs; increasing demand for local goods; complementing/transferring skills (Murard & Sakalli, 2018; Toews & Vézina, 2021; Black et al., 2022; Peters, 2022)
- increasing competition for the available jobs; decreasing wages in some occupations (Braun & Mahmoud, 2014; Morales, 2018; Black et al., 2022)
- long-lasting effects on economic activity choices, e.g., the redistribution of the native population across occupations (Peri & Sparber, 2011)

War, refugees, and sending countries' labor markets

- deconstruction → ↓ job opportunities
- human capital deficit → immediate impacts on firms losing workers; long-lasting effects on the labor markets in general (Waldinger, 2010; Huber et al., 2021)

Research questions

- The effects are highly context-specific, e.g., pre-war integration of migrants into the local labor markets
- Existing studies are mostly based on post-war data
- This paper: Using online vacancy data to examine the impacts of Russia's invasion of Ukraine on
 - job opportunities for Ukrainian workers to work in Poland (jobs for **migrants**) and to work in Ukraine (jobs for **stayers**)
 - wages offered to **migrants** and **stayers**

Summary of results

After Feb 2022:

- (short-term) \uparrow no. ads targeting Ukrainian workers to work in Poland, especially those (1) demand higher skills or (2) are female-dominated
- no significant change in skills requested in job ads in Poland but higher demand for analytical/soft skills in job ads in Ukraine
- significant \downarrow in offered wages

- Vacancies are sourced from Ukrainian domains → Job ads posted by Ukrainian and international employers targeting Ukrainian workers or, more broadly, job seekers in Ukraine
- Vacancies are aggregated and checked for duplication

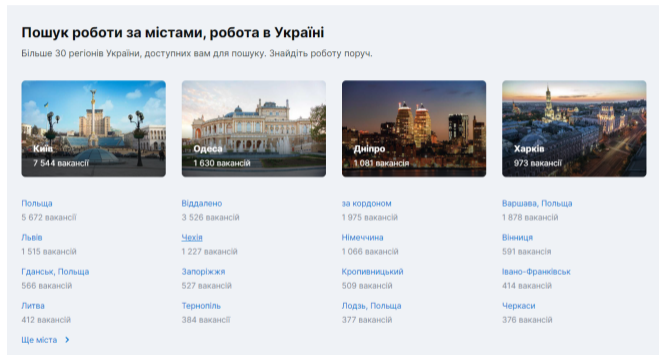


Figure: Snapshot of ua.jooble.org

- Data include (1) posted date, (2) job title, (3) job description, (4) offered maximum and/or minimum salary (if any), and (5) job location
- Sample: more than 5.4 mil. ads over the Jan 2021 - Nov 2022 period; new ads

Оператор чату віддалено

15 000 - 55 000 грн

Часткова зайнятість

Студія Prostepious

✓ Перевірані контакти

📍 Київ

📞 Переглянути контакти

Віддалена робота

Відгукуйтесь

Студія Prostepious запрошує на віддалену, добре оплачувану роботу!

Нам потрібні комунікабельні та харизматичні співробітники. Вакансія не передбачає знання англійської мови!

Обов'язки:

Ви працюватимете на міжнародній платформі за вбудованим перекладачем!

Графік роботи:

Вільний графік роботи! Повний та неповний робочий день (не менше 3-4 годин на добу)

Умови:

- Зарплата 1200-2500 грн на день.
- Підтримка нових співробітників 24/7
- Можна розглядати як основний дохід чи поєднувати з навчанням, роботою та декретом!

Для роботи потрібний інтернет, мобільний телефон або ноутбук.

Залиш на співбесіду +380991829433 вайбер або телеграм (менеджер).

Відгукуйтесь

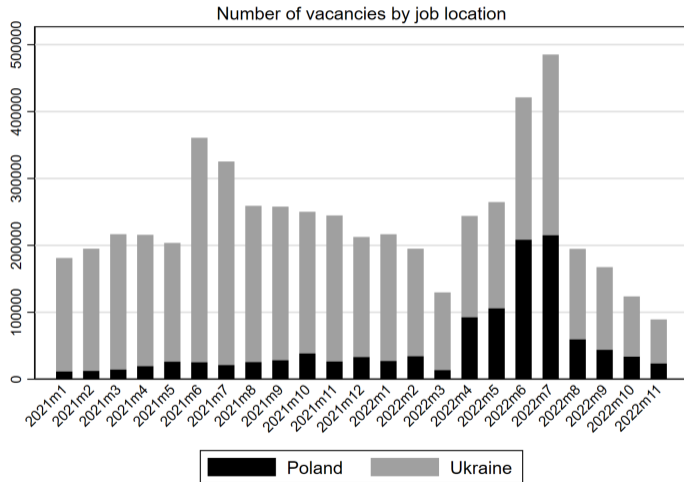
Figure: Snapshot of an advertisement

Data - Drawbacks

- Not representative of the whole labor market: the data do not cover all sectors/industries, also do not cover government/civil service jobs
- Do not cover Polish jobs targeting Ukrainian workers posted on Polish domains
- Not all vacancies explicitly state offered wages

- High frequency
- Real-time update
- **Representative of online vacancies in Ukraine**

Useful given that the labor market data during the war are limited and lack granularity!

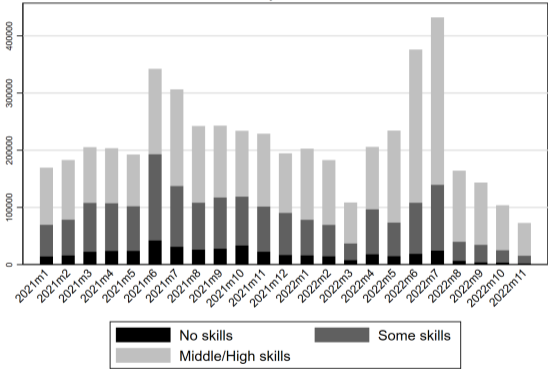


Cleaning job titles

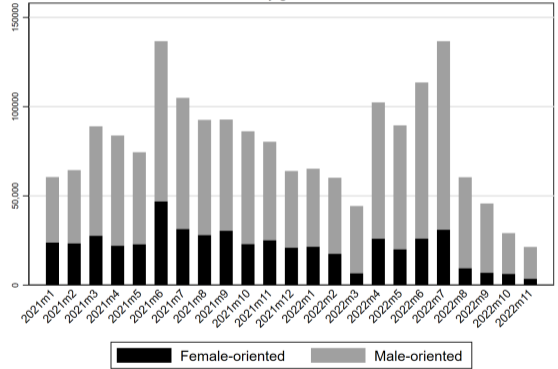
- 467 normalized job titles: 275 titles appear both before and after 24 February 2022 (continuing titles), 41 titles appear in the pre-war period only (exit titles), and 148 titles are new job titles that enter the sample after February 2022 (enter titles)
- Match the normalized job titles with the closest job titles in O*NET for **classification**:
 - No skills - Some skills - Medium/high skills
 - Male-oriented - Undefined/neutral - Female-oriented

Jobs by skills/gender

By skills



By gender



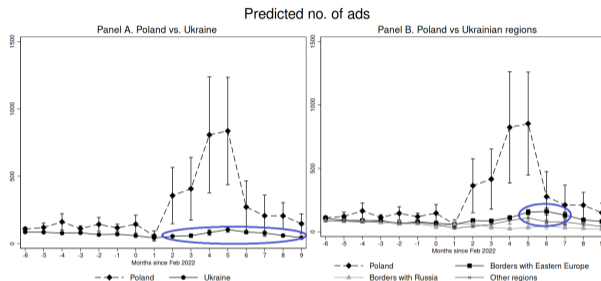
- We perform `text analysis` to generate requirement keywords from the ads' description: languages, teamwork skills, analytical skills, communication skills, experience
- 36.3% of ads require candidates to be fluent in foreign languages
- 14.72% request candidates with good communication skills
- <10% request teamwork skills, analytical skills, or experience

Specification

$$Ads_{i,j,t} = \alpha + \sum_{k=-6}^9 D_t^{war+k} \beta_1^k + \sum_{k=-6}^9 D_t^{war+k} \times Ukraine_j \beta_2^k + \beta_3 WarIntensity_{j,t} + FEs + \epsilon_{i,j,t} (1)$$

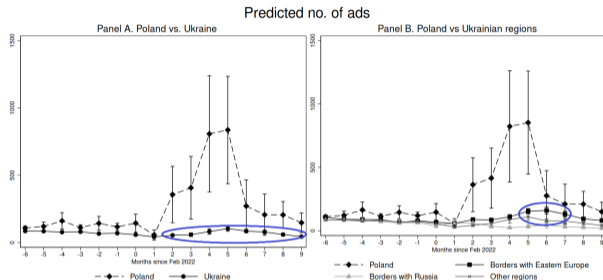
- $Ads_{i,j,t}$: number of ads for job title i in location j in month t
- D_t^{war+k} : 0 for the January 2021 – July 2021 period, 1 if month t is k months ($k=[-6;9]$) from February 2022
- $WarIntensity_{j,t}$: share of populated areas in a region that is under Russian control or is contested ground in a given month

Predicted no. of ads in Ukraine vs. Poland Estimates



- There is no considerable difference in the total no. of ads in Ukraine before vs. after Feb 2022
- However, the no. of ads in regions sharing borders with Eastern Europe slightly increased while the opposite is observed for regions sharing borders with Russia

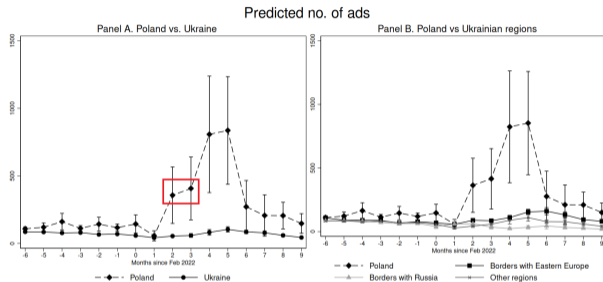
Predicted no. of ads in Ukraine vs. Poland Estimates



• Why?

- Forced migration → left the existing jobs vacant
- Although businesses had to cease their operations completely at the beginning of the war, the situation slowly improved as the war continued
- Firms relocated within Ukraine

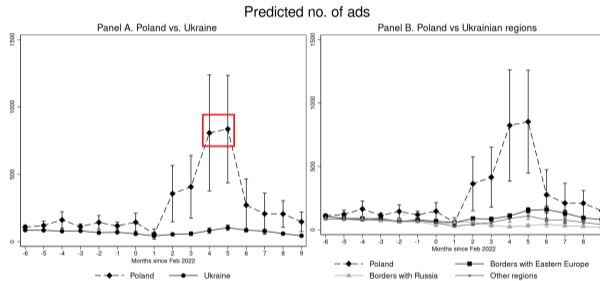
Predicted no. of ads in Ukraine vs. Poland Estimates



- During the 6-month period before the full-scale invasion, the average predicted no. of jobs in Poland available to Ukrainian workers is 100 per month
- This figure is around 350-400 in April-May 2022

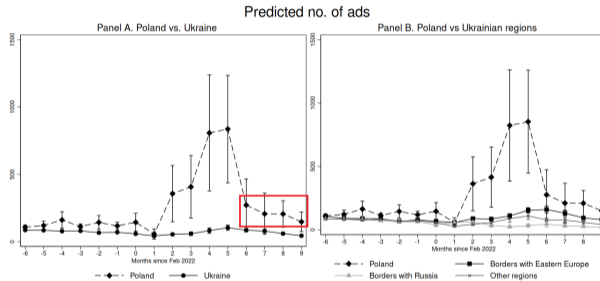
Predicted no. of ads in Ukraine vs. Poland

Estimates



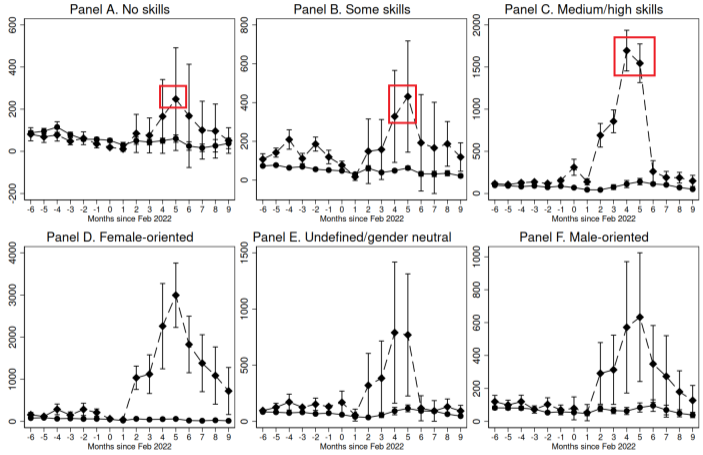
- The no. of Polish jobs is around 800-840 in June-July 2022

Predicted no. of ads in Ukraine vs. Poland Estimates



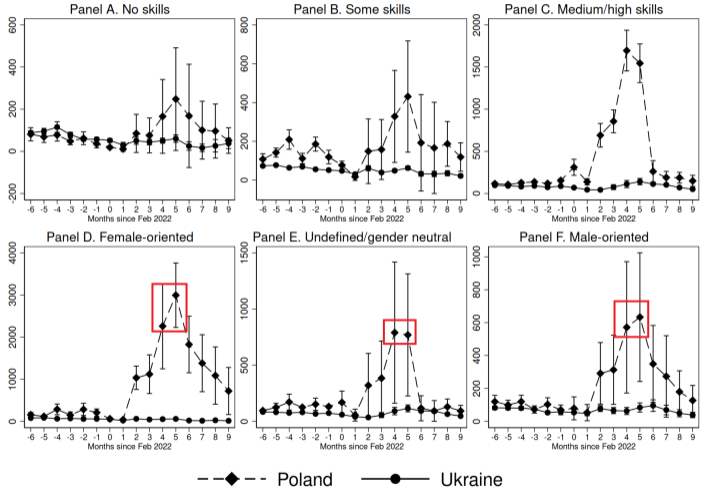
- Since August 2022, the no. of Polish jobs has decreased to around 150-200 jobs a month

Heterogeneity - Job skills/Gender segregation

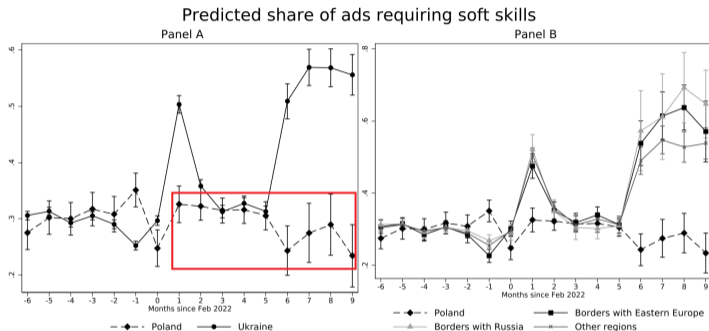


--◆-- Poland ●— Ukraine

Heterogeneity - Job skills/Gender segregation

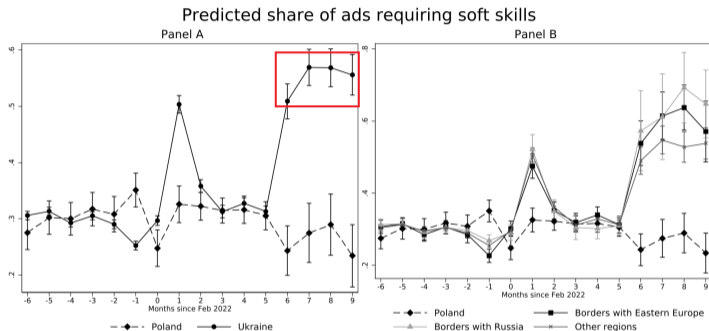


Demand for skills



- Although Polish employers do not lower their demands for language, communication, analytical, or teamwork skills, they also do not increase their demand for such skills

Demand for skills



- Ukrainian firms tend to request soft and analytical skills in their ads more often in the post-February 2022 period

- 36.77% of ads have minimum wages
- Cleaning:
 - wages listed in USD or EUR are converted to UAH rates
 - wage rate is converted to an hourly rate by assuming eight working hours per day and five working days per week
 - nominal wages are deflated using the monthly consumer price index
- We trimmed our wage data at the 1st and 99th percentiles to remove outliers

Specification

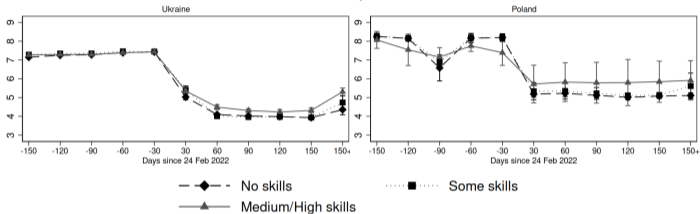
$$\ln(wage)_{i,j,l,d} = \alpha + \sum_{k=-150}^{150} D_d^{war+k} \beta_1^k + \sum_{k=-150}^{150} D_d^{war+k} \times Jobheterogeneity_j \beta_2^k + \beta_3 WarIntensity_{j,d} + FEs + \epsilon_{i,j,l,d} (2)$$

- $\ln(wage)_{i,j,l,d}$: natural log of real minimum wage offered in vacancy i , occupation j , location l on date d
- D_d^{war+k} : 0 for the January 2021 – 27 September 2021 period, 1 if date d is in the period between k to $k+30$ days ($k=[-150;150]$ with a time step of 30 days) since the full-scale war start date (24 February 2022)

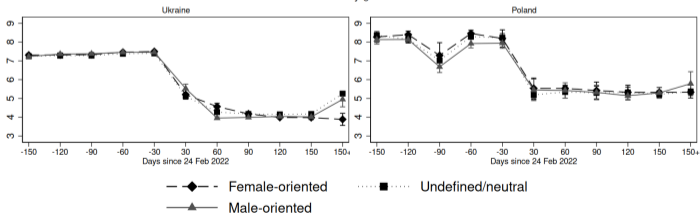
Impacts on offered wages - All data

Predicted log(wage)

Panel A. By skills



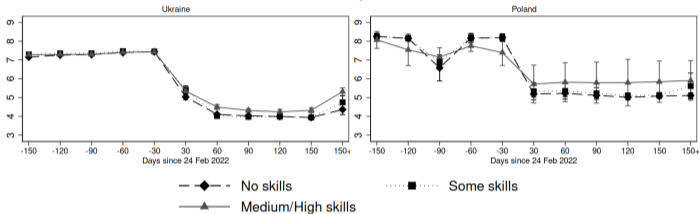
Panel B. By gender



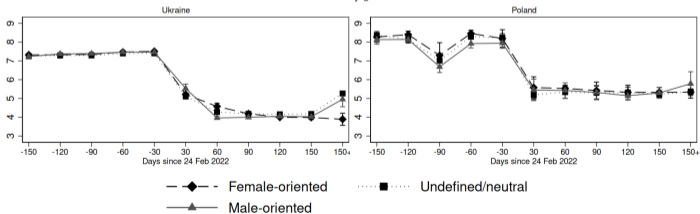
Impacts on offered wages - Continuing jobs

Predicted log(wage)

Panel A. By skills



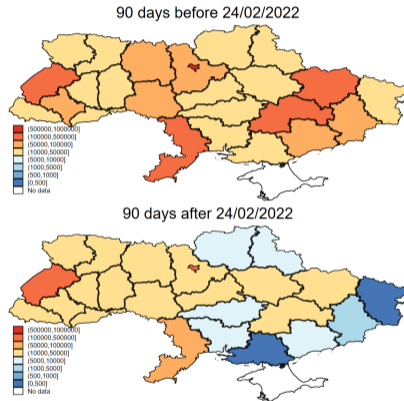
Panel B. By gender



- Ukrainian migrants to Poland before February 2022 are mostly economic migrants, while Ukrainian migrants after February 2022 are predominantly refugees
- Relative to Ukrainian economic migrants before the full-scale war begins, Ukrainian refugees are offered (1) lower-paid jobs and/or (2) lower wages for similar jobs

- Despite the immediate access to employment opportunities that facilitates integration, more needs to be done to improve Ukrainian refugees' labor market outcomes
- Suggestive evidence that the skill set needed in the post-war economy might be different
→ require up-to-date tracking of skills demands and online vacancies will be a suitable data source for this task!

Data - Before vs. After



Main

Job titles classification

- Use O*NET's Job Zone indicator to classify jobs according to their skills level:
 - **No skills** = Little or No Preparation Needed
 - **Some skills** = Some Preparation Needed
 - **Medium/high skills** = Medium/Considerable/Extensive Preparation Needed
- Use O*NET's Work Context data to classify jobs into female vs. male-oriented:
 - **Male-oriented** = "Spend Time Climbing Ladders, Scaffolds, or Poles" or "Spend Time Using Your Hands to Handle, Control, or Feel Objects, Tools, or Controls" ≥ 80
 - **Female-oriented** = "Contact With Others" ≥ 80

Main

Text analysis

- We use paraphrase-multilingual-mpnet-base-v2, a sentence-level transformer model trained on 50+ languages, to generate a 768-dimensional embedding vector for each description and for bigrams, trigrams, and fourgrams within each description
- We generate the cosine similarity score for each description pair and its n-grams ($n=[2;4]$)
- For each description, the top 30 phrases which (1) have the highest similarity scores and (2) appear in at least 500 ads are retained as the keywords of the description → a list of nearly 35,000 phrases that best represent the descriptions in the sample
- The extracted phrases are manually coded to generate the keywords

Main

No. of job ads before - after Feb 2022

k=	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6	7	8	9
War	0.270*** (0.091)	0.373*** (0.101)	0.669*** (0.158)	0.303*** (0.076)	0.547*** (0.148)	0.350*** (0.105)	0.555** (0.269)	-0.376 (0.377)	1.463*** (0.343)	1.596*** (0.335)	2.281*** (0.316)	2.316*** (0.287)	1.190*** (0.405)	0.919** (0.416)	0.913*** (0.279)	0.580** (0.285)
War x Ukraine	-0.231** (0.093)	-0.351*** (0.103)	-0.729*** (0.159)	-0.333*** (0.079)	-0.767*** (0.152)	-0.518*** (0.110)	-0.905*** (0.271)	-0.296 (0.388)	-1.880*** (0.347)	-1.933*** (0.357)	-2.289*** (0.342)	-2.087*** (0.304)	-1.156*** (0.411)	-0.968** (0.425)	-1.236*** (0.289)	-1.209*** (0.296)

- On average, the no. of Polish jobs advertised during the 6 months leading up to February 2022 is around 1.5 times greater than the no. of ads observed in the pre-August 2021 period

Main

No. of job ads before - after Feb 2022

k=	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6	7	8	9
War	0.270*** (0.091)	0.373*** (0.101)	0.669*** (0.158)	0.303*** (0.076)	0.547*** (0.148)	0.350*** (0.105)	0.555** (0.269)	-0.376 (0.377)	1.463*** (0.343)	1.596*** (0.335)	2.281*** (0.316)	2.316*** (0.287)	1.190*** (0.405)	0.919** (0.416)	0.913*** (0.279)	0.580** (0.285)
War x Ukraine	-0.231** (0.093)	-0.351*** (0.103)	-0.729*** (0.159)	-0.333*** (0.079)	-0.767*** (0.152)	-0.518*** (0.110)	-0.905*** (0.271)	-0.296 (0.388)	-1.880*** (0.347)	-1.933*** (0.357)	-2.289*** (0.342)	-2.087*** (0.304)	-1.156*** (0.411)	-0.968** (0.425)	-1.236*** (0.289)	-1.209*** (0.296)

- The no. of Polish jobs in June and July 2022 is around 10 times higher than the no. observed during the January – July 2021 period

Main