Transnational Trauma: Mental Health Effects of War on Expatriates*

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Abstract

We investigate the impact of the 2022 Russian invasion of Ukraine on the mental health of Ukrainian migrants living abroad, leveraging comprehensive administrative data on medical prescriptions in Sweden. Despite the physical distance from danger, expatriates may still be affected by home-country conflict through the social, economic, or national ties they have to their homeland. To isolate the causal effect of indirect war exposure, we use the synthetic control method, comparing the outcomes of Ukrainians to a weighted average of other migrant groups in Sweden. Our results indicate an immediate deterioration in the mental health of Ukrainian expatriates following the invasion, with a marked increase in the take-up of medication for anxiety and insomnia. Furthermore, the uptake of anti-depressants rises significantly in the third quarter of 2022, indicating a potential shift towards medications for more long-term conditions. These effects are driven by women, although it is possible that men face mental health challenges without seeking medical care. We find little evidence that family situation, legal status, or economic conditions are important mediators of the effect.

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1 Introduction

I am a poet of the periodic table of ruins
of a broken army and a forfeited land
shot-through like the heart of a soldier
it shakes like an uncatchable feather
trembling lightly on a stem.
On War by *Vasyl Makhno* (American-Ukrainian poet, NYC)[1]

Wars cost lives, traumatize survivors, and destroy countries' physical and human capital (Abadie and Gardeazabal, 2003; Johnson and Thompson, 2008; Blattman and Miguel, 2010). The costs of war may also spread across country borders as they disrupt global trade (Glick and Taylor, 2010), force military investments (Nordhaus et al., 2012), and displace war-afflicted populations (Becker and Ferrara, 2019). Nations, however, comprise not only the individuals residing within their physical borders but also their diaspora – citizens living abroad who maintain significant social, cultural, and economic connections to their homeland. In an increasingly globalized world, millions of migrants live abroad as violent conflicts erupt in their countries of origin. Despite being physically distant from the epicenter of violence, these expatriates are unlikely to be immune to the effects of conflict.

There are several reasons migrants' health may be affected by conflicts in their home countries. First and foremost, they are likely to be concerned about the safety of their family and friends (Kristensen et al., 2012). Second, although they are now at a safe distance from the conflict, some may only reside abroad on a temporary visa, meaning that they are expected to return to their home country in a near future. Third, some individuals may be working for a company operating from their home country, which may be forced to implement layoffs in response to the conflict, thereby potentially affecting the workers' wellbeing (Schaller and Stevens, 2015). Besides these more direct channels, simply being exposed to violent events from individuals' home countries through the media may cause stress. In psychology, *secondary trauma* refers to situations where individuals do not experience a traumatic event themselves but learn about it from another source, such as family or friends, or by watching the news (Cieslak et al., 2013). Those sharing the social identity of victims may be particularly prone to follow the media coverage of traumatic events (Relihan et al., 2023), but exposure to this type of media coverage may further increase their distress (Neria and Sullivan, 2011).

This paper studies how indirect exposure to war affects the mental health of expatriates. Specifically, we focus on how the Russian invasion of Ukraine in February 2022 impacted

[1] Translated from Ukrainian by Uilleam Blacker.

the mental health of Ukrainians living outside of their home country. Before the invasion, millions of Ukrainians and individuals with Ukrainian ancestry lived in countries such as the United States, Canada, Poland, and Russia.[2] News articles written after the invasion describe Ukrainian expatriates' intense stress and anxiety in the immediate aftermath of the invasion, with reports of how they indirectly experience the war through close and regular contact with family members still in Ukraine.[3]

We focus on Sweden, where more than 10,000 Ukrainians resided before the invasion. To proxy for the mental health status of Ukrainian expatriates, we use comprehensive administrative data covering all medical prescriptions for anxiety, insomnia, and depression. To identify the causal effect of indirect exposure to war in the home country, we use the synthetic control method, comparing Ukrainians to other migrant groups living in Sweden (Abadie and Gardeazabal, 2003; Abadie et al., 2010). This method compares the average outcome of Ukrainian migrants to a weighted average of migrants from other countries, selected and weighted to match pre-invasion trends in mental health prescriptions. Given the possibility of immigration from Ukraine in response to the invasion or selective migration in anticipation of the war, we restrict attention to migrants residing in Sweden for at least three years before the invasion. For all practical purposes, however, the invasion was sudden and unexpected. Despite the significant deployment of troops near Ukraine in the months leading up to February 2022, there was significant uncertainty about whether an invasion would in fact take place. Section 2 provides a more detailed discussion of the discourse and expectations that preceded Russia's invasion.

We find that Ukrainian expatriates in Sweden experience an immediate deterioration of mental health upon Russia's invasion. In the first quarter of 2022, the probability of filling a prescription for any mental health drug increases by 1.6 percentage points, a 30 percent increase over the pre-invasion mean among Ukrainians. The increase is driven by a rise in the take-up of prescriptions for anxiety and insomnia, which are often used to treat sudden and acute symptoms of mental stress. The uptick in prescriptions for these medications remains significant in the second quarter of 2022, albeit at a lower level. Prescriptions of anti-depressants, on the other hand, do not change during the two first quarters of the invasion. However, they display a statistically significant increase in the third quarter. This delay indicates a possible substitution away from medications used to treat acute symptoms to those that are used for more severe and long-term mental health conditions (National

[2]In 2020, around 6.1 million individuals born in Ukraine lived abroad (UN, 2020). Extending the group to individuals with Ukrainian ancestry, the number is notably higher. In the US alone, there are 1 million Americans of Ukrainian descent (Rodriguez and Batalova, 2009).

[3]Appendix Figure A.1 displays a selection of newspaper headlines written about Ukrainians living abroad.

Board of Health and Welfare, 2021).[4]

We next split our sample along several dimensions to investigate heterogeneities in responses to the invasion. Partitioning the sample by gender, we first find that women account for most of our estimated effects. This finding is in line with prior literature on mental health effects of war, which regularly finds women to display a greater incidence of mental health challenges following a conflict (Murthy and Lakshminarayana, 2006). However, women are also more likely to seek medical help, increasing the likelihood that they receive diagnoses and treatment (Sundbom et al., 2017). This raises the possibility that Ukrainian men in Sweden remain untreated despite worsening mental health. Furthermore, we find that those without prior medical leave have more pronounced effects than individuals who had been on leave, suggesting that the effects are not driven by individuals who already had health issues.

To investigate the mechanism, we split the sample based on family situation, visa status, and employment and largely find small differences between these groups. This suggests that the effects are not driven by Ukrainians who were more directly affected through their links to Ukraine, but rather that the events had a general effect on Ukrainians abroad.

Finally, we explore whether there are effects on migrants who come from countries neighboring the conflict. We focus on Russians and migrants from European countries sharing borders with either Russia or Ukraine. We find significant positive effects on mental health prescriptions for Russia in the first and second quarters, but the effect is smaller than the effect on Ukraine in both absolute and relative terms. We also observe marginally significant or null effects on other neighboring countries.

This paper is related to a large literature in psychology that examines the mental health effects of events such as conflicts or natural disasters, including those who are indirectly exposed (Kristensen et al., 2012). We contribute by providing rigorous causal evidence using panel data and a synthetic control group to take general trends into account. We also contribute by showing that such effects are not confined to the country where the event takes place, but may travel across national borders.

We also add to a nascent literature in economics and political science that studies the impact of home-country shocks on emigrants. Previous studies have found that violent events in migrants' home countries affect their educational investments and return plans (Bassetto and Freitas Monteiro, 2024; Aksoy et al., 2024). A few studies have also examined how immigrants' well-being is affected by home country events, such as macroeconomic volatility

[4]As of this draft, our data end in the third quarter of 2022, but new drafts will include data until the end of 2023. The new data will allow us to further investigate the persistence in the take-up of mental health prescriptions over time.

(Akay et al., 2017; Nguyen and Connelly, 2018) and natural disasters (Bharadwaj et al., 2024). Closest to our study, Sønderskov et al. (2021) find that prescriptions for mental health issues increase for refugees in Denmark following terrorist attacks in their home countries. The authors argue that part of the effect is driven by the re-activation of past trauma. Similarly, Keita and Schewe (2021) show that the self-reported life satisfaction of refugees living in Germany decreases following terror fatalities in their country of origin. Relative to this literature, we focus on emigrants rather than refugees. Refugees may be particularly vulnerable to violent events given the high incidence of pre-existing health issues (Steel et al., 2009; Morina et al., 2018). Moreover, we study the onset of a war at a much larger scale than individual terror attacks. The invasion was also sudden, making claims of causality stronger. In addition, we use high-frequency and high-quality data on prescriptions to identify effects.

Finally, we contribute to the recent findings on the mental health of Ukrainians following the Russian invasion. Studies show high levels of anxiety, PTSD, and depression among individuals still in Ukraine (Kurapov et al., 2023; Chudzicka-Czupała et al., 2023) as well as among war-refugees now living in other countries (Długosz, 2023; Lushchak et al., 2024). These studies consistently find higher levels of mental health disorders among women. We show that these adverse effects also extend to Ukrainians living abroad, who were indirectly affected by the war.

2 Background: The Russian Invasion of Ukraine

The ties between Ukraine and Russia go back for centuries. Following the dissolution of the Soviet Union in 1991, Ukraine declared its independence and in the following years developed a relationship with Russia that had elements of both cooperation and tension. The relationship took a dramatic turn with Russia's annexation of Crimea in 2014, a move that was widely condemned by the international community and considered illegal under international law. This was followed by the conflict in the Donbass region, where Russian-backed separatists declared independence, leading to an ongoing conflict with Ukrainian forces.

Starting in March of 2021, Russia led a significant buildup of military forces along the Ukrainian border. Despite these signs, there was considerable uncertainty and debate among international observers and governments about whether Russia would indeed proceed with an invasion (Zwack et al., 2021; Astrov et al., 2022; Driedger and Polianskii, 2023). This uncertainty was partly due to mixed messages from the Russian government, which consistently denied any intention to invade, while simultaneously engaging in aggressive rhetoric and military posturing (Kiely and Farley, 2022).

According to Russia, a significant motivation for the military buildup was the desire to prevent Ukraine from moving closer to Western institutions, primarily NATO. Russia issued several demands to the West in the months preceding the invasion, wanting guarantees that Ukraine would not join NATO. This period saw intense efforts of diplomacy attempting to dissuade an invasion. Despite the accumulating evidence of imminent military action, the exact intentions of the Kremlin remained difficult to ascertain (Fox and Isachenkov, 2022). This ambiguity was a deliberate component of Russia's strategy, exploiting the uncertainty to keep both Ukraine and the international community off balance and unprepared for the eventual full-scale military offensive. On February 11, 2022, thirteen days before Russia's invasion, US national-security advisor Jake Sullivan declared that there was an "immediate" threat of invasion, and several Western embassies began to evacuate from Kyiv in the following days (Walker, 2022).

The invasion of Ukraine by Russia on February 24, 2022, unfolded rapidly, with Russian forces launching a multi-pronged offensive that aimed to seize key Ukrainian cities and military installations. The initial phase of the invasion saw a combination of air strikes, missile attacks, and ground operations, targeting military facilities as well as critical infrastructure. Despite the overwhelming force projected by the Russian military, Ukrainian forces, bolstered by significant civilian support and a surge in national solidarity, managed to put up a formidable resistance.

The immediate results of the warfare were devastating. Urban areas, especially in the east and south of Ukraine, witnessed severe destruction, with civilian infrastructure including homes, hospitals, and schools being damaged or destroyed. The port city of Mariupol became emblematic of the humanitarian disaster, enduring a prolonged siege that resulted in thousands of civilian casualties and widespread destruction.

The conflict had a profound humanitarian impact, triggering one of the largest refugee crises in Europe since World War II that saw millions of Ukrainians fleeing their homes to escape the violence. Neighboring countries, including Poland, Slovakia, Hungary, Romania, and Moldova, opened their borders to Ukrainian refugees, who sought safety and shelter. The EU activated the Temporary Protection Directive for the first time since its establishment, providing immediate and collective protection measures for displaced people fleeing from Ukraine (IOM, 2024). Civilians remaining in conflict zones faced dire circumstances, with access to food, water, medical care, and electricity severely limited. Reports of human rights abuses, including indiscriminate bombings, forced disappearances, and other violations, added to the atrocities of the conflict (Roy, 2023).

The war has had a staggering human toll. Thousands of Ukrainian civilians have been killed (Radford et al., 2023). 28,000 have been claimed to be held captive by Russia against

their will (Kyiv Post, 2023). Military casualties have been estimated at upwards of 500,000 on both sides according to US officials, with approximately 100,000 deaths of Ukrainian forces (Roth, 2023). It is important to note that there is significant uncertainty in these estimates, as estimates vary widely by source (see also Figure A.2). The invasion also inflicted severe damage on Ukraine's economy, leading to a significant GDP contraction of 29% in 2022, as well as destruction of infrastructure and exports (Reuters, 2023). According to the latest estimates, there are 6.5 million Ukrainian refugees and 3.7 million internally displaced individuals in Ukraine (UNHCR, 2024).

3 Data and Sample

Our study is based on full-population Swedish administrative data, covering information on demographics and annual labor market outcomes spanning 2000–2021, which we use to create our sample and estimate heterogeneous effects by subgroups. Importantly, the data include information about individuals' country of birth. Countries with small expatriate populations in Sweden are aggregated into groups. For example, individuals from Ukraine and Moldova constitute one group in our dataset. Aggregated national statistics indicate that, in 2019, there were 11,000 Ukrainians and 1,300 Moldovans living in Sweden. Thus, our data still overwhelmingly capture Ukrainians as they comprise approximately 90% of individuals from these two countries. We therefore refer to this group simply as Ukraine or Ukrainians.

Mental health outcomes are estimated using comprehensive data on all medical prescriptions made in the Swedish healthcare system from January 2005 to October 2022. Physicians follow national guidelines on how to treat patients with anxiety and depression (National Board of Health and Welfare, 2021). The Swedish healthcare system provides universal health coverage for residents regardless of their nationality, meaning that foreign nationals are covered as long as they have formal residency. A price subsidy ensures that a patient pays at most 2,850 SEK (≈$270) for medication over a 12 month period. After reaching this limit the patient gets all additional medication at no out-of-pocket expense. Thus, access to medications is less likely to be mediated by socioeconomic status than in other settings.

Our analysis focuses on prescriptions for three types of mental health medications: those treating anxiety, insomnia, and depression. Medications for insomnia and anxiety can have an instant effect and are usually prescribed for short-term or need-based usage. Antidepressants, on the other hand, are given to individuals with persistent issues and may take months to have full effect, while symptoms may worsen during the initial treatment (Harmer et al., 2017; WHO, 2009). Table A.1 lists all medications included in our anal-

ysis, which comprise the most commonly used drugs for each respective condition.[5] The prescriptions data include information on the date that a medical drug was prescribed by a doctor and when it was picked up by the patient from the pharmacy. Our primary outcome measure, "filled prescription", is a dummy variable indicating whether an individual picks up any mental health prescription during a given quarter. We also analyze the take-up of prescriptions for anxiety, insomnia, and depression separately.

In Sweden, doctors provide prescriptions that enable the patient to pick up the same medication on multiple occasions, with the restriction that they can not pick up more than a 90-day supply at one time.[6] Consequently, an outcome value of 1 indicates that the patient is actively undergoing treatment within the specified quarter.

We restrict our sample to immigrants in Sweden who are above the age of 16 and include all origin countries that have at least 30 people per quarter in the administrative data. We further restrict attention to individuals residing in Sweden since at least the first quarter of 2019, two years before the Russian invasion, and who remain in the country until the end of our data in Q3 of 2022. To investigate spillover effects on migrants from other countries that may be affected by the Russian invasion, we identify a set of conflict-adjacent countries as European countries that share borders with either Ukraine or Russia, as well as Russia itself.

The final sample consists of 11,202 individuals from Ukraine and Moldova, 363,404 individuals from Russia and adjacent countries, and 1,428,425 individuals from the rest of the world. The sample comprises a total of 97 countries of origin, out of which 12 are adjacent to the conflict. Table 1 details the size of each country in our sample. Table 2 provides summary statistics from our sample, separately for Ukrainians and migrants from countries that are not war-adjacent. Ukrainians are generally younger and more likely to be female, but relatively similar in terms of marriage and having children. They are less likely to be Swedish citizens, consistent with them having been in Sweden for a shorter period of time. A larger share of Ukrainians have completed higher education and are employed. They also have significantly higher monthly incomes. In terms of health care usage, Ukrainians are less likely to have been prescribed any of the mental health medications studied in this paper, and have lower expenses.

[5]The table also provides the corresponding Anatomical Therapeutic Chemical (ATC) codes, which are assigned to medicines according to the organ or system they work on and how they work.

[6]Moreover, to be eligible for the price subsidy, patients can only pick up a new box once they have used two-third of the last one.

4 Empirical Strategy

To identify the causal effect of Russia's invasion on Ukrainian expatriates, we must assess what the counterfactual outcomes of Ukrainians would have been in the absence of war. The key challenge is that we only have one treatment unit and a diverse set of potential control units, i.e., migrants from other countries than Ukraine that are also residing in Sweden. As displayed in Table 2, there are a number of differences between Ukrainians and the raw average of remaining countries that make this comparison method unlikely to yield a credible counterfactual outcome. To improve on using the raw average of non-treated countries as controls, we therefore employ the synthetic control method of (Abadie et al., 2010). By using information from the pre-treatment period, this method constructs a counterfactual, *synthetic* Ukraine as a weighted average of outcomes in a set of control units. These weights, which may be zero, are chosen so as to minimize the deviation between the actual and synthetic Ukraines in the pre-treatment window. In our set of potential control units, we do not include Russia or European countries bordering Russia or Ukraine as they can also be indirectly exposed to the conflict and confound post-treatment estimates. In a separate analysis, we consider them as treated and investigate the effects on their mental health outcomes. We also conduct robustness tests in which Russia and conflict-adjacent countries are included in the set of controls.

An alternative approach to the synthetic control method in our setting could have been to rely on a difference-in-differences design and two-way fixed effects estimation. An advantage of the synthetic control method, however, is that it relaxes the parallel trends assumption inherent in difference-in-differences, as it explicitly minimizes deviations between treatment and control units prior to treatment. As such, it may improve the reliability of the counterfactual estimate. The reasoning behind this is that if we can construct a synthetic Ukraine that closely follows the actual path of mental health outcomes in Ukraine in the pre-period, the synthetic counterfactual would also be a good estimate of what would have occurred in the absence of an invasion. Nevertheless, to complement our main results and assess the robustness of our results, we also employ a two-way fixed effects event study, described in Section A.1.3.

We next describe the synthetic control approach in detail. For each country of origin k, we aggregate data at the quarter level t. There are K countries: $K-1$ control countries of origin, and one *treated* country, which is Ukraine ($k=1$). The *treatment* for Ukrainian migrants starts in period T_0, or Q1 of 2022. As this method requires a long pre-treatment period to fit and estimate the synthetic control, we extend the pre-treatment period to start in Q1 of 2015.

Let Y_{kt}^N be the outcome for country of origin k at time t in the absence of treatment and Y_{kt}^1 is the outcome when *treated*. Following Abadie et al. (2010) and the setup of Jones and Marinescu (2022), we define:

$$Y_{kt}^N = \delta_t + \theta_t \mathbf{Z}_k + \lambda_t \mu_k + \epsilon_{kt} \tag{1}$$

$$Y_{kt}^1 = \alpha_{kt} + Y_{kt}^N, \tag{2}$$

where δ_t is a common time-varying factor, $\mathbf{Z}_k$ is an observable $(r \times 1)$ vector of r covariates, θ_t is a $(1 \times r)$ vector of time-varying coefficients, μ_k is an unobservable $(m \times 1)$ vector of factor loadings, and λ_t is a $(1 \times m)$ vector of time-varying factors that are common across k. The error terms ϵ_{kt} are unobserved transitory shocks at the country of origin level with mean zero. Our parameter of interest is the treatment effect for the treated group in the post-intervention period, i.e., $\alpha_{1,t}$, where $t \in \{T_0, ..., T\}$. To estimate this parameter, the synthetic control method seeks to identify a set of $K-1$ weights $\mathbf{w} = (w_2, ..., w_K)$ such that when applied to the corresponding control units, the resulting weighted average can approximate the counterfactual outcome for $Y_{1,t}^N$ over $t \in \{T_0, ..., T\}$. Following Abadie et al. (2010), these weights are estimated as follows:

$$\mathbf{w}^*(V) = \arg_{\mathbf{w}}\min \left(\mathbf{X_1} - \sum_{k=2}^{K} \cdot \mathbf{X_k} \right) \mathbf{V} \left(\mathbf{X_1} - \sum_{k=2}^{K} \cdot \mathbf{X_k} \right), \tag{3}$$

where $\mathbf{X_k}$ is a $(J \times 1)$ vector consisting of covariates and/or outcomes in the pre-treatment period. In our case, this is the vector of lagged outcomes $Y_{k,1}, ..., Y_{k,T_0-1}$.[7] The diagonal elements v_j of the diagonal matrix $\mathbf{V}$ are estimated using a regression-based approach. For each pre-treatment period, the outcome variable Y_{kt} is regressed on the vector $\mathbf{X_k}$, yielding j coefficients α_{jt} for every period t. These coefficients are used to construct v_j as:

$$v_j = \frac{\sum_t \alpha_{jt}^2}{\sum_j \sum_t \alpha_{jt}^2} \tag{4}$$

Once the set of weights $\mathbf{w}^*(V^*)$ is estimated, the estimator for the parameter of interest is $\hat{\alpha}_{1t} \equiv Y_{1t} - \sum_{k=2}^{K} w_k^*(\mathbf{V}^*) \cdot Y_{kt}$ for $t \in \{T_0, ..., T\}$. We implement the synthetic control using the "synth_runner" package in Stata introduced by Galiani and Quistorff (2017). Treatment effect coefficients are estimated as the difference between the outcomes of Ukraine and the

[7] For similar examples, see Billmeier and Nannicini (2013); Stearns (2015); Friedson et al. (2020). Our results are robust to alternative choices of predictors.

synthetic Ukraine.

For inference, we employ the permutation method by Abadie et al. (2010), which compares the synthetic control estimate to a distribution of placebo estimates. Placebo estimates are gathered by assigning treatment status to each of the control units, and recalculating the synthetic counterfactual for the placebo treatment. We generate a placebo estimate for each control unit and post-intervention period. This allows us to calculate p-values by measuring the share of placebo effects that are larger in absolute value than that of Ukraine.

The reliability of placebo comparisons and associated p-values depends on whether or not we are able to create good synthetic counterfactuals for each placebo unit. If the method is unable to find a convex combination of other units to create a synthetic outcome with a good pre-treatment fit, such placebos become uninformative for inference. One way to quantify the quality of synthetic outcomes is to estimate their pre-period root mean squared prediction error (RMSPE). We follow Abadie et al. (2010) and Andersson (2019) and display results of tests including the full sample as well as when successively removing high RMPSE units from placebo tests. We also report the *standardized* p-values that automatically take into account the quality of the pre-treatment fit in order to weight the placebo estimates.

5 Results

We start by plotting raw data on filled prescriptions by country of origin for our sample of individuals residing in Sweden since the first quarter of 2019. To take seasonality into account, Figure 1, Panel A, plots year-on-year changes in prescriptions for the three types of mental health medications that we consider, treating either anxiety, insomnia, or depression. Units are grouped into three sets of countries: Ukraine, war-adjacent countries, and *rest of countries*. The last group constitutes the set of potential controls for synthetic Ukraine. Prior to the invasion in Q1 2022, the plots show considerable fluctuations in usage, especially for Ukraine and war-adjacent countries. Such fluctuations may be due to the relatively small number of individuals originating in these countries, combined with the small fraction of individuals that use mental health medications. By contrast, the *rest of countries* trend is smoother, although it also displays some fluctuations.

Interestingly, these raw year-on-year changes indicate that *rest of countries* is a promising candidate for a control group for Ukraine, as these countries generally mimic its trend. At the same time, the pre-treatment match between the two lines is far from perfect, indicating that potential improvements can be made with a synthetic control group. For example, the *rest of countries* group displays notable deviations from Ukraine in the second half of 2019 and 2021.

In the first quarter of 2022, at the onset of Russia's invasion, Figure 1, Panel A, shows that mental health prescriptions for Ukrainians increase sharply, by a factor of nearly 1.5 relative to the same quarter in 2021. By contrast, there are much smaller increases observed for war-adjacent countries and little to no change for the remaining set of origin countries. Breaking these results down by medication type, Panels B to D indicate that the largest increase occurs for anti-anxiety and, to a smaller extent, insomnia prescriptions. Furthermore, there is a rise – only for Ukrainians – in prescriptions of anti-depressants in the third quarter of 2022.

5.1 Synthetic Control Estimates

In order to investigate the trends in the raw data more rigorously, we next apply the synthetic control method as detailed in Section 4. Our specification uses a set of 97 potential control countries that are not adjacent to the conflict in order to match the pre-invasion trend in outcome for Ukraine from 2015 to 2021. Table 3 displays the weights assigned to donor countries when matching on the outcome *Any mental health prescription*. The majority of the donor countries belong to Europe or Central Asia. The top three countries, accounting for approximately 50 percent of the weight, are Albania, the group comprising Uzbekistan, Tajikistan, and Kazakhstan, as well as Greece. The following 3 countries, which account for another 30 percent, are Montenegro and Serbia (grouped), Ireland, and Azerbaijan.

Figure 2 presents path plots with the evolution of prescriptions for Ukrainians and the synthetic control group. Compared to the raw-data plot of Figure 1, the synthetic control method achieves a much closer match between actual and synthetic Ukraine. Both groups display a somewhat declining trend in drug prescriptions until 2020, after which usage begins to increase, possibly due to the COVID-19 pandemic. However, a clear divergence emerges starting in Q1 of 2022, coinciding with the Russian invasion of Ukraine. Similar to what we saw in the raw data, the initial effect is driven by anti-anxiety and insomnia prescriptions, while there is an increase in prescriptions for anti-depressants in the third quarter. This may indicate a substitution from medications that treat acute and sudden symptoms towards longer-term treatments for persistent depression.

Figure 3, Panel A reports the effect plots for our main outcomes, showing the dynamics in the difference between Ukraine and its synthetic control. The series displays a flat and stable trend before Q1 of 2022, in which we see a sharp increase in prescriptions for any mental health drug. The difference decreases and remains stable for the next two quarters.

Panel A of Figure 3 also displays the results of placebo estimations in which each country in the control group is counterfactually assigned treatment status. We then use the synthetic

control method to estimate the placebo treatment effects for each country, which are displayed in solid white lines. Estimates shown are net of the mean outcome for each country to take into account level differences. Reassuringly, the placebo estimates are centered around zero both in the pre- and post-treatment periods, with the estimate for Ukraine consistently at the tails of the distribution.

The placebo effects in Figure 3 can be used for inference. P-values are calculated by measuring the fraction of countries that display effects that are at least as large as the one obtained for Ukrainians. However, placebos that are consistently noisy (both before and after the invasion) are less informative for inference as large post-invasion values are likely to be spurious. To avoid making inferences based on noisy estimates rather than true large effects, we can drop countries that have a high pre-treatment root mean squared prediction error (RMSPE) relative to Ukraine. Panel B displays our preferred choice, in which we keep countries whose pre-treatment RMSPE is at most twice as high as that of Ukraine. As is clear from the figure, this drastically reduces noise among placebos in the pre-period. Figure 4 reports effect plots for our main outcomes using this sample restriction.[8]

Table 4 reports the corresponding synthetic control estimates for each post-treatment quarter, along with p-values and standardized p-values using this sample restriction.[9] Column 1 shows that the take-up of prescriptions for any mental health drug increases by 1.64 percentage points in Q1 of 2022. From a pre-treatment baseline mean of 5.35 percent among Ukrainians, this represents a considerable increase of 30 percent. The estimate is significant at the 1 percent level using both regular and standardized p-values. In the subsequent two quarters, the effect declines to 0.71 and 0.63 percentage points, respectively, a relative increase of 12–13 percent that is statistically significant at the 5 percent level in both periods. As a comparison, Bharadwaj et al. (2020) study how expatriates respond to natural disasters in their home countries, and find that migrant's take-up of mental health prescriptions increases by 5 percent in the three months following a disaster, an effect that persists for up to 12 months. Our results are thereby at least twice as large, which is not surprising considering the scale of the Russian invasion.

Next, we look at the different types of prescriptions. Column 2 shows the effects on antidepressants, which do not display an economically or statistically significant change during the first two quarters of 2022. In the third quarter, there is an increase of 0.44 percentage points, a relative increase of 13 percent compared to the baseline of 3.26 percent. This

[8]Table A.3 displays the point estimates for each post-treatment quarter, including p-values and standardized p-values, under different sample restrictions. Column 1 displays estimates with the full set of countries as included for inference, while columns 2–5 successively drop those with high pre-treatment RMSPE.

[9]Table A.4 instead displays estimates and p-values when including all countries in the control group, regardless of pre-treatment RMSPE.

result is statistically significant at the 5 percent level using either p-value method. Columns 3 and 4 display results for anti-anxiety and insomnia prescriptions, both of which increase significantly in quarter one. The effect of anti-anxiety medications is 1.27 percentage points and indicates a doubling relative to the pre-invasion baseline among Ukrainians. This effect remains significant in quarter two, before decreasing to smaller and statistically insignificant levels in quarter three. The pattern is similar for insomnia medications, with a spike in the first quarter that decreases in subsequent periods.

As an alternative method of inference, we estimate the ratio of post-treatment RMSPE to pre-treatment RMSPE for each country. Since the synthetic control method creates a control group using pre-treatment data only, the idea is that the post-treatment period should have a large RMSPE only if there is a true effect. By contrast, if there was no effect, the model should have low RMSPE as it should be able to accurately predict outcomes in the post-period. Thus, a larger ratio of post-treatment RMSPE to pre-treatment RMSPE is indicative of a causal effect from the treatment. This method has the advantage of including all countries for inference, avoiding the potentially arbitrary choice of dropping countries with high pretreatment RMSPE. Figure 5 shows the ratio test for the outcome *Any mental health prescription* using all three post-invasion quarters. Ukraine is at the extreme right of the distribution, with a ratio of 68. The bulk of ratios for other countries are clustered around one, with a handful of larger estimates around 20.

As a second placebo test, we estimate the impact of the invasion on prescriptions that are not directly related to anxiety, insomnia, or depression. Separating medications by how common they are, we test whether we see any change in the take-up of such unrelated prescriptions, which would indicate that there may be other shocks occurring at the same time. Figure 6 displays our results for major and minor drug categories, including placebo estimates for control countries. We find that neither drug type displays any statistically significant change, in any quarter after the invasion, whether using regular or standardized p-values. Table A.5 displays the corresponding estimates and p-values in table form.

5.1.1 Mechanisms and Heterogeneity

The literature on mental illness among war-afflicted populations has found several mediators for conflict-related conditions, such as post-traumatic stress disorders. Prevalence rates are associated with the degree of trauma, and the availability of physical and emotional support. Moreover, women have been found to display greater symptoms of mental health issues following conflict exposure (Murthy and Lakshminarayana, 2006). Looking at refugees in particular, increased vulnerability has also been linked to post-migration conditions, such as being separated from family and unemployment (Bogic et al., 2015). Below, we investigate

heterogeneous effects in our sample and relate them to possible mechanisms.

We begin by separately estimating effects for women and men. This separation is relevant in part because women have much higher rates of mental health conditions than men in general. This is also true in our sample of Ukrainians, where 6.7 percent of women have any drug prescription in a given quarter, compared to 2.9 percent of men. Consistent with the previous literature, Table 5 shows that our results are almost fully driven by women. Their drug prescriptions increase by 2.2 percentage points in the first quarter, a relative increase of 33 percent. By comparison, men's prescriptions increase by a statistically insignificant 0.38, a 13 percent relative increase. A test of the joint hypothesis that all three post-invasion effects are zero is strongly rejected for women, but not for men.

An important caveat when studying heterogeneous effects in our setting is that any observed effects are possibly mediated by the fact that some groups are more likely to seek out health care. Men have, for example, been argued to be under-diagnosed and under-treated for depression in Sweden, in part because they manifest different symptoms than women (Sundbom et al., 2017). It is therefore entirely possible that male Ukrainian migrants also experienced significant mental health shocks following the Russian invasion, but these are not reflected in health statistics.

Apart from health-seeking behavior, one reason for the difference in effects by gender may be that gender reflects differences in underlying civil and legal status. For example, civil status may influence responses to the invasion as it indicates if one has a spouse in Sweden, out of harm's way.[10] If more Ukrainian women than men are single or married to non-Swedes, they may be more susceptible to mental health shocks after the invasion. Similarly, legal (visa) status may indicate how strong one's connection is to Sweden. For example, individuals who are on temporary work or student visas may be more likely to return home to a war-torn and potentially dangerous environment. In order to investigate the influence of civil and legal status, we separately estimate treatment effects by gender. For marriage, the results in Table 6, Panel A show that the joint hypothesis of non-zero effects in all post-invasion quarters are significant for women regardless of whether they are single, married to a non-Swedish citizen, or married to a Swedish citizen. Point estimates are also largely similar across columns. The relative effect differs somewhat between women with different legal status, however, as those married to non-Swedes have a relative increase of almost 60 percent in the first quarter of 2022. By contrast, we observe quantitatively much smaller effects for men in Panel B, with all joint hypothesis tests being insignificant. However, similar to the case for women, men who are married to non-Swedes display a larger

[10] Ideally, we would have data that indicate whether and to what extent individuals' family members still live in Ukraine and are at risk, but such data are not available to us.

and statistically significant effect, albeit only in the third quarter of 2022.

Next, Table 7 displays effects by legal status and gender. Column 1 presents results for Swedish citizens born in Ukraine. Column 2 shows results for Ukrainians who had a relative (family reunification) visa, Column 3 indicates those on a work visa, while the remaining visa categories are shown in Column 4. In general, women again display significantly positive effects regardless of legal status, while men do not. The exception is for women in the *Other visa* category, who do not display any statistically significant effects. Interestingly, point estimates for women are relatively similar regardless of whether individuals are Swedish citizens, and thus have a permanent status in Sweden, compared to those on a work visa. However, relative to the average usage in each group, Ukrainian women on relative and work visas do display markedly larger effects, between 66 and 105 percent increases.

Lastly, Table 8 displays effects by gender and having children present in the household. Again, we see strong, significant effects for women in either category, with no effects statistically significant effects for men.

Together, these tests indicate that women are driving our main results of increased mental health prescriptions, regardless of women's civil, child, or visa status. While it is hard to compare effect sizes across groups that may have different propensities to seek health care (even within gender), we take these results to indicate that the strength of ties to Sweden does not entirely drive our results. This holds for both family ties and legal status.

Another potential mechanism that can explain our result is the economic reliance on Ukraine. It is possible that Ukrainian migrants experience large economic losses if they work for firms that are active in or trade with Ukraine, potentially causing mental stress. To gauge the role of economic status more broadly, Table 9 and separates effects by employment status prior to the invasion. In terms of employment, measured as having any reported income in 2021, both groups of individuals display positive and significant effects. While we do not directly test the reliance on Ukrainian economic ties, this result does indicate that economic status was not an important mediator of the overall effect.

As mentioned above, health seeking behavior is likely to be an important mediator of our effects. Populations that generally do not seek out health care are unlikely to do so following the Russian invasion, even if they are displaying severe symptoms. One way to investigate the role of health seeking behavior is to estimate separate models for individuals who have a record of health seeking behavior, and those who have not. Table 10 does this by separating individuals by whether they have had any medical leave prior to 2022. Comparing means in Columns 1 and 2 indicates that this is a meaningful distinction, as it predicts large differences in mental health prescriptions. Individuals without medical leave have an incidence of 4.1 percent, while those with past medical leave have an incidence of 13.7. Despite this large

difference, those with no prior medical leave have the most pronounced effects, which are both larger in magnitude (except quarter one) and more precisely estimated.

5.2 Effects on Migrants from Russia and Conflict-Adjacent Countries

Lastly, we estimate the synthetic control for Russia and all countries defined as war-adjacent, i.e. European countries that border either Russia or Ukraine. For Russians, the prospects of seeing their family or returning home changed drastically. Men were faced with the increased likelihood of having to join the army if they returned, while anyone with a male relative in Russia could be faced with their relative being endangered in war. In addition, relatives could no longer obtain visas after the European Union decided to fully suspend its visa facilitation agreement with Russia in September 2022.[11] During the last year, the number of Ukrainian attacks on Russian territory has also increased. While the adjacent countries were not under direct attack, missiles have entered the Polish territory on numerous occasions, and the military presence along the border has increased in many countries. Moreover, several countries that border Russia face an increased risk of invasion. Hence, individuals from these countries may also have experienced increasing levels of stress and anxiety.

Table 11 displays our results. Column 1 reproduces our estimates for Ukraine as a point of comparison. Interestingly, Column 2 indicates that Russians also experienced statistically significant mental shocks following the invasion. In terms of magnitude, the effect is only one-third of the effect on Ukrainians during the first quarter of the invasion, but it increases somewhat in the second quarter, almost matching the effect exhibited by Ukrainians. The joint test for all three quarters is significant at either the 5 or 10 percent level, depending on whether one uses regular or standardized p-values.

Turning to the war-adjacent countries, we list results by countries' pre-invasion synthetic control RMSPE, from lowest (best fit) to highest. Among countries that have a relatively good fit, we only find one (weakly) significant effect, for the Baltic countries during the first quarter of 2022. Norway and Finland display large positive effects, but these are driven by the fact that these countries have very high pre-treatment mean usage of mental health medications. Thus, the synthetic control method is unable to create a good fit for these countries, as evidenced by the very high pre-treatment RMSPE, and the large difference between regular and standardized p-values.

[11] The age limit for conscription in Russia increased from 27 to 30 in July 2022. One year later, the age limit to serve increased by five years for individuals who had already completed their compulsory service, now reaching the age of 40, 50 or 55, depending on the category.

6 Conclusion

In this study, we demonstrate the ripple effects of war across borders and its consequences for expatriates who are not directly exposed to the dangers of conflict. In particular, we study the impact on mental health outcomes of Ukrainians living in Sweden during the Russian invasion of Ukraine in February 2022. Our findings reveal a statistically significant increase in mental health prescription uptake of 1.6 percentage points in the quarter of the invasion. Given the pre-treatment baseline, this represents a relative increase of 30 percent. These findings provide evidence that events occurring outside the boundaries of a host country can influence the well-being of migrant communities across large distances, and that conflicts and their associated traumas are thus not confined within the geographical limits of a country or to those directly exposed to the dangers and atrocities that war may bring.

Given that we rely on medical prescription data, it is important to recognize that we are only able to identify cases in which individuals were willing and able to seek out treatment. We are likely to underestimate the full effect of the Russian invasion on mental health issues, as a substantial number of individuals experience mental distress without seeking medical care (Andrade et al., 2014)

Studying the mental health of immigrants is important as many studies point to a link between mental health and labor market outcomes (e.g. Lundborg et al., 2014; Banerjee et al., 2017). Migrants' exposure to events abroad can thereby be an additional factor contributing to the observed differences in labor market outcomes between natives and immigrants (Brell et al., 2020). Future versions of the draft will examine whether the Ukrainians' labor market outcomes were affected by the Russian invasion.

Our findings serve as a reminder of how global events are interconnected, which is particularly relevant in countries such as Sweden, where migrants make up 20% of the population, with many originating from regions experiencing ongoing conflicts. Therefore, these results call for healthcare and labor market policies to consider the external factors that may hinder the integration and progress of migrant communities, and to consider populations more vulnerable within these communities.

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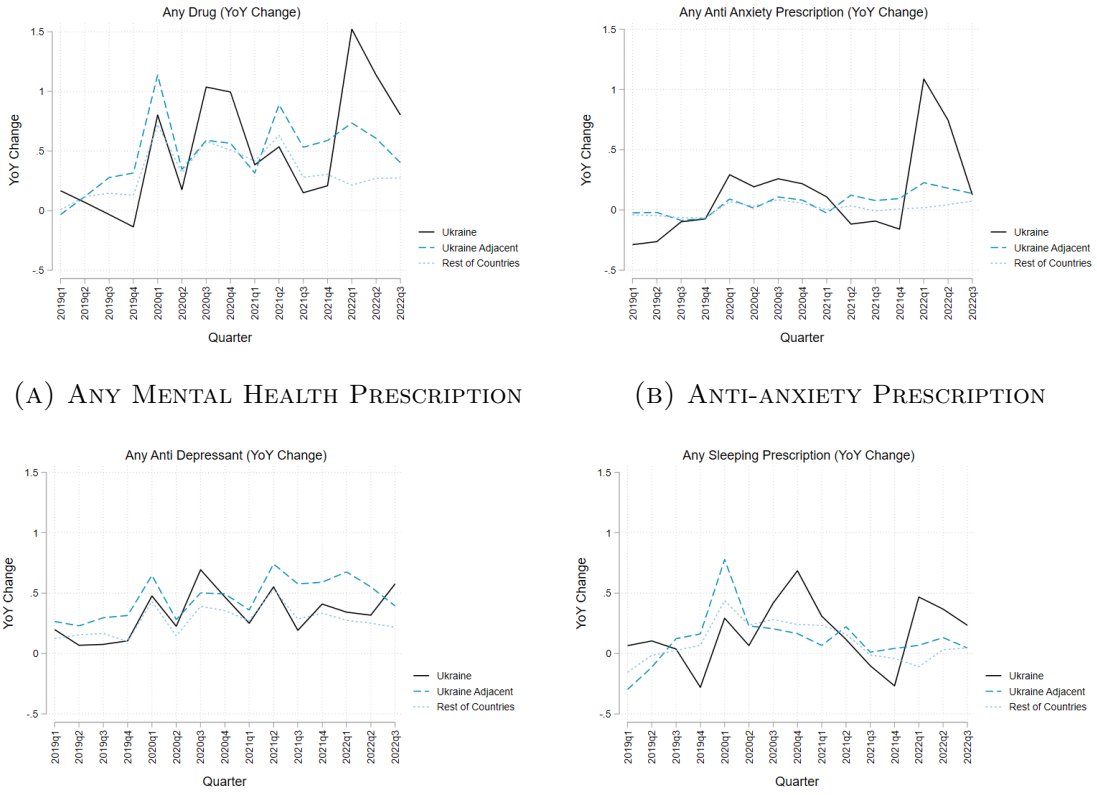
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7 Figures

FIGURE 1: PRESCRIPTIONS FILLED, YEAR-ON-YEAR CHANGES



(A) ANY MENTAL HEALTH PRESCRIPTION

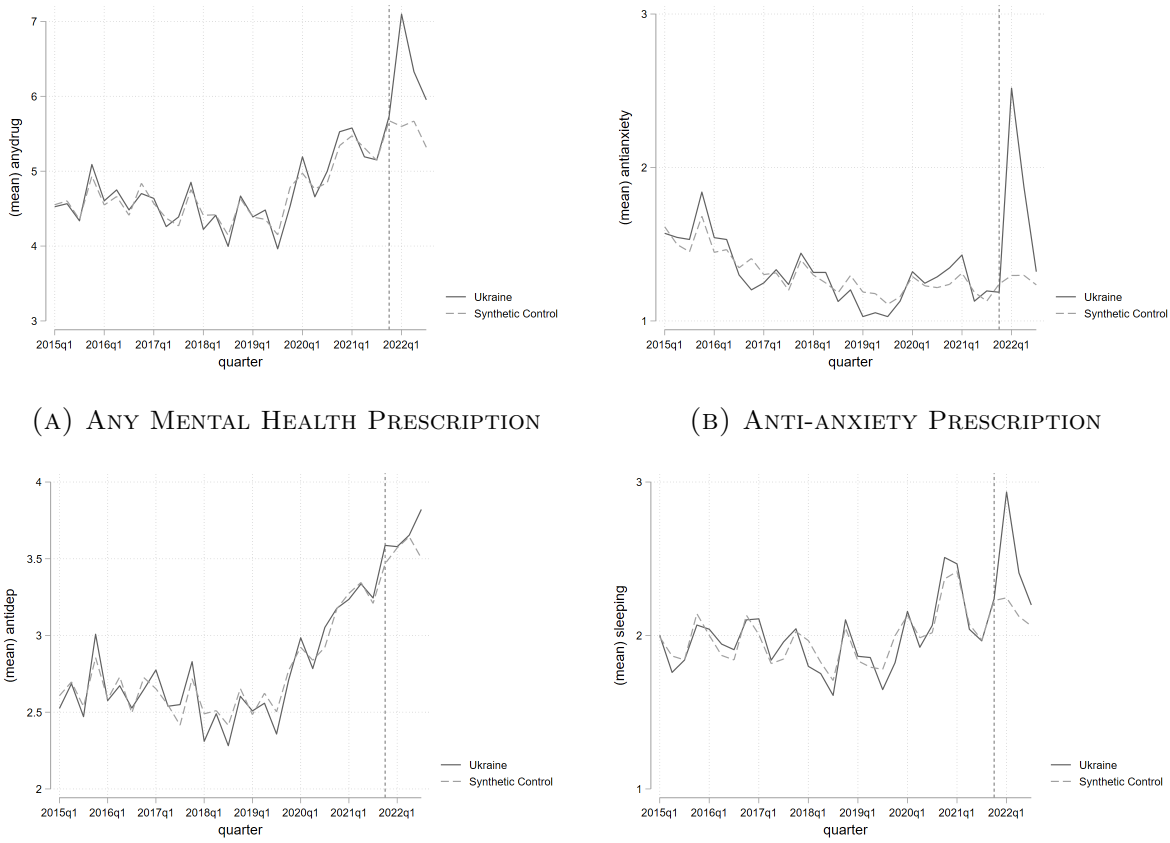
(B) ANTI-ANXIETY PRESCRIPTION

(C) ANTI-DEPRESSANT PRESCRIPTION

(D) INSOMNIA PRESCRIPTION

Notes: This figure shows the year-over-year change of filled prescriptions by country group using Swedish administrative data. In Panel A, the outcome is a dummy for filling a prescription of any mental health drug in a given quarter; in Panel B the outcome is anti-anxiety filled prescriptions; in Panel C is anti-depressant filled prescriptions; and Panel D shows insomnia prescriptions.

FIGURE 2: SYNTHETIC CONTROL PATH PLOTS



(A) ANY MENTAL HEALTH PRESCRIPTION

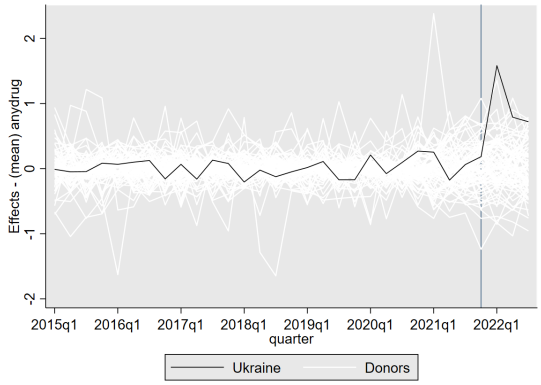
(B) ANTI-ANXIETY PRESCRIPTION

(C) ANTI-DEPRESSANT PRESCRIPTION

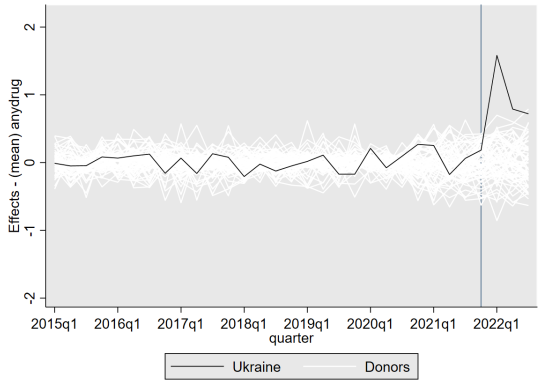
(D) INSOMNIA PRESCRIPTION

Notes: This figure shows synthetic control path plots of the evolution of filled prescriptions for migrants from Ukraine and for a synthetic Ukraine constructed using countries that are not directly adjacent to Ukraine or Russia. The outcome is a dummy for filling a prescription of the specified drug in a given quarter. In Panel A, the outcome is a dummy for filling a prescription of any mental health drug in a given quarter; in Panel B the outcome is anti-anxiety filled prescriptions; in Panel C is anti-depressant filled prescriptions; and Panel D shows insomnia prescriptions.

FIGURE 3: SYNTHETIC CONTROL BY DROPPING PLACEBOS



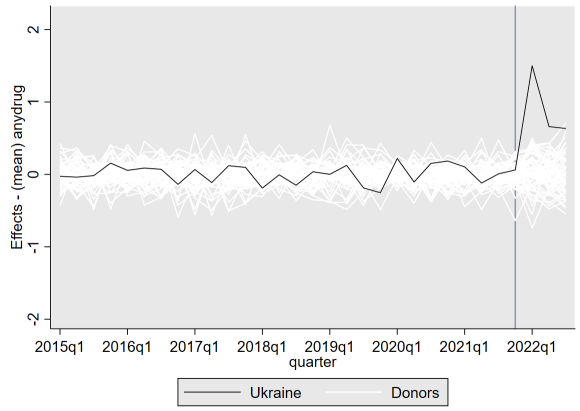
(A) ALL PLACEBOS



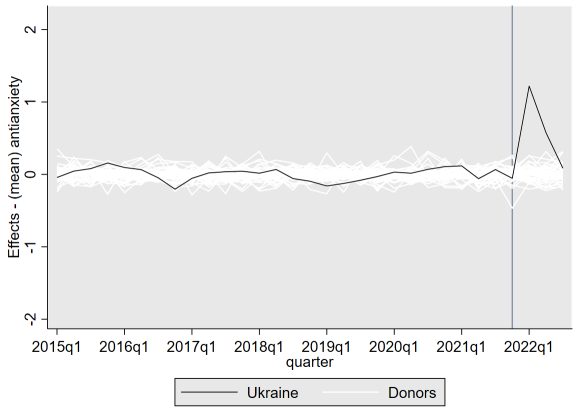
(B) RATIO OF 2

Notes: This figure displays the synthetic control effect plot for Ukraine (solid black line) and placebo effect plots for all other countries (solid white lines). Panel A displays placebo effects for the full set of control countries. Panels B drops countries that have a poor pre-treatment synthetic control, as measured by the ratio of its pre-treatment RMSPE over Ukraines pre-treatment RMSPE. Panel B is our preferred model, which drops all countries whose pre-treatment RMSPE is more than twice as high as that of Ukraine. Note that we only drop countries for inference, while the full set of countries is used to construct Ukraine's synthetic control.

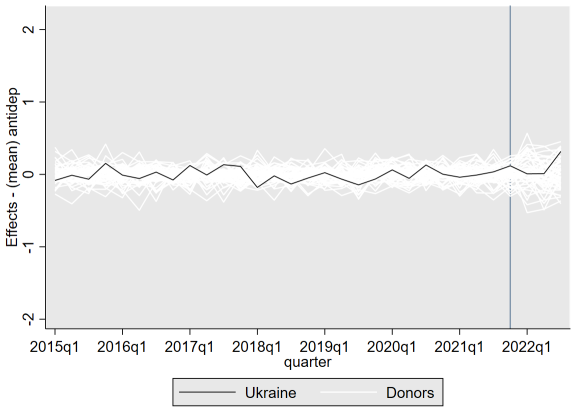
FIGURE 4: SYNTHETIC CONTROL EFFECT PLOTS



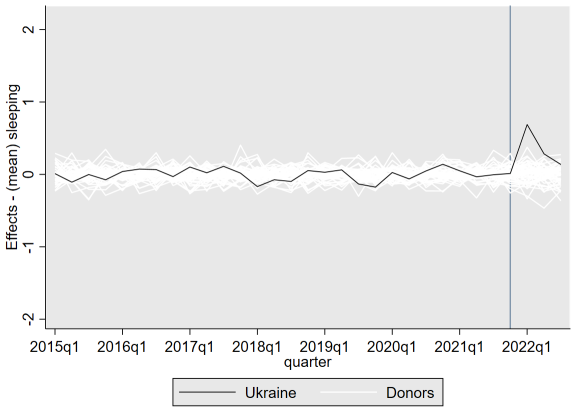
(A) ANY MENTAL HEALTH PRESCRIPTION



(B) ANTI-ANXIETY PRESCRIPTION



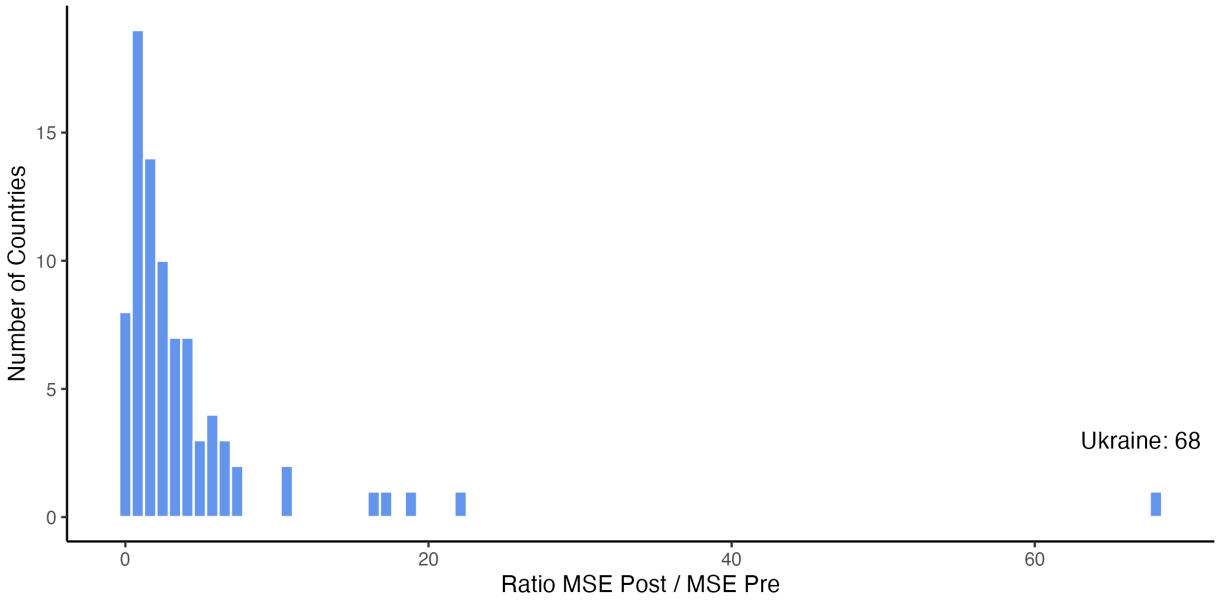
(C) ANTI-DEPRESSANT PRESCRIPTION



(D) INSOMNIA PRESCRIPTION

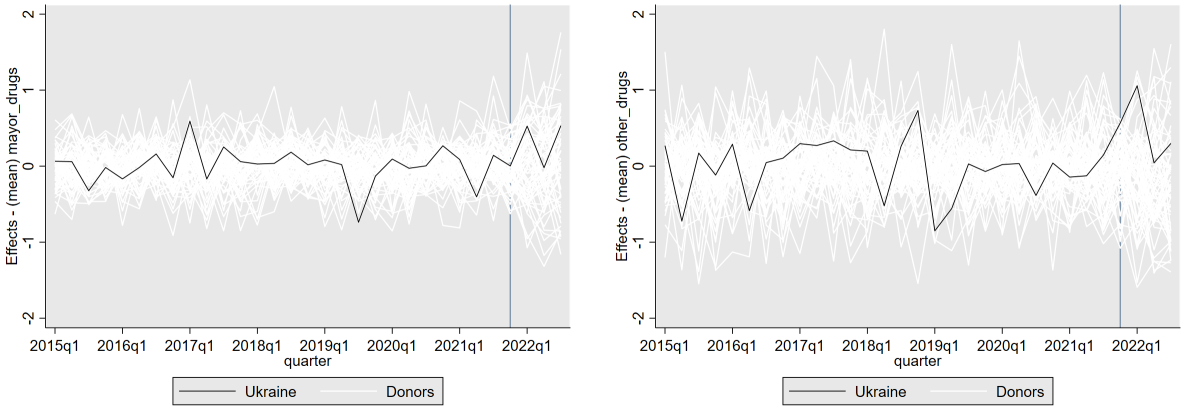
Notes: This figure shows synthetic control effects of the evolution of mental health prescriptions for migrants from Ukraine after netting out prescriptions in a synthetic Ukraine, constructed using countries that are not directly adjacent to Ukraine or Russia. The white lines display the placebo estimations using the synthetic control method to construct synthetic counterparts for each donor country. The outcome in Panel A, the outcome is a dummy for filling a prescription of any mental health drug in a given quarter; in Panel B the outcome is anti-anxiety filled prescriptions; in Panel C is anti-depressant filled prescriptions; and Panel D shows insomnia prescriptions.

FIGURE 5: RATIO TEST: RATIOS OF POST-TREATMENT MSPE TO PRE-TREATMENT MSPE BY COUNTRY OF ORIGIN



Notes: This figure shows the distribution of the post-treatment mean square prediction error (MSPE) over the pre-treatment mean square prediction error using the synthetic control method. The outcome variable is take-up of any mental health prescription post-invasion. The MSPE is the average of the squared difference between the mental health prescriptions of each country and its synthetic country. Pre-treatment period ranges from 1Q of 2015 to 4Q of 2021. Post-treatment period starts in 1Q of 2022 and ends in 3Q of 2022.

FIGURE 6: SYNTHETIC CONTROL: EFFECTS ON OTHER PRESCRIPTIONS



(A) MAJOR DRUGS: EFFECT PLOTS

(B) MINOR DRUGS: EFFECT PLOTS

Notes: This table shows the synthetic control effects of the evolution of other health prescriptions for migrants from Ukraine after netting out prescriptions in a synthetic Ukraine, constructed using countries that are not directly adjacent to Ukraine or Russia. The white lines display the placebo estimations using the synthetic control method to construct synthetic counterparts for each donor country. The outcome in Panel A corresponds to Major health prescriptions comprised of health prescriptions with an ATC first-level code A, B, C. The outcome in Panel B corresponds to Minor health prescriptions comprised of prescriptions with ATC first-level code D, J, H, G, J, L, M, P, R, V, X. See appendix A.2 for their definition.

8 Tables

Table 1: Number of individuals in the sample by country of origin

Country	**Individuals**
Moldova, Ukraine	11,020
Adjacent:	363,404
Belarus	3,278
Czechia, Slovakia	7,927
Estonia	8,606
Finland	132,765
Hungary	14,877
Latvia	7,513
Lithuania	13,397
Norway	34,607
Poland	85,701
Romania	29,175
Russia	20,428
Soviet	5,130
Rest of the World (RoW):	1,428,425

Notes: This table shows the number of individuals in the analysis sample per country of origin as registered in the Swedish administrative data.

Table 2: Descriptive statistics: Ukrainian migrants compared to non-adjacent countries

	Rest of Countries			**Ukraine**		
	N	Mean	SD	N	Mean	SD
Monthly income	1428425	1849.89	2369.55	11020	2308.48	2334.53
Is female	1428425	0.48	0.50	11020	0.65	0.48
Age	1428425	42.82	16.17	11020	38.96	12.34
Is over 40 years old	1428425	1.00	0.00	11020	1.00	0.00
Married	1428425	0.54	0.50	11020	0.57	0.50
Has children	1428425	0.53	0.50	11020	0.52	0.50
Years in Sweden	1428425	17.15	13.93	11020	9.34	7.33
Has Swedish citizenship	1428425	0.68	0.47	11020	0.56	0.50
Had relative visa	1428425	0.10	0.30	11020	0.18	0.39
Had work visa	1428425	0.04	0.18	11020	0.13	0.34
Had student visa	1428425	0.01	0.11	11020	0.02	0.12
Is refugee	1428425	0.07	0.26	11020	0.01	0.09
Has higher education	1428425	0.43	0.50	11020	0.77	0.42
Received income	1428425	0.64	0.48	11020	0.75	0.43
Received UI	1428425	0.10	0.30	11020	0.08	0.27
Any prescr. visit	1428425	7.74	26.73	11020	5.35	22.51
Insomnia prescr.	1428425	3.30	17.85	11020	2.17	14.57
Antidepressant prescr.	1428425	4.90	21.60	11020	3.26	17.76
Anti-anxiety prescr.	1428425	1.76	13.14	11020	1.29	11.30
Prescription expense	1428425	22.07	139.92	11020	16.82	137.08

Notes: This table shows descriptive statistics for migrants in Sweden, grouped by whether they originate from Ukraine or from rest of the world.

Table 3: Synthetic control weights for any mental health prescription

Country	**Weight**
Albania	.244
Uzbekistan, Tajikistan, Kazakhstan	.136
Greece	.112
Montenegro, Serbia	.094
Ireland	.081
Azerbaijan	.08
Belgium	.078
Syria	.043
Mongolia	.032
Mexico	.03
United Arab Emirates	.026
Switzerland	.023
Indonesia, Malaysia	.015
Burundi, Rwanda	.006

Notes: This table shows the synthetic control weights resulting from predicting any mental health prescription based on their values pre-treatment from Q1 of 2015 to Q4 of 2021. The donor countries belong to rest of the world to construct a synthetic Ukraine.

Table 4: Synthetic Control Effect on Filled Prescriptions

	Any drug	Depression	Anxiety	Insomnia
$\beta(t=1)$	1.64	0.12	1.27	0.77
	(0.000)	(0.491)	(0.000)	(0.000)
	[0.000]	[0.418]	[0.000]	[0.000]
$\beta(t=2)$	0.71	-0.08	0.60	0.29
	(0.000)	(0.709)	(0.000)	(0.063)
	[0.015]	[0.655]	[0.013]	[0.016]
$\beta(t=3)$	0.64	0.44	0.07	0.11
	(0.015)	(0.018)	(0.605)	(0.429)
	[0.029]	[0.036]	[0.605]	[0.397]
Baseline Mean	5.350	3.259	1.294	2.170
Number of Placebos	68	55	76	63

Notes: This table shows the coefficients from the synthetic control method, or the difference between Ukraine and Synthetic Ukraine. Each column corresponds to a different dependent variable: In Column 1, the outcome is a dummy for filling a prescription of any mental health drug in a given quarter; in Column 2 is anti-depressant filled prescriptions; in Column 3 the outcome is anti-anxiety filled prescriptions; and Column 4 shows insomnia prescriptions. The population corresponds to migrants in Sweden over 16 years old. The numbers in parentheses "()" show the p-values which measure the share of placebo effects that are larger in absolute value than that of Ukrainian migrants. The numbers in brackets "[]" show the *standardized* p-values, which are estimated by weighting the placebo estimations by the quality of their pre-treatment matches. The joint p-value is the share of placebos with a posttreatment root mean squared percentage error (RMSPE) at least as large as the average for Ukraine. The standardized joint p-value measures the share of placebos that have a ratio of posttreatment RMSPE over pretreatment RMSPE at least as large as the average ratio for Ukraine. The mean corresponds to the dependent variable and is estimated for Ukrainian migrants from 2019 to 2021. Placebos are the number of countries used for inference, which have a ratio or pre-treatment RMSPE over Ukraine's pre-treatment RMSPE less than 2. The percentile pre RMSPE measures the percentile in which Ukraine's pretreatment RMSPE is with respect to placebos. The closer the number is to 1, the worse is the relative fit of Ukraine.

Table 5: Heterogeneous effects by gender

	Female	Male
$\beta(t=1)$	2.20	0.38
	(0.000)	(0.176)
	[0.000]	[0.191]
$\beta(t=2)$	1.15	0.14
	(0.000)	(0.574)
	[0.020]	[0.647]
$\beta(t=3)$	0.67	0.43
	(0.120)	(0.176)
	[0.080]	[0.162]
Baseline Mean	6.66	2.88
Share of Ukrainians	0.65	0.35
Number of Placebos	50	68

Notes: This table shows the coefficients from the synthetic control method, or the difference between Ukraine and Synthetic Ukraine for different treated groups: Column 1 corresponds to female migrants. Column 2 corresponds to male migrants. The outcome is a dummy for filling a prescription of any mental health drug in a given quarter. The population employed are migrants in Sweden over 16 years old. The statistical metrics are the same as Table 4. The share of Ukrainians is the proportion of Ukrainian individuals in each group. Placebos are the number of countries used for inference, which have a ratio or pre-treatment RMSPE over Ukraine's pre-treatment RMSPE less than 2.

Table 6: Heterogeneous effects by gender and married status

	Single	Married with Non Swedish	Married with Swedish
Panel A: Female			
$\beta(t=1)$	2.66	2.36	2.44
	(0.000)	(0.000)	(0.000)
	[0.000]	[0.000]	[0.000]
$\beta(t=2)$	0.94	1.77	1.10
	(0.068)	(0.000)	(0.020)
	[0.068]	[0.000]	[0.041]
$\beta(t=3)$	1.03	0.48	0.64
	(0.085)	(0.250)	(0.224)
	[0.034]	[0.350]	[0.224]
Average Effect	1.54	1.54	1.39
Joint P-val	0.000	0.000	0.000
Joint P-val (std)	0.000	0.000	0.000
Baseline Mean	8.783	4.071	5.848
Share of Ukrainians	0.27	0.15	0.24
Number of Placebos	59	20	49
Percentile (Pre RMSPE)	0.339	0.250	0.306
Panel B: Male			
$\beta(t=1)$	0.56	0.16	0.70
	(0.197)	(0.780)	(0.148)
	[0.224]	[0.707]	[0.272]
$\beta(t=2)$	0.27	-0.01	0.31
	(0.461)	(1.000)	(0.556)
	[0.592]	[1.000]	[0.667]
$\beta(t=3)$	0.56	0.78	-0.36
	(0.184)	(0.073)	(0.420)
	[0.303]	[0.024]	[0.630]
Average Effect	0.46	0.31	0.22
Joint P-val	0.289	0.293	0.420
Joint P-val (std)	0.342	0.268	0.728
Baseline Mean	3.299	2.186	2.975
Share of Ukrainians	0.16	0.11	0.08
Number of Placebos	76	41	81
Percentile (Pre RMSPE)	0.592	0.390	0.728

Notes: This table shows the coefficients from the synthetic control method, or the difference between Ukraine and Synthetic Ukraine for different treated groups: Column 1 corresponds to single migrants. Column 2 corresponds to married or cohabiting migrants with a partner that is not from Sweden. Column 3 corresponds married or cohabiting migrants with a partner that is from Sweden. Panel A corresponds to female migrants. Panel B to male migrants. Marriage or cohabiting status with partner's nationality is defined in 2020. The outcome is a dummy for filling a prescription of any mental health drug in a given quarter. The population employed are migrants in Sweden over 16 years old. The statistical metrics are the same as Table 4. The share of Ukrainians is the proportion of Ukrainian individuals in each group. Placebos are the number of countries used for inference, which have a ratio or pre-treatment RMSPE over Ukraine's pre-treatment RMSPE less than 2.

Table 7: Heterogeneous effects by gender and visa status

	Citizen	Relative Visa	Work Visa	Other Visa
Panel A: Female				
$\beta(t=1)$	2.48	1.73	2.86	0.60
	(0.000)	(0.000)	(0.080)	(0.345)
	[0.000]	[0.024]	[0.000]	[0.276]
$\beta(t=2)$	1.21	0.83	3.31	0.54
	(0.017)	(0.195)	(0.080)	(0.276)
	[0.034]	[0.171]	[0.040]	[0.241]
$\beta(t=3)$	0.85	0.72	0.88	-0.26
	(0.119)	(0.195)	(0.640)	(0.483)
	[0.085]	[0.195]	[0.640]	[0.552]
Average Effect	1.51	1.10	2.35	0.29
Joint P-val	0.000	0.049	0.160	0.517
Joint P-val (std)	0.000	0.049	0.080	0.483
Baseline Mean	8.889	2.602	2.712	4.229
Share of Ukrainians	0.40	0.15	0.03	0.07
Number of Placebos	59	41	25	29
Percentile (Pre RMSPE)	0.390	0.439	0.320	0.414
Panel B: Male				
$\beta(t=1)$	1.04	-0.22	-0.20	0.25
	(0.013)	(0.716)	(0.545)	(0.618)
	[0.038]	[0.797]	[0.500]	[0.632]
$\beta(t=2)$	0.16	-1.41	0.76	0.71
	(0.620)	(0.189)	(0.136)	(0.263)
	[0.646]	[0.311]	[0.182]	[0.382]
$\beta(t=3)$	0.40	-0.19	0.25	0.49
	(0.354)	(0.770)	(0.636)	(0.487)
	[0.418]	[0.838]	[0.636]	[0.566]
Average Effect	0.53	-0.61	0.27	0.48
Joint P-val	0.076	0.365	0.455	0.539
Joint P-val (std)	0.215	0.581	0.500	0.632
Baseline Mean	4.847	2.194	0.710	1.513
Share of Ukrainians	0.16	0.04	0.09	0.06
Number of Placebos	79	74	22	76
Percentile (Pre RMSPE)	0.544	0.689	0.182	0.566

Notes: This table shows the coefficients from the synthetic control method, or the difference between Ukraine and Synthetic Ukraine for different treated groups: Column 1 pertains to migrants born in Ukraine with Swedish citizenship. Column 2, to migrants holding a visa for relatives. Column 3, to migrants holding a work visa. Column 4, to migrants holding another type of visa. Panel A corresponds to female migrants and Panel B, to male migrants. Citizenship and visa status are defined in 2021. The outcome is a dummy for filling a prescription of any mental health drug in a given quarter. The population employed are migrants in Sweden over 16 years old. The statistical metrics are the same as Table 4. The share of Ukrainians is the proportion of Ukrainian individuals in each group. Placebos are the number of countries used for inference, which have a ratio or pre-treatment RMSPE over Ukraine's pre-treatment RMSPE less than 2.

Table 8: Heterogeneous effects by having children and gender of parent

	No Children		Has Children	
	Female	Male	Female	Male
$\beta(t=1)$	2.46	0.59	2.51	0.59
	(0.000)	(0.181)	(0.000)	(0.156)
	[0.000]	[0.194]	[0.000]	[0.273]
$\beta(t=2)$	1.16	0.26	1.06	0.17
	(0.049)	(0.528)	(0.048)	(0.701)
	[0.024]	[0.528]	[0.016]	[0.779]
$\beta(t=3)$	0.80	0.43	0.58	0.13
	(0.098)	(0.292)	(0.190)	(0.727)
	[0.122]	[0.319]	[0.159]	[0.779]
Average Effect	1.47	0.43	1.38	0.29
Joint P-val	0.000	0.333	0.000	0.416
Joint P-val (std)	0.000	0.347	0.000	0.610
Baseline Mean	8.310	3.086	5.345	2.644
Share of Ukrainians	0.29	0.19	0.36	0.16
Number of Placebos	41	72	63	77
Percentile (Pre RMSPE)	0.366	0.514	0.333	0.636

Notes: This table shows the coefficients from the synthetic control method, or the difference between Ukraine and Synthetic Ukraine for different treated groups: Column 1 pertains to female migrants with no children; Column 2, to male migrants with no children; Column 3 to female migrants that have children; and Column 4 to male migrants that have children. Childbearing status is defined in 2021. The outcome is a dummy for filling a prescription of any mental health drug in a given quarter. The population employed are migrants in Sweden over 16 years old. The statistical metrics are the same as Table 4. The share of Ukrainians is the proportion of Ukrainian individuals in each group.

Table 9: Heterogeneous effects by employment

	Employed	Not working
$\beta(t=1)$	1.81	1.68
	(0.000)	(0.000)
	[0.000]	[0.000]
$\beta(t=2)$	0.61	0.99
	(0.069)	(0.000)
	[0.056]	[0.038]
$\beta(t=3)$	0.42	1.09
	(0.167)	(0.000)
	[0.139]	[0.038]
Baseline Mean	4.65	5.55
Share of Ukrainians	0.70	0.30
Number of Placebos	72	26

Table 10: Heterogeneous effects by medical leave

	No Sick Leave	Had Sick Leave
$\beta(t=1)$	1.58	2.04
	(0.000)	(0.042)
	[0.000]	[0.070]
$\beta(t=2)$	0.83	0.36
	(0.000)	(0.507)
	[0.017]	[0.606]
$\beta(t=3)$	0.71	-0.55
	(0.017)	(0.423)
	[0.000]	[0.465]
Baseline Mean	4.13	13.65
Share of Ukrainians	0.87	0.13
Number of Placebos	59	71

Notes: This table shows the coefficients from the synthetic control method, or the difference between Ukraine and Synthetic Ukraine for different treated groups: Column 1 pertains to migrants that had no medical leave before 2022. Column 2 pertains to migrants that had any medical leave before 2022. The outcome is a dummy for filling a prescription of any mental health drug in a given quarter. The population employed are migrants in Sweden over 16 years old. The statistical metrics are the same as Table 4. The share of Ukrainians is the proportion of Ukrainian individuals in each group. Placebos are the number of countries used for inference, which have a ratio or pre-treatment RMSPE over Ukraine's pre-treatment RMSPE less than 2.

Table 11: Synthetic Control by Adjacent Countries

	Ukraine	Russia	Romania	Poland	Hungary	Baltic	Belarus	Czechia	Norway	Finland
$\beta(t=0)$	1.64	0.54	0.09	0.27	0.26	0.47	0.60	-0.04	1.64	2.17
	(0.000)	(0.040)	(0.538)	(0.235)	(0.310)	(0.082)	(0.049)	(0.817)	(0.012)	(0.000)
	[0.000]	[0.080]	[0.538]	[0.118]	[0.241]	[0.061]	[0.268]	[0.927]	[0.440]	[0.333]
$\beta(t=1)$	0.71	0.63	0.05	0.13	-0.04	-0.04	0.73	0.13	1.05	1.67
	(0.000)	(0.000)	(0.846)	(0.471)	(0.828)	(0.816)	(0.012)	(0.561)	(0.012)	(0.012)
	[0.015]	[0.027]	[0.615]	[0.176]	[0.845]	[0.816]	[0.134]	[0.756]	[0.595]	[0.476]
$\beta(t=2)$	0.64	0.40	-0.07	0.05	-0.18	0.12	0.08	0.15	1.08	1.44
	(0.015)	(0.107)	(0.538)	(0.706)	(0.517)	(0.510)	(0.707)	(0.585)	(0.012)	(0.012)
	[0.029]	[0.120]	[0.538]	[0.588]	[0.414]	[0.551]	[0.878]	[0.707]	[0.595]	[0.536]
Average Effect	1.00	0.52	0.02	0.15	0.01	0.19	0.47	0.08	1.26	1.76
Joint P-val	0.000	0.027	0.923	0.412	0.603	0.327	0.061	0.829	0.012	0.012
Joint P-val (std)	0.000	0.067	0.692	0.294	0.431	0.122	0.305	0.988	0.738	0.607
Baseline Mean	5.350	8.079	7.644	10.271	13.062	6.742	6.308	13.300	17.636	17.818
Number of Placebos	68	75	13	17	58	49	82	82	84	84
Percentile (Pre RMSPE)	0.368	0.453	0.077	0.118	0.310	0.347	0.915	0.915	0.988	1.000

Notes: This table shows the coefficients from the synthetic control method for every adjacent country. The outcome is a dummy for filling a prescription of any mental health drug in a given quarter. The statistical metrics are the same as Table 4. Placebos are the number of countries used for inference, which have a ratio or pre-treatment RMSPE over Ukraine's pre-treatment RMSPE less than 2.

Appendix

A.1.1 Figures

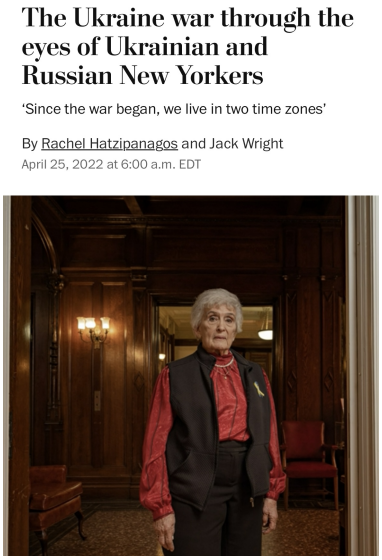
Figure A.1: Newspaper articles on the reactions of Ukrainians living abroad



(a) NBC News, February 28th 2022

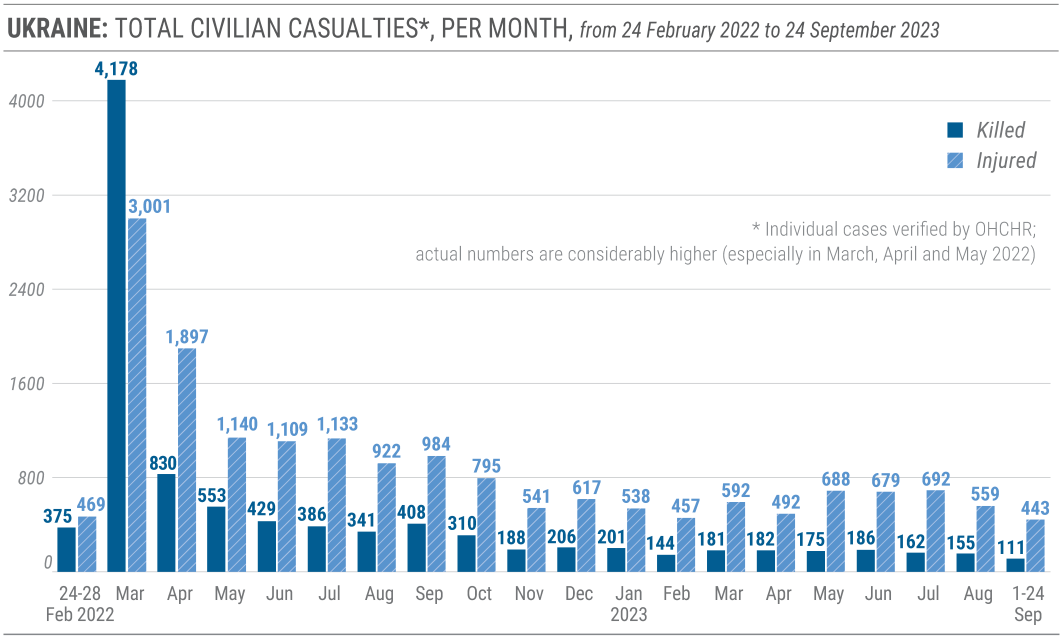


(b) CBC News, February 24th 2022



(c) The Washington Post, April 25th 2022

FIGURE A.2: UKRAINIAN CASUALTIES



A.1.2 Tables

Table A.1: Medical drugs for mental health issues

Anti-Depressant	ATC	Anti-anxiety	ATC	Insomnia	ATC
Clomipramine	N06AA04	Pregabalin	N02BF02	Nitrazepam	N05CD02
Amitriptyline	N06AA09	Diazepam	N05BA01	Melatonin	N05CH01
Nortriptyline	N06AA10	Oxazepam	N05BA04	Zopiklone	N05CF01
Fluoxetine	N06AB03	Lorazepam	N05BA06	Zolpidem	N05CF02
Citalopram	N06AB04	Alprazolam	N05BA12	Propiomazine	N05CM06
Paroxetine	N06AB05	Hydroxyzine	N05BB01		
Sertraline	N06AB06				
Fluvoxamine	N06AB08				
Escitalopram	N06AB10				
Moklobemide	N06AG02				
Mianserin	N06AX03				
Mirtazapin	N06AX11				
Bupropion	N06AX12				
Venlafaxin	N06AX16				
Agomelatin	N06AX22				
Duloxetin	N06AX21				
Vortioxetin	N06AX26				

Notes: The lists include the most common medical drugs in use in Sweden for anxiety, insomnia, and depression.

Table A.2: Medical drugs classification

ATC 1st level	Classification
A	Alimentary tract and metabolism
B	Blood and blood forming organs
C	Cardiovascular system
D	Dermatologicals
G	Genito urinary system and sex hormones
H	Systemic hormonal preparations,
J	Antiefective for systemic use
L	Antineoplasic and immunomodulating agents
M	Musculo-skeletal system
N	Nervous system
P	Antiparasitic product, insecticides and repellents
R	Respiratory system
S	Sensory organs
V	Various

Notes: Anatomical Therapeutic Chemical (ATC) Classification by World Health Organization. Mental health drugs employed in our analysis belong to code N. https://www.who.int/tools/atc-ddd-toolkit/atc-classification.

Table A.3: Synthetic Control Effect on Filled Prescriptions by Placebo Groups

	All	Ratio 4	Ratio 3	Ratio 2
$\beta(t=0)$	1.64	1.64	1.64	1.64
	(0.012)	(0.000)	(0.000)	(0.000)
	[0.000]	[0.000]	[0.000]	[0.000]
$\beta(t=1)$	0.71	0.71	0.71	0.71
	(0.036)	(0.012)	(0.012)	(0.000)
	[0.012]	[0.012]	[0.012]	[0.015]
$\beta(t=2)$	0.64	0.64	0.64	0.64
	(0.036)	(0.024)	(0.025)	(0.015)
	[0.024]	[0.024]	[0.025]	[0.029]
Average Effect	1.00	1.00	1.00	1.00
Joint P-val	0.012	0.000	0.000	0.000
Joint P-val (std)	0.000	0.000	0.000	0.000
Number of Placebos	84	82	81	68
Percentile (Pre RMSPE)	0.298	0.305	0.309	0.368

Notes: This table shows the synthetic control results varying placebo groups for inference. The first column displays the results with all placebos. Columns 2-4 drops countries that have a poor pre-treatment synthetic control, as measured by the ratio of its pre-treatment RMSPE over Ukraines pre-treatment RMSPE. Column 2 drops countries with a ratio larger than 4, Column 3 drops countries with a ratio larger than 3, and Column 4 drops countries with a ratio larger than 2, which is our preferred method. The statistical metrics are the same as Table 4. Placebos are the number of countries used for inference, which have a ratio or pre-treatment RMSPE over Ukraine's pre-treatment RMSPE less than 2.

Table A.4: Synthetic Control Effect on Filled Prescriptions - All Placebos

	Any drug	Anti-depressant	Anti-anxiety	Insomnia
$\beta(t=0)$	1.64	0.12	1.27	0.77
	(0.012)	(0.524)	(0.000)	(0.012)
	[0.000]	[0.333]	[0.000]	[0.000]
$\beta(t=1)$	0.71	-0.08	0.60	0.29
	(0.036)	(0.750)	(0.000)	(0.071)
	[0.012]	[0.631]	[0.012]	[0.012]
$\beta(t=2)$	0.64	0.44	0.07	0.11
	(0.036)	(0.083)	(0.619)	(0.524)
	[0.024]	[0.024]	[0.607]	[0.369]
Average Effect	1.00	0.16	0.65	0.39
Joint P-val	0.012	0.321	0.000	0.024
Joint P-val (std)	0.000	0.107	0.000	0.000
Baseline Mean	5.35	3.26	1.29	2.17
Number of Placebos	84	84	84	84
Percentile (Pre RMSPE)	0.298	0.202	0.464	0.262

Notes: This table shows the coefficients from the synthetic control method, or the difference between Ukraine and Synthetic Ukraine. The statistical metrics are the same as Table 4. Placebos are the number of countries used for inference, which have a ratio or pre-treatment RMSPE over Ukraine's pre-treatment RMSPE less than 2.

Table A.5: Synthetic Control Effect on Other Prescription Drugs

	Major drugs	Other drugs
$\beta(t=0)$	0.53	1.06
	(0.269)	(0.099)
	[0.224]	[0.127]
$\beta(t=1)$	-0.02	0.04
	(1.000)	(0.958)
	[1.000]	[0.972]
$\beta(t=2)$	0.53	0.30
	(0.418)	(0.620)
	[0.373]	[0.634]
Average Effect	0.35	0.47
Joint P-val	0.522	0.408
Joint P-val (std)	0.463	0.451
Baseline Mean	10.482	18.217
Number of Placebos	67	71
Percentile (Pre RMSPE)	0.328	0.423

Notes: This table shows the synthetic control estimates for prescription drugs that are not directly related to mental health conditions. Major health prescriptions correspond to prescriptions that comprised the majority of the observed prescriptions, and include ATC groups A, B, and C. Minor health prescriptions include the groups D, J, H, G, J, L, P, M, R, V, X. See appendix A.2 for the definition of the ATC codes. The statistical metrics are the same as Table 4. Placebos are the number of countries used for inference, which have a ratio or pre-treatment RMSPE over Ukraine's pre-treatment RMSPE less than 2.

Table A.6: Synthetic Control Effect varying Control Groups

	Ukraine	Ukraine complete
$\beta(t=0)$	1.64	1.64
	(0.000)	(0.000)
	[0.000]	[0.000]
$\beta(t=1)$	0.71	0.71
	(0.000)	(0.000)
	[0.015]	[0.013]
$\beta(t=2)$	0.64	0.64
	(0.015)	(0.013)
	[0.029]	[0.037]
Average Effect	1.00	1.00
Control group	RoW	RoW+Adjacent
Joint P-val	0.000	0.000
Joint P-val (std)	0.000	0.000
Baseline Mean	5.35	5.35
Number of Placebos	68	80
Percentile (Pre RMSPE)	0.368	0.375

Notes: This table shows the coefficients from the synthetic control method, or the difference between Ukraine and Synthetic Ukraine varying donor groups. Column 1 drops adjacent countries from the control group. Column 2 keep adjacent and rest of the world countries. The outcome is a dummy for filling a prescription of any mental health drug in a given quarter. The statistical metrics are the same as Table 4. Placebos are the number of countries used for inference, which have a ratio or pre-treatment RMSPE over Ukraine's pre-treatment RMSPE less than 2.

A.1.3 Difference-in-Differences (Event Study)

For the corresponding event study in a difference-in-differences framework, we regress the outcome variable Y_{it} of individual i in quarter t on a series of interactions of the indicator L_t for event time t with an indicator of being in the *treated* group Ukraine_i, individual fixed effects γ_i and time fixed effects μ_t:

$$Y_{it} = \sum_{t \in (-11,+2), t \neq -1} \beta_t \times \text{Ukraine}_i + \gamma_i + \mu_t + \epsilon_{it} \tag{5}$$

We normalize the periods relative to the quarter of the start of the war, Q1 of 2022 ($t = 0$), with $t = -1$ as the reference period. $\beta_t (t \in (0, +2))$ are the parameters of interest. Considering that the *treatment* is at the level of one's country of origin, we cluster the standard errors at the country level. For the pooled effect in the post-treatment period, we estimate the following specification:

$$Y_{it} = \beta_{\text{pooled}} (\text{post}_t \times \text{Ukraine}_i) + \gamma_i + \mu_t + \upsilon_{it}, \tag{6}$$

where $post_t$ is a binary variable indicating the post-treatment quarters, i.e., quarters one through three in 2022. β_{pooled} is the coefficient of interest.

Finally, to investigate heterogeneous treatment effects, we adopt the following specification:

$$Y_{it} = \kappa(\text{Ukraine}_i \times \text{post}_t \times X_i) + \phi(\text{Ukraine}_i \times \text{post}_t) + \lambda(\text{post}_t \times X_i) + \gamma_i + \mu_t + \varepsilon_{it}, \tag{7}$$

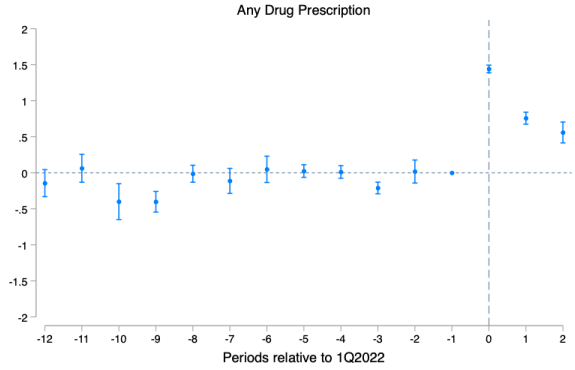
where X_i is an individual characteristic such as gender, age, and pre-treatment employment or income. κ is the parameter of interest.

The event study analysis employs a balanced sample of individuals who are present in the administrative data throughout all quarters between Q1 of 2019 and Q3 of 2022.

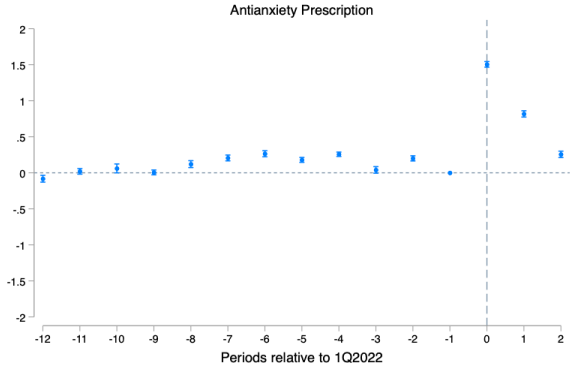
A.1.4 Difference-in-Differences Results

We next replicate our main results using the standard event-study method. Because our setting features a single, non-staggered treatment, the standard two-way fixed effects approach is not susceptible to the issues raised in the recent literature on event-study methodology, such as issues of heterogeneous effects or using already treated units as controls. Figure A.3 displays the event-study plot, indicating a similar pattern as found using synthetic control.

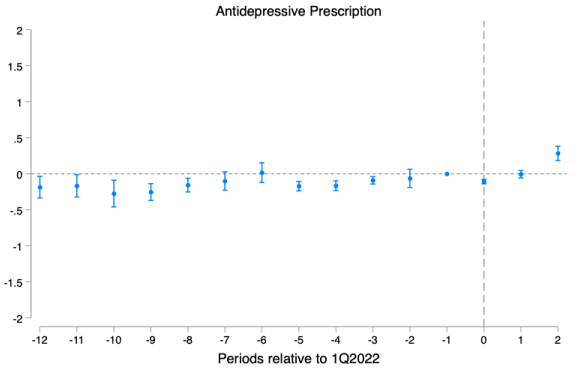
FIGURE A.3: EVENT STUDY: FILLED PRESCRIPTIONS



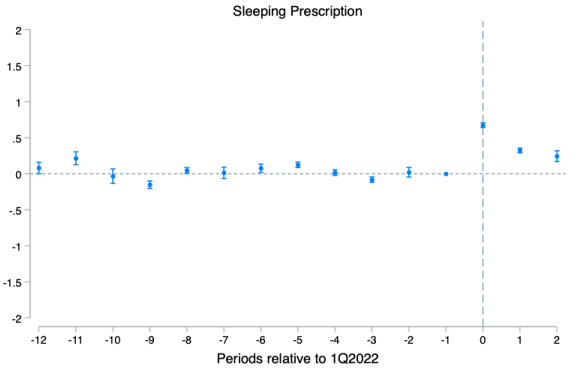
(A) ANY MENTAL HEALTH PRESCRIPTION



(B) ANTI-ANXIETY PRESCRIPTION



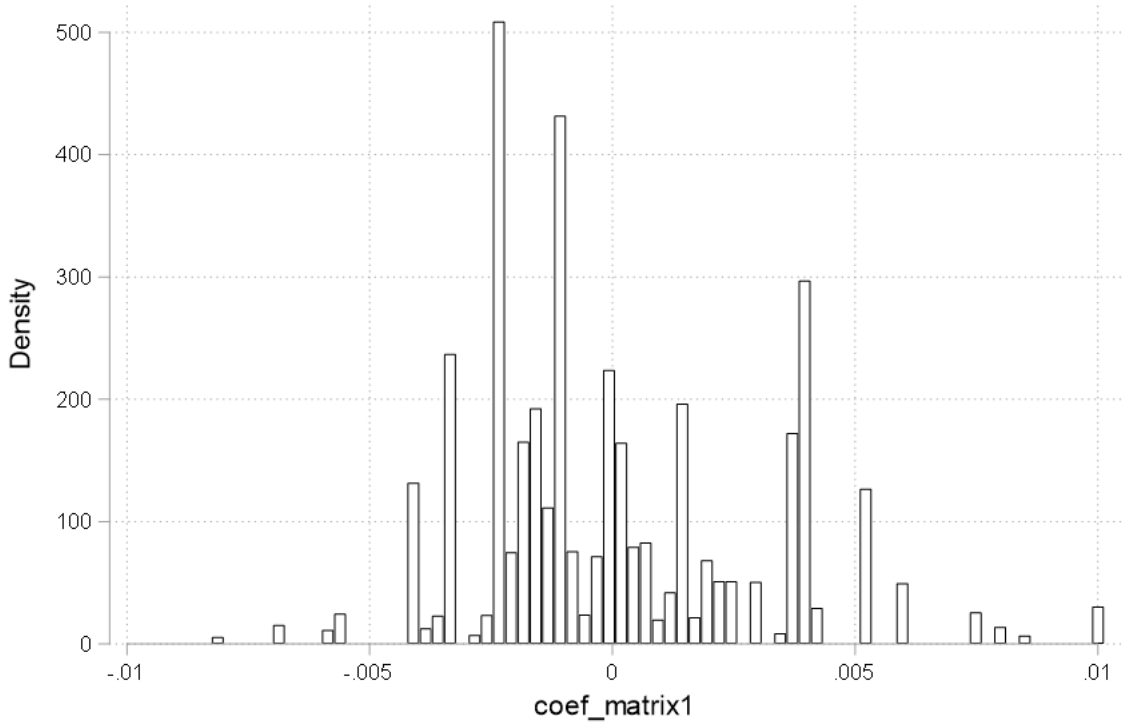
(C) ANTI-DEPRESSANT PRESCRIPTION



(D) INSOMNIA PRESCRIPTION

Notes: This figure shows the event-study estimates of β_t corresponding to $Y_{it} = \sum_{t\in(-11,+2),t\neq-1} \beta_t \times \text{Ukraine}_i + \gamma_i + \mu_t + \epsilon_{it}$. The bands show the confidence intervals at the 95% level. In Panel A, the outcome is a dummy for filling a prescription of any mental health drug in a given quarter; in Panel B the outcome is anti-anxiety filled prescriptions; in Panel C is anti-depressant filled prescriptions; and Panel D shows insomnia prescriptions.

FIGURE A.4: TWFE/DID ESTIMATES FOR EACH COUNTRY OF ORIGIN



Notes: This figure shows the distribution of placebo estimations of the TWFE specification $Y_{it} = \beta_{\text{pooled}}(\text{post}_t \times \text{Ukraine}_i) + \gamma_i + \mu_t + \upsilon_{it}$, for each origin country of rest of the world and Ukraine. The bar on the far right corresponds to Ukraine.