Anticipating the war and filling the gaps: the impact of the Ukrainian refugee crisis on unemployment in Poland.

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Abstract

This dissertation investigates the impact of an influx of Ukrainian refugees on the unemployment rate among Polish natives. I exploit the variation in the refugee rate among the Polish counties to estimate the effect empirically. Despite the relatively high participation of Ukrainians in the Polish labour market, I find little evidence that suggests the refugee influx caused an increase in the unemployment rate among the natives. It seems that Ukrainians predominantly filled the gaps in the Polish labour market. Secondly, I find evidence that suggests that merely the anticipation of the war had substantial consequences for the Polish labour market. The unemployment rate fell sharply three months before the war in the counties that later hosted many refugees. Thirdly, it seems that low-skilled workers were disproportionately affected by this crisis. Finally, there is no evidence that suggests that men and women were affected differently by the refugee crisis even though most working age refugees are women.

Acknowledgements

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I. Introduction

This dissertation analyses the short-term effect of a large refugee influx on native unemployment. My analysis is based on Poland, which experienced a large influx of refugees from Ukraine due to the war that started in February 2022. Informed by the approach found in the literature, I seek to estimate the causal effect of refugees on native unemployment by using fixed effects, first differences, and instrumental variables models. I am particularly interested in whether this impact differs between native men and women and how low-skilled workers are affected. I also investigate whether the refugee flow affected the number of job offers in each county. I find some evidence that suggests the refugee influx was associated with a small increase in the registered unemployment rate among the native population. At the same time, the available data indicates that the registered unemployment rate fell three months before the war in Polish counties that later hosted many refugees compared to other counties. The effect of this refugee influx on unemployment is substantially higher than the one shortly observed after the outbreak of the war. A possible explanation for this change before February 2022 is the anticipation of war and a refugee crisis by natives and Ukrainian immigrants in Poland. Furthermore, I find evidence indicating that the number of vacancies in the labour market dropped as a consequence of the refugee influx. Overall, it seems that Ukrainians that came to Poland after the outbreak of the war predominantly filled gaps in the Polish labour market rather than competing against native workers. Finally, I find some evidence that suggests that low-skilled workers are much more likely to become unemployed than high-skilled and medium-skilled workers. Despite this, I find little support for native men and women being affected differently by this refugee crisis with regard to unemployment.

My dissertation contributes to the literature in several ways. Firstly, to the best of my knowledge, this is the first attempt to estimate empirically (1) the consequence of the refugee crisis caused by the war in Ukraine on the neighbouring country's labour market and (2) the impact of immigration on native unemployment in Poland. The two salient points from my analysis are that it is possible for a large, unexpected flow of migrants to complement the native labour force and that the mere anticipation of a significant geopolitical shock can have substantial repercussions for the countries potentially affected by it. Furthermore, the data's structure allows me to investigate how the effect of interest differs between men and women and people of different skill levels. That is especially interesting given that most refugees, in this case, are women and due to immigrants' downgrading, which is a common phenomenon found in the literature.

The dissertation is structured as follows: Section 2 reviews the literature on the impact of immigrants on natives' labour market outcomes; Section 3 provides background information relevant to my study; Section 4 describes the data and Section 5 the empirical strategy I use to estimate the causal effect of interest; Section 6 presents the results of my analysis; Section 7 contains the possible explanations for my findings; and Section 8 concludes the dissertation.

II. Literature Review

The empirical literature on the impact of immigration on natives' labour market outcomes is vast. Scholars have reached mixed conclusions as to the overall impact of immigrants on natives' employment. Some papers suggest that immigration leads to a lower employment level among natives (Card 2001; Longhi et al. 2006) while others find immigration has no effect at all (Card 1990; Altonji and Card 1991; Dustmann et al. 2005) and still others believe it even has a positive impact on employment (Ortega and Verdugo 2014).

There are diverse explanations for the disagreement on the overall impact of immigration on natives' labour market outcomes. Differential results may be explained partially by the fact that scholars use different empirical strategies to reach their results (Dustmann et al. 2016) which means that, in practice, they measure quantities that are not directly comparable. Some evidence suggests that the overall impact of immigration varies with time (Cohen-Goldner and Paserman 2011; Fromentin 2013; Latif 2015; Dustmann and Görlach 2016) which may be driven by the fact that different parts of the economy respond to the shock within varying time frames. Another relevant factor is the relationship between the immigrants and natives with respect to skill composition. If immigrants were substitutes for natives, we would expect more competition and a fall in native employment whereas if the two groups were complementary, we would not expect this effect (Edo 2019; Viseth 2020). The relative importance of immigrants in the labour market and as consumers may also play a role (Borjas 2013). If the demand increase associated with the immigrant flow is higher than the effects of the competition, the economy may absorb the immigrants without depressing natives' employment. Immigrant flow may also begin other processes that tend to diminish the potential negative impact on labour market outcomes such as the migration of natives to regions less affected by immigration (Monras 2020) or firms' adjustment to the local labour supply (Lewis 2011). In short, the existing literature suggests that the overall impact of immigration on the economy depends on multiple factors, many of which are difficult to capture empirically.

An early example of a model designed to describe the impact of immigration on the labour market can be found in Johnson (1980). In this paper, the author disaggregates the labour force into low- and high-skilled workers and assumes that an immigrant flow is associated with an increase in the labour supply of the low-skilled group. Later scholars also distinguish between low- and high-skilled workers and make similar assumptions with respect to the economy's production function (Altonji and Card 1991; Borjas 2003; Dustmann et al. 2005). This approach implies that immigrants compete in the labour market primarily or exclusively with low-skilled natives, which should lead to detrimental effects for this group, predominately in terms of real wages in the long run.

Altonji and Card (1991) use a model similar to Johnson (1980), and they explicitly treat every standard metropolitan statistical area as a separate economy. They also allow for immigrants to belong to both skill groups and assume that added population also leads to an increase in demand for the local output. This strategy is more flexible since it allows both the supply and demand sides of the economy to respond to the shock. Borjas (2003) criticises their approach on the grounds that urban areas should not be treated as separate economies. According to him, there are too many ways in which the local labour markets can adjust to an increase in immigration to treat them as a closed economy. Given these adjustment possibilities, Borjas et al. (1997) argue that immigration should be analysed at the national level.

The impact of immigration on wages is a complex phenomenon. Scholars have extended the basic models to account for a wide range of possible factors that may influence the overall impact of immigration on labour market outcomes. Extensions include allowing for more than one output in the economy (Dustmann et al. 2005), multiple labour types (Dustmann et al. 2013), trade between local economies, and adjustment of technology by firms as a response to immigration shock (Lewis 2003; Lewis 2005). Although these extensions shed light on how different factors may influence the overall impact of immigration on the natives' labour market outcome, it is unlikely that any single model will capture the whole range of relevant factors, given the complexity of the issue at hand.

Differences in theoretical approaches give rise to diverse empirical strategies that scholars have used to estimate the causal effect of immigration on natives' labour market outcomes. On the one hand, immigrants are assigned to a particular skill group and thereafter compared with the corresponding group from the native population. On the other hand, they are not so assigned. This latter approach of not being assigned often uses the variation of immigrant flow among regions and region-level labour market outcomes to estimate the causal effect (Card 1990; Altonji and Card 1991; Dustmann et al. 2005). The former approach was pioneered by Borjas

(2003) and exploits the variation in immigrant flow among skill groups within the native population. This approach was criticised on the grounds that, contrary to Borjas' assumptions, high school graduates and dropouts are perfect substitutes and that natives and immigrants with the same observable characteristics are treated differently by the labour market (Card and Peri 2016), which may be driven by the language skills immigrants sometimes lack (Peri and Sparber 2009). Dustmann et al. (2016) suggest that scholars should abstain from pre-assigning immigrants to skill cells due to the possibility of heterogenous labour supply elasticities across skill groups and the downgrading of immigrants. They also provide evidence of downgrading for the US, the UK and Germany.

Downgrading occurs when immigrants achieve systematically worse labour market outcomes compared to natives with a similar level of education and experience. Scholars found evidence of downgrading for the UK (Dustmann et al. 2013), the US (Akresh 2008), Colombia (Lebow 2021), Ireland (Voitchovsky), Italy, Spain and France (Fellini and Guetto, 2019). The degree of downgrading probably varies depending on many factors, including the immigrants' and the host country's characteristics. Nevertheless, the available evidence suggests that this phenomenon is not confined to any particular country or a group of countries.

One of the principal empirical difficulties in estimating the causal effect of immigration on employment is that we cannot observe what would happen in the absence of immigration. This is especially problematic given that migrants are rarely distributed at as-if random across the host country. Some evidence suggests that immigrants tend to cluster in areas that are flourishing economically (Peri 2016) and where immigrants already reside (Bartel 1989, Jaeger 2007). To overcome this endogeneity problem, scholars often use instrumental variables estimation (Altonji and Card 1991; Dustmann et al. 2013), where the settlement pattern of previous migrants is an instrument used to predict the treatment variable.

Although research on immigration is relevant to the impact of refugees on the local labour market, since the latter is a subset of the former, there are some considerable differences between economic migrants and refugees (Ruiz and Vargas-Silva 2018). Most importantly, refugees are forced to move from their country of origin. Their choice is not informed by economic considerations which means that the relationship between those people entering the country and the host country itself is closer to a 'forced marriage' than a 'chosen match'. However, this does not necessarily mean that the relationship is inferior in any regard (Dustmann et al. 2017).

Labour market outcomes are consistently worse for refugees when compared with other immigrant groups and natives (Lebow 2021; Fasani et al. 2022) even if we control for a wide

range of relevant factors (Connor 2010). Furthermore, the phenomenon of downgrading is also more significant among refugees when compared with economic migrants and, in some cases, may persist over time (Nikolov et al. 2021). It is also important to remember the very personal aspect of forced migration; it is often a life-changing experience which can lead to lasting behavioural changes (Becker and Ferrara 2019; Becker et al. 2020).

Despite this, in a survey on recent findings on the consequences of forced migration, Becker and Ferrara (2019) state that the impact of refugees on the host country workers' wages and employment is positive in most studies. Similarly to the literature on immigration in general, one reason behind this may be the increase in demand for goods and services caused by the refugee flow (Labanca 2016). Another source of better employment opportunities may come from the increase in the extent of operations of help organisations and the government as a consequence of a refugee crisis (Ruiz and Vargas-Silva 2015).

We can draw several conclusions from this literature review. The impact of a refugee flow on the host country is complex and tricky to capture empirically since it simultaneously unleashes several processes operating within different time frames. There is no general agreement on the impact of immigration on natives' labour market outcomes among scholars. Despite many similarities, there are some significant differences between refugees and economic migrants, which has implications for both theoretical and empirical considerations. Most importantly, refugees are forced to move whereas other immigrants' choice is motivated by economic considerations. Even though the nature of the relationship is different, it is not necessarily inferior in the refugee case. Most studies find that the overall impact of refugees on the natives' employment and wages is positive.

III. Background

On 24 February 2023, Russia invaded Ukraine and caused one of the biggest refugee crises since World War II. According to the UN, as of 29th November 2022, almost 8 million refugees from Ukraine were recorded across Europe (UNHCR 2022). Poland has recorded approximately 1.5 million refugees, which make up 3.7% of the country's population. In the major Polish cities, the population has increased by 17% since the war started, with some cities experiencing a 30% or even 50% population growth in several weeks (Cywiński and Wojdat 2022). This unprecedented flow of people has markedly affected many aspects of everyday life in Poland.

Although few people expected Russia to start a full-scale invasion of Ukraine, many pundits and government officials had indicated before February 2022 that a war between the two countries was likely. As early as November 2021, the United States warned about the unusual movement of Russian troops near the border with Ukraine. Similar activity was also noted in March and April 2021. It is crucial to view all these events through the lens of the broader context of Russo-Ukrainian relations. In early 2014, mass protests in Ukraine led the pro-Russian president Victor Yanukovych to step down. What followed was pro-Russian unrest in the eastern part of the country, very likely supported by the Russian military. After months of fighting, Ukraine lost de facto control over the Donbas and Luhansk regions as well as the Crimean peninsula which Russia annexed. Military activity with varying intensity continued in eastern Ukraine until February 2022.

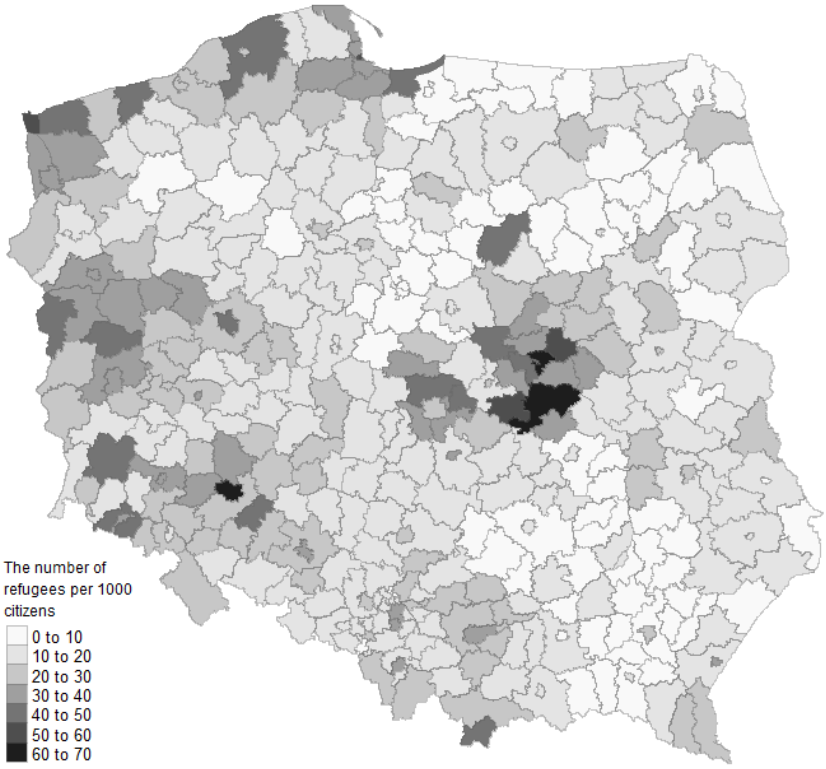
The Polish government implemented several policies to facilitate the refugees' quick departure from the conflict zone and their settlement in Poland. Firstly, it abolished the usual border formalities to ensure that all people that wished to move to Poland could do so as quickly as possible (Office for Foreigners 2022). Secondly, it established the Aid Fund, the task of which is to support financially all actions and programmes working towards assisting and integrating Ukrainian refugees (Fusiek 2023). Thirdly, refugees were permitted to live and work in Poland (and across the EU) and were eligible for the same benefits as Polish citizens (Fusiek 2023). Collectively, these policies were designed to keep the refugees within the boundaries of Poland and assimilate them into the wider Polish society through various means.

A second important aspect of this refugee crisis was the high presence of Ukrainians in Poland prior to February 2022. An estimated 1.35 million Ukrainian citizens lived in Poland in 2020 (Duszczyk and Kaczmarczyk, 2022). To a certain degree, this can be accounted for by the immigration that took place following the Euromaidan protest movement and the consequent annexation of Crimea and Eastern Ukraine by Russia in 2014. Another reason for this migration was rooted in the job opportunities available in Poland, which may have attracted economic migration. Cultural and linguistic similarities between Poland and Ukraine could also have played a role. It is very likely that the increased presence of Ukrainians in Poland between 2014 and 2021 contributed to Poland's popularity as the choice of destination among Ukrainian refugees in 2022 and facilitated their integration.

Ukrainian refugees reside in every part of Poland. Map 1 shows the number of Ukrainian refugees with a Polish national identity number (PESEL) in each county (pol. Powiat) per 1000 citizens. The map clearly shows that there is no general pattern in the refugees' location. In particular, we do not observe high refugee rates in the southeast (near the border with Ukraine)

compared to the rest of the country. We can find counties with a relatively high number of refugees in western and central Poland.

Map 1: The number of working-age registered Ukrainian refugees in each Polish county per 1000 native citizens in working age.



The main difference between the most recent immigrants and those that came to Poland before February 2022 is their demographic. Before the war, most Ukrainian immigrants in Poland were male and economically active (Duszczyk and Kaczmarczyk 2022). Conversely, the majority of immigrants during the war were women and children. After martial law was declared in Ukraine, most men aged 18-60 were forbidden to leave the country. These demographic differences between the two immigration waves reflect the different natures of the shocks. Prior to February, migration to Poland from Ukraine had mainly economic roots whereas later, it was a consequence of an armed conflict. Nevertheless, scholars estimate that around 30% of Ukrainian refugees migrated to Poland before February 2022, which suggests the two waves of immigration are closely related (Górny and Kaczmarczyk 2023).

Ukrainian refugees are very well educated compared to Polish citizens; around 46% of refugees in Poland have higher education whereas approximately a third of Poles have higher education (Zymnin et al. 2022). Despite downgrading, the authors suggest most Ukrainian refugees found work in Poland as around 70% of them already had some working experience in Poland prior to the war, which may explain the high labour market participation rate.

However, the same study estimates that less than half of Ukrainian refugees in Poland can communicate in Polish, which may explain why most of them work in jobs below their qualifications.

In 2021 and early 2022, Poland was still recovering from the disruption caused by the COVID-19 pandemic. According to the World Bank, the GDP per capita in Poland had grown by 7.3% in 2021. The unemployment rate in the same year equalled 3.4%, which is relatively low compared to previous years and other European countries in 2021. Perhaps the most concerning was the inflation rate, which equalled 5.1% in 2021, far above the Polish central bank's target. On the eve of the war, the Polish labour market was tight. In January 2022, around half of employers in Poland indicated that labour shortages and upward wage pressures are among the most significant barriers to future growth (Dębkowska et al. 2022).

In summary, Ukrainian refugees in Poland are predominantly well-educated women and children with a very high labour market participation even though they often work in positions requiring skills below their qualifications. They are spread across the country and have access to the same public services as Polish citizens. The economic outlook of Poland before the war was relatively good. The labour market was tight, and many firms spoke about worker shortages and upward wage pressures.

IV. Data

The data used in this dissertation comes from three sources, all of which are publicly available. The first source is Statistics Poland, the government agency designated to collect and publish data about the country (also known as the Central Statistical Office). Unemployment data and county characteristics come from this source. The second source is the Chancellery of the Prime Minister of Poland, which has been collecting data on the location of Ukrainian refugees in Poland since April 2022. The final source is the Labour Market Department of the Office of Family and Social Policy which gathers data on work permits issued to foreigners in each county. All variables are gathered at the county level (there are 380 counties in Poland), and their means and standard deviations are summarised in Table 1.

The first outcome variable of interest is the registered unemployment rate in a given month. Statistics Poland defines it as "the share of registered unemployed people to the economically active civilian population". This share is generally smaller than the unemployment rate since some unemployed people are not registered. Foreigners are not included in these numbers. I am using the registered unemployment rate instead of the actual unemployment rate since monthly

county-level data on the latter is not available. The available data allows me to disaggregate this variable and compute the registered unemployment rate for people of different skill levels. I define three skill groups (high, medium, and low) based on education: the high-skill group includes people with higher education; the medium-skill group comprises of people with secondary, post-secondary, and vocational education; and the low-skill group contains people with primary education and no education. I define the registered unemployment rate for each group as the number of registered unemployed people belonging to a group as a share of the total economically active population. I use this disaggregation to see whether the impact of the refugee flow on natives' unemployment differs depending on skill level. Finally, I also disaggregate the data based on gender to investigate whether men and women are affected differently by this crisis. Disaggregated data is available starting from the year 2021. The summary found in Table 1 suggests that the registered unemployment rate equalled 8.33% on average in January 2022 and decreased slightly over the next year.

The second outcome variable of interest is the number of job offers registered in each county's Labour Office. This variable is available monthly and can be an indicator of the number of vacant positions in a local labour market and the firms' willingness to hire new employees. The average number of registered job offers in a county in Poland equalled 304 in January 2022 and dropped substantially over the course of the year.

Table 1: Summary of the variables used in the empirical analysis.

Variable	**Mean (std. dev.)**
Registered unemployment rate in January 2022	8.33 (4.57)
Registered unemployment rate in January 2023	7.87 (4.36)
Number of job offers in January 2022 (total)	304 (470)
Number of job offers in January 2023 (total)	241 (397)
Registered refugee rate in January 2022	1.90 (1.13)
Number of work permits issued to Ukrainians in 2021 as a share of working-age natives	5.84 (6.49)
Average monthly wage in 2021 (PLN)	5 212 (640)
Average house price in 2021 (PLN per square metre)	4 202 (1 404)
Working age population in 2021 (total)	61 773 (77 139)
Population in 2021 (total)	99 757 (123 860)

The independent variable of interest is the number of working age refugees with a PESEL number as a proportion of the most recent estimate (2021) of the native population of working age in each county. Statistics Poland defines "working age" as 15 to 59 years for women and 15 to 64 years for men which is determined by the retirement age. Since not all refugees have registered and received a PESEL number, this value is below the de facto number of working age refugees relative to the native population.

The instrument used in the IV estimation is computed by dividing the number of work permits issued to Ukrainians in 2021 by the total native population of production age in each county. This variable is used as a proxy for the settlement pattern of Ukrainian migrants before the war. The available literature recommends using values from further back in time, but data before 2021 is unavailable, partly due to the fact that immigration to Poland from Ukraine is a relatively recent phenomenon.

The control variables include mean house price, wage, total population, the working-age population in each county (all from 2021) and a dummy variable that indicates whether a county is a city. These controls come from the Statistics Poland database. The mean house price and wage are selected to control for the level of development of a county, which is relevant to refugees when they are deciding where to reside; this potentially explains the dynamics of the macroeconomic indicators for a region. Similarly, a city dummy is relevant since, on average, cities have more job opportunities and available resources to host refugees. The working age population is selected to capture the potential competition in the labour market. Finally, I include the total population size to control for the county's size, which is relevant both for the refugee residence choice as well as the size of the labour market.

V. Empirical specification

I began by looking at a simple event plot. To create it, I defined a treatment and a control group. The treatment group comprises of counties in which the refugee rate in January 2023 was higher than the county median. All other counties belong to the control group. I analysed the difference in the average recorded unemployment rate and the average number of job offers between the treatment and control groups, starting from January 2015. To adjust for seasonal changes, I regressed the registered unemployment rate and the number of job offers on month and year dummies and then subtracted the estimates of the month dummies from the difference.

Thereafter, I estimated three models to determine the effect of the refugee flow on the registered unemployment rate among the natives and the number of job offers. The first model is a fixed effect model captured by the following equation:

$$y_{it} = \beta_0 + \gamma_i + \delta_t + \alpha r_{it} + \beta X_i + \varepsilon_{it}$$

in which y_{it} is the independent variable (either the registered unemployment rate or the number of job offers) for county *i* in year *t* (this value is for the same month for all years), γ_i and δ_t are county and year fixed effects. The coefficient of interest is α which stands in front of the refugee rate in county *i* in year *t* (this variable is equal to 0 for all months before March 2022). Finally, X_i captures county characteristics in the year 2021, and ε_{it} is the error term.
The second model is a first differences model which takes the following form:

$$\Delta y_i = \beta_0 + \alpha \Delta r_i + \beta X_i + \varepsilon_i$$

in which Δy_i is the difference in the independent variable for county *i* during a given month (I look at the differences in January and October). The coefficient of interest is again α, which stands in front of the change in the refugee rate in county *i* between a month before the war and the same month after the war (Δr_i). This value is equivalent to the refugee rate in county *i* after the war since before that there were no Ukrainian refugees in Poland.

Finally, to account for endogenous refugee allocation, I estimated a third model using instrumental variables. The second stage of the model has the same form as the first differences model. The first stage of the model takes the following form:

$$\Delta r_i = \beta_0 + \alpha z_i + \beta X_i + \varepsilon_i$$

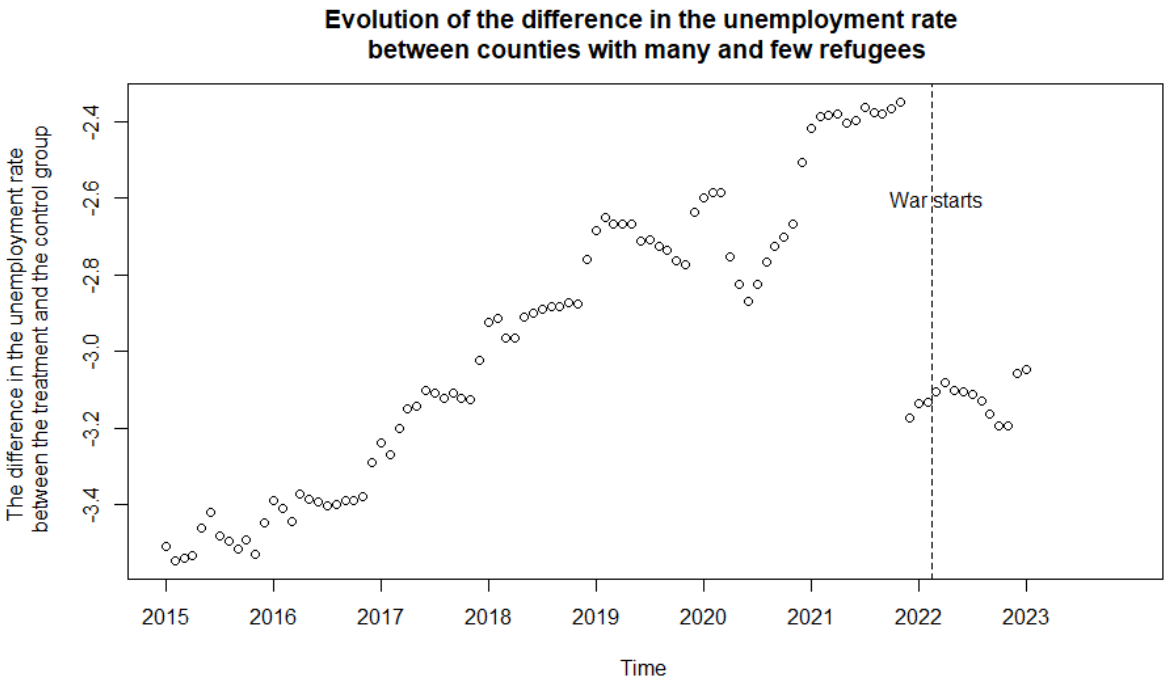
in which z_i is the number of work permits issued in county *i* as a share of the native working age population. To check whether the instrument is relevant, I conducted an F-test between a restricted and an unrestricted first-stage model. The F-statistic equalled 145, which suggests the instrument is relevant. Secondly, after estimating the second stage, I checked whether the instrument is correlated with the error terms. I found no correlation between the instrument and the error term conditionally on other covariates.

VI. Results

Figure 1 demonstrates the event plot for the registered unemployment rate. The difference in the registered unemployment rate between the treatment and the control group is negative, which suggests that counties that hosted more refugees tend to have lower unemployment. This gap was shrinking gradually from 2015 until a significant drop occurred between November and December 2021, three months before the war started. After February 2022, there was no

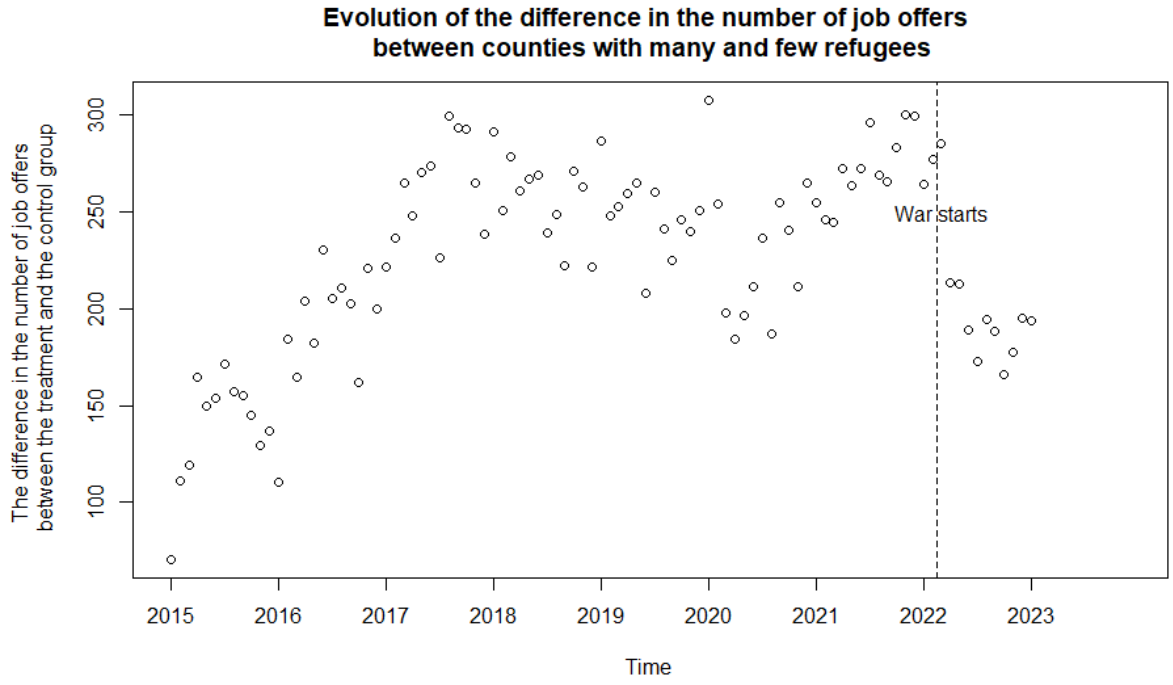
clear trend until the December of that year when the gap began to shrink again. However, shifts of similar size were present at multiple points in previous years when Poland was not experiencing a sudden refugee influx. Furthermore, the shrinking of the gap, which occurred in late 2022, was relatively small compared to the drop we observed three months before the war.

Figure 1: The monthly difference in the mean registered unemployment rate between counties with a high and low refugee concentration.



The event plot for the number of job offers is presented in Figure 2. This time, the difference is positive, suggesting that counties that hosted more refugees tend to have more job offers. Although that could be driven by the labour market characteristics, it may also be a reflection of the average size of the counties in the treatment and the control group. We can see that the difference increased in 2015 to approximately 100, then oscillated at approximately 250 before the war, and then fell to slightly below 200 directly after February 2022. The drop after February 2022 is what we would expect if refugees primarily filled in the gaps in the Polish labour market.

Figure 2: The monthly difference in the mean registered unemployment rate between counties with a high and low refugee concentration.



To show empirically the presence of a substantial shock three months prior to the war, I estimated two sets of regression models. The first set takes the registered unemployment rate in January prior to and after the beginning of the war (or the change in that rate) as the dependent variable (Table 2). Since January 2022 is a month before the war, but after the fall between November and December 2021, it is a more reliable estimate of what happened as a direct consequence of the refugee influx (which occurred after February 2022). The second set of models has the registered unemployment rate in October as the dependent variable (Table 3) which means that the estimated impact includes the fall change at the end of 2021.

The fixed effects and the first differences model for January are not statistically significant at the .05 level, suggesting the refugee influx did not affect the registered unemployment rate among the natives. However, the more robust model for January suggests that counties with more refugees experienced an increase in the registered unemployment rate. The estimate is statistically significant at the .001 level and indicates that, on average, a one percentage point increase in the refugee rate was associated with a 0.167 percentage point increase in the registered unemployment rate between January 2022 and January 2023.

Table 2: Regression results with the total registered unemployment rate in January as the dependent variable. Coefficients are reported with robust standard errors in brackets.

	Fixed effects	First Differences	IV
Refugee rate	0.041 (0.028)	0.041 (0.032)	0.167*** (0.050)
County controls	No	Yes	Yes
Observations	760	380	380

**p<0.05 **p<0.01 ***p<0.001*

The picture changes when we estimate the same models for October. All three models suggest a negative relationship between the refugee concentration and the registered unemployment rate among the natives. The coefficients are statistically significant at the .001 level for the fixed effect and instrumental variable models. The coefficient of the most robust instrumental variable model is -0.481, which is almost three times more than the absolute value of the coefficient for the same model in January. Therefore, on average, a one percentage point increase in the refugee rate was associated with a 0.481 percentage point decrease in the registered unemployment rate between October 2021 and October 2022.

Table 3: Regression results with the total registered unemployment rate in October as the dependent variable. Coefficients are reported with robust standard errors in brackets.

	Fixed effects	First Differences	IV
Refugee rate	-0.143*** (0.042)	-0.081 (0.048)	-0.481*** (0.097)
County controls	No	Yes	Yes
Observations	760	380	380

**p<0.05 **p<0.01 ***p<0.001*

To investigate how the effect changes depending on the worker's skill level, I estimated January models with the total registered unemployment rate disaggregated based on the three skill groups. Table 4 summarises the results of this analysis. All estimates of the instrumental variable model and positive and statistically significant at the .01 level. On average, a one percentage point increase in the refugee rate in a particular county was associated with a 0.022 percentage point decrease in the number of registered unemployed people with higher education as a share of the economically active population. The coefficient is more than two times higher in the case of low-skilled workers and more than four times higher in the case of people with medium education.

However, raw coefficients tell us little due to the differences in the labour market participation between these groups. To make the results more meaningful, I compare the share

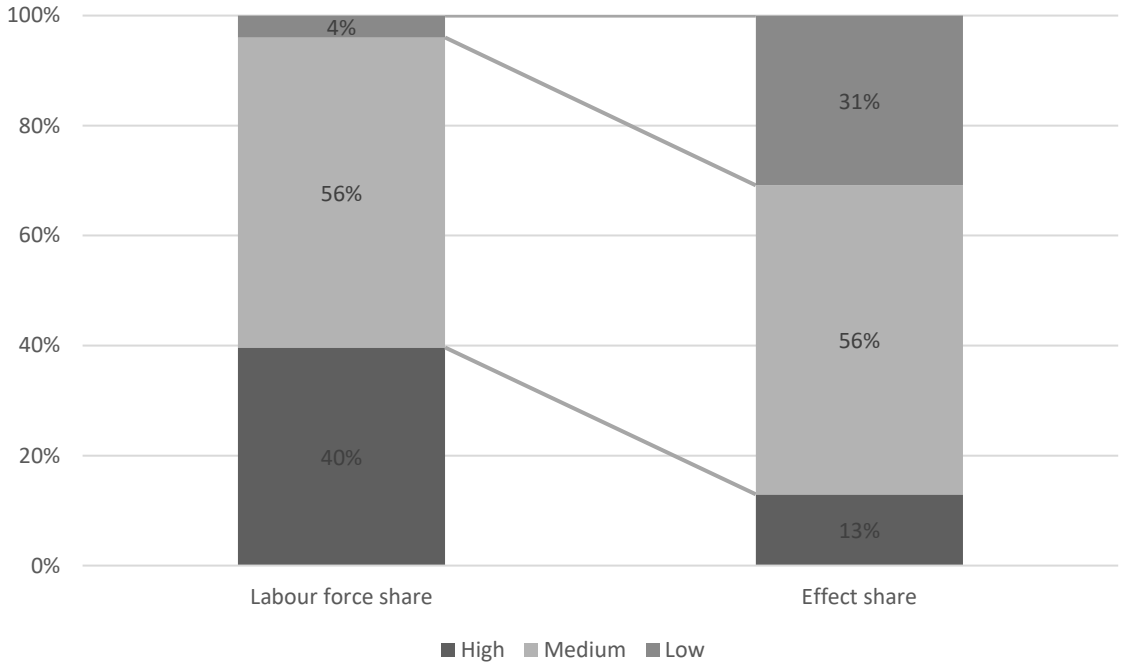
Table 4: Regression results with the total registered unemployment rate in January as the dependent variable across three skill groups. Coefficients are reported with robust standard errors in brackets.

	High			**Medium**			**Low**		
Model type	FE	FD	IV	FE	FD	IV	FE	FD	IV
Refugee rate	0.008	0.015**	0.022**	0.019	0.016	0.094**	0.014	0.010	0.052**
	(0.004)	(0.005)	(0.008)	(0.017)	(0.020)	(0.031)	(0.010)	(0.011)	(0.019)
County controls	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Observations	760	380	380	760	380	380	760	380	380

**p<0.05 **p<0.01 ***p<0.001*

of the effect for each group with the share in the labour force (Figure 3). On the one hand, the figure suggests that even though low-skilled workers account for only approximately 4% of the labour force, their share in the estimated increase in the registered unemployment rate equals more than 30%. On the other hand, high-skilled workers account for approximately 40% of the labour force but only 13% of the estimated increase in the registered unemployment rate falls on people that belong to this group. This comparison suggests that the effect of a refugee influx on native unemployment is of a higher magnitude among low-skilled workers. However, it is crucial to note that this is true regardless of the direction of the effect. If we performed the same analysis for October, we would find a negative correlation between the refugee rate and the registered unemployment rate and approximately 44% of this fall would occur among low-skilled workers. This is what we would expect if refugee workers and low-skilled native workers were closer substitutes than refugee workers and high-skilled workers.

Figure 3: Comparison of the effect share and labour force share for the three skill groups.



Finally, I estimated the same set of models to see whether the effect differs between men and women. The results are presented in Table 5. Both fixed effects and first difference models suggest a substantial gap between men and women. However, the estimates are not statistically significant. The instrumental variable model suggests virtually no difference between men and women, with a statistically significant coefficient of approximately 0.08 for both groups. Nevertheless, given that women account only for approximately 45% of the labour force, similar coefficients suggest that a refugee influx does affect women more than men when it

comes to unemployment. However, the magnitude of the difference is relatively small compared to the difference between people of different skill levels.

Table 5: Regression results with the total registered unemployment rate in January as the dependent variable disaggregated by genders. Coefficients are reported with robust standard errors in brackets.

	Women			**Men**		
Model type	FE	FD	IV	FE	FD	IV
Refugee rate	0.035* (0.015)	0.030 (0.017)	0.085*** (0.017)	0.006 (0.015)	0.011 (0.017)	0.082*** (0.017)
County controls	No	Yes	Yes	No	Yes	Yes
Observations	760	380	380	760	380	380

**p<0.05 **p<0.01 ***p<0.001*

To demonstrate that a refugee flow caused a fall in the number of vacancies empirically, I estimated the three models with the total number of job offers as the dependent variable. The results are summarised in Table 6. The coefficients of the fixed effects and first differences models are not statistically significant at the .05 level. After including the instrument, the coefficient drops to -107.2 and is statistically significant at the .05 level. Therefore, the most robust model indeed suggests that a higher concentration of refugees is associated with fewer job offers. On average, a one percentage point increase in the number of working-age refugees as a share of the working-age native population is associated with 107 fewer vacant positions.

Table 6: Regression results with the total number of job offers in January as the dependent variable. Coefficients are reported with robust standard errors in brackets.

	Fixed effects	First Differences	IV
Refugee rate	-26.8 (35.0)	10.8 (43.0)	-107.2* (46.5)
County controls	No	Yes	Yes
Observations	760	380	380

**p<0.05 **p<0.01 ***p<0.001*

VII. Discussion

There are several conclusions we can draw from the analysis above. Firstly, some evidence suggests that a presently unknown cause related to where the refugees decided to stay had reduced the registered unemployment rate between November and December 2021. The drop we observe in the event plot is unprecedented, and all regression models suggest a statistically significant, negative relationship between the refugee rate and registered unemployment rate change. There are several potential explanations for this. Firstly, it is possible that this drop is

not directly related to the subsequent refugee crisis; perhaps it was a consequence of preparation towards Christmas which is an economically intense period of the year and a time when many immigrants return home. Although possible, this explanation fails to account for why a similar drop has not occurred in previous years, which makes it less likely prima facie. A second explanation is that businesses and consumers, anticipating the possible refugee influx, responded to the news about Russian forces concentrating near the border with Ukraine in a way that caused a reduction in the registered unemployment rate. Under this explanation, counties with a high number of Ukrainian migrants in 2021 may have been more inclined to act this way (due to stronger ties with Ukraine), thus widening the gap between the treatment and the control group. The last explanation I would like to offer is that due to the Russian forces' movement in November 2021, some people may have decided to return to Ukraine (perhaps in order to prepare with their families for the conflict) and, through that, created a gap in the labour market which native workers filled in. Regardless of the reason behind the rapid change in the registered unemployment rate, a key takeaway I would like to highlight is that the mere anticipation of a refugee crisis or a war may have substantial consequences for the labour market of a country that could potentially host refugees. As suggested by the coefficients of the instrumental variables models, the magnitude of this anticipation effect may be larger than the direct effect of the crisis.

If we omit the divergence at the end of 2021 and focus on the change that occurred immediately after the outbreak of the refugee crisis, we find that counties which hosted more refugees reported a higher registered unemployment rate after the war ceteris paribus. This finding is contrary to most research found in the literature. Two factors may explain this. Firstly, as mentioned above, it is possible that the forces leading to a fall in the unemployment rate among natives were unleashed three months prior to the conflict. If we were to accept this assumption, then we would have found a negative relationship between the refugee rate and the registered native unemployment rate. Secondly, the case of Ukrainian refugees in Poland may be unique due to a remarkably high labour market participation among refugees which is partially explained by the very strong connection between the two countries. However, it is crucial to note that the magnitude of this effect is not substantial, which is surprising given the scale of the refugee crisis and the relatively high labour market participation. As suggested by the event plot, similar changes have occurred in years before the war and they certainly cannot be linked causally to a refugee crisis. Overall, the available evidence is not enough to conclude that native Polish citizens lost jobs as a consequence of the refugee crisis.

It may be helpful to turn to the dynamics in the number of vacancies in the local labour markets to reconcile the lack of an adverse effect on the natives' employment with the relatively high participation of the refugees in the labour market. After the war started, counties that hosted many refugees reported fewer vacancies on average. That pattern is what we would expect to see if we assumed that refugees were happy to accept any job as long as it was available immediately. Together with the lack of a substantial increase in the registered unemployment rate in counties that hosted many refugees, this pattern can be taken as evidence for the supplementary nature of the impact of Ukrainian refugees on the Polish labour market. It seems that the refugee influx predominantly filled gaps in the Polish labour market rather than adversely affected native job security. Importantly, counties that received more refugees after the war outbreak experienced a more substantial fall in the registered unemployment rate prior to the war, which made the integration of the new labour force possible without negative repercussions for the native workers.

Some evidence suggests that low-skilled workers are much more affected by labour market shocks compared to the rest of the population regardless of the direction of the change. If we look at the change that occurred between January 2022 and January 2023, we find that low-skilled workers were more than twenty times likely to become unemployed compared to high-skilled workers and more than seven times likely compared to medium-skilled workers. Similarly, low-skilled workers were much more likely to find a job between November and December 2021. Overall, this pattern is evidence for the relationship established in the literature that refugees and immigrants tend to substitute low-skilled labour. Since Ukrainian refugees in Poland tend to be better educated than natives, this can also be taken as evidence of downgrading upon arrival.

Finally, there is little evidence that suggests men and women are affected differently by the refugee influx with regard to the likelihood of unemployment. Even though the coefficient is slightly higher for women who comprise less than half of the labour force, the difference is negligible, within statistical error. This finding is, at least to some extent, surprising since most Ukrainian refugees are women. The lack of any substantial discrepancy suggests that male and female labour are relatively close substitutes.

This study has numerous limitations. Firstly, the measures of refugee concentration and unemployment rate are imperfect since they only account for what is present in the official records. Not all refugees have applied for a PESEL number, and not all unemployed people are registered. Nevertheless, both groups are relevant if one seeks to study the overall impact of a refugee crisis on unemployment. Similarly, the instrument used is a proxy, not a direct measure

of the immigrants' location before the conflict. Secondly, the data used for this analysis spans a relatively short period of time, making the results less robust. That is particularly relevant for instrumental variable estimation, in which an instrument that occurs further back in time is recommended. However, finding an instrument from several years earlier is difficult if immigration is a relatively new phenomenon, which is true in the case of Poland. Finally, similarly to other studies that use the spatial variation in the immigrant flow to estimate the causal effect on unemployment, the proposed research methodology treats Polish counties as closed, separated markets. That means not accounting for any change in the movement of native population, goods or services between counties due to the refugee influx (which could be potentially relevant to the unemployment rate).

A crucial limitation in the context of interpreting the results of this study is that the impact of the refugee influx on wages is unclear, which hinders the assessment of the overall impact of the refugee influx on the natives' labour native outcomes. Even if unemployment increases as a consequence of more intense competition in the labour market, this does not mean that native workers are worse off overall since higher competition may also drive up wages. This study investigates only one aspect of the labour market, so any more general conclusions would be unfounded.

It is necessary to keep the above limitations in mind when discussing the results. In addition, they can be helpful in identifying areas of future research on the subject. The first area is investigating what precisely is the cause of the jump in the difference in the registered unemployment rate between the treated and non-treated counties. The second area is investigating the impact of the refugee crisis on wages would give a more comprehensive understanding of how the crisis affected local labour markets in Poland.

VIII. Conclusion

This dissertation investigates the impact of the recent refugee crisis caused by the war in Ukraine on the Polish labour market. To estimate this effect empirically, I exploited the variation in the refugee concentration among the Polish counties. There are three main empirical findings that stemmed from this analysis. Firstly, there is little evidence that suggests that the refugee flow caused a substantial increase in the unemployment rate among the natives. Although the most robust model does suggest a positive and statistically significant impact, its magnitude is small and similar changes in the registered unemployment rate have occurred previously. Secondly, there is evidence that suggests that counties that hosted many refugees

experienced a substantial fall in the registered unemployment rate among the natives three months prior to the war. The magnitude of this effect is substantial and unprecedented. Several competing hypotheses to explain it were suggested, but further work is needed to establish the exact cause of this shift. Finally, there is evidence that suggests that the refugee flow caused a fall in the number of vacancies in the local labour markets. This finding reconciles the high labour market participation of the refugees with virtually no loss of employment among the natives.

Two further minor findings about the Polish labour market are worth highlighting. Firstly, consistent with the literature, it seems that any changes in the unemployment rate among the natives associated with the refugee crisis or the anticipation of anything thereof fall disproportionately on low-skilled workers. That pattern is consistent with the assumption that immigrants are generally substitutes for low-skilled labour. Secondly, I find no evidence that suggests native men and women are affected differently by the refugee crisis with regard to unemployment, which is surprising given the demographic of the refugees.

This dissertation contributes to the existing literature in several ways. Firstly, to the best of my knowledge, this is the first attempt to analyse the impact of a refugee flow to Poland and the consequences of the recent war in Ukraine. This particular case is an instance of when the relatively high number of economically active refugees fill gaps in the host country's labour market rather than compete with the native population. Most likely, there are several factors that have contributed to this, such as the previous experiences of Ukrainians in Poland, the low level of unemployment and government policies that swiftly enabled the refugees to start working. Further analysis is necessary to establish what conditions and policies are the most important in making such integration possible. Lastly, this dissertation highlighted the importance of a refugee crisis and an anticipation of war. The most substantial shift in the unemployment rate among the natives occurred before the conflict outbreak and the subsequent refugee flow. An important insight from this is that when analysing the impact of a major economic shock caused by geopolitical factors on economic outcomes, it is necessary to carefully choose the timeframe of the analysis and explicitly distinguish between the effect of the anticipation of the shock and the shock itself.

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