Information Cascades and Refugee Crises: Evidence from Kosovo

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Abstract

Refugee crises repeatedly surprise the international community with their size and suddenness, yet we know little about what drives them. I develop a theory of refugee crises in which civilians living in conflict zones make individual decisions to flee in response to new information about the risk of victimization in war. The information conveyed by observing refugees fleeing can result in an information cascade, in which waves of refugees fleeing cause other civilians to increase their beliefs about the risk, increasing the numbers of subsequent refugees. To test this theory, I construct a geocoded village-day level dataset of refugee flows, violence against civilians, and the actions of armed groups during the Kosovo war. I develop an instrumental variables estimation strategy using the spatial network of villages connected by roads and the fact that refugees fled toward a single border crossing to estimate the causal spillover effect of refugees fleeing. I find that on average a refugee fleeing causes more than one additional civilian to flee.

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1 Introduction

In April 2012, a year after the Syrian civil war began and with the local refugee population nearing 25,000, the Turkish government began warning the UN of a refugee crisis unfolding (Blomfield, 2012). By the end of 2013, more than 2.3 million Syrians had fled their country.[1] This is nothing new. The international community has repeatedly been surprised by the suddenness and scale of refugee crises. Since the 1990s, wars in Bosnia, Rwanda, Kosovo, Afghanistan, Iraq, and South Sudan, among others, have led to sudden, large outflows of refugees fleeing to neighboring countries. Large numbers of refugees fleeing not only causes an enormous human cost on the refugees themselves, who lose their assets and often end up in poor conditions or subjected to discrimination, but may have large economic[2] and social costs on the countries refugees receiving the refugees (Dancygier and Laitin, 2014; Salehyan and Gleditsch, 2006; Salehyan, 2008).

This paper addresses the question of what causes refugee crises. Refugee flows are the result of the aggregate decisions of the millions of civilians living in a conflict zone faced with the choice to exit the state or remain (Hirschman, 1970). Each of these civilians must acquire information to learn about their risk of becoming a victim of violence and use that to make a decision about fleeing or staying in the conflict zone. We know little about how civilians living in conflict zones acquire information about their risk, in spite of the recognized importance of information in civil war environments (Kalyvas, 2006). "Mistakes" in this decision—fleeing when it was safe to stay or staying when it was too dangerous—have enormous consequences. Remaining when it was more dangerous than anticipated leads to excess civilian casualties. Large numbers of refugees fleeing when they would have been safe at home cause refugee crises.

A large literature uses cross-national data to investigate the determinants of refugee flows (see, e.g., Davenport, Moore and Poe, 2003; Melander and Öberg, 2006, 2007; Moore and Shellman, 2004, 2006; Schmeidl, 1997). The most robust finding of this literature is that violence against civilians is strongly associated with refugee flows (Apodaca, 1998; Davenport, Moore and Poe, 2003; Gibney, Apodaca and McCann, 1996; Jonassohn, 1993; Moore and Shellman, 2004, 2006; Rummel, 1994; Schmeidl, 1997; Weiner, 1998). Several papers have considered information in civilian's decision

[1] Data from the UN High Commission on Refugees available at http://data.unhcr.org/syrianrefugees/regional.php

[2] Germany, for example, estimates that it costs 12,500 euros per refugee per year (http://www.dw.com/en/what-helping-refugees-costs-germany/a-18693996).

making processes, but have only focused on information about the journey and destination learned from refugees who have already fled, not information about their risk of victimization in the conflict zone (e.g., Davenport, Moore and Poe, 2003; Edwards, 2009; Moore and Shellman, 2004, 2007). More recently, several within-country studies of the determinants of civilian displacement in civil wars have been conducted using surveys of internally displaced people in Nepal and Colombia (Adhikari, 2013, 2012; Bohra-Mishra and Massey, 2011; Engel and Ibáñez, 2007; Lozano-Gracia et al., 2010; Ibáñez and Vélez, 2008; Steele, 2011). These conclude that local violence and economic factors are associated with fleeing from conflict zones. Balcells and Steele (2016) use within-country data constructed at small geographical units in Spain and Colombia, but do not consider civilians living in conflict zones to have agency, instead theorizing as to why armed groups would unilaterally choose to displace civilians that have opposing political viewpoints.

I present an alternative mechanism for refugee flows, information cascades, to explain the sudden surprise nature of refugee crises. Civilians living in conflict zones flee and become refugees because people they know or observe have decided to flee and they lack other information about their risk of victimization. In conflict environments, where information is scarce and civilians are locally informed, a civilian needs to use what little sources of information available to make a potentially life and death decision. One major source of information available to civilians living in conflict zones is their friends', acquaintances', and neighbors' decisions to flee. This can result in an information cascade, in which waves of refugees fleeing cause other civilians to increase their beliefs about the risk, increasing the numbers of subsequent refugees.

To test the role of social networks and information in the decision to flee and become a refugee, I construct a fine-grained, geocoded panel dataset on the Kosovo war compiled from a number of different sources. Using Albanian border records, documents presented as evidence at the International Criminal Tribunal for the former Yugoslavia, lists of victims collected by human rights organizations, and historic maps, I collect a village-day level dataset of refugee flows, violence against civilians, and the actions of armed groups.

Information cascades imply spatial spillovers—that the decision of a civilians' neighbor to flee and become a refugee causes that civilian to become more likely to flee him or herself. The direction of the migration patterns allows violence experienced by neighbors of neighbors that cannot be observed fleeing to act as instrumental variables for the spillover effect of fleeing. Because Kosovo is mountainous and has a limited number of roads, virtually all travel to the border was by road. Using travel routes on the road network and and the fact that in this case refugees had to travel to a single border post on the Albanian border, I can differentiate which other villages refugees could potentially have passed near and conveyed information on the risk of violence from villages that could not have seen refugees fleeing.

Using these instrumental variables this paper shows that refugees' fleeing causes additional fleeing from nearby places, providing evidence that civilians learn from their neighbors' decisions about fleeing, which, in turn, are affected by their neighbors—an information cascade. In fact, on average a refugee fleeing causes more than one additional civilian to flee. This is an important mechanism to magnify the effect of violence against civilians, which is much rarer than fleeing by civilians in most conflicts

The paper proceeds as follows. In section 2 I elaborate as to the decision making process of civilians living in civil war, the theory of refugee crises caused by information cascades, and the testable hypotheses it implies. Section 3 shows how the Kosovo war and the refugee crisis it engendered provide a useful case to evaluate the theory. Section 4 explains how the data on the Kosovo war was collected and compiled. Section 5 details the empirical strategy that is used to find the causal effect of neighbor's fleeing on refugee flows, the results of which are shown in section 6. Finally, I conclude.

2 Theory

The importance of the agency of civilians living in conflict zones, especially in their support for government or rebel forces or participation in violence is widely recognized (Wood, 2003; Kalyvas, 2006; Schubiger, 2015). In deciding whether to flee and become a refugee or stay, civilians living in a war zone face a difficult problem. There is a trade-off in the risk of violence and the likely loss of personal property associated with fleeing (Davenport, Moore and Poe, 2003; Edwards, 2009; Melander and Öberg, 2006; Moore and Shellman, 2004, 2006, 2007; Schmeidl, 1997). As Adhikari (2013) notes, "people make a decision to flee or stay even under highly dangerous circumstances." While the primary concern of most civilians during civil war is to remain alive, people often accept risks in return for other things of value to them.[3] In spite of the risk of violence, many people remain in conflict zones (Steele, 2009).

In the case of fleeing and becoming a refugee, the personal costs can be enormous. Many refugees can expect to never return to their former homes. Ibáñez and Vélez (2008) estimate that the welfare loss of internal displacement in Columbia is 37 percent of the net present value of rural lifetime aggregate consumption. Becoming a refugee in another country is potentially even more costly, where language and cultural barriers may be difficult. Wiesner (1988) points out that during the Vietnam War, the amount civilians would lose if they fled their villages determined how long they remained. Land-owning peasants were the least likely to leave because they had nothing else.

Nordstrom (1997) quotes a Mozambican man who illustrated the dilemma facing civilians living in war zones: "if you try to protect yourself and flee you lose everything. If you stay you may keep your possessions and lose your life." Because of the high costs to becoming a refugee, not everyone flees at the first sign of trouble. Instead, individuals choose to flee only when their beliefs about the risk of becoming victims of violence are high enough to outweigh the loss of their material assets or the personal cost of fleeing.

In order to make the difficult decision to flee your home toward an largely unknown foreign country, a civilian living in a conflict zone needs to assess his or her personal risk of becoming a victim of violence. Unfortunately civil wars are environments where information is scarce and civilians are locally informed (Kalyvas, 1999). It is difficult to know what is happening in another place, even if it is not actually very far away. As wars destroy telecommunications and transportation infrastructure and make even short journeys potentially dangerous, outsiders living abroad often have a much better idea of the state of the conflict than do those living within it. In such an information-poor environment a civilian needs to use what little sources of information available to him or her to make a potentially life and death decision. Local social networks—friends and acquaintances who can pass on what they know or have heard and observation of the behavior of others nearby—provide opportunities to gain new information and better assess the risk of remaining.[4]

[3] It is unclear how different levels of risk aversion might affect the likelihood of fleeing a conflict zone and becoming a refugee. The uncertainty involved in leaving for an unknown place might deter risk averse individuals from migrating (Fischer, Martin and Straubhaar, 1997). However, sufficiently high expectations of the risk of violence may cause risk averse individuals to become refugees in spite of this.

[4] In fact, scholars have emphasized the importance of local communities and social networks in the decisions of

Observations that individuals fled at a certain time implies that their beliefs about the probability of becoming victims of violence had risen sufficiently high to change their mind about remaining in their homes. New information is needed for individuals to change their beliefs about the risk of violence. People can acquire information either from combatants or from other civilians. They learn from combatants directly by observing violence against their neighbors. Civilians from other villages who are themselves fleeing past these individuals' villages can tell them about violence that they witnessed or heard about, changing individuals' beliefs about their own risk. They can also observe other civilians fleeing and update their beliefs about their personal risk of violence. The lack of good information during a war means that any information individuals do acquire has a larger impact on their decisions than if they were in a situation with more access to information about the risk they face.

One major source of information available to civilians is from other civilians who are fleeing from their own villages. This information can be conveyed by talking to these refugees as they pass and learning about the violent events that may have motivated their flight or just by seeing them pass nearby. Even without actually communicating with the refugees, knowing that others are fleeing is enough to increase an individual civilian's belief about the probability of being a victim of violence and therefore increase her likelihood of fleeing herself. This means that every subsequent refugee who passes by increases the expected number of civilians who will flee from their homes. If this is enough to motivate them to flee themselves, these new civilians fleeing then can influence the fleeing decisions of civilians in subsequent villages.

Social networks and the communication across these ties may play a role in fleeing. Individuals are embedded in preexisting social networks in their communities (Adhikari, 2013; Petersen, 2001; Parkinson, 2013). These ties may make them more likely to stay with the people they know, but they also allow the transmission of information. Besides preexisting social networks, refugees meet and talk to other civilians while they are fleeing (Edwards, 2009). Spitzer (2015) shows that nearby pogroms in the Russian Empire were not the main driver of late-nineteenth and early-twentieth century Jewish immigration to the United States and argues that information transmitted through

civilians living in conflict zones to participate in violence or aid combatants (Petersen, 2001; Parkinson, 2013). As well, acquiring information about the journey and destination from other civilians in order to make decisions about fleeing or staying has been considered in the literature, but acquiring information from other civilians within the conflict about the risk of remaining has not been discussed (Davenport, Moore and Poe, 2003; Edwards, 2009; Moore and Shellman, 2004, 2007).

“chain-migration networks” is a bigger cause. That is, social networks allowed potential migrants to gain information that increased their likelihood of choosing to migrate themselves.

This situation, where observing someone fleeing can cause an individual to flee him or herself, which can cause someone else to subsequently flee, is an information cascade. Information cascades have been shown to be important to protests, revolutions, and voter turnout (Lohmann, 1994; Kuran, 1989, 1991*a*,*b*; Fowler, 2005). An implication of information cascades is that small changes, or sparks, can can shift the behavior of large numbers of people because of the information learned from the behavior of others (Kuran, 1989). A large theoretical literature in the economics on social learning, in which individuals learn by observing the behavior of others has developed, concluding that such situations are rational, but result in inefficient outcomes (Banerjee, 1992; Bikhchandani, Hirshleifer and Welch, 1992, 1998). This is because cascades can be based on very little information. Once a cascade begins, individuals ignore their own information in favor of the information from observing others fleeing. This means that the right initial event can result in large numbers of refugees leaving their homes even though the actual probability of most of these individuals imminently experiencing violence has not changed. The actual risk to an individual is local, but information cascades can propagate information far beyond its actual useful range.

3 The Kosovo Conflict

The Kosovo conflict provides a prime example of a refugee crisis. Between March and June 1999, 435,000 refugees fled from Kosovo to Albania (UNHCR, 2000). The flood of refugees surprised the unprepared international community, with refugee camps quickly overflowing (Ottawa Citizen, 1999; Knickmeyer, 1999). News organizations told of increasing waves of refugees crossing the border, describing the humanitarian crisis as a “flood of refugees” and the “frightened tide from Kosovo” (Gall, 1999; Associated Press, 1999; Roughton Jr., 1999). On March 28 relief officials said that refugees were streaming into Albania “at a rate of more than 1,000 an hour” (Finn, 1999). By March 31 aid officials estimated that “up to one-quarter of the province’s population of two million could be displaced” (Vancouver Sun, 1999). The refugee influx continued. On April 18 it was reported that “20,000 hungry, exhausted ethnic Albanians [had] passed through Albania’s main border crossing with Yugoslavia in the last 48 hours” (Mcgee, Spahia and Hamilton, 1999).

Why did the refugee crisis suddenly appear? How did civilians living in Kosovo gather information about their risk and make their decision to flee or stay? Figure 1 shows the geographic distribution of violence against civilians and the origins of refugees. It is striking how dissimilar they appear. Many refugees fled from areas that never experienced violence. Mobile phones were not yet available, so when landlines were cut off early in the war, communication became local.[5][6] During the Kosovo war, communicating with people who were not physically nearby was impossible. Another potential source of information, the KLA rebels—coethnics of the refugees—did not want to help civilians to flee. Instead, they repeatedly issued statements that Kosovar Albanian civilians should remain in Kosovo and did not help civilians who wanted to flee. One such statement, read on Albanian television by Hashim Thaci, a leader of the KLA said "Albanian people, do not fall prey to panic.[. . .] Do not abandon your century-long homes. We have no other homeland." (Finn, 1999).

The 1999 war in Kosovo war resulted in over 9,000 deaths, most of them civilians. At the same time, 435,000 refugees fled from Kosovo to Albania (UNHCR, 2000). The war stated as a low-level insurgency by the Albanian-nationalist Kosovo Liberation Army (KLA), but rapidly expanded in 1998 as the Yugoslav army and allied ethnic Serb militias heavily repressed the ethnic Albanian majority in Kosovo. Concerned about ethnic cleansing and the large numbers of ethnic Albanian refugees from Kosovo, NATO initiated a bombing campaign that lasted from March 24, 1999 to June 10, 1999, when the war ended.

Civilians caught in the conflict were forced to make decisions under extreme uncertainty. A contemporary report by Human Rights Watch argued that for many Albanian civilians in Kosovo,

[5] The first mobile phone network in Kosovo was built shortly after the end of the war and did not begin operating until 2000 (Friedrich-Ebert-Stiftung, 2014). The Post, Telephone and Telegraph of Kosovo (PTK) had been the sole provider of telephone services in Kosovo since 1959, but the company was largely unable to function during the war (Post and Telecom of Kosovo, 2017). All of PTK's ethnic Albanian employees were fired and the lack of staff and the danger in 1998 and 1999 left PTK unable to repair damage to its infrastructure (Post of Kosova, 2015; Post and Telecom of Kosovo, 2017). Due to looting and violence, PTK describes its assets as being "completely destroyed during the war of 1998 to 1999" and says that during this period "Telephony and Telegraphy of Kosovo as well as international connections were almost inoperative" (Post of Kosova, 2015; Post and Telecom of Kosovo, 2017). What telecommunications infrastructure remained—largely limited to government offices in large cities—was destroyed during the NATO bombing campaign, which specifically targeted civilian communications infrastructure that could be used by the military (Drozdiak, 1999). The UN Interim Administration Mission in Kosovo reported that in 1999 "most telephone links between Kosovo and the rest of the world were cut during March and April, when NATO airstrikes destroyed trunk lines between telephone exchange systems" (United Nations Interim Administration Mission In Kosovo, 1999).

[6] The widespread availability of cell phones, as used in the Syrian civil war, would make identifying social networks more difficult because they would no longer necessarily be based on spatial proximity. However, information cascades could still be a cause of refugee movement.

"a climate of fear ... left them with no choice but to leave" (Human Rights Watch, 2001). Stories of the difficulty in deciding whether or when to flee are common in Kosovo. An ethnic Albanian civilian from Glogovce said that "it was a very big panic. If you stayed any longer it might be too late" (Human Rights Watch, 2001). Recounting nearby violence he had heard about, one person from Lugadzija, interviewed in a refugee camp said, "we were not frightened by the massacre in Slovinje ... but when it happened in [Malo] Ribare and [Mali] Alas we were afraid. We were unarmed and the children were very afraid so we had no choice but to leave" (Human Rights Watch, 2001). One of the charges later filed by the ITCY prosecutor was that the "forces of the FRY and Serbia have intentionally created an atmosphere of fear and oppression through the use of force, threats of force, and acts of violence."

Comprehensively measuring fleeing from war zones is difficult due to the chaos of the conflict situation and the often surreptitious nature of the fleeing. This is likely a reason for the dearth of quantitative research on civilians fleeing within conflicts. Most conflicts create not just refugees, civilians who flee to other countries, but also internally displaced people, who leave their homes but remain in their own country. The internally displaced are often harder to count, interview, or survey, but they are of equal theoretical interest to questions about why civilians flee their homes. The Internal Displacement Monitoring Center estimates nearly twice as many internally displaced people as refugees in the world in 2014, creating a problem for research using only data on refugees.[7] Measuring migrant flows is easier for the Kosovo war because of its small size and because it had a sympathetic neighbor in Albania, willing to accept unlimited numbers of coethnic refugees.[8] These factors allowed the vast majority of people who fled their homes to exit the country.

Not only did the vast majority of displaced people in Kosovo leave the country, they left quickly and in the same direction. All refugees entering Albania had to travel through the sole border crossing at Morina. However, there was little contact with Albania by these civilians prior to becoming refugees because international travel was difficult in Yugoslavia. Kosovo is geographically small and surveys conducted in refugee camps show that most refugees left the country the same day they fled their homes (Iacopino et al., 2001; Ball, 2000). Contemporary reports describe long

[7]For 2014 they estimate 38 million IDPs and 19.5 million refugees. See http://www.internal-displacement.org/global-figures.

[8]The Yugoslav army did briefly close access to the Albanian border several times during the war and reports by refugees of being forced to bribe Yugoslav soldiers to be allowed to reach the border are common.

lines of refugees, "traveling by foot, tractor, car and horse" streaming across the border at Morina (Finn, 1999).

4 Data

I combine data from multiple sources to construct a village-day panel dataset of refugees fleeing, violence against civilians, and violence between combatants between March 28, 1999 and May 28, 1999, the period that saw the greatest number of refugees flee from Kosovo. Records of refugees fleeing recorded on Albanian border records, violence against civilians collected by human rights organizations, information on the actions of armed groups introduced as evidence by the International Criminal Tribunal for the former Yugoslavia (ICTY) Office of the Prosecutor, and demographic data from the census were combined based on named locations and dates. Descriptive statistics of the variables used in the analysis are shown in Table 1. Every village was geocoded so that neighboring villages could be determined. The number of neighboring villages for different neighborhood threshold distances is shown in Table 2.

4.1 Refugees fleeing

I measure refugees fleeing during the Kosovo war using border crossing records collected at the Morina border crossing point with Albania. Records collected by Albanian border guards at the Morina border crossing between Kosovo and Albania were photographed by Ball et al. (2002), a consultant for the ITCY prosecutor. This was the only border crossing between Kosovo and Albania open during the war, the primary recipient country of refugees during the war. Albanian officials at the border recorded the size of the party crossing the border, the date, and the origin village or town of the group. Each of the 19,126 records represents a single individual, household or group that crossed the border. These groups range in size from 1 to 1961 people, with a mean of 14.45. The Yugoslav army heavily patrolled the border with Albania to prevent KLA incursions, so few refugees crossed into Albania using other routes. Lines of people waiting to cross often extending back several kilometers from the border.[9] As Klingner and Silva (2013, pp. 157) notes, "these border crossing records are remarkably complete. Nearly all of the refugee flow from Kosovo

[9] http://reliefweb.int/report/albania/more-kosovar-refugees-pour-albania

into Albania went through this one small border post, and Albanian officials there attempted to document each crossing." Figure 1a shows the geographic distribution of the origins of refugees.

4.2 Violence

Data on the killing and disappearances of civilians during the war are from the "Kosovo Memory Book, 1998-2000," a comprehensive list of every known death or disappearance in Kosovo due to the war that was compiled by the Humanitarian Law Centre, a Belgrade and Prishtina based human rights organization. It lists 13,549 people by name who were killed or are missing from the conflict as well as the date, location, and known details of the incident. For this analysis I restrict my measure of violence to ethnic Albanian civilians killed or known to have disappeared between March and June 1999, to correspond to the data on ethnic Albanian refugees.[10] By considering only fleeing by one ethnic group, some factors identified as potential causes of displacement, such as which armed faction the civilian supports, are held constant. I dropped any reported violence for which village-level location information was not available. This included violence with only a municipality-level location identified and that which had an even more vague location (e.g., "in the mountains"). This affected 4.6 percent of the records. I also dropped 204 reported deaths for which only the year is known. Figure 1b shows the distribution of violence against civilians throughout Kosovo. All areas of Kosovo encountered killings of civilians by Yugoslav forces.

4.3 Combat

Data on NATO airstrikes and KLA activity are only available at the municipality-level. There were 29 municipalities in Kosovo in 1999 and this data was matched to all villages within the geographic boundaries of the municipality. Data on the 364 NATO airstrikes are from Arkin (2000). Data on both battles and Yugoslavian casualties due to KLA activity are from Ball et al. (2002), based on data originally from the ICTY Office of the Prosecutor. This data omits several incidents included in the original list of KLA attacks because of ITCY confidentiality rules.

[10]The Kosovo conflict was an ethnic war, in which were primarily killed by the Yugoslav army and ethnic Serb militias and ethnic Albanians fled to Albania. While ethnic Albanians make up the majority of the victims of the war, there was also violence against Serb civilians by the KLA and fleeing from Kosovo by Serb civilians. I restrict this analysis to fleeing by and violence against ethnic Albanian civilians.

Table 1: Descriptive Statistics

	Level	Obs.	Mean	Std. Dev.	Min.	Max.
Refugees fleeing	village-day	89,404	1.9	77.5	0	8874
Civilians killed	village-day	89,404	0.06	1.49	0	274
KLA killed	village-day	89,404	0.01	0.25	0	28
Army killed	municipality-day	1798	0.11	0.53	0	6
Battles	municipality-day	1798	0.04	0.51	0	20
NATO airstikes	municipality-day	1798	0.16	0.38	0	2
Population	village	1442	1098.0	4307.4	5	108,083
Albanians	village	1442	850.4	3057.5	0	75,803
Serbs	village	1442	145.3	660.0	0	16,898
Distance to border (m)	village	1442	97,470	37,239.3	1,215	175,600
Distance to highway (m)	village	1442	1786	1593.8	0.62	10,110

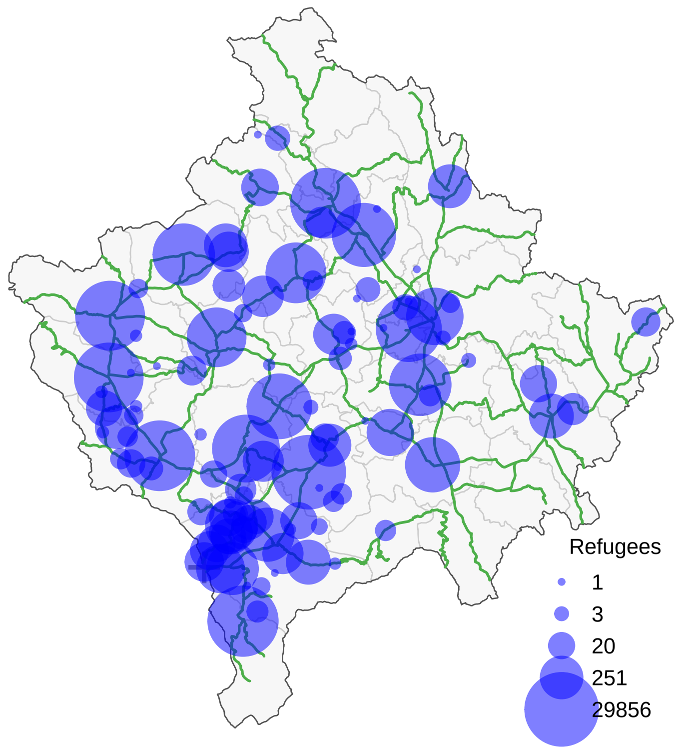
4.4 Demographics

I use the 1981 census of Yugoslavia for locality-level demographic data, with the 1445 villages, towns, or cities in this census serving as the units of analysis.[11] The 1991 census was not used because of a large-scale boycott of the census by ethnic Albanians that was promoted by Albanian nationalist groups in Kosovo. Every village was geocoded so that neighboring villages could be determined.

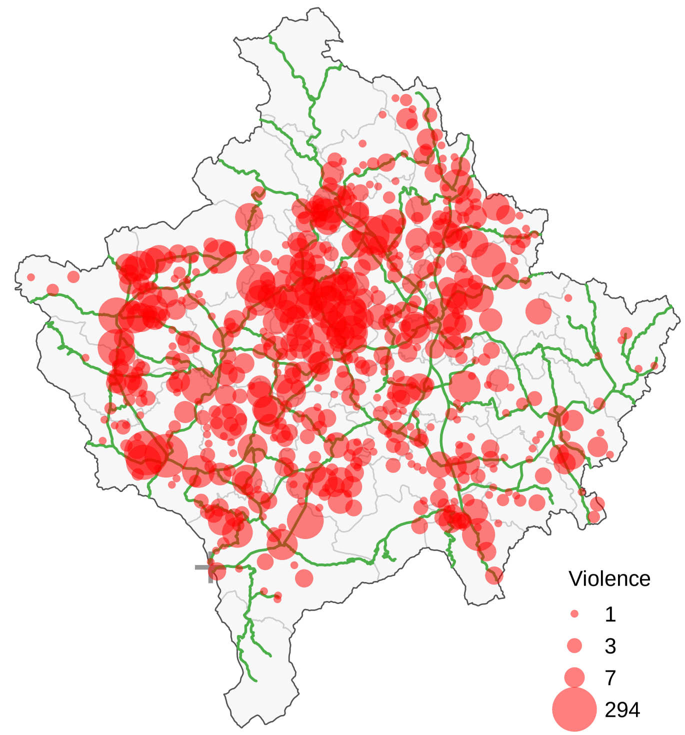
5 Methods

The theory of information cascades implies that civilians' decisions about fleeing and becoming refugees is affected by the actions of nearby civilians, who they know and can learn from. This spillover effect—civilians fleeing causing nearby civilians to flee—is endogenous because neighbors are transitive, so instrumental variables are used to identify the causal effect. Violence local to a village's neighbors' neighbors that are not the village's neighbor and from which civilians fleeing do not pass the village on the way to the border are used as instruments for the spillover effect of

[11] In three cases neighboring villages with the same name prefixed by "Upper" and "Lower" were combined because it was impossible to determine which village border records or reports of violence were referring to.



(a) Origins and magnitudes of refugee flows from Kosovo



(b) Locations and magnitudes of Albanian civilians killed in Kosovo

Figure 1: The origins of refugees who entered Albania as recorded by Albanian border guards and the locations of violence against civilians between March 28, 1999 and May 28, 1999 . Magnitudes are on a log scale because of the large variation. Major roads are shown in green and the location of the Morina border crossing point with Albania is marked with a gray "+".

refugees fleeing.

The effect of neighboring civilians fleeing on refugees fleeing is a spillover effect. Let N_i be the set of neighbors of village i. Then the average number of refugees fleeing from neighboring villages on day t is $\frac{\sum_{j \in N_i} y_{j,t}}{n_i}$, where n_i is the number of neighbors of i. It is possible that not just local violence, but also violence experienced by neighboring civilians and shared by them might cause civilians to flee independently of those neighbors' decisions to flee. Therefore, it is important to control for both local and neighborhood measures of violence. Equation 1 shows the basic specification representing the spillover effect of fleeing, the effect of local violence, and the effect of violence in neighboring villages.

$$y_{i,t} = \beta \frac{\sum_{j \in N_i}}{n_i} y_{j,t} + \gamma x_i + \delta \frac{\sum_{j \in N_i}}{n_i} x_{j,t} + \epsilon_{i,t}, \tag{1}$$

Here β represents the spillover effect of fleeing, γ is the local effect of violence and δ is the spillover effect of violence. If β is positive, it indicates that civilians' decisions to flee and become refugees are caused by the decisions of their neighbors. However, because $y_{j,t}$ is endogenous, an identification strategy using instrumental variables is used to identify the causal spillover effect of fleeing, β.

Using the spatial proximity of the villages to construct an row standardized adjacency matrix of neighbors, W, equation 1 can be rewritten in matrix notation as

$$y_t = \alpha + \beta W y_t + X_t \gamma + \delta W X_t + \epsilon_t \tag{2}$$

This is similar to a spatial autoregressive model (SAR), $y = \alpha + \beta W y + X\gamma + \epsilon$, with the addition of the spillover effect of violence (Cliff and Ord, 1981). This model relaxes the assumption in a SAR that all spillover effects operate through the dependent variable. If civilians find out about violence in neighboring villages and this affects their probability of separately from the effect of refugees fleeing from the neighboring village a SAR model could find a spillover effect of fleeing when there was only a spillover effect of violence.

The problem with estimating the regression shown in equation 1 is what Manski (1993, 2000) refers to as the reflection problem: fleeing from neighboring villages affect each other. If refugees fleeing from one village may be caused by fleeing from a neighboring village, but those refugees' flight could have been caused by fleeing from the first village, we cannot know which village's fleeing is the cause and which is the effect. In estimating the effect of refugees fleeing from the villages that neighbor village i on refugees fleeing from village i, fleeing is endogenous because village i is a neighbor of i's neighbors. The spillover effect of fleeing can be identified using instrumental variables subject to an exclusion restriction. The exclusion restriction is that the instrument must cause fleeing from i's neighbors, but cannot cause fleeing from village i directly. Bramoullé, Djebbari and Fortin (2009) suggest identifying spillovers using the characteristics of neighbors' neighbors. I modify their approach to take advantage of the structure of interactions caused by fleeing toward the border in Kosovo. Violence in the villages that are neighbors of i's neighbors, but not neighbors of i, and from which refugees fleeing would not pass i fulfill this exclusion restriction.

The identifying assumption is that while both refugees fleeing from neighboring villages and violence in neighboring villages can affect fleeing from your village directly, refugees fleeing from neighboring villages and violence in the neighboring villages of your neighboring villages which are not also neighboring your village can only affect fleeing from your village through their effect on your neighbors. Neighbors can directly affect one's behavior because of social connections due to proximity and because one can observe and communicate with them. However, an individual is much less likely to know people who live far away. Even if someone knows others who are far away, in the absence of communications infrastructure, one cannot observe their behavior and so cannot be affected by their decisions. However, some individuals who are not proximate to i are near one of i's neighbors. That is, there may be $k \in N_j$, where $j \in N_i$ and $k \notin N_i$. In this case, k, a neighbor's neighbor that is not one's neighbor can affect the behavior of j, the mutual connection, directly, but neighbors' neighbors do not directly affect one's behavior. In order for violence experienced by k to affect i, it must affect j's—or another mutual connection's—behavior because i cannot directly observe k's decision. There is one important case in which this is not true: when i's neighbors' neighbor, k passes i and is observed by i while fleeing. This would violate the exclusion restriction, but once we exclude neighbors' neighbors that could potentially flee on routes passing i, the exclusion restriction will hold. An illustration of the identification strategy is shown in figure 2. If k can affect i's behavior directly this means that the network of neighbors is mismeasured. Because of this possibility, models are estimated using several different neighborhoods.

There is still the potential for spatially correlated omitted variables, which could be time varying.

Table 2: Number of Neighboring Villages

	Neighbors within		
	10 km	20 km	30 km
Mean	44.30	154.4	308.5
Min.	7	16	65
Max.	77	235	460

These are unobserved factors may affect villages that are near each other. Factors such as the course of the conflict and the economic situation are almost certainly spatially correlated. Residents in neighboring villages are likely to be more similar to each other than they are to residents of villages far away. Because of these spatially correlated omitted variables, if there is a correlation between fleeing from nearby villages it is difficult to determine whether this is truly due to spatial spillover effects or simply because nearby places are similar. For these to be problematic they would have to be regional, such that they affected a village, its neighbors and their neighbors. Since the dataset is a panel, I include village or municipality and day fixed effects, as shown in equation 3. Spatially correlated error terms may still lead to incorrect inferences. Therefore I use spatially and temporally robust standard errors (Conley, 1999). These standard errors allow for arbitrary correlations between villages within the neighborhood and over time.

$$y_t = \beta W y_t + X_t \gamma + \delta W X_t + \zeta_i + \eta_t \epsilon_t \tag{3}$$

The identification strategy hinges on distinguishing the villages from which civilians in a given village might have seen refugees fleeing from those from which they could not have seen fleeing. Violence in village i's neighbor's neighbors from which fleeing is unobservable in i can only affect affect fleeing from i though the actions of civilians in their common neighbors. On the other hand, violence in neighbors' neighboring villages from which fleeing is observable in i could affect civilians in village i's decisions to flee directly, because fleeing is directly observed. Several characteristics of refugee flows during the Kosovo war enable distinguishing villages from which civilians in other villages could observe fleeing directly from villages where observing fleeing is not possible.

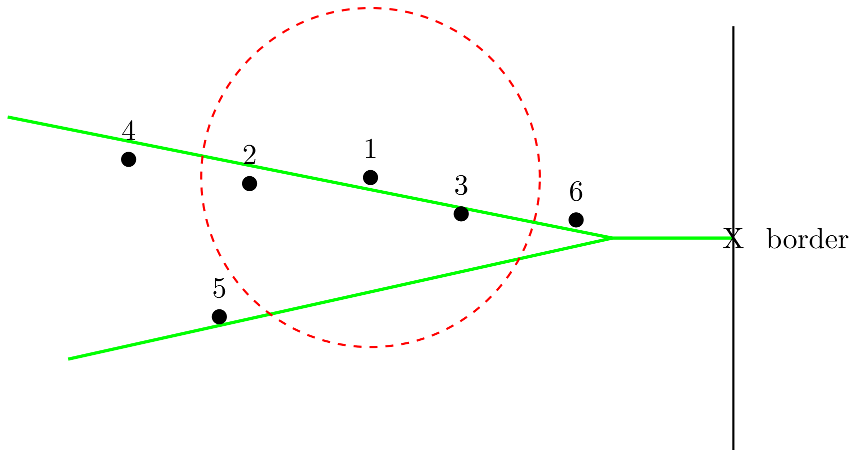
The Albanian border crossing records record where and when refugees started their journeys and, because only one border crossing point was open on the Albanian border, the end point of their journey is also known. The vast majority of refugees traveled to the border in vehicles on roads, which was safer and much easier than other options in mountainous Kosovo (Finn, 1999). The sparseness of the road network due to the mountainous terrain means there is virtually always one route from a village to the Albanian border post that is much shorter than any others. From some villages there is only one route.

Using the major road network of Kosovo obtained from the Digital Chart of the World,[12] I find the shortest route to the border for all villages. Figure A.1 shows the highway network of Kosovo and all villages. Most settlements are not directly on a highway. Instead, dirt tracks link small villages to larger roads. These tracks are not mapped, so I link each village to the nearest point on a highway.

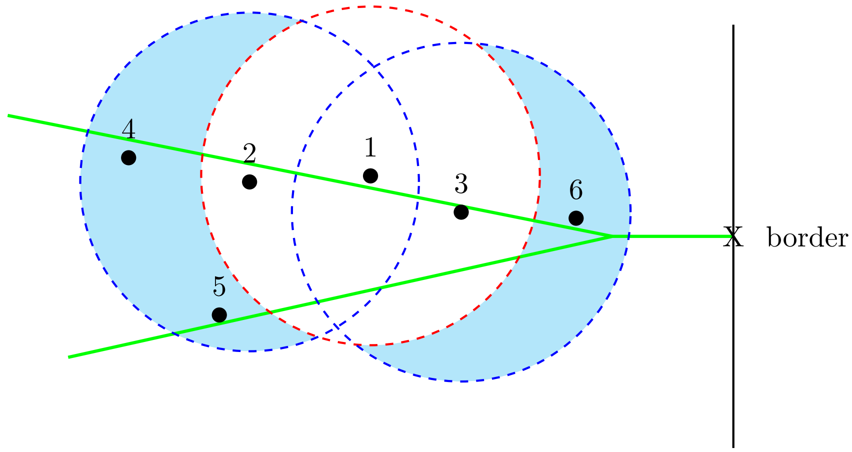
The routes from each village to the border make it easy to distinguish, for a village i, which other villages would pass i while fleeing to the border and which would not pass i. There are two situations in which civilians from another nearby village, j would not pass i. First, civilians from j would not pass i if j if farther toward the border along the same road that refugees from i would travel on. Second, civilians from j would not pass i if j if j's route to the border follows a different road and does not pass near i. An illustration of this identification strategy is shown in figure **??**.

The question of how to measure social connections remains. Long standing social ties are caused by proximity. Civilians know others from neighboring villages, who they might see fleeing or who might warn them as they leave. It is necessary to pick a distance defining neighboring villages. It needs to be small enough that intra-village social networks plausibly exist or that refugees might travel near the neighboring village. Yet, a neighborhood distance that is too small excludes neighbors that do affect the decision to flee. I use three different neighborhoods, including neighboring villages within 10, 20, and 30 km. The numbers of neighboring villages for these thresholds is shown in table 2.

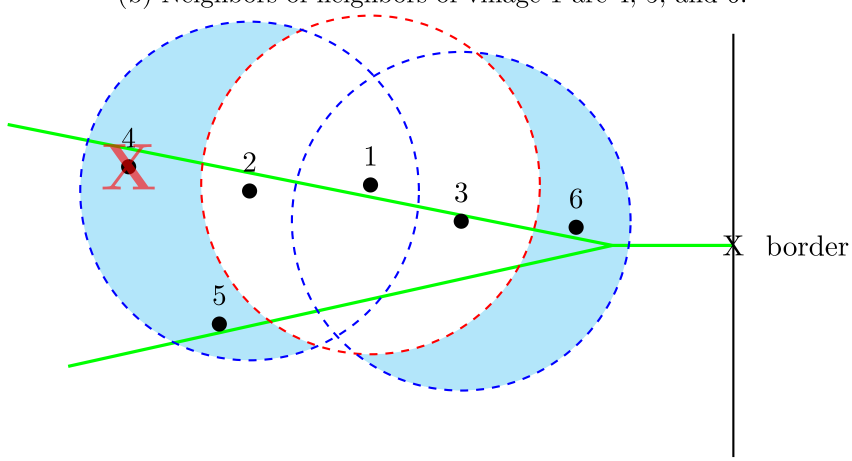
[12] The Digital Chart of the World is derived from United States Defense Mapping Agency's operational navigation chart 1:1,000,000 scale paper map series, which was originally produced in 1992. This is several years prior to the war, but no new highways were constructed in Kosovo during the 1990s.



(a) Neighbors of village 1 are 2 and 3.



(b) Neighbors of neighbors of village 1 are 4, 5, and 6.



(c) Refugees from village 4, but not 5 or 6, would pass village 1 on the way to the border, so violence in 5 and 6 are valid instruments for the effect of refugees fleeing from 1's neighbors, 2 and 3, on refugees fleeing from 1.

Figure 2: An illustration of the identification strategy used to estimate the effect of refugees fleeing from village 1's neighbors, 2 and 3, on refugees fleeing from village 1.

6 Results

Due to the endogeneity of the spillover effect of fleeing, equation 3 is estimated using two stage least squares using violence in neighbors of neighboring villages whose fleeing cannot be directly observed as instrumental variables. Uncovering the causal spillover effect of refugees fleeing relies on the exclusion restriction that for village i on day t, refugees fleeing from the neighboring villages of neighboring villages that are not also i's neighbors and who they cannot directly observe fleeing do not affect refugees fleeing from village i except through their effect on refugees fleeing from the village i's neighboring villages. This could be violated if an omitted variable causes both fleeing from village i and fleeing from the neighbors of neighbors of village i on the same day. Omitted variables that violate the exclusion restriction would have to be regional to affect both i and its neighbors. For example, if large troop movements in an area are observed by residents of village i, its neighboring villages, and the neighbors of those neighbors, the exclusion restriction could be violated.

I deal with this in several ways. First, I vary the distance between villages that are considered neighbors from 10 km to 30 km. If spatially correlated omitted variables are clustered at any particular distance, increasing the distance that encompasses neighbors beyond this will solve the problem. Increases in the threshold distance for neighboring villages requires ever more distant spatially correlated omitted variables to violate the exclusion restriction. In case there are local or larger regional, spatially correlated omitted variables, I include village and municipality fixed effects in different specifications. Municipalities are local regions encompassing multiple villages. If omitted variables, vary systematically at these regional levels, this will control for these regional effects. If omitted variables instead vary at the village level, village-level fixed effects are included. There is also the potential for time varying omitted variables. To account for this, I also include day fixed effects.

Table 3 presents regression results of models of the form in equation 3 to find the spillover effect of refugees fleeing. These control for local village measures of violence—civilians killed, KLA fighters killed, battles between the Yugoslav army and the KLA, Yugoslav army soldiers killed by the KLA, and NATO airstrikes—as well as the same measures of violence in neighboring villages and demographics in the local village and its neighbors. Village or municipality and time fixed effects are also included. The models are estimated using two stage least squares with the covariates of the neighbors of neighboring villages that are closer to the border, using violence in neighbors of neighbors that are not one's own neighbor and which do not flee on routes that can be directly observed as instrumental variables. Estimates for different threshold distances for neighboring villages are shown between 10km and 30km. Cragg-Donald and Kleibergen-Paap F-tests to reject weak instruments show that violence in neighbors of neighboring villages are not weak instruments (Cragg and Donald, 1993; Kleibergen and Paap, 2006). There are more instruments than endogenous variables, so the Sargan overidentification test is reported (Sargan, 1958). In all models this test fails to reject the hypothesis that the instruments are correlated with the residuals and therefore invalid instruments. First stage results are shown below. Two types of standard errors are shown. For regressions that include municipality-level measures of violence, standard errors clustered by municipality and day are shown. For regressions that exclude these variables, spatially and temporally robust standard errors using the method of Conley (1999) are shown. These standard errors allow for arbitrary correlations between villages within the neighborhood distance and over time. Tables A.1, A.2, and A.3 show additional robustness checks. These models include or exclude village-level demographic variables, village and municipality fixed effects, and municipality-level measures of violence.

A potential problem arises if the social network does not have the structure assumed. If people are (somehow) obtaining information from people who do not live near them the exclusion restriction is violated. The case of Kosovo minimizes this problem because of the lack of communications infrastructure during the war. I use two different approaches to evaluate the assumption of communication only occurring between neighbors nearby. First, I use different definitions of neighbors to see if the results are robust to a potential misspecification of the neighbors network. Second, I run a placebo test, where I instead assume villages are connected to other villages that are not their neighbors rather than villages near them, with the expectation of a null result if there is not long distance communication. For this placebo test I assume the neighbors are at least 50 km away and vary the maximum distance of "neighboring" village as before.

There is a large, positive spillover effect of fleeing. The spatial weights matrix is row standardized, so the spillover effect can be interpreted as the number of civilians induced to flee and become refugees when an average of one refugee flees from the neighboring villages that are nearer to the

Table 3: Instrumental Variables Regression Results using Different Neighbor Distances

	Neighbors within								
	10 km			20 km			30 km		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Spillover effect of fleeing									
Refugees (neighboring villages)	1.444**	1.276**	1.265*	0.997**	1.088**	1.099***	2.197**	1.906**	1.927**
	(0.705)	(0.644)	(0.705)	(0.398)	(0.490)	(0.340)	(0.960)	(0.883)	(0.752)
Local violence									
Civilians killed	0.558**	0.280	0.281	0.582**	0.299	0.298	0.584	0.300	0.296
	(0.244)	(0.451)	(0.241)	(0.246)	(0.429)	(0.218)	(0.378)	(0.425)	(0.362)
KLA killed	2.722	2.353	2.340	2.450	2.121	2.125	2.409	2.140	2.121
	(2.134)	(2.007)	(2.130)	(2.142)	(2.048)	(2.130)	(2.118)	(2.017)	(2.092)
Battles	−0.308		0.017	−0.072		0.021	−0.050		−0.092
	(0.381)		(0.359)	(0.398)		(0.421)	(0.489)		(0.498)
Army killed	−0.937*		−0.448	−0.091		0.039	0.260		0.441
	(0.545)		(0.491)	(0.660)		(0.687)	(0.607)		(0.673)
NATO airstrikes	0.805		2.074	0.115		0.605	0.677		1.447
	(0.674)		(1.382)	(0.754)		(1.172)	(0.973)		(1.402)
Spillover of violence									
Civilians killed (neighboring villages)	−1.388	−0.657	−0.624	−0.849	−0.371	−0.489	−7.428	−5.207	−5.275
	(1.058)	(1.648)	(0.756)	(1.902)	(2.148)	(1.612)	(7.757)	(6.393)	(7.017)
KLA killed (neighboring villages)	−11.343	−10.003	−10.118	13.632	7.880	8.554	−25.710	−16.677	−17.671
	(13.231)	(8.189)	(12.884)	(13.546)	(21.376)	(15.430)	(39.661)	(35.570)	(28.943)
Battles (neighboring villages)	0.820		0.252	−0.378		−0.488	0.799		0.802
	(0.752)		(0.861)	(0.831)		(0.754)	(1.070)		(0.835)
Army killed (neighboring villages)	1.088		0.585	−0.180		−0.325	−0.883		−0.956
	(0.837)		(0.634)	(1.305)		(1.314)	(1.811)		(1.477)
NATO airstrikes (neighboring villages)	−0.931		−2.534	0.021		−0.456	−1.303		−3.197
	(0.977)		(1.677)	(1.340)		(1.967)	(2.279)		(3.249)
	First stage								
Instruments									
Civilians killed (neighbors of neighbors)	0.660	0.930	0.888	3.277	3.442*	3.453	3.794	3.900	3.874
	(1.697)	(0.770)	(1.760)	(3.454)	(1.828)	(3.564)	(3.855)	(2.408)	(3.980)
KLA killed (neighbors of neighbors)	14.999	15.522***	15.691	26.883	27.696**	27.744	9.442	9.939	9.819
	(11.204)	(5.281)	(11.328)	(22.812)	(12.051)	(23.116)	(16.923)	(11.215)	(17.386)
First stage R^2	0.110	0.132	0.132	0.225	0.233	0.236	0.363	0.367	0.369
C-D F statistic	64.842	75.93	75.489	382.31	399.238	400.981	165.999	169.27	166.858
K-P F statistic	40.625	46.509	48.961	109.467	109.348	114.41	73.777	78.148	76.837
Overidentification test p-value	0.538	0.797	0.774	0.671	0.735	0.723	0.2	0.386	0.382
Village fixed effects	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
Village demographics	Yes	No	No	Yes	No	No	Yes	No	No
Municipality fixed effects	Yes	No	No	Yes	No	No	Yes	No	No
Observations	89,404	89,404	89,404	89,404	89,404	89,404	89,404	89,404	89,404

Note: For models 2, 5, and 8, which exclude municipality-level measures of violence, spatially and temporally robust standard errors using the method of Conley (1999) are shown. These standard errors allow for arbitrary correlations between villages within the neighborhood distance and over time. For models 1, 3, 4, 6, 7, and 9, standard errors are clustered by municipality and day. Models without village fixed effects control for total population, Serb population, Albanian population, the road distance to the border, and the average values of these variables for neighboring villages. All models include day and either municipality or village fixed effects. $^{*}p<0.1$; $^{**}p<0.05$; $^{***}p<0.01$

border. This result is consistent across different distance thresholds for neighbors. A neighboring village may itself have multiple neighbors, affecting them all this way, on average. Thus, fleeing from neighboring areas has an independent effect on fleeing from local or neighboring violence. This result implies that civilians living in war zones learn from the behavior of other people, who may or may not have access to more information than them, but who are in similar situations. This learning could happen directly, because friends of acquaintances in neighboring villages tell them that they are leaving, or indirectly, when civilians observe that their neighbors have left. This is consistent with the theory of information cascades—that civilians living in conflict zones without assess to good information on their local risk of victimization infer from the decisions of other civilians to flee that the risk must be higher, magnifying the effect of actual violence. It also implies that the location of violence may matter for the number of refugees that result from the conflict.

Unlike the spillover effect of fleeing, the estimates of the relationship between violence and refugees is not statistically identified here. Therefore caution in comparison is needed. Yet the literature has largely argued that violence is the primary cause of refugee flows. Because the average number of refugees is virtually always much greater than the number of victims of violence, even if violence had a much larger causal effect on refugees than information cascades, the aggregate effect of information cascades would still dominate in explaining refugee crises. During the Kosovo war, the average number of refugees in a village-day is more than 30 times the average number of civilians killed, so the marginal causal effect of violence would have to be at least 30 to be equal to the spillover effect of refugees fleeing. This is not to say that violence is not the ultimate cause of refugee movements, just that the way information flows through social networks greatly magnifies the effect of violence and can cause the movements of people who may be far from the locations of violence.

7 Discussion and Conclusion

Based on a novel identification strategy using the neighbors of neighboring villages and the routes of refugees fleeing on roads in Kosovo, this paper finds that exposure to refugees from neighboring villages significantly increases the number of refugees that flee. This result is consistent with the proposed theoretical argument, that civilians living in conflict update their beliefs about the likelihood of victimization based on observing the decisions to flee of neighbors and that this can cause cascades of refugees streaming toward the border, in spite of little or no change in the probability of being killed.

By systematically identifying the spillover effect of fleeing, this study provides novel insight into how refugee flows can quickly grow and contributes to the growing body of research on the causes of civilian displacement in civil war. In the information-poor environment of civil wars, the actions of others can have a substantial impact on an individual's own perception of the risk of violence and therefore on her decision to flee and become a refugee. If this civilian flees, he or she can further impact the information and decision making processes of other civilians, creating a information cascade caused by the information transmitted to other civilians by a stream of refugees fleeing. This can help explain why there is such variation in the numbers of refugees that result from wars with similar levels of violence.

Although the analysis in this paper is based on one conflict, the results can be applied more broadly. When refugees fleeing can affect other civilians' beliefs about risk and decision making, the spatial and temporal distribution of violence matters. The same amount of violence in different places will result in different numbers of refugees because cascades of refugees generated by information spillovers will differ.

A deeper understanding of why civilians flee and become refugees or stay in war zones is vital to preparing for and responding to current and future refugee crises. Expanding the reasons for refugee flows beyond local violence and economic factors and focusing on the role of information on the actions, not just of combatants, but civilians as well, is a first step.

This study addresses the question of why civilians living in war zones flee their homes as refugees causing refugee crises. Previous research has concluded that refugees flee because of violence. I collect more fine grained data than was previously available and show that many refugees flee from places where there wasn't violence. Instead, I focus on how information is transmitted though populations living in war zones and how civilians use that information to estimate their risk and make decisions to flee or stay. I show that many more people flee because of the information cascades that result than flee because of nearby violence. This has important implications. First, the reducing the amount of violence against civilians in civil wars will not necessarily reduce the number of refugees because there remain more social connections to transmit information about the violence that does occur. Second, refugee crises are inherently unstable—the same 'spark' of violence will cause very different numbers of refugees if the violence occurs in different places and times or if the social networks that civilians use to learn about rumors of violence are different.

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A Appendix

Table A.1: Instrumental Variables Regression Results for Neighbors within 10 km

	(1)	(2)	(3)	(4)	(5)
Spillover effect of fleeing					
Refugees (neighboring villages)	1.579*	1.466*	1.444**	1.276**	1.265*
	(0.806)	(0.775)	(0.705)	(0.644)	(0.705)
Local violence					
Civilians killed	0.931	0.557	0.558**	0.280	0.281
	(0.833)	(0.659)	(0.244)	(0.451)	(0.241)
KLA killed	3.274	2.737	2.722	2.353	2.340
	(2.284)	(2.128)	(2.134)	(2.007)	(2.130)
Battles			−0.308		0.017
			(0.381)		(0.359)
Army killed			−0.937*		−0.448
			(0.545)		(0.491)
NATO airstrikes			0.805		2.074
			(0.674)		(1.382)
Spillover of violence					
Civilians killed (neighboring villages)	−1.973	−1.434	−1.388	−0.657	−0.624
	(2.270)	(2.053)	(1.058)	(1.648)	(0.756)
KLA killed (neighboring villages)	−13.656*	−11.306	−11.343	−10.003	−10.118
	(8.191)	(8.050)	(13.231)	(8.189)	(12.884)
Battles (neighboring villages)			0.820		0.252
			(0.752)		(0.861)
Army killed (neighboring villages)			1.088		0.585
			(0.837)		(0.634)
NATO airstrikes (neighboring villages)			−0.931		−2.534
			(0.977)		(1.677)
			First stage		
Instruments					
Civilians killed (neighbors of neighbors)	0.571	0.684	0.660	0.930	0.888
	(0.689)	(0.699)	(1.697)	(0.770)	(1.760)
KLA killed (neighbors of neighbors)	15.202***	14.932***	14.999	15.522***	15.691
	(4.134)	(4.317)	(11.204)	(5.281)	(11.328)
First stage R^2	0.105	0.110	0.110	0.132	0.132
C-D F statistic	64.262	65.408	64.842	75.93	75.489
K-P F statistic	35.994	38.294	40.625	46.509	48.961
Overidentification test p-value	0.666	0.56	0.538	0.797	0.774
Village fixed effects	No	No	No	Yes	Yes
Village demographics	No	Yes	Yes	No	No
Municipality fixed effects	Yes	Yes	Yes	No	No
Observations	89,404	89,404	89,404	89,404	89,404

Note: For models that exclude violence that is measured at the municipality-level, spatially and temporally robust standard errors using the method of Conley (1999) are shown. These standard errors allow for arbitrary correlations between villages within the neighborhood distance and over time. For models 3 and 5, standard errors are clustered by municipality and day. Models without village fixed effects control for total population, Serb population, Albanian population, the road distance to the border, and the average values of these variables for neighboring villages. All models include day and either municipality or village fixed effects. $^{*}p<0.1$; $^{**}p<0.05$; $^{***}p<0.01$

Table A.2: Instrumental Variables Regression Results for Neighbors within 20 km

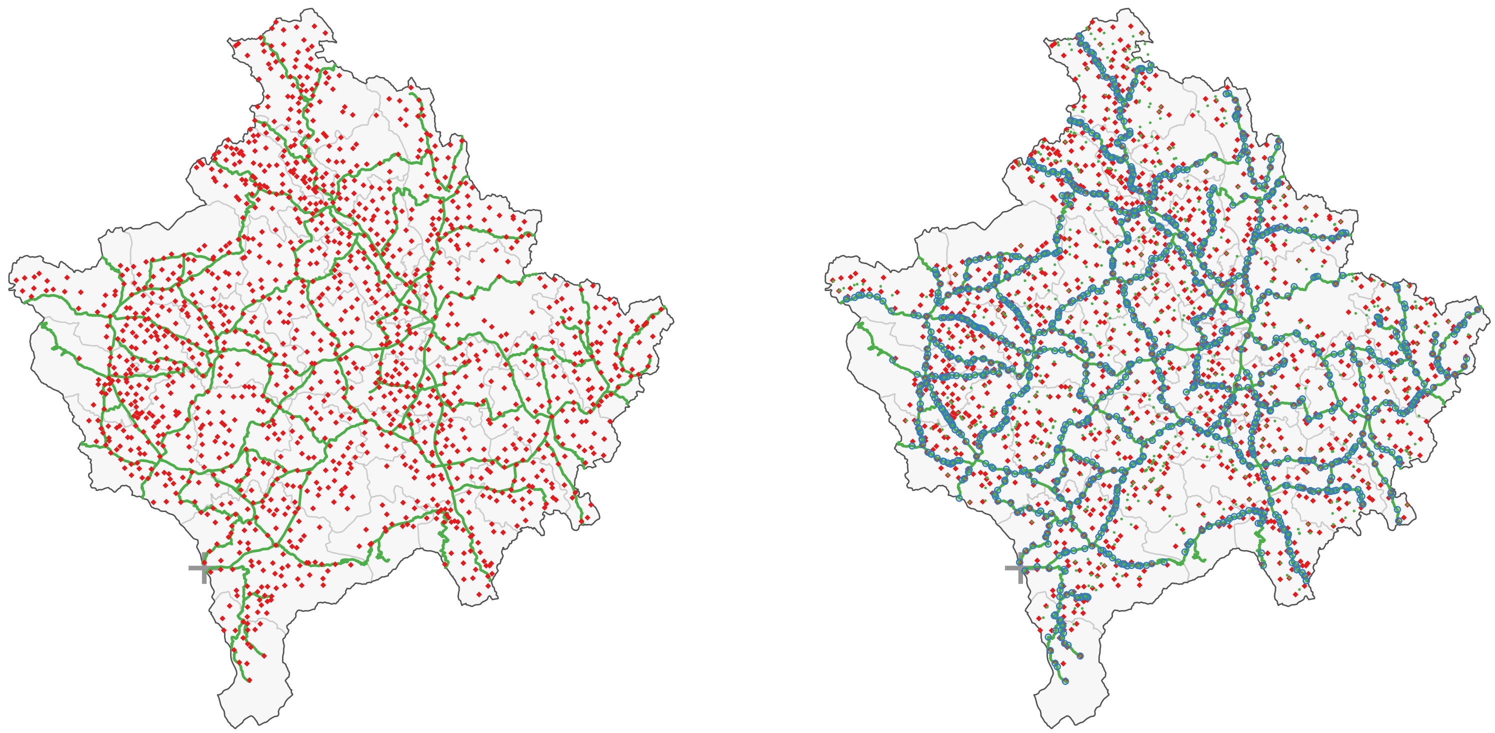
	(1)	(2)	(3)	(4)	(5)
Spillover effect of fleeing					
Refugees (neighboring villages)	1.072**	0.992*	0.997**	1.088**	1.099***
	(0.516)	(0.512)	(0.398)	(0.490)	(0.340)
Local violence					
Civilians killed	0.957	0.582	0.582**	0.299	0.298
	(0.784)	(0.619)	(0.246)	(0.429)	(0.218)
KLA killed	2.878	2.443	2.450	2.121	2.125
	(2.269)	(2.118)	(2.142)	(2.048)	(2.130)
Battles			−0.072		0.021
			(0.398)		(0.421)
Army killed			−0.091		0.039
			(0.660)		(0.687)
NATO airstrikes			0.115		0.605
			(0.754)		(1.172)
Spillover of violence					
Civilians killed (neighboring villages)	−1.408	−0.778	−0.849	−0.371	−0.489
	(2.840)	(2.733)	(1.902)	(2.148)	(1.612)
KLA killed (neighboring villages)	10.933	12.787	13.632	7.880	8.554
	(23.671)	(23.455)	(13.546)	(21.376)	(15.430)
Battles (neighboring villages)			−0.180		−0.325
			(1.305)		(1.314)
Army killed (neighboring villages)			0.021		−0.456
			(1.340)		(1.967)
NATO airstrikes (neighboring villages)			0.021		−0.456
			(1.340)		(1.967)
			First stage		
Instruments					
Civilians killed (neighbors of neighbors)	3.049*	3.268*	3.277	3.442*	3.453
	(1.838)	(1.843)	(3.454)	(1.828)	(3.564)
KLA killed (neighbors of neighbors)	28.534**	26.972**	26.883	27.696**	27.744
	(12.535)	(12.255)	(22.812)	(12.051)	(23.116)
First stage R^2	0.219	0.223	0.225	0.233	0.236
C-D F statistic	385.102	382.895	382.31	399.238	400.981
K-P F statistic	104.106	104.942	109.467	109.348	114.41
Overidentification test p-value	0.997	0.681	0.671	0.735	0.723
Village fixed effects	No	No	No	Yes	Yes
Village demographics	No	Yes	Yes	No	No
Municipality fixed effects	Yes	Yes	Yes	No	No
Observations	89,404	89,404	89,404	89,404	89,404

Note: For models that exclude violence that is measured at the municipality-level, spatially and temporally robust standard errors using the method of Conley (1999) are shown. These standard errors allow for arbitrary correlations between villages within the neighborhood distance and over time. For models 3 and 5, standard errors are clustered by municipality and day. Models without village fixed effects control for total population, Serb population, Albanian population, the road distance to the border, and the average values of these variables for neighboring villages. All models include day and either municipality or village fixed effects. $^{*}p<0.1$; $^{**}p<0.05$; $^{***}p<0.01$

Table A.3: Instrumental Variables Regression Results for Neighbors within 30 km

	(1)	(2)	(3)	(4)	(5)
Spillover effect of fleeing					
Refugees (neighboring villages)	2.406**	2.181**	2.197**	1.906**	1.927**
	(0.949)	(0.937)	(0.960)	(0.883)	(0.752)
Local violence					
Civilians killed	0.959	0.585	0.584	0.300	0.296
	(0.778)	(0.616)	(0.378)	(0.425)	(0.362)
KLA killed	2.869	2.417	2.409	2.140	2.121
	(2.260)	(2.104)	(2.118)	(2.017)	(2.092)
Battles			−0.050		−0.092
			(0.489)		(0.498)
Army killed			0.260		0.441
			(0.607)		(0.673)
NATO airstrikes			0.677		1.447
			(0.973)		(1.402)
Spillover of violence					
Civilians killed (neighboring villages)	−9.395	−7.364	−7.428	−5.207	−5.275
	(7.770)	(7.508)	(7.757)	(6.393)	(7.017)
KLA killed (neighboring villages)	−32.409	−25.415	−25.710	−16.677	−17.671
	(36.541)	(35.061)	(39.661)	(35.570)	(28.943)
Battles (neighboring villages)			0.799		0.802
			(1.070)		(0.835)
Army killed (neighboring villages)			−0.883		−0.956
			(1.811)		(1.477)
NATO airstrikes (neighboring villages)			−1.303		−3.197
			(2.279)		(3.249)
			First stage		
Instruments					
Civilians killed (neighbors of neighbors)	3.768	3.815	3.794	3.900	3.874
	(2.533)	(2.529)	(3.855)	(2.408)	(3.980)
KLA killed (neighbors of neighbors)	9.827	9.518	9.442	9.939	9.819
	(11.528)	(11.511)	(16.923)	(11.215)	(17.386)
First stage R^2	0.360	0.361	0.363	0.367	0.369
C-D F statistic	166.806	167.9	165.999	169.27	166.858
K-P F statistic	73.487	74.782	73.777	78.148	76.837
Overidentification test p-value	0.11	0.201	0.2	0.386	0.382
Village fixed effects	No	No	No	Yes	Yes
Village demographics	No	Yes	Yes	No	No
Municipality fixed effects	Yes	Yes	Yes	No	No
Observations	89,404	89,404	89,404	89,404	89,404

Note: For models that exclude violence that is measured at the municipality-level, spatially and temporally robust standard errors using the method of Conley (1999) are shown. These standard errors allow for arbitrary correlations between villages within the neighborhood distance and over time. For models 3 and 5, standard errors are clustered by municipality and day. Models without village fixed effects control for total population, Serb population, Albanian population, the road distance to the border, and the average values of these variables for neighboring villages. All models include day and either municipality or village fixed effects. $^{*}p<0.1$; $^{**}p<0.05$; $^{***}p<0.01$



(a) Settlements and the highway network

(b) Settlements, the highway network, and the nearest point on the highway network to each settlement

Figure A.1: Proximity of settlements to highways