

Multidimensional effects of conflict-induced violence on wartime migration decisions: evidence from Ukraine

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Abstract

This study makes three key contributions to the literature on the effect of conflict-induced violence on wartime migration. First, while conflict-induced violence is often treated as a monolithic factor, we consider conflict-induced violence as multidimensional, varying in intensity, type and proximity. Second, by including both movers and stayers, we address the mobility bias prevalent in the literature and examine both mobility and immobility in the context of conflict. Third, we contribute to debates on destination choices by empirically testing the likelihood of internal displacement versus seeking refuge abroad. Using dynamic models and unique comparative data from the OneUA project, which surveyed 24,000 Ukrainian women in Ukraine and eight other European countries, we examine the migration behaviors of those who stayed in their pre-war residence, relocated internally (internally displaced persons), or fled abroad during the first 6 months of Russia's full-scale invasion of Ukraine. Our findings reveal a curvilinear relationship between conflict-induced violence and migration propensity: violence initially increases migration but diminishes beyond a threshold. We also find that forewarnings and indirect threats have a stronger influence on migration than direct threats. Violence catalyzes migration among vulnerable groups, narrowing demographic disparities in migration propensity. However, resourceful individuals retain an advantage in early migration, perpetuating inequalities in escape opportunities. Additionally, we observe distinct patterns of internal versus international migration in response to stronger conflict-induced violence, providing theoretical and empirical insights into the dynamics of wartime migration.

Keywords

Conflict-induced violence, refugees, displaced persons, Ukraine, survival analyses

Introduction

The global population of forcibly displaced individuals has reached unprecedented levels, with the United

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Nations High Commissioner for Refugees (UNHCR) reporting an increase from 89.3 million in 2021 to 122.6 million in 2023 (United Nations High Commissioner for Refugees, 2024a). A significant driver of this surge is the full-scale Russian invasion of Ukraine on the 24 February 2022, which has resulted in one of the most severe displacement crises since World War II. As of August 2024, nearly one-third of Ukraine's population have been forced to flee their homes and 3.7 million are currently internally displaced persons (IDPs), while 6.3 million are refugees¹ across Europe (United Nations High Commissioner for Refugees, 2024b).

This study contributes to the literature on conflict-induced migration by focusing on the migration patterns of Ukrainians in the immediate aftermath of the Russian invasion. We address three critical gaps in the literature on conflict-induced migration.

First, the literature predominantly treats conflict-induced violence (CIV) as a monolithic factor, often measured by the intensity of violence at the national level. However, violence in conflict zones is more multi-dimensional, varying in type (e.g. direct vs. indirect violence; Braithwaite et al., 2021), and proximity to the affected population (Lubkemann, 2005; Melander and Öberg, 2007). Research has yet to disentangle fully how different dimensions of CIV influence migration decisions. Some studies suggest that proximity to violence and type of violence (e.g. air raids vs. fatalities) may have different impacts on migration behavior (Tai et al., 2022), but a systematic analysis across these dimensions is still needed (Erdal et al., 2023). Possibly, the different measures of CIV employed, as well as the different levels of analyses (national vs. local) may account for the mixed results, with some indicating a linear relationship between conflict intensity and migration (Adhikari, 2013; Davenport et al., 2003; Engel and Ibáñez, 2007; Moore and Shellman, 2004), while others report non-linear (Alvarado and Massey, 2010; Bohra-Mishra and Massey, 2011; Morrison, 1993) or insignificant effects (Schon, 2019).

Second, the literature on conflict-related migration falls short in understanding who stays and who leaves conflict areas. The majority of studies have a 'mobility bias', focusing on those who flee, while neglecting those who remain (Erdal et al., 2023; Schewel, 2020). This is problematic because, in many conflict regions, a substantial portion of the population does not migrate, and understanding which subgroups stay behind is equally important. While some studies have examined refugee selectivity patterns in terms of education, age and gender (e.g. Aksoy and Poutvaara, 2021; Spörlein et al.,

2020; Van Tubergen et al., 2024), these studies have overlooked how these and other subgroups differently respond to the intensity and nature of conflict in their region. Recent reviews, such as Erdal et al. (2023), emphasize the need better to understand immobility during crises, which remains one of the most pressing challenges in the field.

Third, the literature is divided on how conflicts influence the choice between internal displacement and international migration. While some studies argue that higher levels of violence push individuals to migrate further, often across borders (Bohra-Mishra and Massey, 2011; Echevarria-Coco and Gardezabal, 2021), others suggest that internal displacement is more likely when violence is localized or when international migration is difficult (Braithwaite et al., 2021). There is a need for more empirical research that tests these competing hypotheses, particularly in the context of recent conflicts.

This study addresses these critical knowledge gaps by leveraging unique data from the *OneUA* project (Kogan et al., 2022), which surveyed 24,000 Ukrainian women during the first 6 months of the large-scale Russian invasion of Ukraine. Our data include not only those who fled the country but also those who were internally displaced or stayed, allowing us to examine both mobility and immobility in the context of conflict (Carling, 2002). By including both movers and stayers, our study overcomes the mobility bias that characterizes much of the existing literature (Erdal et al., 2023; Schewel, 2020). We analyze which subgroups remain in place, providing insights into heterogeneous responses to conflicts.² We contribute to the debate on how CIV affects destination choices by empirically testing which individuals are more likely to be internally displaced (IDPs) or to seek refuge abroad. Additionally, we offer a comprehensive analysis of the impact of CIV by considering both its proximity and type. This multidimensional approach allows us to explore how different forms of violence, such as direct (e.g. fatalities) and indirect (e.g. destroyed infrastructure) threats as well as violence forewarning (e.g. air raid alarms), influence migration decisions. Our study provides new evidence on how these different aspects of CIV shape individual anticipations of future violence and perceived threats in the early periods of a full-scale invasion.

The setting: Russian invasion of Ukraine

On 24 February 2022, Russia launched a full-scale invasion of Ukraine, escalating the ongoing Russo-Ukrainian

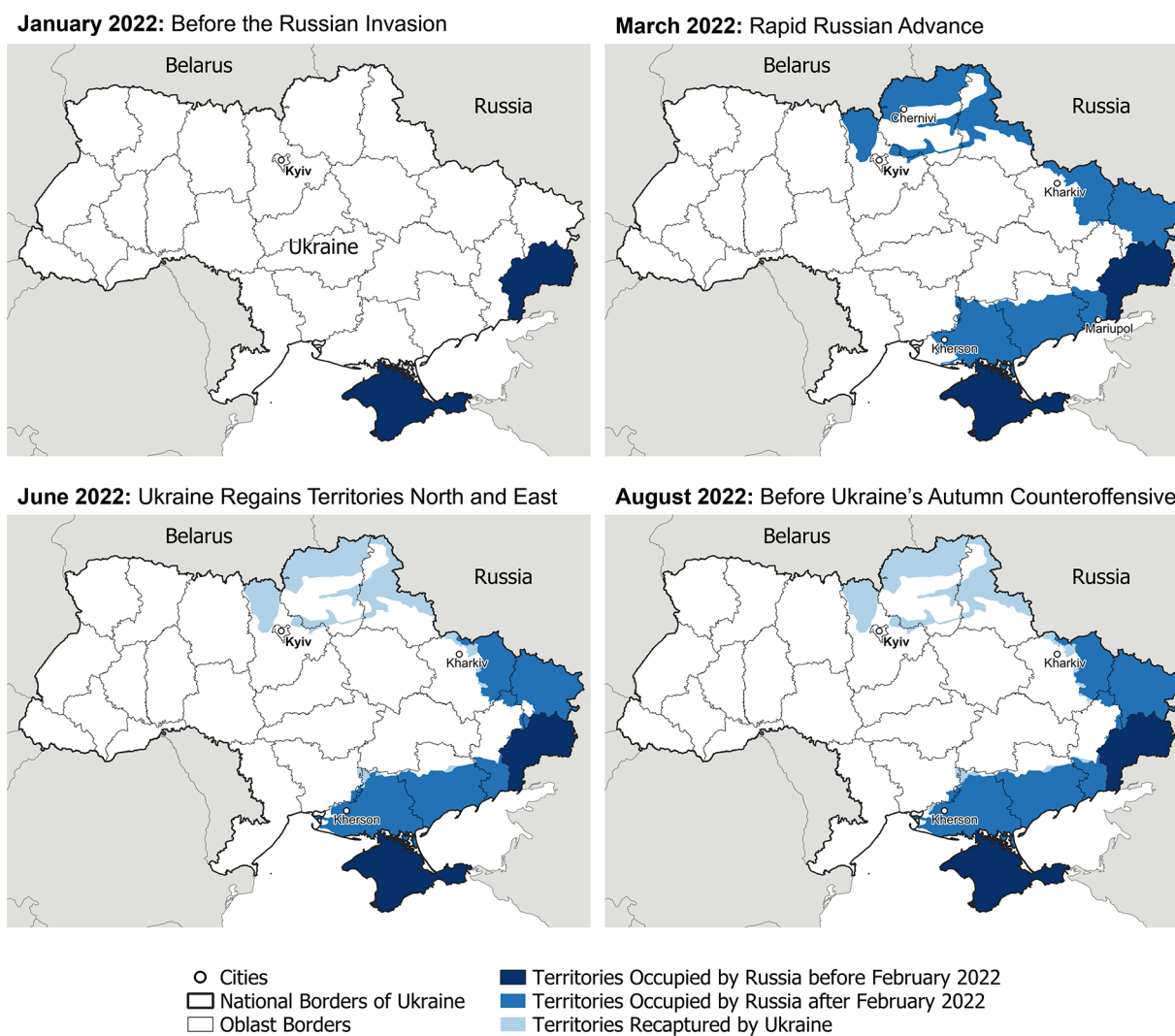


Figure 1. Tracking the war with Russia in maps (February to August 2022).

Data source: liveuamap.com (2023).

conflict that had been underway since 2014. The invasion commenced with Russian heavy air strikes throughout Ukraine. Four spearhead military assaults were launched: a northern front from Belarus towards Kyiv and Chernihiv, a southern front from Crimea towards Kherson and Zaporizhzhia, a south-eastern front from the Russian-controlled parts of Donbas, and an eastern front from Russia towards Kharkiv and Sumy (Clark et al., 2022). Ukrainian President Zelenskyy promptly declared martial law and ordered a general mobilization of all Ukrainian men between 18 and 60 years old, prohibiting them from leaving the country (Deutsche Welle, 2022). Figure 1 illustrates the war trajectory over four periods: January 2022 captures the prelude to Russia's invasion, while March, June and August of the same year delineate the advancement of Russian forces

within Ukraine's territory. Whereas most of the territorial gains were made by the Russian Army in February and early March, by April Russian troops retreated from the northern counties (*oblast* in Ukrainian) after encountering stiff Ukrainian resistance and problems with logistics. The later period is characterized by positional warfare with insignificant Russian gains in the east. The Russian invasion of Ukraine inflicted substantial human suffering, including but not limited to mass detentions, forced disappearances, mock executions, extrajudicial killings and sexual violence perpetrated by Russian military forces (Human Rights Watch, 2022). A massacre in Bucha was revealed after the Russian forces left the area (near Kyiv) following a month of occupation, with hundreds of killed civilians lying on the streets or in detected mass graves (Al-Hlou et al., 2022). Similar atrocities

were uncovered in other cities recaptured by the Ukrainian Army in 2022. Further, thousands of civilians were killed by Russia's indiscriminate shelling and missile strikes against civilian areas since the start of the full-scale war (Human Rights Watch, 2022).

Theory and hypotheses

Wartime migration

Recent theoretical approaches underscore the pivotal roles of aspirations and capabilities in elucidating migration decisions (Carling, 2002; Carling and Schewel, 2018; Czaika et al., 2021; De Haas, 2021; Schewel, 2020). The concept of 'aspirations' encompasses various mechanisms driving individual's preferences to either stay or migrate. In the context of CIV, aspirations primarily revolve around escaping violence and seeking protection and safety. On the other hand, 'capabilities' refer to the opportunities and constraints individuals encounter in realizing their migration aspirations. These capabilities, or the lack thereof, can be associated with individual resources (e.g. financial resources or health status) or to intervening opportunities (e.g. obstacles along the escape route or restrictions at the border to a safe region).

The aspirations–capabilities approach aligns with a framework that views migration as a function of the relative perceived benefits (in terms of security or economic situation, access to health care, etc.) at origin and at destination, the perceived probability of the benefits to materialize and costs associated with the move (monetary and non-pecuniary) (Tjaden, 2023). Variations of the above-described model have found application in analyses of both economic (Chiswick, 1999; Sjaastad, 1962) and wartime migrations (Aksoy and Poutvaara, 2021; Engel and Ibáñez, 2007). For war-time migrants, non-economic aspects, particularly safety threats, bear greater weight in their migration decisions (FitzGerald and Arar, 2018).

Role of CIV in migration decision

While the attacks by Russian military forces have plunged all of Ukraine into war, it is crucial to consider the local context and the varying degrees of conflict intensity across regions to understand migration decisions (Lubkemann, 2005). We theorize that CIV in one's region of residence has opposite effects on migration aspirations and capabilities.

On the one hand, the escalation of CIV poses multifaceted threats to physical safety and individual wellbeing (Bohra-Mishra and Massey, 2011), as well as

challenges in securing a livelihood (Aksoy and Poutvaara, 2021). Individuals assess their risks in the face of violence and security threats (Basu and Pearlman, 2017; Schon, 2019). When the threats to one's wellbeing outweigh the opportunity costs of staying – such as economic prospects and emotional ties to home – the aspiration to leave increases (Adhikari, 2013).

On the other hand, violence can undermine migration capabilities by raising the costs of migration (Basu and Pearlman, 2017). When perceived or actual costs become too high, individuals may experience 'involuntary immobility' (Carling, 2002; Lubkemann, 2008). For instance, damage to transport networks like roads, railways, ports and airports from bombings can lead to prolonged and difficult journeys to new destinations. Regions completely occupied by the enemy troops – which also experience escalated violence levels (e.g. Bucha massacre in 2022 in Ukraine) – may effectively leave no opportunity for individuals to flee.

The idea that the costs of moving rise significantly at higher levels of CIV would imply non-linear, concave relationship with migration. Therefore, we suggest that:

Hypothesis 1: Increasing CIV intensity in one's county increases propensity of leaving initially, but then levels off at higher levels, after which further CIV intensity results in declining propensity of leaving.

In the following, we further refine this main hypothesis, paying closer attention to both proximity and type of CIV.

Proximity of CIV. The perception of insecurity in the immediate surroundings is intricately linked to various hazards, encompassing destruction, acts of violence and casualties (Basu and Pearlman, 2017; Erdal et al., 2023). This perception is not only shaped by personal victimization but also by reports of violence in other regions, with rapid information dissemination – including unverified information – potentially prompting people to take precautionary actions based on perceived threats (Tai et al., 2022).

The underlying mechanism – violence anticipation – is demonstrated in Tai et al. (2022) who explored mobility patterns in Afghanistan following violent events by means of high-frequency mobile data linked to the conflict data. Their analysis unveiled a noteworthy trend: individuals tended to change districts already before the event was reported in the local media.

Reports from neighboring areas also hold significance, potentially prompting individuals to move due to the anticipation of violence spilling over from more violent regions to their own, even if their immediate region does not experience violence threats (Basu and Pearlman, 2017). To address these anticipation effects, we incorporate a spatial dimension of the source of threat (Melander and Öberg, 2007). We refine our original hypothesis (H1) by proposing that the proximity of the threat to the individual's local area influences the likelihood of leaving:

Hypothesis 2: The positive effect of CIV intensity on propensity of leaving is the strongest when threat of violence comes from the immediate local area, weaker when threat of violence comes from the neighboring area and the weakest when threat comes from the distant area.

Type of CIV. To explore the heterogeneous effects of various types of violence threat, we adhere to the distinction introduced by Braithwaite et al. (2021), who propose a classification, which distinguishes between exposure to direct and indirect types of violent threats. A direct threat of violence, such as physical assaults, torture, or sexual violence, is characterized by its specific targeting of civilians and assumes the existence of enemy forces in close proximity to purported victims. In contrast, an indirect threat of violence, exemplified by shelling or bombing, is typically less likely to target specific individuals deliberately. Instead it poses a risk to non-combatants due to its proximity to a battlefield (Braithwaite et al., 2021). Both shelling and bombing are likely to induce destruction of critical infrastructure resulting in deterioration of basic services, such as access to electricity, water, healthcare and education, functioning as an important catalysator for migration (Adhikari, 2013; Seven, 2022). Simultaneously, the destruction of road facilities and communication services may impede opportunities to escape the violence (Adhikari, 2013; Czaika and Kis-Katos, 2009).

Additionally, we consider violence forewarning by leveraging air raid alarms. The role of air raid alarms, serving as a forewarning of an impending attack, remains less explored in existing literature. Psychological studies investigating the repercussions of air raid alarms on individual health and stress levels suggest heightened symptom severity (Stieger et al., 2023). Still, research is rather equivocal regarding the civic population's resilience and stress level towards indirect and forewarning threats of violence compared with more direct exposure to war-specific violence (Adhikari, 2013; Stieger et al., 2023),

while the effect on migration has not been examined. Therefore, we posit:

Hypothesis 3: The positive effect of CIV intensity in the respondent's county on propensity of leaving is stronger when it comes to the direct threats of violence than when it comes from the indirect threats of violence or violence forewarning.

Heterogeneous responses to CIV by subgroups

Although CIV presents a universal threat to all individuals in a given region, responses are likely to vary among different subgroups. These differences stem from varying capabilities and aspirations, particularly in relation to potential losses in wellbeing or economic stability. Empirical evidence from the early to mid-2010s in the context of Syrian refugees highlights distinct population segments with higher propensities for wartime migration: women and children, individuals with social ties abroad and wealthier individuals (Ghosn et al., 2021; Schon, 2019). Conversely, those maintaining employment in their hometowns are less inclined to flee compared with unemployed individuals (Adhikari, 2013). However, these studies tend to overlook the heterogeneous responses of different population subgroups to violence.

The perception of threat is not solely tied to its intensity; vulnerability also plays pivotal roles (Williams and Baláž, 2012). More vulnerable groups are expected to react more strongly to CIV, as they may perceive a higher benefit in relocation. Mothers with (many) children are one of such groups (Lindstrom and Giorguli Saucedo, 2007; Nguyen and Tran, 2020). Their reduced migration propensity is likely due to the increased logistical challenges and higher costs associated with relocating multiple family members, alongside the integration costs in a new environment (Van Tubergen et al., 2024). In the situations of escalated threat of violence, mothers, particularly of larger families, are likely to perceive risks more acutely than their childless counterparts. Likewise, elderly individuals, who likely exhibit worse health status, tend to perceive the risks of staying in conflict-affected areas as more severe, especially given the probable degradation of medical infrastructure due to escalating CIV. However, these same individuals may be constrained by a lack of the necessary capabilities to migrate. To the extent the aspirations to leave outweigh the costs, we anticipate that:

Hypothesis 4: The positive effect of CIV in respondent's county on propensity of leaving is stronger for more vulnerable groups compared to less vulnerable groups.

In the context of war, when civilians are exposed to indiscriminate violence, expected economic losses from remaining in the conflict zone vary depending on their individual productive resources (Aksoy and Poutvaara, 2021). Violence disrupts productive resources on a broad scale, with particularly adverse effects on individual financial stability (Basu and Pearlman, 2017). Consequently, the economic costs of staying at the origin differ among individuals. Therefore, drawing from Aksoy and Poutvaara (2021), those with more to lose economically are likely to respond more strongly to CIV threats with a higher propensity to leave home. Hence, we propose:

Hypothesis 5: The positive effect of CIV in respondents' county on propensity of leaving is stronger for economically more resourceful groups compared with less resourceful groups of individuals.

Migration patterns in response to CIV

Previous research contends that the impact of violence on migration increases with the distance of the move (Basu and Pearlman, 2017; Bohra-Mishra and Massey, 2011; Echevarria-Coco and Gardezabal, 2021). If an entire country is perceived as unsafe, households are more inclined to move abroad (Basu and Pearlman, 2017). As a result, violence has the most significant effect on migration to international destinations (Echevarria-Coco and Gardezabal, 2021), followed by migration to other districts, and then local migration (Bohra-Mishra and Massey, 2011). This correlation might be driven by a cost-related mechanism, whereby the physical threats to life need to be exceptionally high to outweigh the costs of longer-distance relocations. This leads us to the hypothesis:

Hypothesis 6a: With increasing levels of CIV in respondents' county, propensity of leaving abroad instead of resettling in comparatively safer regions within the same country is exacerbated.

Conversely, from a risk tolerance viewpoint (Mironova et al., 2019), those with low tolerance for risk might promptly flee areas of escalating violence, preferring regions untouched by conflict over merely less violent areas within their country (Ceriani and Verme, 2018). This preference could be attributed to a desire to avoid any level of threat. However, individuals with higher risk tolerance might relocate to areas with reduced, yet present, violence. This idea is supported by Seven (2022),

indicating that in response to heightened violence, individuals move for precautionary reasons but remain nearby, seeking eventual return; a phenomenon known as 'home bias' (Braithwaite et al., 2021; Schewel, 2020). This behavior is often dictated by the substantial opportunity costs of international migration, such as the need to learn a new language or seek employment (Braithwaite et al., 2021). This would imply a competing hypothesis:

Hypothesis 6b: With increasing levels of CIV in respondents' county, propensity of resettling in safer region within the same country instead of leaving abroad is exacerbated.

Data, measures and methods

Data

The empirical analyses draw on data from the *OneUA* survey (Kogan et al., 2022), collected from 14 July to 18 August 2022, via self-administered computer-assisted web interviews. The survey targeted all Ukrainians residing in Ukraine as of 23 February 2022, focusing on those still residing in their pre-war places of residence in Ukraine, IDPs within Ukraine and Ukrainian refugees in eight other European countries (Poland, Germany, Czechia, Italy, The Netherlands, Romania, Hungary and Moldova).

Given the complexities of sampling in the context of armed conflict and wartime migration, traditional sampling frames were impractical due to infrastructure damages or fighting, or because of the recent nature of the target population's mobility which might mean that they are not (yet) included in national population registers, even where they exist and could otherwise be used for sampling purposes. Moreover, sampling frames that simultaneously cover the mobile part of a national population and migrants in specific target countries are hardly available either (e.g. Andreß and Careja, 2018).

To overcome these challenges, the study leveraged Meta's advertisement manager to deploy targeted ads on Facebook, Instagram and Facebook messenger aimed at engaging Ukrainians within Ukraine and Ukrainian and Russian speakers in the target countries (for further details, see Online Appendix Section A). This method facilitated an identical sampling procedure across diverse locations.

The ads, exclusively in Ukrainian to mitigate interference from Russian trolls, directed participants to the survey hosted externally or via links on the project's Facebook page, enriched by a snowball sampling for

extended reach. Despite a significant portion of Ukrainian citizens considering Russian as their mother tongue, the prevalence of proficiency in the Ukrainian language is high enough that Ukrainian citizens are capable of responding to the questionnaire in Ukrainian (Kulyk, 2016).

Sample

We focus on adult women (18+ years) holding Ukrainian citizenship who post-23 February 2022 either stayed in the house or apartment in which they had lived on 23 February 2022 (henceforth, pre-war residence), reallocated within Ukraine, or moved abroad. Correspondingly, the selection criteria for our analytic sample were based on citizenship, gender, age (birth years 1942–2004), the county of the pre-war residence, and migration status as well as destination choice post-23-February 2022. To identify the county of the pre-war residence, we utilized responses to the survey question on pre-war residence location across Ukrainian counties, including the city of Kyiv, Autonomous Republic of Crimea, and city of Sevastopol. We further tracked whether respondents continuously lived in the same house/apartment since 23 February 2022, till the survey completion date and (if any) the date of leaving this house/apartment to define ‘stayers’ and ‘leavers’. Among leavers, we further distinguished between those left abroad and those resettled within Ukraine (IDPs) for analyses regarding migration patterns in response to war-related violence.

For our empirical investigation, we included only female respondents with Ukrainian citizenship (while allowing for dual citizenships), given the general mobilization and emigration restrictions for men aged 18–60 years in Ukraine, which potentially affected the male population’s survey participation. Respondents with pre-war residences outside Ukraine or with missing migration data post-23 February 2022, and those who emigrated before 2022 were excluded. Additionally, due to missing data on one of the CIV indicators, respondents from the Luhansk county were excluded from multivariate analyses (see below). Online Appendix Section B details sample selection steps.

The distribution of respondents’ pre-war residence counties highlighted a significant portion from east Ukraine (27%), followed by the north (19%), the center and Kyiv city (each 15%), and the south (14%), with the smallest share from west Ukraine (10%) (see Online Appendix Figure B2).

For the following analysis, the data were organized as person-day observations to consider the dynamics of changes in CIV. This means that each row of the dataset

corresponded to a time period of one day. For each individual in the sample, the period of observation began on 24 February 2022, and either ended on the date of leaving (day, month and year) the house or apartment in which the person has been living on 23 February 2022 or the date of the survey completion. This led to a total of 1,316,476 person-day observations representing the analytical sample of 23,881 persons.

Dependent variable and method

To analyze migration patterns of Ukrainian women, we focus on the hazard rate, which represents the probability of leaving the county of the pre-war residence on day t given that by the beginning of t a person had not left home. Accordingly, a higher hazard rate implies both a faster rate and a higher (daily) probability of leaving the pre-war residence. The leaving event occurred for 17,206 women and is coded 1 (whereas 0 means that a person has not left the pre-war residence on day t).

Not all *OneUA* respondents had left their pre-war residence at the time of the survey. However, they might leave it, for example, soon after having completed the interview. Hence, our data are potentially right-censored due to the ongoing possibility of migration. Failing to account for such cases in the analysis could bias the results, because only those who experienced the leaving event ‘in time’ for the survey would be represented. To mitigate bias and to consider data from all participants, we employ survival analysis techniques, which are particularly suited for this purpose because they can effectively handle the complexities associated with time-to-event data (Blossfeld et al., 2007). Specifically, we apply the Cox proportional hazard model with time-varying covariates. This methodological approach allows us directly to assess the factors influencing the timing of migration events (see also Bohra-Mishra and Massey, 2011; Schon, 2019). The advantage of the Cox model is that it does not make any assumption about the probability distribution of survival times (Blossfeld et al., 2007). Through the partial likelihood method, covariate effects can be estimated while the baseline hazard remains unspecified. Compared with parametric methods, this significantly reduces the risk of misspecification in the rate pattern. Robust standard errors clustered at the individual level were included to account for the nested structure of the data.

Measures of CIV

To measure CIV in the county of the pre-war residence, we created a compound index relying on nine indicators

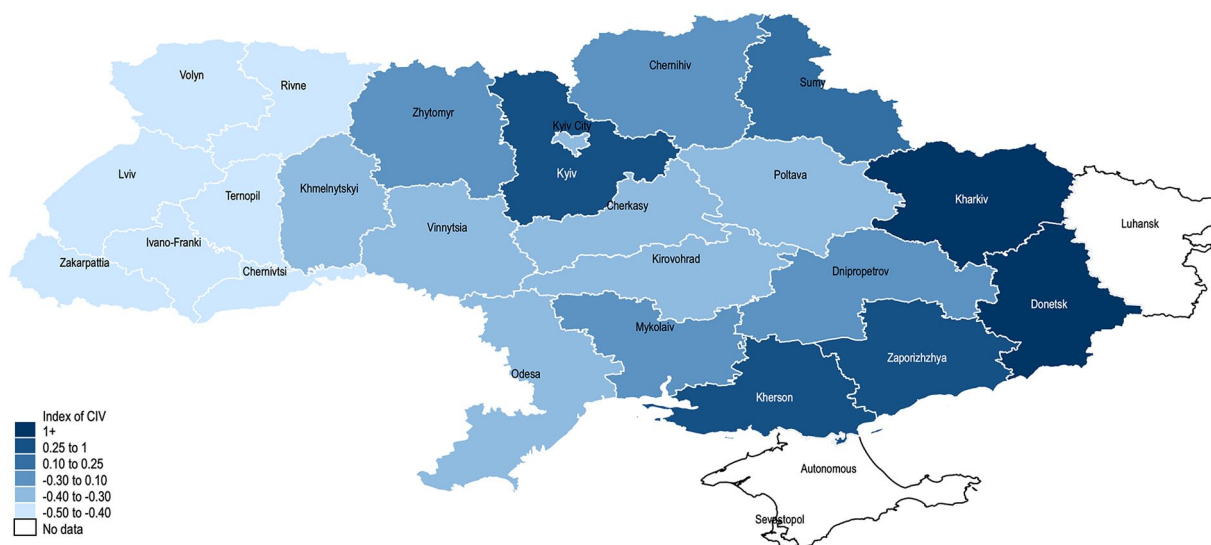


Figure 2. CIV in the respondents' pre-war residence county between 24 February and 13 August 2022. Data source: *OneUA* (Kogan et al., 2022).

from various data sources. These included: (1) fatalities; (2) battles; (3) violent events against civilians; (4) explosions or remote violence; (5) territory (partially) occupied by the enemy forces; (6) destruction of basic services infrastructure; (7) destruction of logistic and information infrastructure; (8) destruction of non-critical infrastructure; and (9) duration of alarms.

Indicators (1) to (3) capture threat directly targeting humans, indicators (4) and (7) approximate threat indirectly targeting humans, and indicator (9) stays for forewarning threat. Indicators (1)–(4) come from the Armed Conflict Location and Event Data Project (ACLED) database, which provides daily information on political violence and protest events (Raleigh et al., 2010). Indicator (5) measures the daily share of a county's territory occupied by enemy forces, using data from the Live Universal Awareness Map based on real-time open sources (liveuamap.com, 2023). Infrastructure damage data indicators (6)–(9) come from the Map of Recovery database, which details the status of buildings and facilities affected by the conflict (Map of Recovery, 2023). Forewarning threats are measured using alarm statistics documenting the frequency and duration of alarms³ across Ukraine since the start of the invasion (Air-alarms.in.ua, 2023). Due to missing alarms data for Luhansk county, respondents from this region were excluded from the main analysis, with additional checks performed by adjusting the CIV index accordingly (Model E1.12 in Online Appendix Table E1).

For each county-date observation, we pooled the cumulative data on indicator of CIV and its

components over 2 days before t (leaving or censoring date).⁴ Since the violence indicators were at different scales, we standardized them by conversion into z scores. Then we averaged them to create the final score. The internal consistency of the resulting compound score, as indicated by Cronbach's alpha (intercoder reliability), is sufficiently high (0.733). For the ease of interpretation of results, we carried out a re-standardization, so that a final index, labeled as cumulative index of CIV in the pre-war residence county, has a mean of zero and a standard deviation of one.

Online Appendix Section C details information on data sources and the components of the CIV indicators, including averages for the measures used to construct a cumulative index of CIV across counties in Ukraine during the observation period (Table C1). It also includes descriptive statistics and the distribution of the index (Table C2 and Figure C1, respectively), as well as the regional and temporal variations of the CIV index and its components (Figures C2a–C2h).

Figure 2 depicts the average of the index of CIV across counties since the outbreak of the war up to the last survey completion date. The results provide a comprehensive overview of the situation in Ukraine, with Donetsk and Kharkiv counties showing the highest levels of conflict intensity, followed by Kherson, Zaporizhzhia and Kyiv. Conversely, west Ukraine appears to be the least severely affected by CIV. The map of CIV found in Figure 2 closely mimics the track of the Russian–Ukrainian war illustrated in Figure 1.

Independent and control variables

To capture heterogeneous effects of CIV, we differentiate between individuals according to the characteristics related to their potential vulnerability in front of violence and economic resourcefulness.

Vulnerable groups are identified by age and the presence and number of children, with elderly and women with children posited to have a lower likelihood of migration due to future potential economic concerns and heightened relocation costs, respectively. We operationalize this through categorical variables for age (i.e. age 18–25, 26–35, 36–45, 46–55, 55+ years) and the number of children, differentiating between (0) women without children, (1) women with one child, (2) with two children, (3) with three children or more. Economic resources are inferred from the respondents' self-reported relative financial situation in the summer of 2021, included as a continuous scale (ranging from 1 'well below average' to 5 'well above average').

As for control variables, we consider respondent's partnership status, English language skills, education level, country of birth, an indicator for being born in Crimea or Donbas (to approximate potential exposure to the Ukrainian-Russian's conflict already since 2014), an indicator for multiple citizenship, and the fixed effects for survey type and survey week participation (to absorb any systematic differences related to the survey design and field period). Online Appendix Table C3 includes information on all independent and control variables, their descriptions and descriptive statistics.

To address missingness of control variables, we used single imputation using the lowest value of the variable for imputation and included dummy variables to indicate whether the value was imputed. A key advantage of this method is that we keep the full sample. Our robustness checks show that we arrive at the same conclusions when using listwise deletion of missing values (Model E1.17 in Online Appendix Table E1).

Results

Intensity and proximity of CIV

In response to the full-scale Russian intrusion into Ukraine, approximately half of the Ukrainian female respondents in our sample relocated from their pre-war residence county within 2 weeks (refer to the left panel of Online Appendix Figure D1). The hazard rate of leaving highlights significant regional disparities, closely mirroring the progression of the early stages of the Russian invasion (see Online Appendix Figure D1 right panel).

The intensity of CIV in the pre-war residence county significantly affected the hazard of leaving among Ukrainian women in our sample, as indicated by Table 1. Specifically, Model 1 suggests that a one standard deviation increase in CIV⁵ results in a 31% elevation in the hazard of leaving ($=\exp(0.27)*1-1$). However, the significant negative squared term implies that at higher CIV levels, the increase in the rate of leaving lessens, and might even become negative after a CIV increase of approximately 4.5

Table 1. The effect of the intensity and proximity of CIV on the hazard rate of leaving pre-war residence county (estimates from the Cox proportional hazards regression).

	<i>Model 1</i>		<i>Model 2</i>	
	<i>Log odds</i>	<i>(SE)</i>	<i>Log odds</i>	<i>(SE)</i>
Index of CIV				
in the pre-war residence county	0.27***	(0.01)	0.25***	(0.02)
in the pre-war residence county, squared	-0.03***	(0.00)	-0.03***	(0.00)
in the neighboring counties			0.17***	(0.02)
in the neighboring counties, squared			-0.02***	(0.00)
in the non-neighboring counties			-0.06*	(0.03)
in the non-neighboring counties, squared			0.02**	(0.01)

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$ (two-sided tests).

No. of individuals = 23,881; No. of failures = 17,208.

Robust standard errors clustered at the person-level are in parenthesis.

Efron's method implemented for handling tied ending times.

All CIV indices refer to cumulative events in the last 2 days before time t (leaving or censoring).

For the full list of model covariates, refer to data section.

Data source: *OneUA* (Kogan et al., 2022).

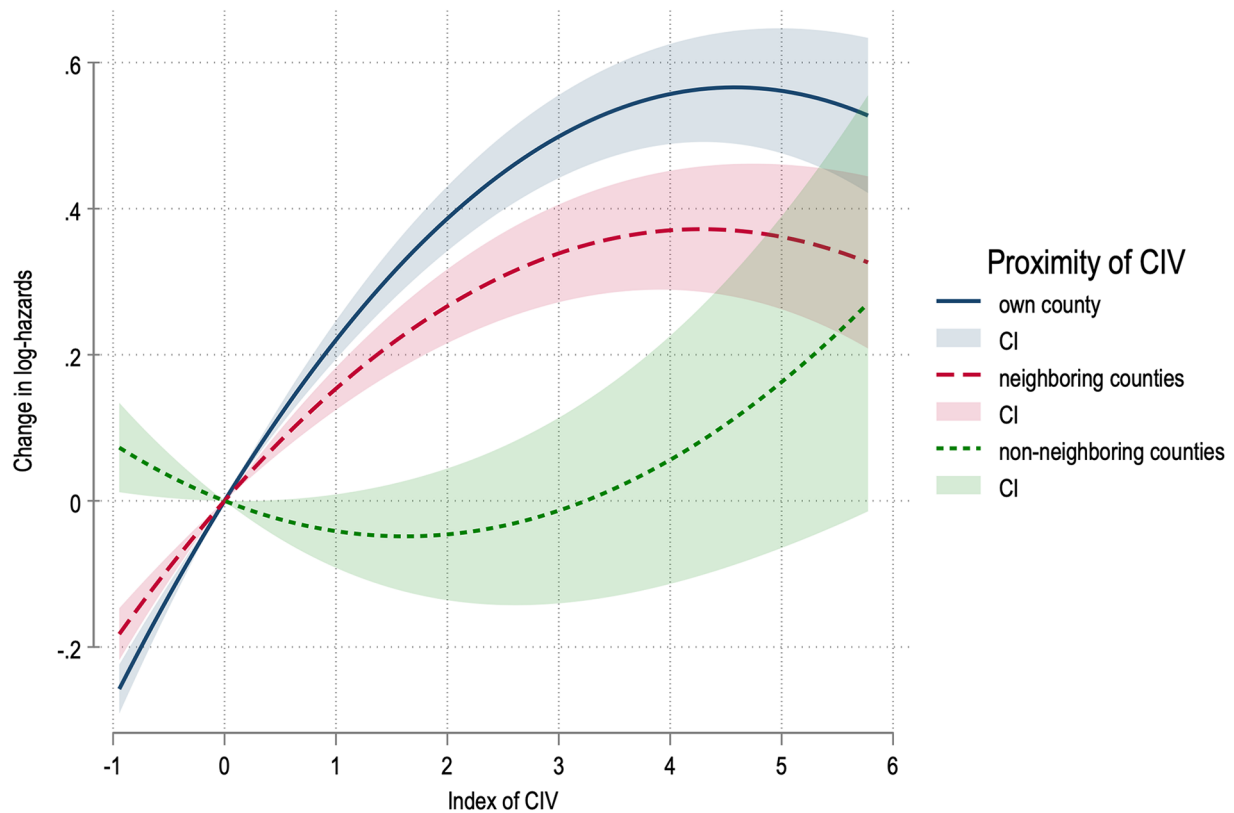


Figure 3. Predicted change in log hazard of leaving pre-war residence county at the different levels of CIV and CIV's proximity (with 95% confidence intervals).

Data source: *OneUA* (Kogan et al., 2022).

Results from Model 2 in Table 2. CIV index refers to cumulative events in the last 2 days before time t (leaving or censoring).

standard deviations (illustrated in Online Appendix Figure D2). Following the goodness of fit statistics in Online Appendix Table D5, inclusion of the CIV variable – and particularly introducing CIV squared term – improves the goodness of fit, and the likelihood-ratio improvement test is statistically significant.

Next, we investigated how the hazard rates of leaving the pre-war residence county are related to conflict proximity. In addition to considering CIV in the respondents' own county, we also included the mean CIV in neighboring and non-neighboring counties in Model 2. The results suggest that while violence in both the respondents' own county and in neighboring regions increases the propensity to leave, the CIV in own county has a more decisive impact. These findings are illustrated in Figure 3. Moreover, the Wald test allows us to reject the hypothesis on equality of both effects in Model 2 ($p < 0.001$). Conversely, CIV in non-neighboring regions appears to have a curvilinear convex effect. Correspondently, Figure 3 suggests that observing low to medium levels of CIV in more distant regions individuals are more likely to stay. Individuals

start increasingly leaving only at very high CIV levels in distant regions.

Types of CIV

To gain deeper insights into the specific types of CIV that compel women to leave their homes amid the Russian invasion of Ukraine, we disaggregated our CIV measure into sub-indices. Table 2 presents the conditional effects of these disaggregated sub-indices for the direct, indirect and forewarning threat of violence in Model 3, alongside the standardized indicators that compose these sub-indices and the CIV measure in Model 4.

The results from Model 3, further visualized in Figure 4, indicate a positive concave impact of direct and indirect threat on the hazard rate of flight, whereas the effect of the violence forewarning is positively linear. On closer examination, it becomes apparent that the forewarning and indirect threat of violence elicits a similar rate of leaving (Wald test of the effect difference: $p = 0.915$). Direct threats appear to have a lower and

Table 2. The effect of the type of CIV on the hazard rate of leaving pre-war residence county (estimates from the Cox proportional hazards regression): disaggregation of CIV types.

	<i>Model 3</i>		<i>Model 4</i>	
	<i>Log odds</i>	<i>(SE)</i>	<i>Log odds</i>	<i>(SE)</i>
(Index of) CIV directly targeting humans	0.06***	(0.02)		
(Index of) CIV directly targeting humans, squared	-0.01***	(0.00)		
War-induced fatalities			0.04*	(0.02)
War-induced fatalities, squared			0.00	(0.00)
Battles			0.30***	(0.02)
Battles, squared			-0.05***	(0.00)
Violence against civilians			-0.12***	(0.01)
Violence against civilians, squared			0.00	(0.00)
(Index of) CIV indirectly targeting humans	0.17**	(0.06)		
(Index of) CIV indirectly targeting humans, squared	-0.01**	(0.00)		
Explosions/remote violence			0.14**	(0.04)
Explosions/remote violence, squared			-0.04**	(0.02)
County area partially occupied by the enemy forces			-0.22***	(0.02)
County area partially occupied by the enemy forces, squared			0.19***	(0.01)
Destructions of basic services infrastructure			0.12***	(0.03)
Destructions of basic services infrastructure, squared			-0.01**	(0.00)
Destructions of logistic and information infrastructure			-0.88***	(0.08)
Destructions of logistic and information infrastructure, squared			0.22***	(0.03)
Destructions of non-critical infrastructure			0.73***	(0.08)
Destructions of non-critical infrastructure, squared			-0.21***	(0.03)
CIV forewarning				
Duration of alarms	0.16***	(0.01)	0.22***	(0.01)
Duration of alarms, squared	-0.00	(0.00)	-0.01	(0.00)

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$ (two-sided tests).

No. of individuals = 23,881; No. of failures = 17,208.

Robust standard errors clustered at the person-level are in parenthesis.

Efron's method implemented for handling tied ending times.

All CIV indices and indicators refer to cumulative events in the last 2 days before time t (leaving or censoring).

For the full list of model covariates, refer to data section.

Data source: *OneUA* (Kogan et al., 2022).

overall minor positive effect that turns negative at higher levels of violence (Wald test of the effect difference: with indirect threat, $p = 0.159$; with forewarning threat, $p < 0.001$).

Delving into the specific indicators of CIV in Model 4, the results suggest that threats directly targeting humans, such as war-induced fatalities, linearly increase the propensity to leave. Battles, however, have a positive concave effect, while violence against civilians shows a negative influence. In simpler terms, the proximity to battle fields and the war-induced fatalities on the front tend to drive civilians away from their homes. In

contrast, the escalation of direct violence against them limits their escape capabilities.

Regarding the index of CIV indirectly targeting humans, heterogeneous effects emerge based on the specific nature of indirect violence. Explosions, along with the destruction of basic services and non-critical infrastructure, positively and concavely influence civilian wartime migration. Conversely, the proportion of occupied territory in the respondents' county and the intensity of destruction of logistic and information infrastructure reveal a negative curvilinear convex effect, suggesting reduced opportunities for civilian departure

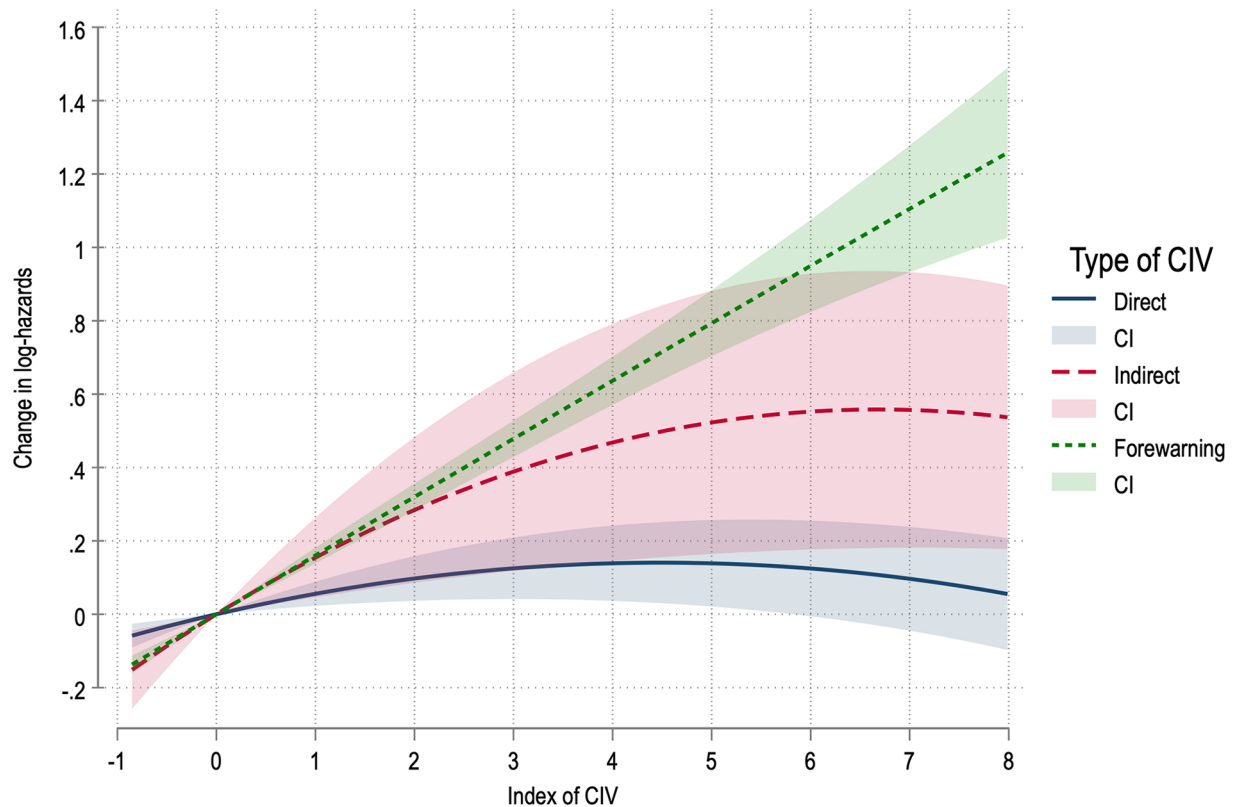


Figure 4. Predicted change in log hazard of leaving pre-war residence county at the different levels and types of CIV (with 95% confidence intervals).

Data source: *OneUA* (Kogan et al., 2022).

Results from the Model 3 in Table 2. All CIV indices refer to cumulative events in the last 2 days before time t (leaving or censoring).

as these factors intensify. The pronounced effects observed in the destruction of logistics and information infrastructure, as well as of non-critical infrastructure, are notably influenced by the specific case of the Sumy county. This region experienced extensive damage during the initial phase of the 2022 Russian invasion of Ukraine, contributing substantially to the observed impact on the wartime migration of civilians. Excluding the Sumy county in additional analyses noticeably diminishes the magnitude of these coefficients (Online Appendix Table D1).

Heterogeneous responses to CIV by subgroups

Next, we investigate heterogeneous responses to CIV, examining more closely which subgroups are more likely to stay and flee under conditions of wartime violence (see Table 3). To this end, we include interaction effects between the index of CIV and respondents' age (Model 5) and the number of children (Model 6). Both interaction effects improve models' goodness of fit (see Online Appendix Table D5).

The higher the CIV in respondent's county the higher is the hazard rate of leaving home among older age groups compared, for instance, to 18–25 years old (Model 5; visualized in the Online Appendix Figure D3). As older female respondents have an overall lower hazard of leaving their pre-war county (main effect), a reduction in the gap in wartime migration propensity by age at higher CIV levels is observed. Similarly, the positive effect of CIV is significantly higher for mothers with three children or more, who are otherwise the least likely to leave compared with childless women (Model 6; visualized in the Online Appendix Figure D4).⁶

Next, we investigated whether the impact of CIV in the pre-war residence county varies by economic resources, measured through the pre-war financial situation (Model 7). Although the main effect is positive and statistically significant, suggesting a higher propensity of economically resourceful individuals to leave, the interaction effect is small in size and not statistically significant. Accordingly, we do not find that financially advantaged individuals are more responsive to increasing levels of CIV compared with their less advantaged

Table 3. The effect of the CIV on the hazard rate of leaving pre-war residence county, by vulnerability and productivity characteristics (estimates from the Cox proportional hazards regression).

	<i>Main effect</i>		<i>Interaction effect with CIV</i>		<i>Interaction effect with CIV, squared</i>	
	<i>Log odds</i>	<i>(SE)</i>	<i>Log odds</i>	<i>(SE)</i>	<i>Log odds</i>	<i>(SE)</i>
<i>Model 5</i>						
Index of CIV	0.19***	(0.03)	-0.02**	(0.01)		
Age (Ref. 18–25 years)						
26–35	0.20***	(0.03)	-0.01	(0.04)	-0.00	(0.01)
36–45	0.02	(0.03)	0.12**	(0.04)	-0.02*	(0.01)
46–55	-0.11***	(0.03)	0.15**	(0.05)	-0.01	(0.01)
>56	-0.45***	(0.04)	0.32***	(0.05)	-0.05***	(0.01)
<i>Model 6</i>						
Index of CIV	0.18***	(0.03)	-0.02**	(0.00)		
Children (Ref. no children)						
1 child	0.02	(0.02)	0.11**	(0.03)	-0.02*	(0.01)
2 children	0.07**	(0.03)	0.14***	(0.03)	-0.02***	(0.01)
3 children or more	-0.00	(0.03)	0.20***	(0.04)	-0.03**	(0.01)
<i>Model 7</i>						
Index of CIV	0.29***	(0.04)	-0.03*	(0.01)		
Finances in summer 2021 relative to others	0.15***	(0.01)	-0.01	(0.01)	-0.00	(0.00)

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$ (two-sided tests).

No. of individuals = 23,881; No. of failures = 17,208.

Robust standard errors clustered at the person-level are in parenthesis.

Efron's method implemented for handling tied ending times.

CIV index refers to cumulative events in the last 2 days before time t (leaving or censoring).

For the full list of model covariates, refer to data section.

Data source: *OneUA* (Kogan et al., 2022).

counterparts. Instead, higher CIV appears to drive individuals out of their pre-war counties, regardless of their economic resources.

Migration patterns in response to CIV

Next, we analyze whether higher levels of CIV prompt individuals to resettle within Ukraine or rather move abroad. To address this question, we adopt a competing risk approach by modeling cause-specific hazards (Blossfeld et al., 2007) and reconfigure our benchmark model to include two exit states: moving to another county within Ukraine and moving abroad. Among the respondents who left their pre-war county, one quarter resettled within Ukraine and three quarters resettled abroad (Online Appendix Section B).

The results from Model 9 in Table 4 suggest that with increasing CIV Ukrainian women were more inclined to seek refuge within Ukraine rather than move abroad. Our alternative analytical approach using cumulative

incidence functions (Fine and Gray, 1999) also supports these findings (Online Appendix Table D4).

Robustness checks

We performed extensive robustness checks (discussed in detail in Online Appendix Section E). First, we investigated whether residence county characteristics shape the hazard of leaving in response to CIV. This included: population size and density, changes in population size, geographical size, overall migration affinity and migration affinity in the case of war with Russia, sentiments towards Russia, and regional fixed effects. Second, to address potential biases from early leavers during the conflict's onset, we conducted additional analyses excluding data for 24–25 February 2022. Third, we systematically excluded various counties, to gauge whether results were sensitive to the inclusion of some outlier cases. All three robustness checks lead to the same conclusions we draw in the main analyses.

Table 4. The effect of the conflict intensity on the hazard rate of leaving pre-war residence county towards other county in Ukraine or leaving abroad (estimates from the Cox competing-risk proportional hazards regression, Model 9).

	<i>Abroad</i>		<i>Resettlement within Ukraine</i>	
	<i>Log odds</i>	<i>(SE)</i>	<i>Log odds</i>	<i>(SE)</i>
Index of CIV	0.17***	(0.02)	0.57***	(0.03)
Index of CIV, squared	-0.02***	(0.00)	-0.06***	(0.01)

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$ (two-sided tests).

No. of individuals = 23,881; No. of failures for abroad = 12,752; No. of failures for resettlement within Ukraine = 4,456.

Robust standard errors clustered at the person-level are in parenthesis.

Efron's method implemented for handling tied ending times.

CIV index refers to cumulative events in the last 2 days before time t (leaving or censoring).

For the full list of model covariates, refer to data section.

Data source: *OneUA* (Kogan et al., 2022).

Table 5. CIV effects, hypothesized relationships, and results.

<i>CIV effects</i>	<i>H#</i>	<i>Prediction</i>	<i>Resulting pattern</i>
CIV intensity	H1	Concave effect	✓
CIV proximity	H2	Strongest in the immediate area	✓
		Weaker in the neighboring area	✓
		Weakest in the distant area	× (convex effect)
CIV types	H3	Stronger from the direct threats of violence	× (weaker effect)
		Weaker from the indirect threats of violence or violence forewarning	× (stronger effect)
Heterogeneous responses to CIV by subgroups	H4	Stronger for more vulnerable compared with less vulnerable groups	✓
	H5	Stronger for more resourceful compared with less resourceful groups	× (no difference)
Migration patterns in response to CIV	H6a	Higher hazard rate of international instead of internal migration	×
	H6b	Higher hazard rate of internal instead of international migration	✓

‘✓’ and ‘×’ indicate supported/rejected prediction, respectively.

Summary and discussion

Table 5 summarizes the hypothesized relationships and the observed results.

First, our findings suggest that in the context of the invasion of Russia in Ukraine, the local intensity of CIV increased the propensity among Ukrainian women to leave their home. On closer inspection, however, we identify a threshold, suggesting a gradual diminishment of the positive effect of CIV, potentially leading to a negative impact under extreme conditions. This supports hypothesis H1, suggesting a curvilinear concave effect of CIV on migration. This nuanced pattern aligns with the aspirations–capabilities theoretical framework (Carling, 2002; Carling and Schewel, 2018; Czaika et al., 2021; de Haas, 2021; Schewel, 2020), highlighting the tension between increased aspirations to escape life-threatening violence and escalating migration costs, constraining individuals' capabilities to relocate (Basu

and Pearlman, 2017). This pattern may also indicate a psychological adaptation process, where persistent violence gradually lessens its impact, leading individuals to establish higher thresholds of violence necessary to trigger migration (e.g. Rubin et al., 2005).

Second, our study underscores the critical role of CIV's spatial proximity in shaping migration decisions. Thus, for example, the impact of CIV on the propensity to leave is most pronounced when the threat is immediate, diminishing for neighboring regions, aligning with hypothesis H2. These observations underscore the anticipatory nature of migration decisions, in which individuals respond to current threats and proactively anticipate potential dangers, particularly from nearby areas. Contrary to expectations, CIV in non-neighboring regions exhibits a curvilinear convex effect on the likelihood of departure, challenging our initial prediction for a weaker concave effect. Accordingly, individuals seem to have a lower propensity to leave when

violence is far away and is not very strong. Extreme conditions in distant areas may, however, trigger migration even in non-neighboring regions.

Third, we find that different types of CIV differently impact migration. Our findings reveal that forewarning of threats and indirect threats elicit significantly higher migration rates compared with direct threats. A forewarning of a threat, captured by the duration of alarms, therefore more strongly impacts people's propensity to leave than the actual occurrence of direct forms of violence. These patterns go against H3. Possibly, these unexpected findings may be driven by heightened resilience or restricted capabilities to flee when confronted with higher levels of direct violence (Tarkhanova and Pyrogova, 2024), on the one hand. On the other hand, air raid alarms might increase leaving propensity via their detrimental effects on individual health and stress (Stieger et al., 2023). Zooming in on specific CIV indicators, factors like the destruction of critical infrastructure, explosions and remote violence events, battles, and war-induced fatalities all contribute to an increased propensity of Ukrainian women fleeing. Conversely, advances of enemy troops leading to the expansion of occupied territories, the obliteration of logistic and communication routes, and direct violence against civilians inhibit out-migration, underscoring diminished capabilities of civilians to leave areas heavily affected by CIV.

Fourth, our study offers new insights into heterogeneous responses to conflict-induced violence. While traditionally vulnerable groups, such as mothers of large families or the elderly, exhibit a lower overall hazard rate of leaving, heightened levels of CIV disproportionately influence their migration propensity, conforming to hypothesis H4. This dynamic suggests that the threat of violence may act as an additional catalyst for vulnerable strata to leave areas heavily affected by CIV, equalizing migration propensities across (some) demographic groups that otherwise differ strongly in their chances to escape violent conflicts (Tarkhanova and Pyrogova, 2024). Contrary to hypothesis H5, which anticipated greater migration responsiveness also among individuals with more economic resources at elevated CIV levels, our findings indicate that this group does not exhibit increased migration rates. Instead, the higher propensity of the early departure of war-torn regions, characteristic of women with greater economic resources, persists regardless of the level of CIV, thereby perpetuating inequality in escape opportunities.

Fifth, our data reveal a distinctive pattern among Ukrainian women in favor of internal resettlement within Ukraine rather than international migration in

response to higher CIV, thus supporting hypothesis H6b and countering competing hypothesis H6a. These patterns diverge from earlier studies (Basu and Pearlman, 2017; Bohra-Mishra and Massey, 2011; Echevarria-Coco and Gardezabal, 2021) that linked greater relocation distances to increased violence. Such deviations may stem from the unique circumstances of the Russian–Ukrainian war: For Ukrainian women, internal relocation strategy might facilitate a potential return home soon and minimize the high opportunity costs of international migration. Additionally, this strategy likely reflects a 'home bias' in which individuals, facing increased violence, opt to seek a safety haven within the borders of their home state (Braithwaite et al., 2021; Schewel, 2020). It is important to note that our findings pertain to the war's early phase, during which many Ukrainians might have anticipated a swift war resolution. The evolving conflict dynamics and prolonged exposure to CIV could alter the pattern of destination choice over time.

Conclusions

The full-scale Russian invasion of Ukraine in February 2022 sparked a humanitarian crisis, compelling millions to seek safety within and beyond the country (United Nations High Commissioner for Refugees, 2024b). This study, leveraging the aspirations–capabilities framework (Carling, 2002; Carling and Schewel, 2018; de Haas, 2021; Schewel, 2020), provides novel insights into the wartime migration dynamics. First, it underscores the multidimensionality of conflict-induced violence (CIV), examining how CIV's intensity, proximity, and type shaped migration patterns of Ukrainian women during the early stages of the conflict. Second, we contribute to the debate on the 'mobility bias' by examining varied responses based on individual-level vulnerability or economic resourcefulness. Third, we establish that different destination choices emerge in response to CIV. Using dynamic modeling techniques, we analyzed data from the *OneUA* survey covering nearly 24,000 Ukrainian women across 21 countries, including those who stayed in Ukraine (in their original homes or as IDPs) and those who moved abroad. This individual-level data were complemented with the extensive contextual information on the CIV indicators in Ukraine.

Our findings highlight the non-linear impact of CIV, signaling the need for enhanced support in areas heavily affected by conflict. We further observe that, at lower levels of CIV, some vulnerable groups are less likely to leave affected areas. However, as CIV intensifies, particularly

vulnerable groups appear capable of mobilizing resources to evacuate. These observations suggest that during periods of acute threat, governmental or privately initiated evacuation programs become crucial, and their expansion could effectively aid these groups. Moreover, we observe a preference for internal over international migration in response to wartime violence, underscoring the necessity for increased (inter-)national efforts to protect and support IDPs (see also Braithwaite et al., 2021). Such support focus is vital, given the long-term health and life consequences of traumatic experiences during conflicts (e.g. Carpiello, 2023).

While this study affirms the positive concave effect of CIV on wartime migration, it challenges existing theoretical and empirical views on the heterogeneity in CIV types, civilian responses, and the migration destinations. The most prominent finding is that Ukrainian civilians begin to flee at the earliest instances of CIV, including forewarnings and indirect threats. Once directly affected by violence, their ability to escape is compromised. Contrary to expectations from existing theories (Aksoy and Poutvaara, 2021), individuals with greater economic resources – despite being more likely to leave – do not show enhanced responsiveness to CIV. Apparently in the context of the Russian–Ukrainian war, CIV does not discriminate by self-reported wealth. Finally, our findings indicate a stronger tendency for internal over international migration in response to CIV. Taken together, our results imply that some effects of CIV are universally consistent, others are uniquely shaped by the specific conflict context.

Despite its insights, the study has limitations that warrant consideration for the interpretation of results and future research. The generalizability of our findings is constrained by the non-probability, social media-based data collection used in the *OneUA* project. In wartime settings, conventional sampling frames are often hindered by infrastructure damage, ongoing hostilities, or the recent mobility of the target population, potentially leading to their exclusion from national population registers. When studying refugees and IDPs, as undertaken in this paper, scholars advise to employ alternative data collection strategies alongside traditional methods (e.g. Ersanilli and Van Der Gaag, 2020; Pötzschke et al., 2023). Additionally, individuals in extreme conditions, such as those facing direct violence or residing in occupied areas without internet or Western social media access, may be underrepresented. This underrepresentation could be pronounced among Russian-speaking Ukrainians in Eastern and Southern

Ukraine, who might avoid engaging with a survey in Ukrainian. Although our analysis attempted to model migration dynamics for those facing severe conditions before the survey time, achieving a truly representative sample remains a challenge.

Another challenge concerns the absence of data on individuals' direct experiences with violence, such as physical assaults, torture, abduction, or sexual violence. Collecting such data, while potentially enriching our findings, raises ethical concerns and could re-traumatize survivors (Seedat et al., 2004). Moreover, despite our CIV index being comprehensive, it encounters limitations due to the scarcity of reliable and extensive big data related to certain forms of violence. This issue is especially acute in occupied areas (Busol, 2023), where accurately documenting violent incidents is exceedingly difficult (Traunmüller et al., 2019).

Finally, measuring CIV at the county level, while more precise than broader regional assessments, may still mask significant intra-regional variations. Violence intensity can vary substantially within a single county, affecting localized experiences and leading to divergent perceptions of safety and stability among residents from different areas within the same region. This granularity issue represents a notable limitation, potentially concealing the full impact of localized experiences on migration patterns.

In conclusion, our study contributes to the study of conflict-induced migration. We demonstrate how different aspects of CIV relate to decisions about moving (internally or internationally) or staying in the context of a full-scale invasion, a scenario distinct from most other conflicts discussed in the literature. This deeper understanding sheds light on the complexities of human responses to violence and imminent threats. In a world grappling with persistent conflicts and mass displacements (United Nations High Commissioner for Refugees, 2024a), our study offers important insights that may foster and inform the discourse on these pressing issues.

Replication data

Replication codes for data preparation and analyses, along with the Online Appendix, are available at <http://www.prio.no/jpr/datasets/> as well as at <https://osf.io/7fd9g/>. Information about the underlying OneUA data can be found at: <https://osf.io/tmgcd/>. The data collection is approved by the Ethics Committee of the Faculty of Social and Behavioral Sciences of Utrecht University (file number 22-0226).

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Notes

1. Henceforth, the term 'refugees' broadly refers to all individuals moving abroad for humanitarian reasons, including refugees, asylum-seekers, and humanitarian migrants. The institutional reception of Ukrainian refugees in

Europe uniquely departed from past practices following the EU's activation of the 'Temporary Protection Directive' (2001/55/EC), which omits standard asylum procedures and issues a temporary residence permit – currently, valid until March 2026.

2. Ideally, we would assess aspirations to leave in response to CIV, including internal moves. However, our data capture only the willingness for international migration, limiting insights into overall migration aspirations and the phenomenon of 'involuntary immobility' caused by CIV (Carling and Schewel, 2018; de Haas, 2021; Lubkemann, 2008).
3. Note that replacing alarms duration with alarms frequency in the conflict intensity index did not alter our conclusions (Model E1.11 in Online Appendix Table E1).
4. Alternative definitions, considering events cumulated over 1 or 3 days, lead to the same conclusions.
5. A one standard deviation increase in the CIV index measure corresponds to the following averages: 44.3 war-induced fatalities, 7.3 battles, 3.7 events of violence against civilians, 39.8 explosions/remote violence, 55.6% of county area partially occupied by the enemy forces, 14.4 destruction events of the basic services infrastructure, 0.2 destruction events of the information and communication infrastructure, 1.4 destruction events of the non-critical infrastructure, and 1074.7 minutes of alarms.
6. Restricting women's age to 18–35 years to cover mothers of younger children did not alter our conclusions (see Online Appendix Table D3 and Figure D5).

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