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What if the Mariel Boatlift Happened Today? Studying the Consequences of the Mass Influx of Ukrainian Citizens on the Polish Economy

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Abstract

The purpose of this research is to evaluate the impact of sudden influx of Ukrainian citizens on Polish economy, as the result of Russian invasion in 2022. Inspired by Peri and Yasenov (2019), I exploit Synthetic Control Method where treated regions are voivodeships in Poland with the largest number of immigrants received. Unlike previous studies, this research does not focus on separate impacts for natives and immigrants, but instead examines the overall effect on the entire country. Using the data retrieved from Statistics Poland and Social Insurance Institution in years 2020-2023, I find no significant effect of the influx of Ukrainian citizens on average salaries and unemployment rates in Poland. The results remain consistent across various robustness checks.

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1. Introduction

In 2022, Russia started a full-scale invasion of Ukraine, marking a significant escalation in the ongoing conflict that began with the annexation of Crimea in 2014. As a result, millions of Ukrainians have been forced to flee their homes, seeking refuge in neighboring countries, leading to one of the largest mass emigrations in recent history.

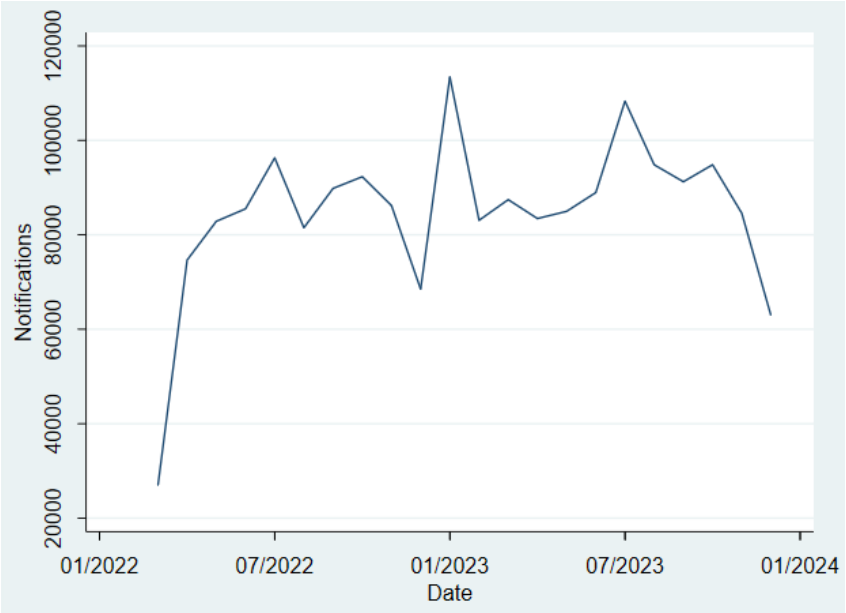
In the light of the humanitarian crisis, the European Union unites with Ukraine. Besides heavy capital investment to support the Ukrainian army, the EU introduces the Temporary Protection Directive which entitles any Ukrainian escaping the war to have temporary protection in any of the EU member countries (European Commission, 2022).

Unsurprisingly, Poland has emerged as the primary destination for Ukrainian immigrants. With its close proximity and shared cultural ties, Poland has opened its borders to millions of Ukrainian refugees, offering them safety and support. Just 4 days after the invasion, 300 000 Ukrainians has crossed the border while the lines to the customs began to be measured in kilometers (Rzeczpospolita, 2022). In the end of April 2022, this number has increased to a staggering 1.5 million refugees (Duszczyk & Kaczmarczyk, 2022) which started the debate whether Poland has enough resources to host that many people.

One year later, when the dust settled a bit, many Ukrainians moved further towards Western Europe. However, many of them stayed potentially restructuring Polish labor markets. According to the Polish Office for Foreigners (2023), as of February 2023, almost 1 million Ukrainian citizens benefited from the Temporary Protection Directive in Poland. At the same time, a total of 1.4 million people had valid residence permits in the country. The immigrant profile mainly consisted of women and children, which represented 87% of all Ukrainian immigrants. Youth and children represented 43% and adult women 77% (Office for Foreigners, 2023). Notably, only a few men managed to leave Ukraine due to martial law. The general mobilization prohibited men aged 18 to 60 from leaving the country to be available for military service (Baker McKenzie, 2024).

Although the influx of Ukrainian citizens was mainly represented by women, many of them began working shortly upon arrival. The Temporary Protection Directive provides not only access to housing, education and healthcare, but also access to the labor market for any Ukrainian citizen in any EU member country that is chosen by them (European Council, 2024). In Poland, the process of finding a job for a Ukrainian refugee has been maximally simplified. In principle, there were 3 different ways to legally employ a Ukrainian citizen- a permanent work permit, a temporary work permit (for seasonal jobs) and a so called "declaration" that is only available to citizens of Armenia, Belarus, Georgia, Moldova and Ukraine. However, in response to Russian aggression, the Polish government introduced a 4th option- a so called "notification" that is the fastest and easiest procedure. This method allows for employment of a Ukrainian citizen (as well as a spouse of Ukrainian citizen that is of a different nationality and other close family members) just by notifying the district employment agency by an employer within 14 days from the day of a work commencement. Many administration steps that were previously in use are skipped and the employment procedure can be finalized digitally by an employer (Biznes.gov, 2024). In Figure 1, I present the time trend of Ukrainian employments based on notifications in Poland.

Figure 1. Notifications reported to district employment agencies by employers in Poland.



Note: The period for which notifications are reported starts in March 2022 as from this month this became possible. The data has been retrieved from Statistics Poland (GUS).

We can clearly observe a spike immediately after the war outbreak and the trend itself has sustained at 80 000- 120 000 notifications per month almost until 2024. As of January 2023, around 900 000 Ukrainians found employment in Poland, increasing its labor supply by 6% compared to the period before the war outbreak (Bankier, 2023). This tangible influx of Ukrainian citizens did not remain unobserved to the Polish nation. Governmental websites added the Ukrainian language to their interface to facilitate navigation. National TV added Ukrainian translation to their productions. Even private businesses like Żabka (Polish grocery store chain) advertised job vacancies on store windows' displays in the Ukrainian language. These are just few examples of how every day's life of an average Polish citizen can be exposed to Ukrainian immigration that resulted from the war outbreak.

Regardless of the personal perceptions and opinions that might evolve in Poles' minds, the mass influx of Ukrainian citizens has created a space for an open debate whether this sudden increase in labor supply may affect the Polish economy. According to the survey that was conducted by Insight Lab in 2022, nearly half of the interviewed Polish workers that have worked with Ukrainian citizens claim, that this influx can potentially deteriorate working conditions and wages (Rzeczpospolita, 2022). As many voices, as many opinions. Therefore, this research has risen as an answer to whether this social anxiety can be justified. The research question I aim to answer is:

What is the effect of the mass influx of Ukrainian citizens on average salaries and unemployment rates in Poland?

I will try to address this question through a comprehensive analysis that includes the groundbreaking Synthetic Control Method and the conventional difference-in-differences approach in a fixed- effects setting. Drawing on the existing evidence, I expect little to no effect of mass Ukrainian immigration on salaries and unemployment rates in Poland. Although this statement is contrary to popular belief, it is in line with both existing literature that studies the effect of migration, as well as many research and surveys conducted in

Poland after the war outbreak. My actual findings indeed coincide with the results found previously. Namely, the mass influx of Ukrainian citizens had no effect on average salaries and unemployment rates in Poland. There are not any observable deviations of regions that received a large number of immigrants from the regions that barely received any. Even focusing on industries most likely occupied by Ukrainian immigrants brought the same conclusion. An alternative approach to tackle this problem, which is difference- in-differences, also confirmed previous findings. Mass Ukrainian immigration is associated to 0.59% increase in average salaries and 0.0009 percentage point decrease in average unemployment rates in Poland. Both results are statistically insignificant and economically irrelevant. The reasons for these findings might potentially be grounded in high complementarity between natives and immigrants or even social pressure on employers who cannot hire and fire workers easily.

This research serves as an extension and supplement to the existing literature. Not only does it provide a new case study but also complements it by exploiting a relatively new methodology that has only been used once in a similar setting- in the paper published by Peri and Yasenov (2019) where authors used Synthetic Control Method to re- examine previous findings on the Mariel Boatlift study conducted by Card (1990). Considering that this event took place in the 1980s, my research will be the first one to exploit this approach in a migration setting in contemporary times. Moreover, the research circumstances are unique compared to other papers studying the effect of immigration on host country economies. In most of the events of mass migration, the migration itself is involuntary, and newcomers are refugees that live in asylums having limited access to the labor market. This type of migration usually occurs due to conflict, persecution, or natural disasters, requiring substantial humanitarian aid and support for integration, which can negatively affect a host economy. We do not often see thousands of immigrants coming in short time period for economic reasons. However, although the Russian invasion itself caused Ukrainians to flee their own country (suggesting that this will purely bring costs to the Polish economy), Ukrainians were not forced to stay in asylums. Thanks to the Temporary Protection Directive, Ukrainian citizens could participate in the Polish labor market, receive a housing, send

children to school and even open a bank account (European Commission, 2022). Many of the immigrants seized this opportunity, started working, and therefore, potentially contributing to the Polish economy. Consequently, this setting provides a unique research opportunity- refugees that can be studied the same way as economic immigrants.

What makes this research substantially different from similar studies from a methodological point of view, is that data has been gathered on an aggregated level, rather than through surveys. Therefore, there is no distinction between average salaries and unemployment rates of natives versus immigrants. The effect is measured for total average salaries and total average unemployment rates so that the focus is on the country as a whole, rather than selected groups. This approach has upsides and downsides. At the cost of pointing out which group is affected by how much, I present a clear overview from the entire economy's perspective. Despite this difference, the expected outcome still coincides with existing literature. The reason behind this is that natives still serve a strong and overwhelming majority of the population. Unfortunately, the latest data of how many people residing in Poland are Polish come from 2021 which is before the war outbreak. In that year, the share of Poles residing in Poland was 97.7% (Business Insider, 2023) Considering that the population of Poland was around 38 million in 2021, it can be safely assumed, that the influx of around 1 million Ukrainian immigrants did not shift the demographic composition of the country to the extent that is high enough to make this distinction between natives and immigrants necessary. In other words, the results that would have been obtained just for natives, most likely align with the results of the country as a whole.

As a concluding remark of this section, the research provides a comprehensive understanding of the consequences of mass Ukrainian immigration that may help politicians to make decisions and design policies. The rest of the paper is structured as follows:

Section 2 covers the discussion of existing literature on the effect of immigration on host economies. Section 3 introduces the data sources as well as variables used in this research. Section 4 explains methodology. Section 5 presents the results and interpretation. Section

6 shows potential mechanisms behind the findings. Section 7 focuses on the alternative approach the study is suitable for, with the results and interpretation. Finally, section 8 concludes the research.

2. Literature Review

2.1 The Cornerstone of This Research: Mariel Boatlift

The foundation and inspiration for studying the effects of Ukrainian immigration on the Polish economy is the groundbreaking research paper presented by David Card (1990) titled "The Impact of the Mariel Boatlift on the Miami Labor Market". It became very influential, as the findings were challenging the prevailing economic theory. To provide some historical context, Card (1990) studied the effects of mass immigration of Cubans on Miami's labor market shortly after Fidel Castro- Cuban president, opened the borders. In 1980, around 125 000 Cubans arrived to the US by boats, increasing Miami's labor supply by 7% almost "overnight". At the time, it was commonly believed, that an influx of low-skilled immigrants would increase labor supply, leading to lower wages and reduced employment opportunities for native low-skilled workers because of intense competition. Surprisingly, by adopting a difference- in- difference methodology (where Miami was a treated city, while other cities served as control group), Card (1990) discovered that the immigration of Cubans had little to no impact on Miami's labor market, questioning common belief and spurring researchers' interest in studying the effect of migration.

In the context of Ukrainian immigration to Poland, this is an extremely similar scenario. Because Ukrainian immigrants were allowed to work upon arrival, labor supply in Poland drastically increased "overnight". Therefore, many Polish workers occupying low- wage jobs started to worry about their employment and wages. Was it then unjustified?

Borjas (2017) re- examines Card's findings by focusing on specific subgroups which are mainly low- skilled workers and high- school dropouts. He argues that this group of workers should be in the spotlight as they have the most similar capabilities to "Marielitos". Borjas (2017) finds that the wages of high school dropouts in Miami experienced a significant

decline, both in absolute terms and relative to the wages of high school and college graduates. What is surprising is that this decline in the average wage for the least skilled workers in Miami was extremely large, with reductions ranging from 10% to 30%.

If the findings of Borjas (2017) are meaningful, this could suggest that low- skilled Polish workers indeed experienced a decline in their wages, as because of the language barrier, Ukrainian immigrants are expected to occupy such sectors. Moreover, given the circumstances of sudden relocation, even high- skilled immigrants can potentially occupy low- wage sectors at first as these types of jobs are faster and easier to find.

However, Peri and Yasenov (2019) heavily critique Borjas' (2017) research suggesting that his findings are far from a causal interpretation. For example, authors question the appropriateness of control groups as cities included by Borjas (2017) can be significantly different from Miami, sample selection as Borjas (2017) considers only non- Hispanic males aged 25-29, data reliability as the CPS survey that Borjas (2017) uses has very small sample sizes, or the timing of alleged wage drops that does not coincide with the Mariel Boatlift.

Peri and Yasenov (2019) conduct their own study and exploit the Synthetic Control Method in their research. Similar to Card's (1990) results, they find no significant effect of immigration on wages and unemployment of natives. Namely, Peri and Yasenov (2019) findings indicate no significant disparity in the labor market outcomes for high school dropouts between Miami and its Synthetic Control after 1979. There were no notable differences in wages or in unemployment rates for high school dropouts between 1980, immediately following the boatlift, and 1983. Following that, they confirm what Card (1990) had discovered almost 30 years earlier. Moreover, authors suggest potential mechanisms that can justify these findings such as complementarity, technology improvements, or increase in demand and efficiency.

Following the work of Peri and Yasenov (2019), the Synthetic Control Method has become an inspiration for the underlying strategy of finding the potential effects of Ukrainian immigration on salaries and unemployment in Poland. Nevertheless, there is one major

difference in my approach compared to Peri and Yasenov (2019). Namely, the data used in this research is gathered on an aggregate level, opposed to the survey data that authors had access to. Therefore, some divisions are impossible such as division by education level of Ukrainian Immigrants. This seems problematic at first, because aggregate wages might not be suitable for interpretation, but I address this problem by splitting the findings by average wages in different industries (those that are most likely chosen by Ukrainians). Following the fact that the data is gathered on an aggregated level, the outcomes in my research are total wage and total unemployment- without the distinction between natives and immigrants. Despite this difference, the effects of Ukrainian immigration on average wages and unemployment in Poland are expected to be in line with Card's (1990) and Peri and Yasenov (2019) findings as natives still represent the overwhelming majority of the population.

2.2 Evidence from Other Papers

In addition to findings on the Mariel Boatlift, numerous other studies have examined the impact of migration on the economic outcomes, offering diverse perspectives and methodologies. Ottaviano and Peri (2012) studied the effects of immigration on wages in the US and they found a small, but significant degree of substitutability between natives and immigrants within the same employment groups. The authors show that immigration has a positive impact on wages of natives of around 0.6% increase which points out high economical insignificance. Even after allowing for imperfect substitutability between workers, they conclude that if there is any negative effect, only the least educated natives are vulnerable with wage effects varying between –2.1% to +1.7%.

Similar findings are presented by Tumen (2016), who studied the effects of an influx of Syrian refugees on the Turkish labor market. Namely, there was no significant effect on wages in both formal and informal jobs. The author also studies the effect on the employment of Turks. Here, opposed to other research papers that followed Card's (1990) narrative, he found that the employment to population ratio decreased by 1.8 percentage points. However, this slightly negative effect is mainly driven by a reduction in employment in informal jobs. In fact, employment in formal jobs increased by 0.46 percentage points. In the context of the

Ukrainian influx effects on the Polish labor market, this is important as data gathered in this research considers only formally employed population. Therefore, the increase of 0.46 percentage point in employment suggests low, but existent economic significance.

Another piece of evidence comes from Abramitzky et al. (2023), where they investigated the effects of immigrant border closure on the US workers. Although the authors examine immigrant reduction, which is opposite to the case study in this research, they still find no effect on the income of natives. This can suggest that a similar negligible effect would be expected regardless of whether immigrants come in or go out. Moreover, Abramitzky et al. (2023) put an emphasis on quick adaptation to new circumstances through, for example, internal US migrants (or Canadians and Mexicans that were not affected by the policy) replacing foreign- born immigrants and therefore not affecting net employment to any extent. This clearly shows that immigrant flows do not affect total employment, where there is a high degree of substitutability. Arguably, in the case of Poland, there might be some degree of substitutability, as according to Eurostat (2021), 16% of Polish workers are employed in physically- demanding jobs, which ranks it second after Greece in the entire EU. At the same time, these types of jobs are going to be the most common choice of immigrants as they do not require Polish language fluency. Nevertheless, the authors notice a decrease in the employment in rural areas where farmers invested in capital- intensive solutions after the immigration quota was implemented. However, when considering the opposite scenario which is Ukrainian immigration to Poland, I find it extremely unlikely that farmers or any other employers would switch from capital- intensive solutions that already exist to labor-intensive solutions when faced a mass immigration (which can increase employment).

So far, the literature discussed is rather consistent and points out that there is negligible to no effect of immigration on economic factors in a host country. However, there are multiple research papers that provide evidence of significant changes, and it is crucial to discuss them, so impartiality remains, and the literature discussed is not tailored to the presumed thesis. On of the convincing examples is a study conducted by Dustmann et al. (2017), where the authors investigate the consequences of the unexpected inflow of Czech workers

to Germany alongside the border, which followed the "commuting" policy that allowed German neighbors to freely cross it. By implementing "distance to border" as the instrument, they find that an increase in the inflow of Czech workers by 1 percentage point decreases the wages of Germans by 0.13%, both statistically and economically significant. Total employment, which is also the outcome in my research, increases by 0.07% suggesting low economic significance (the employment of Germans in the affected regions decreases by 0.93%, but given that my research considers total employment only, this is a less relevant finding). The authors argue that this is justified by hiring declines, rather than job losses. In the case of Ukrainian immigration to Poland, this is infeasible to verify as the distance to border does not serve as a good instrument. The reason behind it is not meaningful first stage, as the distance to border did not play any important role in the destination choice of Ukrainian immigrants. In fact, regions that share the border with Ukraine received the lowest number of immigrants. The pattern shown on Figure 4 later in the methodology section clearly suggests that the destination decision was primarily driven by economic conditions in each region rather than the distance. Moreover, distances between regions in Poland are relatively small. It takes around 2 hours of car drive from Lublin (a large city that is near the border) to reach Warsaw, which is the most prosperous city in the country. On top of that, public transportation is extremely cheap as a one- way train ticket on this route (without any discount) can be bought for less than 40 PLN (≈9.35 EUR). Therefore, Ukrainian immigrants are very mobile, and we do not observe a higher density of their population in regions close to the border. Additionally, it is also not clear to what extent the results obtained by Dustmann et al. (2017) can be meaningful. On the one hand, Germany and Czech Republic are the closest to Poland in geographical terms, on the other hand, the "commuting" policy took place in 1991 which was just after the fall of the Iron Curtain and Berlin Wall. These "unique" circumstances can efficiently influence the results. Furthermore, the long- lasting footprints of the Soviet Union are still visible, which makes Poland not perfectly comparable to Western Europe even today.

2.3 Economic Theory on the Destination Choice

Jennissen (2004) provides a comprehensive summary of existing economic theories of migration. The first one, and at the same time- the oldest one is the neo- classical theory of migration, where the wage differences between countries explain the migration decision. Although, the migration decision itself for Ukrainians was certainly not explained by wage differences, but survival, the decision on the destination country was not random. In this decision, wage differences could play a crucial role. Apart from Poland, Ukraine shares a border with other European countries, and the differences in immigrants received there differ substantially. As Eurostat (2023) shares, at the end of August 2023, Poland had nearly 1 million Ukrainian immigrants, while Slovakia slightly over 100 thousand, Hungary less than 40 thousand and Romania around 140 thousand. Can wages explain these differences in immigrants received? Potentially not. Although Poland has higher wages than Romania, it also has around the same average wage as Hungary, and slightly lower average wage than Slovakia (World Data, 2024). It is unlikely that average wages themselves were a decisive factor of the country of destination. It is also unlikely that the degree of hospitality of the receiving country was a decisive factor, since Slovakia, Hungary and Romania are all EU members and therefore, the temporary protection clause considers them all.

Therefore, there might be a need for another theory- namely, dual- labor market theory that was first introduced in by American economists Peter B. Doeringer and Michael J. Piore (1970). In the context of migration, it states that it is mostly caused by the “pull” factors of host countries (Jennissen, 2004). The theory indicates that labor markets in these countries can be divided into primary and secondary segments. The primary segment features capital-intensive production and mainly high-skilled workers, whereas the secondary segment is marked by labor-intensive production and mainly low-skilled workers. The dual labor market theory posits that international labor migration arises from the demand for labor in the labor-intensive segment of developed societies (Jennissen, 2004; Massey et al., 1993; Piore, 1979) which Poland in fact is. That said, assuming that the majority of Ukrainians do not speak

Polish, their primary occupation choice will be labor- intensive sector that does not require language fluency.

Like in Western European countries, Poland experiences a similar trend of extremely scarce labor- intensive sectors which can effectively “pull” Ukrainian immigrants that choose Poland over the rest of the neighbors when fleeing the country. It is reasonable to assume, that given the smaller size of Slovakia and Hungary, the demand for labor- intensive labor will be lower relative to Poland. In the case of Romania, the country is relatively poorer than other neighbors, making it a less attractive destination choice. Moreover, among the Ukrainian neighbors, Poland has the highest share of highly educated population (Eurostat, 2022) which can in turn cause the demand for unskilled labor to be the highest there.

Besides, it is extremely important to assume, that Poland serves as the “gate” to Western Europe, whereas the journey through other countries like Hungary or Romania would take significantly more time. Eurostat (2023) shows that in fact, it was Germany that received the largest number of Ukrainian immigrants, although it does not share a border with Ukraine.

The theory of world systems might play a crucial role in explaining the destination choice for Ukrainians as well. The theory states that existing relationships between the sending and receiving country can explain the migration destination. For example, the degree of international trade (Jennissen 2004; Chase-Dunn & Hall, 1994). In the context of Ukrainian immigration, this is extremely important as Poland is the second largest trade partner of Ukraine with 7.56% partner share. Only China is ranked higher with 12.13% partner share (World Bank, 2021). None of the other Ukraine neighbors is in top 5.

Finally, the network theory underlines the importance of existing networks in the destination countries such as presence of former immigrants. These connections, through the shared community origin, can facilitate access to foreign labor markets and increase the speed of assimilation (Massey et al., 1993). Before the war outbreak, Ukrainians served the largest share of all immigrants in Poland. According to Eurostat (2022), Poland had over 600 thousand Ukrainian immigrants in 2021, whereas the second place was held by Italy with

around 230 thousand immigrants, which is almost 3 times less. This can strongly suggest that Poland as a destination choice after the war outbreak, can also be explained by pre-existing networks and communities. Moreover, Poland and Ukraine were strongly tied in the past and therefore share a common culture. For example, the city of Lviv was within Polish borders for centuries. First, from 1349 to 1772 and then from 1918 to 1939 (Britannica, 2024).

3. Data

3.1 Data Sources

The data used in my research comes from 2 main databases: Statistics Poland (Główny Urząd Statystyczny- later referred to as GUS) and Social Insurance Institution (Zakład Ubezpieczeń Społecznych- later referred to as ZUS). GUS is a central government administration body responsible for collecting, storing, processing and publishing statistical data in Poland. The president of GUS is appointed and dismissed by the Prime Minister, and therefore, all the data published is representative and official. The data can be accessed on https://bdl.stat.gov.pl/bdl/start. ZUS is a state organizational unit responsible, among others, for determining social insurance obligations, determining eligibility for social insurance and assessing and collecting contributions for social insurance. Similarly to GUS, the president of ZUS is appointed and dismissed by the Prime Minister, and therefore, the data published is representative and official as well. The data can be accessed on https://psz.zus.pl/.

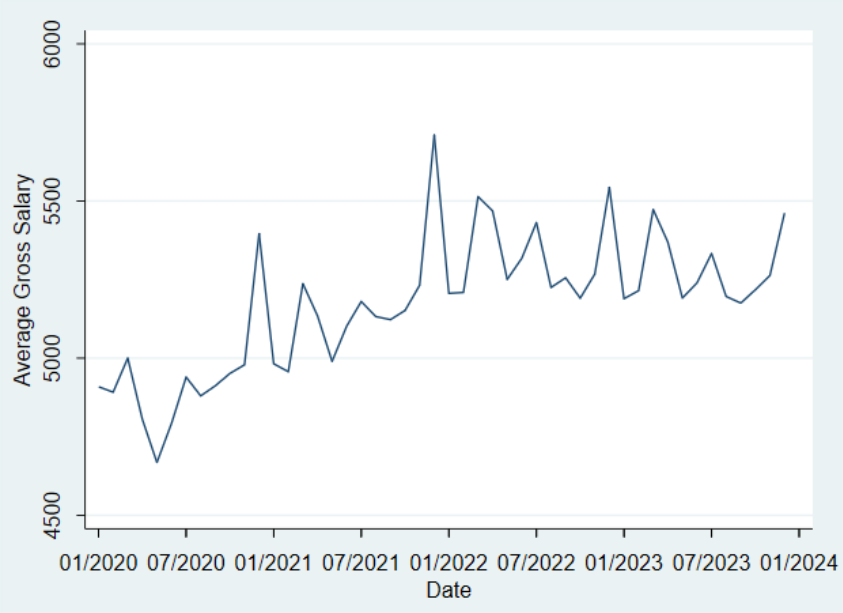
3.2 Outcome Variables

The scope of this research covers 2 outcome variables:

1: Average gross salary (AvgSalary): gathered in each of the 16 voivodeships in Poland, collected monthly from 1st January 2020 to 31st December 2023, expressed in Polish currency- Zloty (later also referred to as PLN- Polish currency code, where 1 PLN≈0.23 EUR), adjusted for inflation. As we can observe in Figure 2, average gross salary in Poland has been moderately rising with some fluctuations. That said, shortly after the beginning of the war- in February 2022, we can see that the trend has stabilized compared to 2020 and 2021.

Therefore, I want to investigate whether this slowdown can be correlated to the influx of Ukrainian refugees.

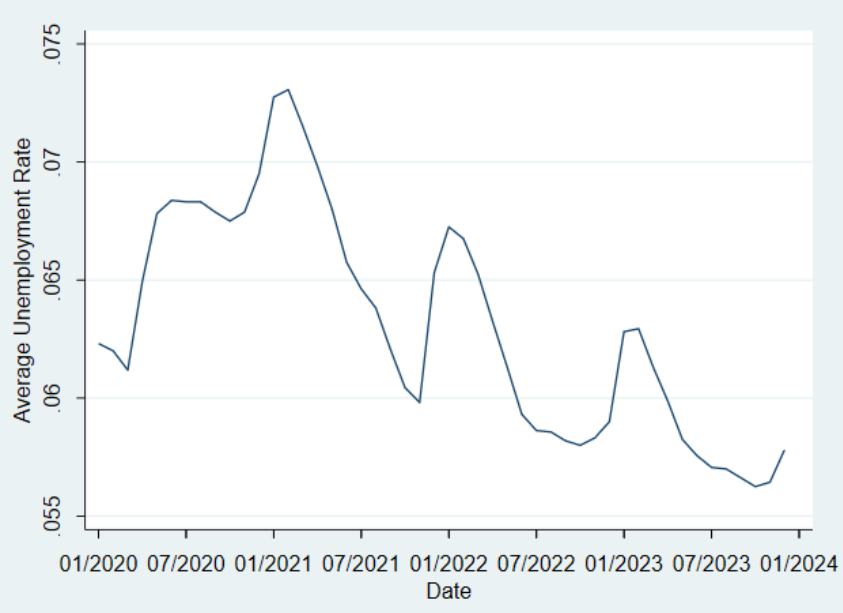
Figure 2. Average gross salary in Poland (constant salary).



Note: The average salary has been calculated by averaging out salaries in each of the 16 voivodeships in a given period. Average salaries are adjusted for inflation. Values on the y- axis are expressed in PLN.

2: Average unemployment rate (AvgUn): gathered in each of the 16 voivodeships in Poland, collected monthly from 1st January 2020 to 31st December 2023, expressed as a percentage (the registered unemployment rate was calculated as a ratio of the number of registered unemployed individuals to the number of economically active population). As we can observe in Figure 3, average unemployment rate in Poland has been decreasing, but with high fluctuations. In the period of the war outbreak, we can observe that the unemployment rate is decreasing. Therefore, I want to investigate whether this decrease can be correlated to the influx of Ukrainian refugees.

Figure 3. Average unemployment rate in Poland.



Note: The average unemployment rate has been calculated by averaging out unemployment rates in each of the 16 voivodeships in a given period. Values on the y- axis are expressed as a ratio (.055 = 5.5% etc.).

3.3 Treatment Variable

The variable of interest in the context of this research is the event of mass migration of Ukrainians to Poland due to the war outbreak. Therefore, the period has been split by the treatment to pre- and post- war period in February 2022 which is roughly in the middle of the studied periods. This is expressed as a binary variable that takes value of 0 before the treatment and 1 after the treatment.

3.4 Control Variables

For the purpose of minimizing the risk of omitted variable bias, I include a set of controls that might explain outcomes (average gross salary and average unemployment rate) besides the treatment (influx of Ukrainians). Below I provide the list of potential predictors with the variable name in the bracket.

1. Average age (Age): gathered in each of the 16 voivodeships in Poland prior to the war outbreak and expressed as the average of the entire population in a given region. Because it is expected to have a non- linear relationship with average gross salary

and average unemployment rate, the effects might be ambiguous. Namely, the older individuals in each region get, the greater the salary and the lower the unemployment. However, at some point, when individuals get old enough, they retire, and the salary decreases. Regarding unemployment, this is less problematic as retired individuals are not considered when finding the unemployment rate.

2. Average Sex (Sex): gathered in each of the 16 voivodeships in Poland prior to the war outbreak, expressed as a percentage based on the ratio of males to the total population in each region. Based on existing literature, a higher ratio of males in the total population is expected to increase average gross salary and decrease average unemployment rate, as males on average earn more and are employed more often (Goldin, 2014).
3. Urbanization (Urbanization): gathered in each of the 16 voivodeships in Poland prior to the war outbreak and expressed as a binary variable that takes a value of 1, if there is at least one city in the region with over 300 000 inhabitants and a value of 0 otherwise. Including this predictor is important as larger urban areas often offer higher salaries and the unemployment there is lower because of plenty of job opportunities.
4. Local amenities (Amenities): gathered in each of the 16 voivodeships prior to the war outbreak and expressed as the total number of cinemas, museums and public libraries. This variable serves as a proxy for running businesses in each region. The number of these local amenities is expected to increase average salaries and decrease the unemployment rate as higher competition among them increases wages for employees as well as creates job opportunities for the unemployed. Not only local amenities affect wages and unemployment themselves, but they also attract conventional businesses to open in the nearby area (like grocery stores). Additionally, they boost tourism and drag the attention of highly skilled workers that choose these places for their homes. This can result in a boom in the local economy, higher wages and lower unemployment.

5. GDP per capita (GDPpercapita): gathered in each of the 16 voivodeships in Poland prior to the war outbreak and expressed in Polish currency- Zloty. The correlation between the average gross salary and GDP per capita is expected to be positive. We do observe a divergence across industries and professions, but it holds in general (Luis Angeles, 2008). The correlation between the average unemployment rate and GDP per capita is expected to be negative. Higher GDP per capita gives an individual incentive to be employed as it reflects better economic conditions in a given region.
6. Population density (PopDensity): gathered in each of the 16 voivodeships in Poland prior to the war outbreak and expressed as a number of people per square kilometer. The relationship between the average gross salary and population density is expected to be positive. According to Belloc et al. (2023), real wages significantly increase when population density increases. The correlation between the average unemployment rate and population density is expected to be negative since higher population density usually generates demand for more services which in turn creates job opportunities.
7. Distance to Ukrainian border (DisToBor): gathered in each of the 16 voivodeships, expressed in kilometers from the border to the largest city in each region. The correlation between the average gross salary and distance to the Ukrainian border is expected to be positive. At the same time, the correlation between the average unemployment rate and distance to the Ukrainian border is expected to be negative. These 2 assumptions are reasoned by the fact, that Western Poland is typically wealthier as it is more under Western Europe influence, while Eastern Poland is more under Eastern Europe influence and is relatively poorer. Inequalities after the fall of the Iron Curtain are visible to this day and it is worth accounting for it.
8. Education level (ExamPassing): gathered in each of the 16 voivodeships in Poland prior to the war outbreak, expressed as a percentage of people who successfully passed the Polish SAT equivalent (the exam is the same and takes place at the exact same time for all students in their final year of high school). This variable serves as a proxy for education level in a given voivodeship as simply looking at the number of

schools may not be meaningful in the context of education level. Therefore, this might be an important factor affecting both salaries and unemployment, as well as refugee' destination choice (this is particularly important as the majority of Ukrainian refugees were mothers with children). The correlation between the average gross salary and educational level is expected to be positive. Namely, Harmon et al. (2003) estimate that average returns to schooling is around 6%-9% internationally. Contrarily, the correlation between the average unemployment rate and educational level is expected to be negative. Núñez and Livanos (2010) found that on average, the higher the education level, the lower the chance of unemployment both in the short run and the long run.

9. Cost of living (CostOfLiving): gathered in each of the 16 voivodeships in Poland prior to the war outbreak and expressed as the average price (in Zloty) of square meter of an apartment. This variable serves as a proxy for the cost of living, as housing prices differ significantly region to region and can affect average salary or unemployment. On the other hand, the rest of the costs like food, fuel or fast-moving consumer goods remain similar if not the same across all voivodeships. The correlation between the average gross salary and cost of living is expected to be positive. Moretti (2013) found that at least 22% of the increase in the college premium is accounted for by the differences in the cost of living. In other words, college graduates are attracted to larger urban areas that have higher costs of living, but they also pay more. The correlation between the average unemployment rate and the cost of living is expected to be negative. The logic behind it is that if the cost of living increases, unemployment must decrease, as some people that were initially unemployed need to start working to cover these higher costs.
10. Past trends: To capture the effect of past salaries and past unemployment rates, I also account for all the historical values (starting from January 2020) of these outcomes as they might be good predictors.

3.5 Descriptive Statistics

Table 1 presents the descriptive statistics of abovementioned variables to create a clear overview of social and economic conditions in Poland.

Table 1. Descriptive statistics.

Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
AvgSalary [PLN]	768	5880.385	988.112	4056.3	9029.77
AvgUn [%]	768	.063	.018	.028	.108
EmployedUk [Nb]	768	40062.625	34497.746	4438	186927
Age [Years]	768	42.637	.285	42.041	43.089
Sex [%]	768	.484	.003	.476	.49
Urbanization [%]	768	.625	.484	0	1
Amenities [Nb]	768	572.125	257.934	260	1165
GDPpercapita [PLN]	768	62591.938	14795.799	47611	107711
PopDensity [Nb]	768	126.706	71.95	56.9	354.8
DisToBor [Km]	768	470.188	204.513	146	885
ExamPassing [%]	768	.774	.0197	.748	.821
CostOfLiving [PLN]	768	5580.25	1273.466	3902	8341

Note: The variable "Employed Uk" is not directly used in main analysis but will be required for the first stage analysis and data visualizations. It stands for the number of employed Ukrainians and is expressed as a headcount. Values in the brackets represent measurement unit.

As can be observed in Table 1, the average gross salary in Poland is around 5900 PLN (≈1382 EUR) and the average unemployment rate is roughly 6.3%. The number of employed Ukrainians is in the range between over 4000 people to over 180 000 people depending on the region and time. The average age of the Polish population is around 42.5 years old and around 48.4% of the population is male. 62.5 % of the regions are considered as highly urbanized. The number of local amenities varies between 260 and 1165 with the average of 572 for all regions. The average GDP per capita is around 63 000 PLN (≈14 671 EUR). The population density varies between roughly 57 people per square kilometer to almost 355 people per square kilometer with a mean of around 127. The average distance from a major city to the Ukrainian border is 470 kilometers. The average rate of passing exams that

represents the education level is 77.4% with 74.8% being the lowest and 82.1% being the highest depending on the region. Finally, the cost of living is around 5600 PLN (≈1299 EUR).

4. Methodology

4.1 Synthetic Control Method

In order to find the effect of migration on salaries and unemployment, this research exploits a relatively new and creative approach which is called the Synthetic Control Method (SCM). This method has been initially introduced by Alberto Abadie and Javier Gardeazabal (2003) in their work "The Economic Costs of Conflict: A Case Study of the Basque Country" published by the American Economic Association. The main purpose of this strategy is to measure the effect of aggregate interventions or events. The intuition behind is simple: we have 2 periods, pre- treatment and post- treatment and J+1 regions. Treatment X affects a region i's outcome Y in the second period. Other values of outcome Y in J regions are different from the region i. In the first period, we find a weighted sum of outcome Y across J regions in such a manner that this weighted sum is approximately equal to outcome Y in the region i. Then, these weights are used to calculate the weighted sum of outcomes Y across J regions in the second period, which now becomes the estimated counterfactual of the region i's outcome Y in the absence of treatment X. Therefore, the effect of treatment X on outcome Y is the value of the region's i outcome Y in the second period minus its counterfactual value in the second period (Lu, 2021).

The econometric specification of the model is as follows:

$$Y_{i,t} = Y_{i,t}^{N} + D_{i,t}$$

$$Y_{i,t}^{N} = \theta_t Z_i + \lambda_t \mu_i + \varepsilon_{i,t}$$

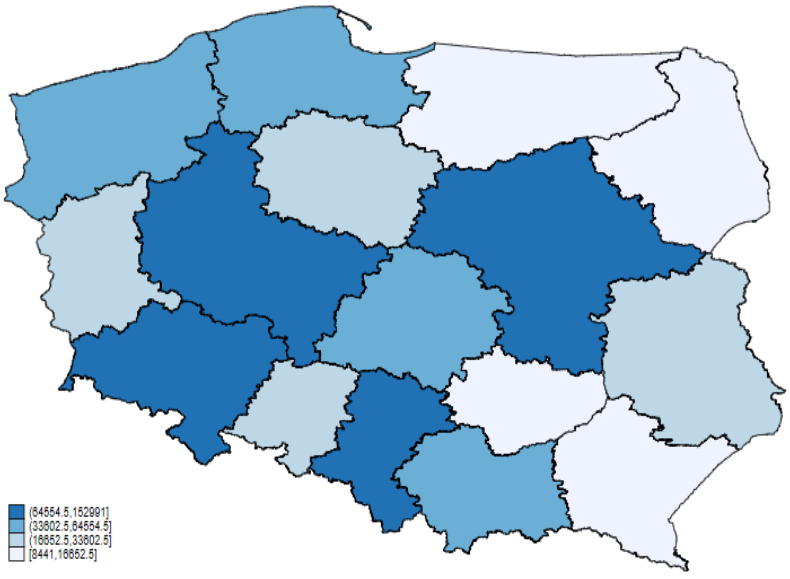
Where $Y_{i,t}$ is the observed outcome, $Y_{i,t}^{N}$ is the counterfactual outcome, $D_{i,t}$ is the treatment effect, θ_t is a vector of observed common factors, Z_i is a vector of observed factor loadings, λ_t is a vector of unobserved common factors, μ_i is a vector of unobserved factor loadings and $\varepsilon_{i,t}$ is an idiosyncratic error term.

Therefore, the purpose of SCM is to identify the weight w_i^* for any $i \in \{1,2,\dots,J\}$ in such a manner that $Y_{0,t} \approx \Sigma_{j=1}^{J} w_j^* Y_{j,t}$ for $t \leq T_0$ and $Z_0 \approx \Sigma_{j=1}^{J} w_j^* Z_j$ where 0 represents the treated region. The counterfactual of the treated region is $Y_{0,t}^N = \Sigma_{j=1}^{J} w_j^* Y_{j,t}$, the pointwise estimator becomes $\overline{D}_{0,t} = Y_{0,t} - \Sigma_{j=1_j^{\overline{w}}} Y_{j,t}$ and finally we obtain the average treatment effect estimator $(T - T_0)^{-1} \Sigma_{t=T_0+1}^{T} \overline{D}_{0,t}$ (Lu, 2021).

4.2 Treated and Control Groups

The first step of the SCM application to Poland- Ukraine migration circumstances is the identification of treated and control groups. To do so, I use the data on insured Ukrainians in Poland, because in order to be employed, pension insurance is mandatory. At the same time, it is extremely unlikely that an individual is insured while being unemployed, especially freshly after arrival. Therefore, the number of insured Ukrainians serves as a proxy for employed Ukrainians.

Figure 4. Number of insured Ukrainians in different voivodeships in Poland.



Note: In this particular figure, number of insured Ukrainians is a headcount 3 months after war outbreak. The data has been retrieved from ZUS.

The highest level of administrative aggregation in Poland is the division into 16 voivodeships. As Figure 4 shows, 4 regions have been particularly impacted by mass immigration and have

been marked with a dark blue color. Namely Masovian (middle right), Greater Poland (middle left), Lower Silesian (bottom left) and Silesian (bottom right). However, these 4 regions are not comparable to the control group as on average, they have a higher GDP per capita, a higher population density, etc. Therefore, Greater Poland will serve as the treated region when finding the effect of immigration on the average gross salaries in Poland since its average gross salary is the most similar to the control regions (see Figure 14 in the Appendix). Therefore, I can avoid the situation where average salaries in the treated region are above all regions in the control group, and only the "second best" region becomes a control group with the weight of 1. Similarly, Lower Silesian will serve as the treated region when finding the effect of immigration on the average unemployment rate in Poland since its average unemployment rate is the most similar to the control regions (see Figure 15 in the Appendix). When one of these 4 impacted regions is a treated one, the others are excluded from the analysis to minimize the risk of biased estimates resulting from including the impacted region in the control group. Other regions will serve as a control group (aka Donor Pool).

In the scope of this research, the SCM model specification can be rewritten as follows:

1. In order to measure the effect of mass immigration on the average gross salary:

$$AvgSalary_{i,t} = AvgSalary_{i,t}^{N} + D_{i,t}$$

$$AvgSalary_{i,t}^{N} = \theta_t Z_i + \lambda_t \mu_i + \varepsilon_{i,t}$$

2. In order to measure the effect of mass immigration on the average unemployment rate:

$$AvgUn_{i,t} = AvgUn_{i,t}^{N} + D_{i,t}$$

$$AvgUn_{i,t}^{N} = \theta_t Z_i + \lambda_t \mu_i + \varepsilon_{i,t}$$

Where $D_{i,t}$ is the event of mass immigration in the region i at time t, θ_t is the set of observed common factors at time t such as immigration policy or minimum wage policy, Z_i is the set of observed factor loadings such as sex, age, education level, urbanization level or number

of amenities in region i, λ_t is the set of unobserved common factors at time t such as mass media propaganda in the national TV, μ_i is the set of unobserved factor loadings in region i such as prejudice towards immigrants, and $\varepsilon_{i,t}$ is the idiosyncratic error term.

4.3 Assumptions and Limitations

There are several assumptions that must be held true to ensure the validity of this strategy. The verification of each of the assumptions is based on the SCM Stata Guide prepared by Lu (2021).

First, the donor pool must be comparable. This is indeed the case as separate regions in Poland do not have any decisiveness in immigrant- specific policies as well as salaries restrictions because the same policy applies to the entire country equally. Moreover, although there are some differences in the standard of living across these regions, the country as a whole is fairly similar and homogenous with just a few exceptions (for example the city of Warsaw stands out). According to World Bank (2021), the Gini Index for Poland was 28.5 which translates into relatively low income inequality. Nevertheless, in order to minimize the risk of regions being incomparable, I chose treated regions from the impacted ones that are most similar to the control group. Using all 4 regions together as a treatment would result in an incomparable donor pool.

Second, there cannot be any interference between the outcome Y in the treated region and any outcome Y in the control regions at any time. This also holds as both average salaries and unemployment rates in the treated regions are unlikely to affect any of these outcomes from the donor pool and vice versa. Again, if average gross salaries increase, this usually happens at the country level and is not region specific.

Third, there cannot be any anticipation. This means that outcome Y cannot be affected in the pre- treatment period. This is expected to hold as well. It is extremely unlikely that markets would respond with different salaries or that we can observe some hirings and firings before the mass immigration took place. Awareness of the potential hospitality for

Ukrainian refugees was very low to the very last moment before the war outbreak. The decision of opening the border for Ukrainian refugees was made “overnight”.

Fourth, there must be sufficient pre- and post- treatment periods. This requirement is arguably met, as 48 periods in total are analyzed (4 years with 12 months each) and the immigration event occurs in period 26, which is fairly in the middle.

Lastly, the Convex Hull Condition is required. What this means is that the weights of the regions are non- negative and sum to one. This is indeed the case as can be seen in the Appendix section in Table 5 and Table 8. However, what can be problematic is the sparsity of the weights. Ideally, the distribution should be equal to a greater or lesser extent to avoid overfitting. However, Table 5 and Table 8 show that this distribution is not ideal, potentially questioning the relevance of the donor pool.

What is interesting about the Synthetic Control Method, is that the parallel trend assumption does not need to hold. Since the outcomes in the donor pool are weighted according to their “relevance”, the tool creates a “perfect” synthetic control that matches the pre- treatment period of the treated region. Therefore, each of the control units can be different from the treated unit in this respect.

Nevertheless, this research has some limitations that must be addressed. Most importantly, all regions received the treatment to some extent. Therefore, treated voivodeships are the ones with the highest number of Ukrainians welcomed. The donor pool, however, is artificially forced to receive no treatment although this is not exactly true. This is a very strong assumption and a potential biasedness of the results. Nevertheless, the amount of immigrants received still differs significantly between the regions and this difference is believed to have an impact. Moreover, as mentioned earlier, immigrants have much mobility upon arrival. The distances between regions in Poland are small, and it is relatively cheap to commute. Therefore, the distance to the border seems to play a minor role in the destination choice for an immigrant. In the original paper by David Card (1990), Cubans could not commute that easily from Miami to Los Angeles or New York for instance, and for this reason,

other regions did not have to be forced to receive no treatment. This is not the case in this research which can potentially limit the credibility. Additionally, the donor pool is relatively limited due to data availability constraints.

5. Empirical Results

5.1 First Stage

Before I start with interpreting the results of the effect of the Ukrainian influx on salaries and unemployment in Poland, I first conduct a "first stage" analysis to see whether the war itself had an impact on the number of Ukrainian immigrants. To do so, I perform a fixed effect regression with the specification as follows:

$$\log E\,mployedUk_{i,t} = \beta_0 + \beta_1 war_{i,t} + \mu_{i,t} + \varepsilon$$

where $\log E\,mployedUk_{i,t}$ is the number of employed Ukrainian immigrants in Poland (transformed to natural logarithm to obtain the percentage change), $war_{i,t}$ is a dummy variable that takes a value of 1 after the war outbreak and 0 before the war outbreak, $\mu_{i,t}$ is the region and time fixed effects and $\varepsilon_{i,t}$ is the idiosyncratic error term. The results of this estimation present as follows:

Table 2. The effect of the war on Ukrainian immigrants in Poland.

VARIABLES	(1) log_EmployedUk
war	0.278***
	(0.00840)
Constant	10.12***
	(0.00581)
Observations	768
Number of Voivodeship	16
R-squared	0.593

Standard errors in parentheses

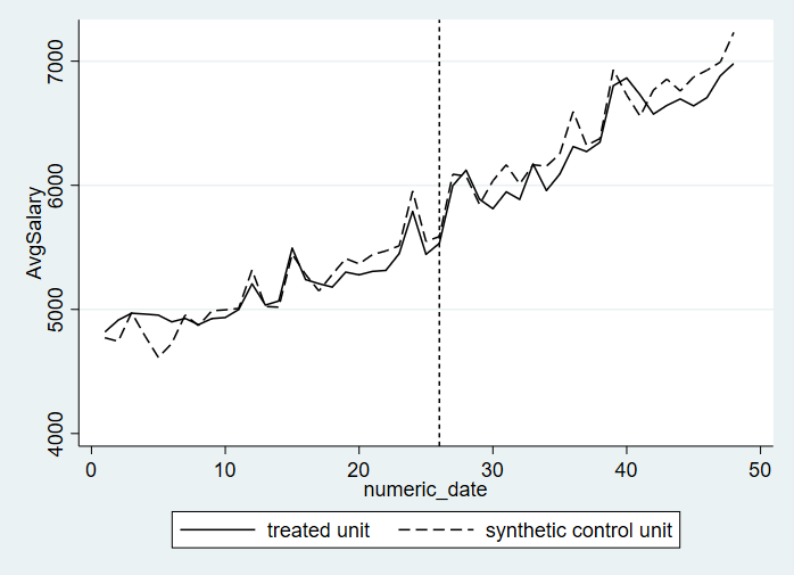
*** p<0.01, ** p<0.05, * p<0.1

As we can observe in Table 2, the war outbreak is positively correlated with the number of employed Ukrainians. Namely, after the war, the number of Ukrainians employed in Poland increased by 27.8% on average, significant at 0.01 significance level. Nevertheless, one must keep in mind, that this is only an association, since I do not control for any time- varying factors that might have influenced the number of employed Ukrainians. What is controlled for, is the time- invariant factors that influenced the number of employed Ukrainians. This is justified, because other factors than the war that might have influenced the immigration decision such as demographic structure or GDP per capita in regions in Poland, are kept constant in year 2021 to avoid reverse causality. Moreover, they are gathered on an aggregate level since there is no survey data used (for example, Sex is the average male to population ratio in year 2021 in the region i). Therefore, these variables are time- invariant and the fixed effects method is believed to capture any of this additional impact. The reason behind including this analysis is to show that the war outbreak is indeed positively correlated with immigrating Ukrainians so that further analysis of the effect of this immigration on economic outcomes is justified.

5.2 Average Gross Salaries

Figure 5 presents the results of mass Ukrainian immigration on the average gross salary in Poland. As mentioned in the Methodology section, the treated unit in this case is the Voivodeship of Greater Poland as it is the most comparable to the control group. At the same time, the Voivodeships of Masovia, Silesia and Lower Silesia are excluded to avoid the situation where regions that received the most Ukrainian immigrants are included in the control group.

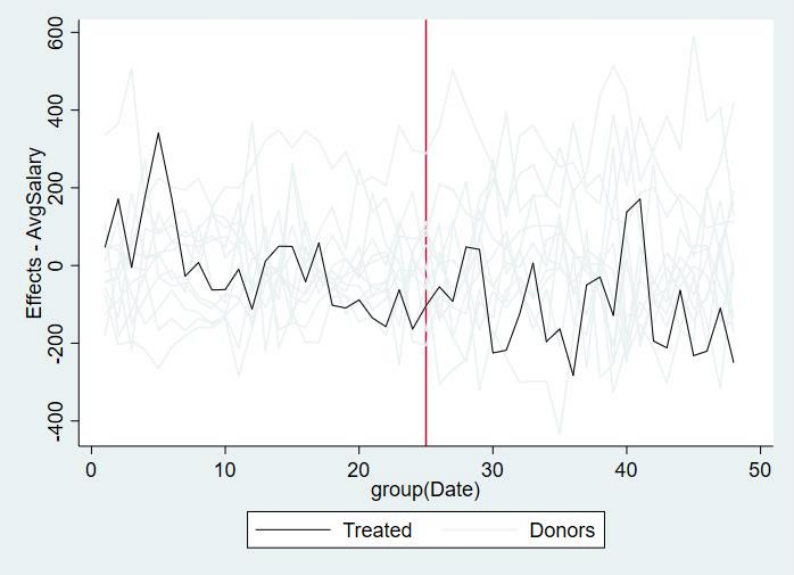
Figure 5. The effect of mass immigration on average gross salaries.



Note: The treated unit is the Voivodeship of Greater Poland. Date is represented by the numeric date where in total there are 48 periods (1 is 1st January 2020 and 48 is 1st December 2023), and the treatment takes place in period 26 (war outbreak). The average gross salary is represented by AvgSalary and is expressed in PLN.

As we can observe, there is not any observable deviation from the synthetic control group (See Table 5 in the Appendix on how weights have been assigned and Table 6 on the values of predictors in both units). Both the treated unit and the synthetic control unit follow the same path before and after the event of immigration to a greater or lesser extent. This indicates that the increased number of Ukrainians had no significant impact on the salaries in Poland. Nevertheless, to confirm it, I run a placebo test in Figure 6 which plots the placebo estimates and compares them with the estimated treatment effect on the treated region. The idea behind this analysis is that we obtain a distribution of permutations (all possible ways of re- arranging) through repeated re-assignment of the treatment to a control unit in the donor pool and estimating placebo effects in every iteration (Lu, 2021). The results would only be statistically significant, if we would observe "large" deviation of Greater Poland from the donor pool.

Figure 6. Placebo effects. Permutation distribution in average gross salaries.



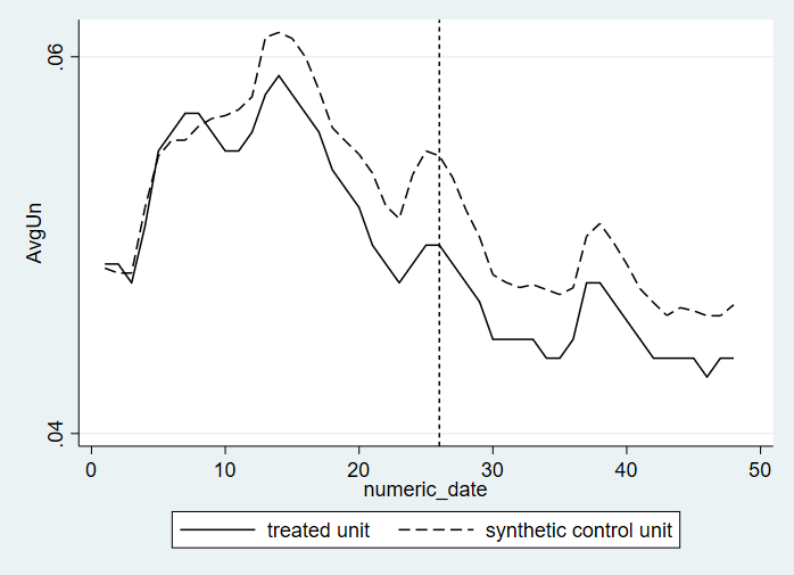
Note: The treated unit is the Voivodeship of Greater Poland. Date is represented by the numeric date where in total there are 48 periods (1 is 1st January 2020 and 48 is 1st December 2023), and the treatment takes place in period 26 (war outbreak). The average gross salary is represented by AvgSalary and is expressed as a deviation from baseline.

As we can observe in the figure above, there is not any significant deviation again. The treated voivodeship (Greater Poland) seems to be in the middle of the distribution before and after the treatment. I find ambiguous effects of mass immigration on average gross salaries where the sign depends on the time period, but none of the results are statistically significant (see Appendix Table 7). This amplitude varies between –283 PLN to +171 PLN which also indicates that these results are economically insignificant.

5.3 Average Unemployment Rates

Figure 7 presents the effects of mass Ukrainian immigration on the average unemployment rate in Poland. As mentioned in the Methodology section, the treated unit in this case is the Voivodeship of Lower Silesia as it is the most comparable to the control group. At the same time, the Voivodeships of Masovia, Silesia and Greater Poland are excluded to avoid the situation where regions that received the most Ukrainian immigrants are included in the control group.

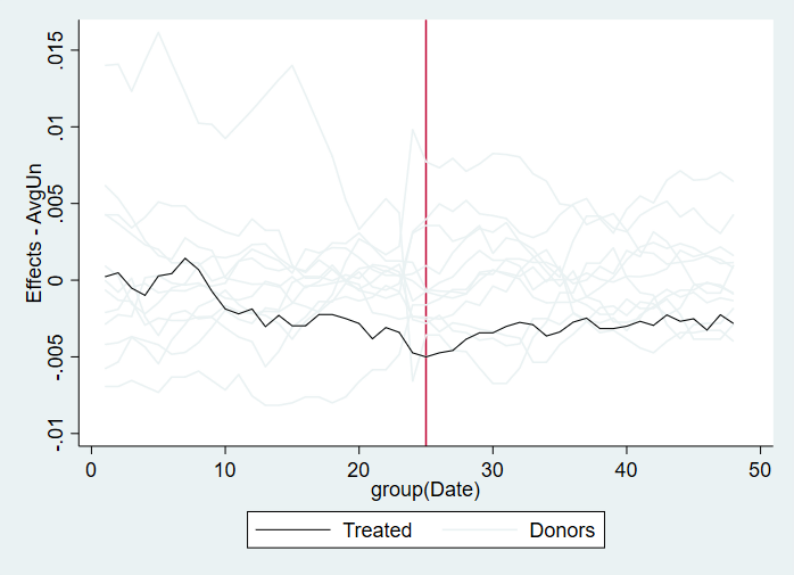
Figure 7. The effect of mass immigration on average unemployment rates.



Note: The treated unit is the Voivodeship of Lower Silesia. Date is represented by the numeric date where in total there are 48 periods (1 is 1st January 2020 and 48 is 1st December 2023), and the treatment takes place in period 26 (war outbreak). The average unemployment rate is represented by AvgUn and is expressed as a ratio (.06 = 6% etc.).

As seen in Figure 7, there is not any observable deviation from the synthetic control group. (See Table 8 in the Appendix on how weights have been assigned and Table 9 on the values of predictors in both units). Both the treated and control units follow the same path. However, in this scenario, we can observe that the average unemployment rate starts decreasing relatively earlier- around period 10 which is when 2021 begins. This can indicate that the treated region and the synthetic control region are not perfectly comparable and result in biased estimates. Therefore, I perform a placebo test again to check whether there is any significant difference.

Figure 8. Placebo effects. Permutation distribution in average unemployment rates.



Note: The treated unit is the voivodeship of Lower Silesia. Date is represented by the numeric date where in total there are 48 periods (1 is 1st January 2020 and 48 is 1st December 2023), and the treatment takes place in period 26 (war outbreak). The average unemployment rate is represented by AvgUn and is expressed as a deviation from the baseline.

Figure 8 suggests that there is not any significant deviation after the war outbreak. The treated voivodeship (Lower Silesian) is within the donor pool distribution range before and after the mass Ukrainian immigration. I find slightly negative effects of immigration on average unemployment rates but none of them is statistically significant, with one exception (See Appendix Table 10). Depending on the time period, the decrease in the average unemployment rates varies between –0.002 and –0.005 percentage points which indicates that these findings are also economically insignificant.

6. Mechanisms

6.1 Narrowing Down the Industries

The reason behind the insignificant results in both average gross salaries and average unemployment rates can be that because of the language barrier, Ukrainians do not compete in the same labor markets as Poles. Therefore, the large majority of industries

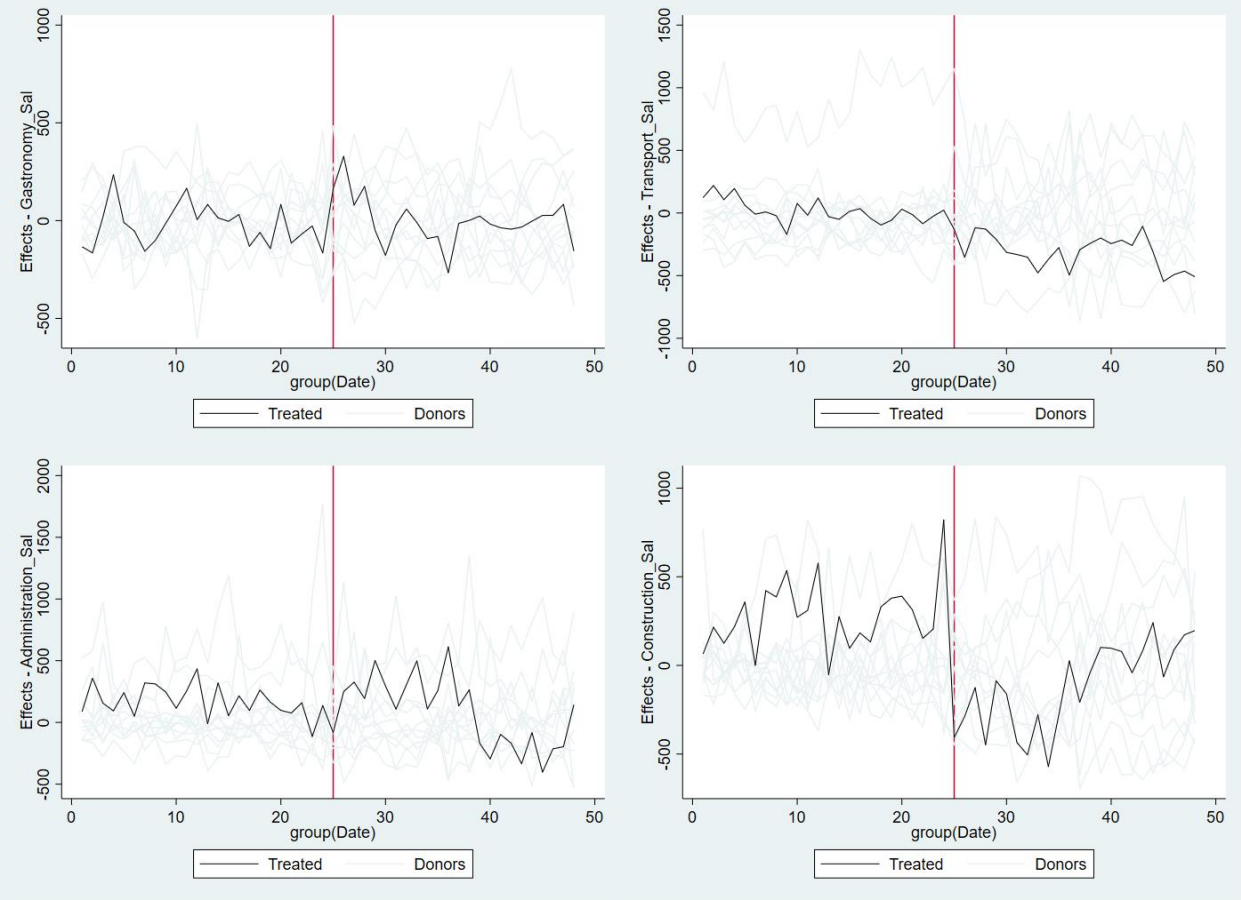
occupied by Ukrainian immigrants do not require Polish language fluency. These include, among others, the gastronomy, transport services, administration and construction industry (Wrona, 2019). Consequently, if the influx of the Ukrainian labor force indeed impacted average gross salaries in Poland, this would be most likely reflected in these industries. Therefore, in this section, I only investigate average gross salaries in industries that are most likely chosen by Ukrainian immigrants. I will apply the same methodology as in the general results, but now, splitting by industries. Figure 9 presents the effect of mass Ukrainian immigration on average gross salaries in the gastronomy sector, transport sector, administration sector and construction sector.

Figure 9. The effect of mass immigration on average gross salaries in gastronomy sector, transport sector, administration sector and construction sector.

Note: The treated unit is the Voivodeship of Greater Poland. Date is represented by the numeric date where in total there are 48 periods (1 is 1st January 2020 and 48 is 1st December 2023), and the treatment takes place in period 26 (war outbreak). The average gross salary in each sector is represented by Sector_Sal and is expressed in PLN.

As can be observed in the figure above, the gastronomy sector and the administration sector do not experience significant deviations from the synthetic control groups. In these 2 sectors trends coincide before and after the treatment. On the other hand, we can observe a decrease in average gross salaries in the transport sector and the construction sector. Regarding the construction sector, this large decrease in salaries occurred before the outbreak of war and mass immigration and for this reason, it cannot be the outcome of this event. The only interesting finding is a slight decrease in average gross salaries in the transport sector in the treated region. It is visible and occurs shortly after the influx of Ukrainians which can potentially suggest a negative impact of immigration on salaries in this sector. However, because 77% of adult Ukrainian immigrants are women (Serwis Rzeczypospolitej Polskiej, 2023), the potential impact narrows down further to industries that do not require significant physical strength and bring lower levels of risk. These sectors are indeed gastronomy and administration for which I found no effect. Nevertheless, as placebo tests show in Figure 10, none of the results are statistically significant.

Figure 10. Placebo effects. Simulated permutations in average gross salaries in gastronomy sector, transport sector, administration sector and construction sector.



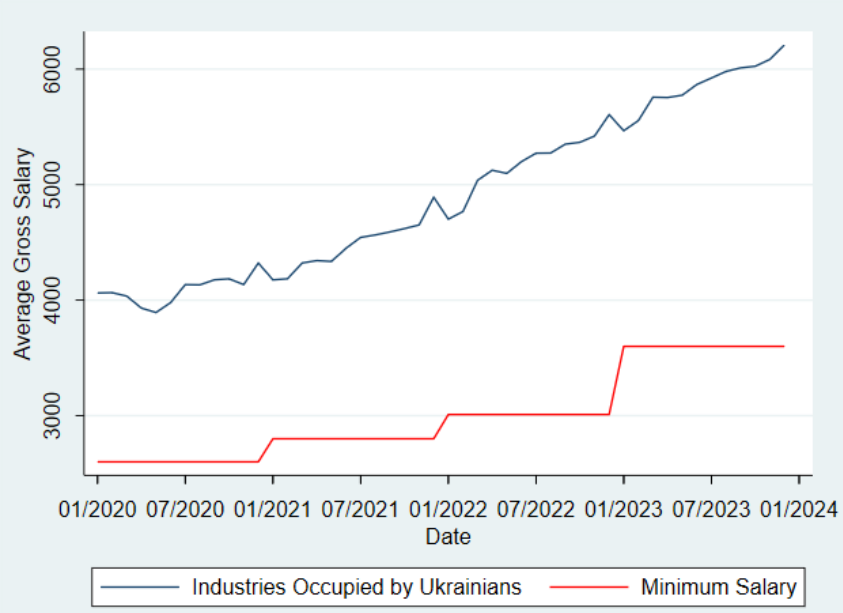
Note: The treated unit is the Voivodeship of Greater Poland. Date is represented by the numeric date where in total there are 48 periods (1 is 1st January 2020 and 48 is 1st December 2023), and the treatment takes place in period 26 (war outbreak). The average gross salary in each sector is represented by Sector_Sal and is expressed as a deviation from baseline.

The concerning decrease in the construction sector just before the war outbreak can be justified in a very simple way. Namely, this fluctuation is strongly correlated to the seasonality of this industry, rather than any anticipation of the war. Usually, when winter starts, all construction works are suspended until the weather improves. Consequently, average salaries in this sector are significantly reduced. The war started at the end of February, while the average salaries started decreasing in January almost 2 months earlier.

6.2 Minimum Wage Policy

Another important reason that can explain the insignificant effect of the influx of Ukrainian immigrants on salaries is the minimum wage policy that is present in Poland. It is intuitional to assume, that most of the jobs occupied by Ukrainian immigrants offer either minimum wage, or wage that is slightly above this threshold. For this reason, if the substitution of the labor force was expected to negatively affect salaries as Ukrainian workers are willing to work for less money, in some cases this might be impossible due to the minimum wage policy.

Figure 11. Average gross salaries in industries occupied by Ukrainians against minimum monthly salary.



Note: The blue line represents the average of average gross salaries in gastronomy sector, transport sector, administration sector and construction sector, expressed in PLN. The red line represents the minimum monthly salary that is the same in each sector and each region, also expressed in PLN. The data on the minimum monthly salary has been retrieved from GUS.

To verify it, Figure 11 presents a comparison of the minimum monthly salary and average salaries in the 4 sectors to be most likely occupied by Ukrainian immigrants (gastronomy, transport, administration and construction). As we can observe, average salaries in these

sectors are still “far away” from minimum wages. Therefore, it is unlikely that if average gross salaries were to decrease due to the Ukrainian immigrant influx, they would be “blocked” by the minimum wage policy.

6.3 Complementarity and Education of Natives

Negligible effect of the Ukrainian immigrants’ influx on salaries and unemployment rates in Poland can also be explained by the complementarity between them and natives. If immigrants bring skills that are in great demand, the competition would be less severe which can mitigate the markets’ reaction. Consequently, immigrants would fill the gap in industries where the labor supply is scarce. This has been already suggested by experts claiming that the Polish economy did not collapse at all, and we observe the opposite scenario, where Ukrainian workers complement Polish labor markets, as they are “competent and hard- working" (Bankier, 2023). According to the European Employment Services (2023), the largest labor shortages in Poland involve construction, accommodation, food service and the transport sector, which are in fact the primary choice of Ukrainian immigrants.

On the other hand, immigrants occupying low- wage industries can potentially push natives to acquire higher education. Foged and Peri (2016) found that low- skilled native workers facing low- skilled immigration, respond by shifting towards more demanding occupations, typically requiring fewer manual tasks. However, this is believed to have no effect in the short run for 2 reasons. First, as explained above, we do not observe severe competition in sectors occupied by Ukrainian immigrants. Poles do not experience a “push” that might create an incentive to acquire higher education. Second, it is simply too early to observe any effect. A Bachelor's degree takes 3 years to complete, so if there are natives that decided to improve their education because of immigrant competition, they have not completed their education yet.

6.4 Prejudice and Social Pressure

Attitudes towards Ukrainian immigrant might potentially play a role in average salaries and unemployment rates as well. Although, at first, Poland was extremely hospitable, these

perceptions evolved quickly. Negative attitudes were getting stronger as many natives started to protest, that Ukrainian immigrants receive better treatment than Poles who are in a difficult situation. This had a "snowball" effect where negative perceptions were increasing day to day through anti- Ukrainian propaganda. According to Personnel Service survey conducted in 2023, 67% of those interviewed who were asked why Poles have negative perceptions about Ukrainians, responded that they demand too much from the Polish government, 55% claimed that Ukrainians have an "entitled attitude" and 36% responded that social support for Ukrainian citizens lasts too long already (money.pl, 2023). The other reason why tensions are high is the fact that many Ukrainian immigrants have been offered social benefits (such as a child grant) from the Polish government that are funded by Poles' pockets through taxes (ZUS, 2022). Consequently, Ukrainian immigrants have experienced dangerous incidents like threats and battery (especially men, who were often told on social media platforms to "go back and fight for your country").

These negative attitudes can potentially create high pressure on employers who are watched very closely regarding who they hire and how much they pay. Employers who lower wages and replace Poles with Ukrainians who are paid less, can expect a large social backlash which can potentially worsen their reputation. For this reason, a potential decrease in wages that might have happened if employers could hire and fire freely, might not be observed. Similarly, one could expect an increase in unemployment among Poles if they could be replaced easily, but if employers experience high social pressure, this might also never happen. Berlina and Cavicchia (2023) indicated in their book, that employers may be reluctant to hire refugees due to negative attitudes revealed by both co- workers and customers.

Lastly, natives who are already employed are trained and experienced. Even if an immigrant can work for less money, there would be a need for investment in his/ her training that in some cases can be long and complex. Fang et al. (2022) found that additional training costs significantly influence employers' hiring decisions in a negative way. Moreover, some employers tend to be prejudiced towards immigrants. Xenophobia and statistical

discrimination can mitigate the effects on salaries and unemployment efficiently as these employers would refrain from hiring immigrants. This might be especially important in Poland, as of 2021, 97.7% of Polish residents identify as Poles (Business Insider, 2023), and the country itself is one of the least ethnically diverse countries in the world (The Washington Post, 2013).

7. Alternative Approach: Difference- in- differences

7.1 Difference- in- differences versus Synthetic Control Method

The major issue of the synthetic control method in this setting is that some regions are not perfectly comparable. Regions chosen by Ukrainian immigrants are more likely to offer better living standards than others. This is especially the case regarding the Masovian Voivodeship. Previously, it has been excluded from the analysis because its salaries are the highest in Poland and the unemployment rate is one of the lowest in Poland. Therefore, this region has no comparable control group as its values are extreme ones. However, this voivodeship might still be important to analyze since it has received the highest number of Ukrainian immigrants in the entire country. To address this issue, I perform a difference- in- differences analysis that relaxes the assumption of a comparable control group at the cost of the parallel trend assumption. The idea behind this strategy is that it aims to capture the difference between the after and before- treatment periods as well as the difference between the treated and control region to finally capture the difference in these differences to identify the treatment effect.

Parallel trend assumption is a key identification criterion. It states that the trends of both the treated and control voivodeships follow the same pattern prior to the mass immigration event. If this assumption is violated, the treatment effect cannot be estimated.

The empirical specifications to find the effect of Ukrainian immigration on average gross salaries and average unemployment rates are as follows:

$$AvgSalary_{i,t} = \beta_0 + \beta_1(Treated_i \cdot Post_t) + \mu_{i,t} + \varepsilon_{i,t}$$

$$AvgUn_{i,t} = \beta_0 + \beta_1(Treated_i \cdot Post_t) + \mu_{i,t} + \varepsilon_{i,t}$$

Where $Treated_i$ represents the treated region i, $Post_t$ represents the post- treatment period, $\mu_{i,t}$ represents region and time fixed effects and $\varepsilon_{i,t}$ is the error term. Moreover, all the control variables are fixed before the war outbreak to avoid the situation where immigrants affect them after the event of mass immigration (making them bad controls). Therefore, region and time fixed effects are believed to capture their impact.

Similarly to the Synthetic Control Method, the treated voivodeships are Masovia, Greater Poland, Silesia and Lower Silesia (dark blue color on Figure 4). In this case, since the control group does not need to be comparable, it consists of 4 voivodeships that received the lowest number of Ukrainian immigrants. Namely Warmia- Masuria, Podlaskie, Swietokrzyskie and Subcarpathia (white color on Figure 4).

7.2 Average Gross Salaries

Table 3. The effect of mass immigration on average gross salaries in Poland.

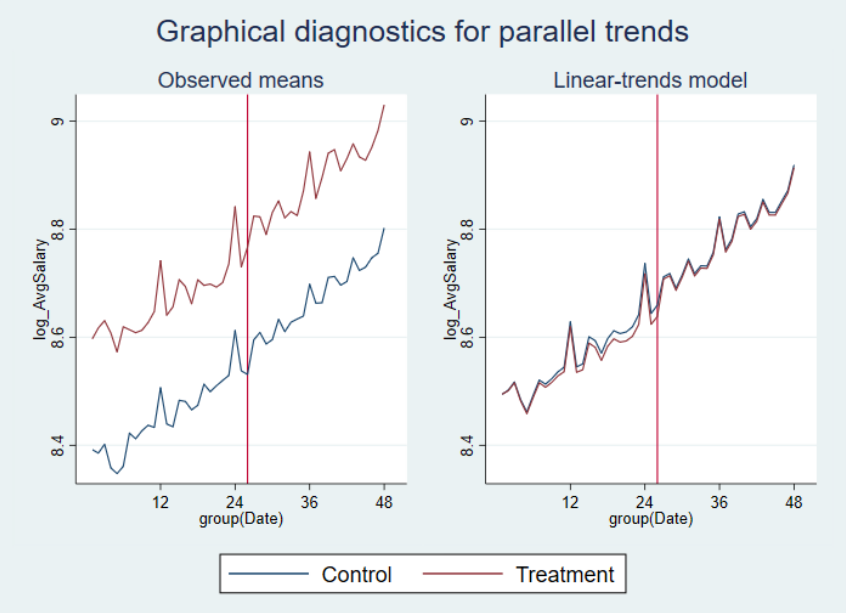
	(1)	(2)
VARIABLES	ATET	Controls
r1vs0.did	0.00588	
	(0.00906)	
Constant		8.494***
		(0.00814)
Observations	384	384

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

As can be observed in Table 3, the difference- in- differences estimation shows a very small but positive effect. Namely, average gross salaries increased by 0.59% in the treated regions compared to the control group. This result, however, is both statistically and economically insignificant.

Figure 12. Parallel trends diagnostics for average gross salaries.



Note: The figure presents graphical diagnostics for parallel trend assumption. The average gross salary on Y-axis has been transformed into natural logarithm to obtain percentage change interpretation. The date is represented by the numeric date where in total there are 48 periods (1 is 1st January 2020 and 48 is 1st December 2023), and the treatment takes place in period 26 (war outbreak).

As can be observed in Figure 12, the parallel trend assumption arguably holds. Salary trends seem to follow the same path before the mass immigration takes place, but some small differences are visible which might challenge the credibility of this method. After the influx of Ukrainian immigrants, there is not any observable deviation of the treated voivodeships which confirms the results found earlier.

7.3 Average Unemployment Rates

Table 4. The effect of mass immigration on average unemployment rates in Poland.

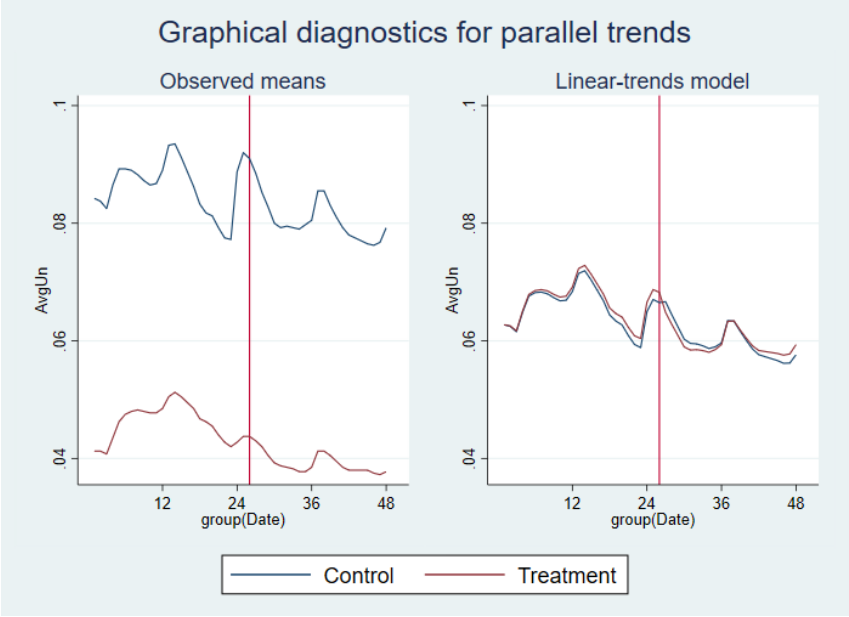
VARIABLES	(1) ATET	(2) Controls
r1vs0.did	-0.000927	
	(0.00266)	
Constant		0.0627***
		(0.00137)
Observations	384	384

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Similarly to average gross salaries, the effect of the influx of Ukrainian immigrants on average unemployment rates is minimal. As can be seen in Table 4, the unemployment rate decreased in the regions treated by 0.0009 percentage points compared to the control group, which is again, statistically and economically insignificant.

Figure 13. Parallel trends diagnostics for average unemployment rates.



Note: The figure presents graphical diagnostics for parallel trend assumption. The average unemployment rate on the Y- axis has remained as percentage (.04=4% etc.). The date is represented by the numeric date where in total there are 48 periods (1 is 1st January 2020 and 48 is 1st December 2023), and the treatment takes place in period 26 (war outbreak).

As Figure 13 suggests, parallel trends assumption is not perfect in this case. Although the treatment and the control groups follow similar paths before the treatment, the control group has significantly larger fluctuations, again challenging the credibility of this method. Nonetheless, there are not any significant deviations of the treated voivodeships after the influx of Ukrainian immigrants which is in line with previous findings.

In summary, the difference- in- differences analysis confirms the results obtained through the Synthetic Control Method. There is no effect of the influx of Ukrainian citizens on average gross salaries and average unemployment rates in Poland.

8. Conclusion

The aim of this research is to examine the potential effects of the mass influx of Ukrainian citizens on the Polish economy- specifically salaries and unemployment. By exploiting the Synthetic Control Method following the work of Peri and Yasenov (2019), I find no significant effect of the sudden increase in Polish labor supply on salaries and unemployment rates in Poland. The regions that were the most impacted by Ukrainian citizens influx did not experience any significant deviations compared to regions that received very low number of immigrants. An alternative approach that is difference- in- differences confirmed these findings. These results coincide with previous literature on this topic. Like Card (1990) and Peri and Yasenov (2019), I came to the same conclusion of negligible to no effect of immigration on salaries and unemployment in the host economy.

Due to justified concern that the majority of Ukrainians do not speak Polish (and therefore their opportunities on the Polish labor markets are limited), I focused on sectors that do not require Polish language fluency as well as are generally easier to secure. These sectors were gastronomy, transport, administration and construction. The only deviation that signaled a

potential effect was the transport sector where average salaries slightly decreased in treated regions. However, considering that 77% of Ukrainian immigrants were women, the industries that are most likely to be chosen by them are gastronomy and administration, for which I found no effect. The minimum wage policy also seems to play an irrelevant role as average earnings in those sectors are on average way above this threshold.

There are 2 potential mechanisms that are expected to explain these findings. First, complementarity between natives and immigrants. Ukrainian citizens most likely filled the gap in employment in sectors where Polish workers were scarce. Second, social pressure on employers in a combination with the already experienced Polish work force effectively restrained firms from excessive firing- even if this would be associated with lower wages they can pay.

In summary, the social anxiety caused by the sudden influx of immigrants from Ukraine seems to be unfounded. Despite a labor force increase of approximately 6%, we have not observed significant changes in salaries and unemployment rates in Poland. If any effect has occurred, it is likely positive. Therefore, it is crucial for the Polish government and media to educate the public to minimize xenophobic behavior, thereby encouraging Ukrainian immigrants to seek employment in Poland.

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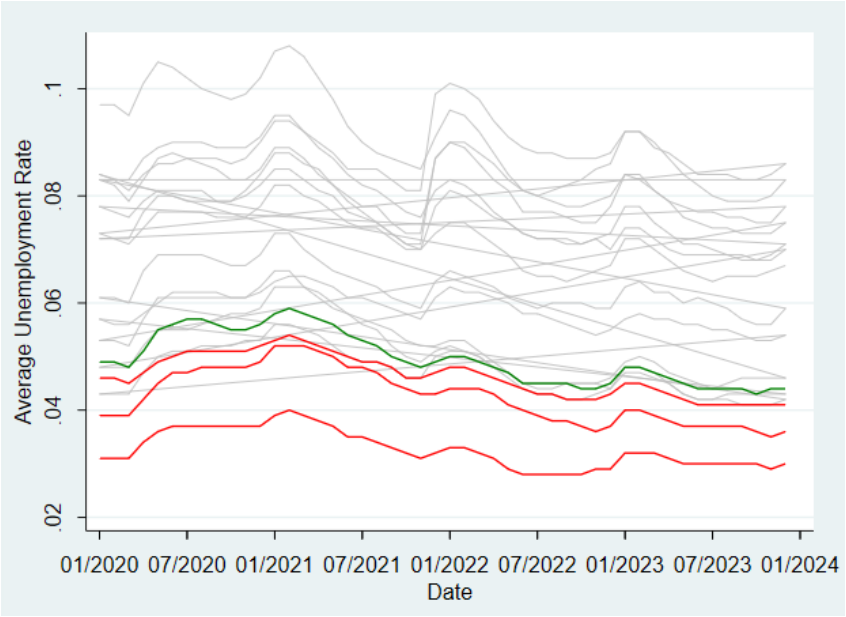
Appendix

Figure 14. Comparison of average gross salaries across 16 voivodeships in Poland.

Note: The green line represents the average gross salary in Greater Poland. The red lines represent average gross salaries in Masovia, Lower Silesia and Silesia. The grey lines represent the donor pool. Values on the y-axis are expressed in PLN.

Figure 15. Comparison of average unemployment rates across 16 voivodeships in Poland.



Note: The green line represents the average unemployment rate in Lower Silesia. The red lines represent average unemployment rates in Masovia, Greater Poland and Silesia. The grey lines represent the donor pool. Values on the y- axis are expressed as a ratio (.02=2% etc.).

Table 5. Weights of control units in the estimation of average gross salaries.

Co_No	Unit_Weight
2	0
4	0.398
5	0
6	0
7	0
8	0.158
9	0.202
10	0.101
11	0
12	0
14	0
16	0.141

Note: Weights are assigned to the following voivodeships: 4- Kuyavia- Pomerania, 8- Lesser Poland, 9- Opole, 10- Subcarpathia, 16- West Pomerania.

Table 6. Predictors of average gross salaries.

	Treated	Synthetic
Sex	0.486	0.485
Age	42.618	42.679
Urbanization	1	0.697
Amenities	785	518.147
GDPpercapita	74224	57113.180
PopDensity	117.300	122.708
DisToBor	629	534.402
ExamPassing	77.800	77.345
CostOfLiving	5242	5340.548
AvgSalary(48)	6981.250	7231.934
AvgSalary(47)	6883.220	6992.978
AvgSalary(46)	6706.930	6927.325
AvgSalary(45)	6640.060	6872.022
AvgSalary(44)	6695.710	6759.777
AvgSalary(43)	6643.650	6855.519
AvgSalary(42)	6573.860	6767.966

AvgSalary(41)	6728.380	6557.070
AvgSalary(40)	6864.880	6727.284
AvgSalary(39)	6802.780	6931.315
AvgSalary(38)	6346.650	6376.175
AvgSalary(37)	6271.860	6322.042
AvgSalary(36)	6312.160	6594.842
AvgSalary(35)	6090.240	6253.512
AvgSalary(34)	5957.860	6153.782
AvgSalary(33)	6171.650	6165.190
AvgSalary(32)	5886.220	6010.922
AvgSalary(31)	5947.550	6165.514
AvgSalary(30)	5811.460	6036.512
AvgSalary(29)	5887.410	5846.056
AvgSalary(28)	6121.490	6073.757
AvgSalary(27)	5997.100	6089.344
AvgSalary(26)	5532.600	5587.352
AvgSalary(25)	5443.620	5547.322
AvgSalary(24)	5790.450	5953.817
AvgSalary(23)	5450.140	5512.540
AvgSalary(22)	5314.140	5471.320
AvgSalary(21)	5306.460	5441.450
AvgSalary(20)	5278.620	5367.191
AvgSalary(19)	5300.470	5409.840
AvgSalary(18)	5179.670	5281.946
AvgSalary(17)	5207.360	5148.968
AvgSalary(16)	5240.320	5282.090
AvgSalary(15)	5493.880	5444.713
AvgSalary(14)	5067.880	5018.168
AvgSalary(13)	5034.860	5023.585
AvgSalary(12)	5206.460	5318.661
AvgSalary(11)	4998.860	5008.342
AvgSalary(10)	4934.580	4996.463
AvgSalary(9)	4926.260	4989.137
AvgSalary(8)	4877.190	4869.514
AvgSalary(7)	4927.590	4955.116
AvgSalary(6)	4899.650	4726.570
AvgSalary(5)	4953.940	4613.073
AvgSalary(4)	4962.420	4785.883
AvgSalary(3)	4969.480	4974.502
AvgSalary(2)	4913.970	4742.677
AvgSalary(1)	4817.740	4771.819

Table 7. Significance of simulated permutations of average gross salaries.

	estimates	pvals	pvals_std
c1	-54.752	0.667	0.667
c2	-92.244	0.75	0.75
c3	47.733	0.583	0.667
c4	41.354	0.833	0.833
c5	-225.052	0.167	0.167
c6	-217.964	0.167	0.167
c7	-124.702	0.333	0.333
c8	6.460	1	1
c9	-195.922	0.25	0.25
c10	-163.272	0.333	0.417
c11	-282.682	0.083	0.083
c12	-50.182	0.583	0.583
c13	-29.525	0.667	0.667
c14	-128.535	0.667	0.75
c15	137.595	0.667	0.75
c16	171.310	0.417	0.333
c17	-194.106	0.417	0.333
c18	-211.869	0.167	0.167
c19	-64.067	0.583	0.583
c20	-231.962	0.083	0.167
c21	-220.395	0.083	0.083
c22	-109.758	0.5	0.583
c23	-250.684	0.083	0

Table 8. Weights of control units in the estimation of average unemployment rates.

Co_No	Unit_Weight
2	0
4	0
5	0
6	0
7	0.264
8	0.319
9	0
10	0
11	0
12	0.417

14	0
16	0

Note: Weights are assigned to the following voivodeships: 7- Lodzkie, 8- Lesser Poland, 12- Pomerania.

Table 9. Predictors of average unemployment rates

	Treated	Synthetic
Sex	0.481	0.483
Age	42.382	42.518
Urbanization	1	1
Amenities	694	598.393
GDPpercapita	76748	65501.040
PopDensity	145.300	160.446
DisToBor	573	488.065
ExamPassing	74.800	78.335
CostOfLiving	5949	7046.093
AvgUn(48)	0.044	0.047
AvgUn(47)	0.044	0.046
AvgUn(46)	0.043	0.046
AvgUn(45)	0.044	0.047
AvgUn(44)	0.044	0.047
AvgUn(43)	0.044	0.046
AvgUn(42)	0.044	0.047
AvgUn(41)	0.045	0.048
AvgUn(40)	0.046	0.049
AvgUn(39)	0.047	0.050
AvgUn(38)	0.048	0.051
AvgUn(37)	0.048	0.050
AvgUn(36)	0.045	0.048
AvgUn(35)	0.044	0.047
AvgUn(34)	0.044	0.048
AvgUn(33)	0.045	0.048
AvgUn(32)	0.045	0.048
AvgUn(31)	0.045	0.048
AvgUn(30)	0.045	0.048
AvgUn(29)	0.047	0.050
AvgUn(28)	0.048	0.052
AvgUn(27)	0.049	0.054
AvgUn(26)	0.05	0.055
AvgUn(25)	0.05	0.055
AvgUn(24)	0.049	0.054
AvgUn(23)	0.048	0.051

AvgUn(22)	0.049	0.052
AvgUn(21)	0.05	0.054
AvgUn(20)	0.052	0.055
AvgUn(19)	0.053	0.056
AvgUn(18)	0.054	0.056
AvgUn(17)	0.056	0.058
AvgUn(16)	0.057	0.060
AvgUn(15)	0.058	0.061
AvgUn(14)	0.059	0.061
AvgUn(13)	0.058	0.061
AvgUn(12)	0.056	0.058
AvgUn(11)	0.055	0.057
AvgUn(10)	0.055	0.057
AvgUn(9)	0.056	0.057
AvgUn(8)	0.057	0.056
AvgUn(7)	0.057	0.056
AvgUn(6)	0.056	0.056
AvgUn(5)	0.055	0.055
AvgUn(4)	0.051	0.052
AvgUn(3)	0.048	0.049
AvgUn(2)	0.049	0.049
AvgUn(1)	0.049	0.049

Table 10. Significance of simulated permutations of average unemployment rates.

	estimates	pvals	pvals_std
c1	-0.005	0.167	0.083
c2	-0.005	0.083	0.167
c3	-0.004	0.25	0.167
c4	-0.003	0.417	0.5
c5	-0.003	0.333	0.25
c6	-0.003	0.5	0.333
c7	-0.003	0.417	0.333
c8	-0.003	0.25	0.25
c9	-0.004	0.167	0.25
c10	-0.003	0.25	0.083
c11	-0.003	0.25	0.417
c12	-0.002	0.5	0.25
c13	-0.003	0.333	0.25
c14	-0.003	0.25	0.333
c15	-0.003	0.417	0.5

c16	-0.003	0.25	0.417
c17	-0.003	0.333	0.333
c18	-0.002	0.5	0.333
c19	-0.003	0.333	0.333
c20	-0.003	0.417	0.333
c21	-0.003	0.333	0.25
c22	-0.002	0.417	0.333
c23	-0.003	0.333	0.333