Leaving As a Community: How Uncertainty and Group Dynamics Inform the Choice to Flee Violence

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Abstract

In 1993, a coup in Burundi touched off several weeks of widespread political violence. Hundreds of thousands of Burundians fled to neighboring countries in the first days following the coup. I use detailed information from this episode in Burundi to examine patterns of migration and violence. I draw on insights from the collective action and global games literature to model a group decision to flee when there is uncertainty about violence. Unlike decision making models typically used to study migration, the proposed framework allows for patterns in group arrivals, like large-scale migration before violence occurs. The theory also provides insight into why, at a critical point in the Burundian crisis, the number of persons fleeing Burundi fell off dramatically, even though violence continued and a large proportion of the population remained in Burundi. More broadly, implications for the model can inform international planning for large-scale refugee flight, and the theory illuminates other migration phenomena in which uncertainty plays a key role, like migration due to climate change.

Introduction

Over the course of ten days in October of 1993, nearly 700,000 refugees fled Burundi. This refugee crisis is widely acknowledged to be among the first of a new kind of refugee crisis in Africa, and perhaps the world, in which refugees arrive in a remarkable surge. In the days before the crisis, very few people were crossing the borders, and then in a matter of days, hundreds of thousands of refugees fled their country of origin. Despite the fact that violence continued in Burundi, out migration drops off dramatically. The 1993 Burundian crisis is the first of a few refugee crises in the Great Lakes Region that have this surge-like characteristic. The Rwandan Genocide generated this kind of surge of refugees, as did the civil war in Eastern Congo. The phenomenon has occurred more broadly, though. The refugee crisis in Syria has exhibited some surge-like refugee flight. Most recently in 2017, the Myanmar refugee crisis in which Rohingya fled had this characteristic.

In the aftermath of the Burundian and Rwandan refugee crises, international aid agencies recognized that they needed to be able to mobilize larger amounts of resources more quickly to respond to this kind of crisis. Humanitarian aid organizations have done much to adjust to these surge refugee crises and probably have saved thousands of lives. Resources to bring to bear on a humanitarian crisis are constrained, and mobilizing more emergency resources limits the resources that can be invested in longer-term programming to sustain refugees or address the underlying political problems that lead to their displacement. Thus, knowing when the surge in refugee flight is coming to an end and emergency response can transition to short-term maintenance is of practical importance.

Currently, theory of refugee flight has little power to predict surge dynamics or when the refugee flight will slow. The workhorse framework for theorizing refugee flight grows out of a theory of labor migration. An important scholarly innovation, the model recognizes that refugees have a choice in whether and where to flee. Violence enters into that decision

making process as a disutility, or a cost of staying. This is weighed against all the losses incurred by fleeing: the cost of getting across the border, the loss of property and assets. This model, and the related household decision making model, are useful for understanding how individuals face both economic and security threats to survival. However, the model has little power to explain patterns of refugee flows that diverge from patterns of violence, as surge-like flows do.

The goal of this project is to better understand surge-like refugee flows by re-framing the choice to flee violence as a decision among a collective with imperfect information about future violence. To better theorize the salient characteristics of surge-like flows I use the 1993 Burundian refugee crisis. In particular, three stylized facts from the Burundian crisis shape the model. First, the pattern of refugee flows does not follow the pattern of violence. In particular, refugee flows are substantially larger in the beginning and drop off more drastically than the incidence of violence. Second, many people flee before violence begins. Finally, not everyone flees. The number that flee is quite large in absolute counts, but be a relatively small proportion of the total population.

Formalizing the decision to flee as a strategic interaction in which there are gains to coordination and uncertainty about future violence, yields traction on conditions — apart from incidence of violence — that increase a person's willingness to flee and the size of refugee flows. In particular, the model yields a few empirical implications. One macro implication is that countries in which people flee as groups will have larger refugee flows than countries in which people flee as individuals. There are two reasons for this: one is that groups have higher success rates by assumption. The second is because the group's improved success, makes more people willing to flee in the first place. Thus, a second empirical implication is that a greater proportion of a community will flees when the members flee as a group than when the members flee as individuals.

Theorizing beliefs about future violence among potential refugees generates implications

for how information drives who flees, if communities receive common information about future violence and individuals are more or less reactive to that information as they form their beliefs about future violence. Persons who are the more reactive type, will have greater willingness to flee when common information is more certain. Less reactive types will have greater willingness to flee when common information is more uncertain. Thinking of the more reactive type as those who can least defend themselves — like children, the elderly or women—yields two more empirical implications. In communities with more precise information about future violence, the group fleeing will have more children, elderly and women. In communities with less precise information about future violence, the group fleeing will be more heterogeneous.

Finally, the uncertainty about future violence creates more circumstances in which people would prefer to flee as a group but fail to coordinate. This implication of the model is suggestive about policy. If it is the case that people are more likely to succeed in reaching safety in groups, providing better information about violence, may help people to be able to coordinate and make flight, safer or more successful.

The remainder of the paper proceeds as follows: First, I situate the individual and household decision making models of migration in the context of forced migration and examine a key critique, that the community, not the individual, is deciding to flee. Second, I introduce the reader to Burundi and the violent events and migration in the Fall of 1993. I develop the model in three parts. In the final section of this article, I examine the 1993 Burundi Crisis in light of the model. I reflect on broader implications for migration in the context of uncertainty. Namely, following a major natural disaster, when individuals are uncertain about the breadth of destruction, similar surge-like trends in migration can occur.

Choosing to Flee & Fleeing as a Community

Most work on mass migration that models a choice on the part of the migrant does so with an individual decision maker model with violence as a disincentive to staying. Evidence suggests that people do trade off on economic factors and safety when choosing to flee political violence. However, macro trends like the surge dynamic in the 1993 Burundian Crisis cannot be generated with this simple model. Furthermore, it may be that migrants are more dependent on their community to flee than such a model suggests. Surge-like mass migration requires a more complex treatment of violence and how community may matter for fleeing.

Scholarly work on forced migration that models a choice on the part of the migrant does so in the context of a market, with an individual who solves a utility maximization problem, building on models of labor migration decisions (See Borjas 2001; Massey et al. 1993, for a more detailed account of the literature) and noting that violence is a disincentive to stay in one's place of origin. Generally this work argues that there is a cost to insecurity. When the cost to insecurity gets high enough, people move.

This basic model has been evaluated empirically in a cross country framework. In a set of articles, Davenport, Moore, and Poe (2003) and Moore and Shellman (2004, 2006) scholars show that (1) there is differential volume of forced migration for different levels of violence and (2) relative country-level economic conditions determine whether displaced people migrate internally or across boarders (see Davenport, Moore, and Poe 2003, for a review of the quantitative work in the 1990s).

However, the presence of violence does not account for all the variation in forced migration. Engel and Ibanez (2007) use household-level data from Colombia to explain that while violence plays a role in the decision to migrate, economic consideration can play a role, as well. The lower the violence, the more weight is given to economic considerations in the

household decision making process. Czaika and Kis-Katos (2009) use village level data from Aceh, Indonesia to differentiate between push and pull factors in conflict-driven migration and have similar findings to Engel and Ibanez with respect to economic determinants.

Sociologists and anthropologists have critiqued this individual decision making view of forced migration, arguing that there is a collective dynamic to forced migration. In some cases, refugees do not arrive at borders as individuals, but rather as groups (Harpviken 2009). This critique offers two theoretical concepts important for understanding surge-like refugee arrivals and consistent with 1993 Burundian Crisis. First, people coordinate when they flee; they flee as a group because it makes it easier. Second, people's *perceptions* of violence and safety drive them to move. On this view, mass migration occurs in collectives, and communities and social networks in wartime environments provide individuals with links to information, material resources, and facilitate a group decision to flee.

For the potential refugee, the fundamental problem is this: If there is some violence that makes a village temporarily unsafe, it does not make sense to flee the country. Villagers would be better off investing in some measure to defend themselves or taking an extended leave in a nearby city. However, if violence is occurring in one village, most of the villages around it, and the nearby provincial capital, it makes sense to travel further. If violence is enough of a problem, then it makes sense to seek protection outside the country of origin. Thus, people have to figure out if their situation is unsafe enough to justify leaving their homes, livelihoods, and possessions. Further they want to coordinate in making a risky and sometimes long, difficult trip to a border because people will be more successful in getting to the border and gaining protection if they flee with others.

The uncertain information environment and a desire to coordinate in a group are precisely the analytic notions underlying the global games. In global games, individuals want to participate when they believe that enough other people are participating, but do not want to participate if no one else is participating (Morris and Shin 2003). Like trying to flee as a

community, information and what other people are doing is critical. Thus I draw on insight from global games and other literature on Bayesian games to model fleeing in coordination with a group.

The 1993 Burundian Mass Migration

The violence and subsequent mass migration that occurred from Burundi in 1993 is a particularly good running example for thinking about surge-like mass migration because of three useful features. The first is that the violent events and out migration occurred over a relatively short and well defined period of time. Thus, the events of the 1993 crisis are not temporally intertwined with other violent events and other major migration events, making analysis easier. The second feature is that, while the events occurred over a short period, the numbers of people moving were large, making the events similar to many other refugee crises that have occurred since. The 1993 Burundian Crisis is comparable in rates of arrival (people arriving in asylum countries per week or per month) to other mass forced migrations, like those out of Somalia, the Democratic Republic of the Congo, and even beyond Africa, like mass migration from the wars in Iraq or Afghanistan. Finally, for a host of reasons, there is a fair amount of information available on the 1993 Burundian Crisis, and so the violence and migration can be studied in greater detail than is typically possible.

Burundi is a small, densely populated country in the center of Africa with a 60-year history of violence and refugee flight. A not often studied country, I proceed in this section by introducing Burundi. I then provide detail about the 1993 coup and the subsequent violence. The final part of this section explores the out migration from the crisis and highlights some trends in migration that will be useful in analyzing the model later.

In 1993, Burundi had between 5.3 and 6 million people. It is roughly the size of the state of Maryland, and in 1993 was roughly as densely populated as Maryland.[1] However, outside

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1. Based on the 2010 US Census.

of the capital, Bujumbura, it has no settlements that could be considered urban, and most of the population relies on agriculture for their livelihood. The capital is situated on the shores of Lake Tanganyika, but Burundi is landlocked and shares borders with Rwanda, Tanzania and what is now the Democratic Republic of the Congo (Central Intelligence Agency, 2012). The population is predominantly from two ethnic groups, the Hutu and the Tutsi, although historically these groups have had meaningful subdivisions (Lemarchand 1970, p. 82n). The Hutus make up a large majority of the country. However, the Tutsis, despite their minority status, have historically been the group in control of the government and the army.[2]

Since independence, Burundi has been plagued by a number of periods of violence and political instability, as well as abrupt changes in government. At independence in 1962, Burundi was ruled by a constitutional monarchy. In 1965, the Prime Minister was assassinated; the following year the king fled to Switzerland and was replaced by his son, who was later dethroned in a military overthrow(WriteNet 1995; US Department of State, 2012). From 1966 forward, for more than thirty years, Burundi was ruled by military leaders of Tutsi ethnicity who had an affiliation with the *Union pour le Progrès National* (UPRONA) party. A decade did not go by in which there was not a coup, rebellion, or violent uprising, most of which were associated with people fleeing to neighboring countries (US Department of State, 1994, 2012).

Regularly there have been violent clashes in which Hutus resisted Tutsi domination and the Tutsi-dominated army responded with retaliatory acts. In 1972 attacks on Hutus resulted in between 50,000 and 100,000 deaths and nearly 200,000 fled the country. In 1988, there were violent clashes between Hutus and the mostly-Tutsi army and at least 20,000 people were killed (United Nations Security Council 1994, par. 5). In response to the 1988 violence, the

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2. The UN and other international groups apportion the country as about 85% Hutu and 14% Tutsi. However, this apportioning has its origins in colonial measures, that were decades old by 1993. It is clear that more Tutsis live in the south of the country than in the North. There are some areas in the UN reports where there were as few as 1 Tutsi in 1,000 people.

president, Pierre Buyoya, set in motion meetings that eventually led to a new constitution. A multi-party constitution was ratified in 1992 and the first free and fair elections were held in 1993. Melchior Ndadaye, who had himself lived in exile, was elected the first Hutu president of Burundi (US Department of State, 1994; WriteNet 1995). By mid-July 1993, Ndadaye had been sworn in and the parliament seated. The peaceful transition from Buyoya's UPRONA military regime to Ndadaye's FRODEBU majority government was a remarkable first in the history of Burundi (US Department of State, 1994).

Coups and attempted coups, however, had been regular occurrences in Burundian history, and were a constant concern as Ndadaye took office. A week prior to his inauguration, a military coup was foiled and four senior military officers were jailed (United Nations Security Council 1996, pars. 92, 161). Ndadaye also took several actions that further alienated the Tutsi-dominated army, including separating the army command structure from the police force (par. 93), welcoming 1972 Burundian refugees home with promises that they could recover their land, and reorganizing local and provincial governments (United Nations Security Council 1995, par. 43). Other coup plots arose during the first months of Ndadaye's presidency, and Ndadaye had been warned about potential plots in the days leading up to his eventual assassination.(par. 45).

The October 1993 Coup and Violence

By the early morning of Thursday, October 21, President Ndadaye, as well as leaders of the FRODEBU party were captured. Coup leaders had also taken measures to shut down the airport and set up road blocks in the capital city. The coup leaders had also taken over the national radio station, which went silent, and cut off the telecommunications systems (United Nations Security Council 1996, pars. 144, 218).

Several governors learned of disruptions in the capital and at the presidential palace before telecommunications had been shut down (pars. 98, 318). By evening, Rwandan radio announced that President Ndadaye had been killed along with other ministers in the coup.

A few hours later, well after sundown, Mr. Francois Ngeze, who had been chosen by the coup leaders to be the head of state, addressed the country by state radio. He informed people that the coup had occurred, the borders had been sealed, and he was imposing a curfew. (United Nations Security Council 1995, par. 92).

In the months prior to the 1993 coup in the collines,[3] people generally lived peacefully together, regardless of the ethnic mix, even through the recent political campaigns and election. While many would have anticipated a coup or attempted coup at some juncture, it is not clear that people outside of the government anticipated the timing of the coup. Tensions were mounting because of some of the changes Ndadaye had signaled or implemented, but violence was not occurring before the coup in any remarkable way (United Nations Security Council 1996, par. 470).

In the morning of the day of the coup, trees were cut down and used to block the roads across the country. Bridges were destroyed. Consistently, on the day of the coup, Tutsi men, and sometimes also Hutus who were visible members of UPRONA, were taken hostage, often held in halls or sheds. In some collines, Tutsis were hidden by their neighbors, or simply not sought after at all. In some places, Hutus killed their Tutsi neighbors after sundown the day of the coup. In other places, they were killed the following day. In still other places, the Tutsi hostages were rescued by the army. Generally, when the Tutsi-dominated army arrived, they killed Hutus indiscriminately. Sometimes the local Tutsis helped the army or cheered them on. While widespread, violence was by no means universal. In many of the places that were not accessible by road, no military personnel arrived at all in days following the coup (United Nations Security Council 1995, 1996). In the places where the military did not reach, many areas remained completely peaceful.

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3. In Burundi, the country is divided into provinces, the provinces are divided into communes, and the communes are divided into collines (which references a hill). The collines are fairly densely populated, but they are rural, mostly composed of family plots of land to be farmed, with market and congregating space along a road.

Patterns of violence and out migration can generally be divided geographically: the North and Central part of the country and the South and East part of the country (see map in Figure 1).[4]

In the North violence was most patterned. It began with groups of Hutus taking Tutsi men hostage, then escalated to include some of these groups killing the Tutsi men. Following that, generally on the Friday after the coup, the groups rounded up and killed Tutsi women and children. Then, the Hutu groups moved on to neighboring collines in search of more Tutsis. Meanwhile, the Tutsi army made headway clearing roads, and interrupted the Hutu group violence at various stages, generally, killing Hutu men, women, and children as they made their way from main roads to secondary roads. Thus, violence moved out from various epicenters across the North and Central province of Burundi (United Nations Security Council 1996, pars. 464-69). When violence did not occur, it was the result of civilian government officials (largely Hutu) coordinating with outposts of the military and police (largely Tutsi) (United Nations Security Council 1995, par. 133). By and large, though, even the coordination forestalled violence for days rather than stopping it altogether. Particularly in the provinces that border Rwanda, volumes of Hutus simply just fled for Rwanda. In places where many fled, there was notably less violence (United Nations Security Council 1996, par. 310), reinforcing the notion that these people fled because they *anticipated* violence, rather than because they were directly responding to the violence.

In the South and East of Burundi, reports of violence are less consistent. There is ample evidence that throughout the South trees blocked roads and bridges were destroyed (Hartley 1993b). In the days following the coup, there was some activity akin to what happened in the North, in the South as well. There are some reports that the day of the coup and the day following the coup, peasants were in the fields working their plots (Hartley 1993b).

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4. I rely primarily on two UN reports that were prepared as a result of the fact finding mission, as well as international news wires and publications to paint a picture of context for mass migration of Burundians in the fall of 1993.
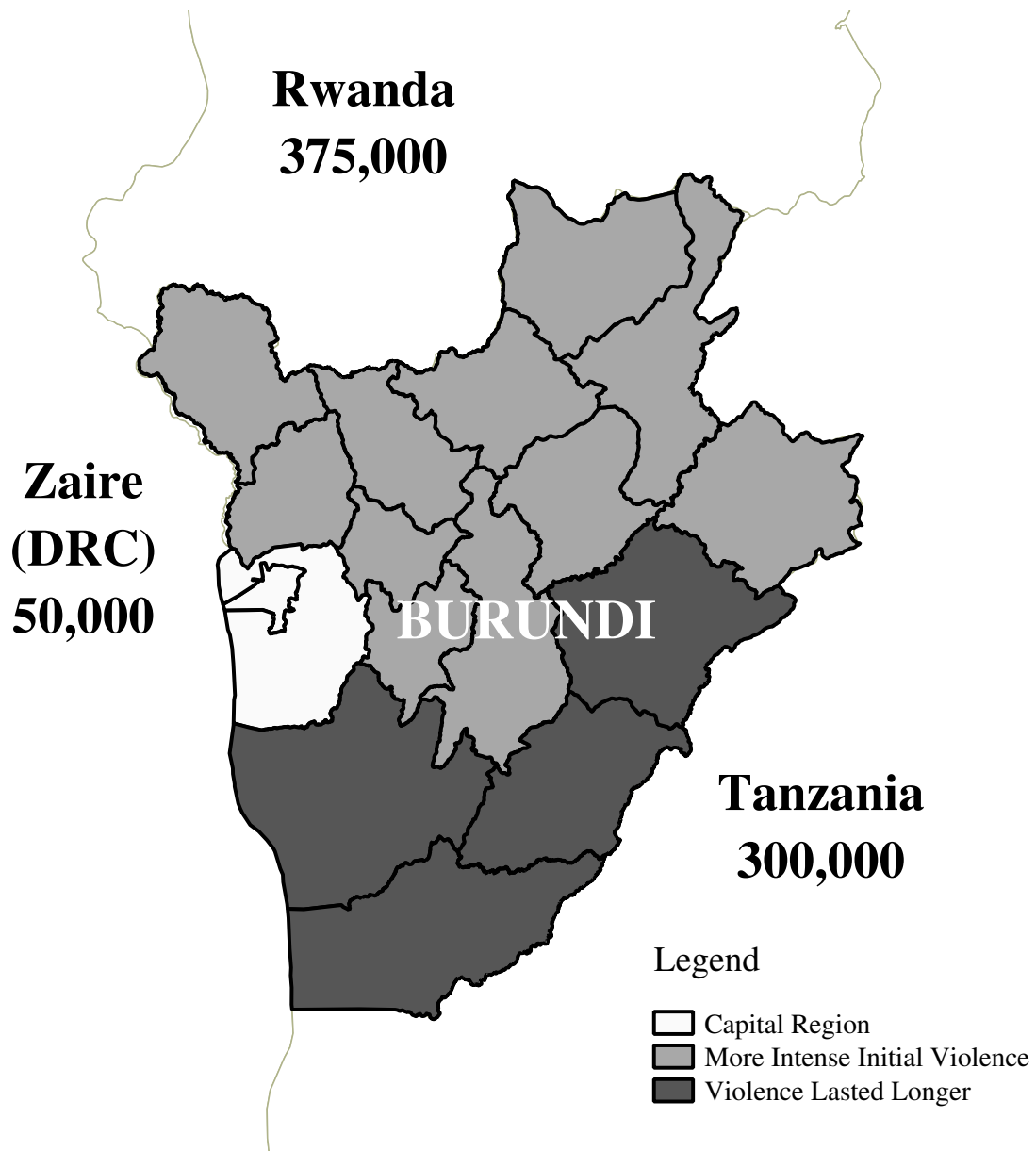
Figure 1: Provinces of Burundi, Violence and Number of Refugees

In Bujumbura, the capital, many people stayed inside. But even by Sunday, Day 4, some reported people out at shops in the capital (Press 1993; BBC 1993). At this juncture, there are reports that the army was making its way through the South and East, killing Hutus indiscriminately (AFP 1993). By Monday, Day 5, the elected government began to reclaim their position, and the coup organizers sought amnesty. By Day 9, after the coup, there are concrete reports of massacres of Hutus in the South (Huband 1993a). Generally, these reports suggest that the army knew that the coup had failed and was exacting reprisals before they were reigned back in.

Refugee Flight

Most of the reports of refugee outflows are announced by international aid organizations and then reported by the international news agencies. It is difficult to synchronize the timing of refugees fleeing with the timing of violence because they are reported not when they leave, but when they arrive and, to a large extent, after they have been processed by national authorities or the United Nations High Commission for Refugees (UNHCR). However, the reports of refugee outflows are consistent with people fleeing *before violence occurred* as well as *at the same time as violence occurred* in their area. Violence reports continue well into November (Peterson 1993; Lorch 1993), but more than 75% of the refugees who fled, fled in the first ten days following the coup.

Refugees, those who crossed borders because of the violence, were mostly Hutu. Most of the Tutsi who the fled violence, took shelter in army-protected displacement camps within Burundi. Refugees fled predominantly across two of the three borders, to Rwanda (to the North) and to Tanzania (to the East). In the first few days, most refugees fled to Rwanda, which has a similar cultural history to Burundi. A large number of refugees fled to Tanzania, in the week following the coup, which shares the longest border with Burundi. Finally, relatively few refugees fled to the DRC, which has the shortest of the borders. In the south of Burundi, the DRC is often closer, but Lake Tanganika makes it more difficult to travel to

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the DRC than to Tanzania.

The reports of refugees fleeing began with those who fled from the northern most provinces across the border into Rwanda. The UN Commission reports and subsequent news reports suggest that many of these refugees fled on Day 1, the day of the coup. At least some of them fled before any violence began, anticipating that the Tutsi-dominated army would arrive. The first counts of refugees are on Friday, Day 2 of the crisis and suggest that as many as 70,000 had fled across the border into Rwanda (Reuters 1993a). By Saturday, Day 3, the number of refugees in Rwanda was estimated to be over 100,000 (Hartley 1993a). Over the next week, people largely from the North of Burundi continued to flee to Rwanda. The UN reports suggest that this was when the Tutsi army was moving through primary and secondary roads across the north of Burundi (United Nations Security Council 1996, par. 468). The number of refugees on Monday, Day 5, was estimated to be 250,000 (Reuters 1993b). By Day 9 that number was up to 324,000 (Huband 1993b). By the end of the year, another 51,000 refugee crossed into Rwanda(BBC 1994); 86% of the refugees who came to Rwanda migrated in the first ten days.

Far fewer refugees arrived in Tanzania initially. By Day 4, 12,000 refugees had arrived at the border, with more of them arriving from the south than from the eastern. Like the initial arrivals in Rwanda on Thursday, these refugees claimed to have fled when they heard that the Tutsi army was approaching (AFP 1993). Retrospectively, reports suggest the first refugees who fled to Tanzania had recently been repatriated (International Crisis Group 1999). On Days 5 and 6, some violence was occurring in the South, but it was not as significant or as widespread as in the North. By Day 5, the number of refugees in Tanzania had risen to 40,000 (Reuters 1993b). The earliest concrete reports of Hutu massacres in the South occur on Days 9 and 10. By then, the number of refugees in Tanzania totaled 214,000 (Huband 1993b). At the end of the year approximately 85,000 more Burundians had sought refuge in Tanzania (BBC 1994); more than 70% of the refugees who migrated to Tanzania did so

in the first ten days and most of the violence in the South and East started in the latter 5 days.

While not all Burundians who fled went to the closest border, some evidence suggests this was generally true of refugees fleeing to Rwanda. News agencies reported that refugees arriving in Rwanda had come from nearby Burundian provinces. Refugees arriving in Rwanda therefore had relatively short distances to travel, distances that can be walked in as few as a couple of hours to under ten hours. Meanwhile those who fled in the south, had greater distance to travel and generally chose to travel to Tanzania rather than Zaire (present day DRC). The first violence that occurred in the South occurred east of Bujumbura, where walks to the border with Tanzania could be as long as 30 hours.[5] The longer distances to Tanzania can account for why refugees who fled in the first days following the coup arrived in Tanzania arrived later than those who fled to Rwanda.

The details of the Burundian crisis concretize what surge-like refugee flows mean. In particular, three stylized facts from the crisis shape what is meant in this article by surge-like refugee flows. First, flows are somewhat disconnected from the pattern of violence. In Burundi, refugee flows are initially a larger volume than the amount of violence might suggest and flows slow considerably. Second, much of the country did not flee. Third, the early bulge in refugee flight is in anticipation of violence rather than in reaction to violence.

In 1993, most Burundians did not flee, were not killed, and were not part of organized fighting. At the end of 1993, there were approximately 725,000 Burundian refugees from the 1993 violence (BBC 1993). In 1993, Burundi had a population of between 5 and 6 million; most people did not flee. It is estimated that 150,000 individuals were killed in the 1993 fighting (New York Times 1995). Estimates suggest that the predominately Tutsi army and the organized Hutu resistance number 80,000 in total (World Bank 2004). Even using the

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5. Distances and times are based on GPS overland routes from Google Maps (maps.google.com) and do not include time needed to eat or rest.

largest estimates, this leaves more than 4 million people who remained in Burundi and were neither killed nor part of organized fighting.

Second, the violence continued in the country for some time, at least several weeks. The out migration did not. About 80% of all those who fled across an international border did so within 10 days of the coup. In other words, for a little over a week, tens of thousands of people poured across one of three international borders, and a few days later, the flows were reduced to mere hundreds.

Last, some of the Burundians, perhaps more than 100,000, fled because they *believed* that violence was approaching. The UN Mission reports this about the North, and the international media confirms this with reports from initial refugee arrivals. The distances that some refugees had to travel to get to the Northern border at Rwanda suggest that many more may have left before they witnessed violence. Similarly, the cut-down trees, the broken bridges, and the recommendation of the government in hiding to prevent vehicle passage not only stalled the Tutsi-dominated army from penetrating the South of the country, but also made travel to the Tanzanian border a long, difficult undertaking. To make it in a few days, many had to have left before violence began.

The Model

Given these empirical features, I aim to model a refugee flow with a few results. First, not all of those who have the option to flee do so. Second, that people flee in larger numbers in a pattern that does not merely follow violence, but is initially larger than violence would suggest and then much smaller than violence suggests. Realizing that people are fleeing in a community and responding to beliefs about future violence provide me with two formal tools: (1) a coordination game where there are gains to leaving together and (2) uncertainty about future violence. Models with uncertainty about future violence and gains to coordination both generate results that can be interpreted like a surge refugee flow. Adding uncertainty

to the model suggests that those who flee do so because they believe violence will be bad. Further they flee but before the violence actually occurs. Adding gains to coordination to the model suggests that some people flee because there is a group with which to flee.

I begin with a canonical individual decision making model of the choice to flee violence. To the baseline model, I formalize the notion that it is easier to flee in a community than alone by examining the choice to flee in the context of a coordination game. The coordination game suggests that surge-like refugee flows may be driven partially members of a community fleeing because others are fleeing, even when their individual calculus would have them stay. Thus, patterns of refugee flows begin to diverge from patterns of violence.

Next, I model uncertainty about future violence in the decision to flee. Uncertainty about violence creates anticipatory migration and has two useful results. First, people may not coordinate always. Unlike the baseline model, not everyone always behaves the same way. Second, among those who are most reactive to the threat of future violence, communal certainty about violence makes people more willing to flee. With uncertainty, people may flee before violence and at rates that have more to do with noisy beliefs about violence than actual violence. Thus, the uncertainty in future violence suggests dynamics that are consistent with surge-like refugee flows. I conclude this section with a brief discussion of the intuition for how coordination and uncertainty interact in a model with both.

Baseline Decision Making Model

Each individual in the population must choose to Stay or Flee. There is complete information, and individuals share a common valuation of benefits and costs. When individuals choose to Stay, they incur a cost for living in the midst of violence. When individuals choose to Flee, they incur a cost for moving. Choosing to flee is risky, in that persons who choose to flee might not make it across a border. Thus, fleeing has a probability of success, and each individual evaluates his options in expectation.

The individual incurs the cost of violence, v if he does not leave the country — he chooses

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to stay or fails in seeking protection. If he chooses to flee, there is a cost to moving, c. If he is successful in getting protection, then he also gets an additional benefit, β. I assume each of these, v, c, and β are positive. Thus, the utility of the individual can be summarized:

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\begin{array}{ccc}
 & Success\ (p) & Failure(1-p) \\
Flee & \beta - c & -(v+c) \\
Stay & -v & -v
\end{array}
$$

The individual optimizes by comparing the expected utility of Fleeing and Staying.

$$EU(Flee) = p(\beta - c) - (1-p)(v+c) = p(\beta + v) - v - c \tag{1}$$

$$EU(Stay) = -v \tag{2}$$

The comparison yields a single threshold, p_f.

$$p_f = \frac{c}{\beta + v} \tag{3}$$

When the probability of successfully gaining protection is sufficiently large, $p > p_f$, the individual will flee. Substantively, this threshold captures a person's willingness to flee. When the threshold is low, there is a larger range of probabilities of success (p) for which the individual will choose to flee. A low threshold means greater willingness to flee. Conversely, when the threshold is high, there is a smaller range of probabilities of success for which the individual will flee. A high threshold means less willingness to flee.

The willingness to flee threshold, p_f, is fairly intuitive. The threshold goes up as the cost of fleeing, c, goes up and the threshold goes down as the benefits of protection, β, go up. Thus, the probability of success for getting protection must be higher when the cost of

fleeing is higher, for the individual to still flee. Also, the probability of success in gaining protection can be lower and individuals will still flee as the benefits of protection increase.

Violence figures into the calculus similarly to benefits because these are both reasons to flee. When violence increases, the threshold decreases and individuals are more willing to flee. In other words as violence increases or incidents accumulate, the likelihood of success in fleeing across the border can decrease, and people will still flee. This translate into a macro trend in which the pattern of refugee flight follows the pattern of violence, all else equal. While intuitive, this is precisely what is empirically false in the Burundian case, and more generally in surge-like refugee flight. Most of the people who ultimately flee, flee at the very beginning. After the "surge" of refugees violence continues, but refugee flows slow considerably.

Gains to Coordination

Fundamental to the notion that refugees flee as a community is that there are gains to coordination among those that flee. Like a protest or other collective action, when people flee with others, it improves the probability that they will be successful and get protection across the border. To formalize this, I examine the choice to flee in the context of a two-player coordination game:

<div align="center">

Player 2

		Flee	*Stay*
Player 1	*Flee*	$p_2(\beta + v) - v - c, p_2(\beta + v) - v - c$	$p_1(\beta + v) - v - c, -v$
	Stay	$-v, p_1(\beta + v) - v - c$	$-v, -v$

</div>

The game is built directly on the baseline decision-making model. Gains to coordination are incorporated into the the probability of successful protection. When both players flee the probability is higher than when one player flees. Thus, I assume $p_1 < p_2$. The game

is symmetric. Each of the players perform the same decision making calculus, taking into account the behavior of the other player in the game.

Depending on the probability of success, both players will Stay, both players will Flee, or both players will want to coordinate, Staying if the other Stays and Fleeing if the other Flees.What determines whether the probability of success is high enough is the willingness to flee threshold $p_f = \frac{c}{\beta+v}$ from Equation 3 in the decision-making model. The equilibria of the game can be defined in a series of propositions using the willingness to flee threshold, p_f.

Proposition 1. *When* $p_2 < p_f = \dfrac{c}{\beta + v}$, *Player 1 and Player 2's best response is to Stay and (Stay, Stay) is the equilibrium.*

Proposition 2. *When* $p_1 > p_f = \dfrac{c}{\beta + v}$, *Player 1 and Player 2's best response is Flee and (Flee, Flee) is the equilibrium.*

Proposition 3. *When* $p_1 < p_f = \dfrac{c}{\beta + v} < p_2$, *Player 1 and 2's best response is to coordinate. Thus, there are two equilibria (Stay, Stay) and (Flee, Flee).*

In the case when $p_1 < p_f < p_2$, there are multiple equilibria. Following the global games literature, I use risk dominance as the equilibrium selection criterion. In the case of a two player game, risk dominance can be evaluated with a equal-chance lottery over the payoffs of the individual strategies.

Thus, (Flee, Flee) is risk dominant when

$$\frac{1}{2} \left[p_2(\beta + v) - v - c \right] + \frac{1}{2} \left[p_1(\beta + v) - v - c \right] \geq -v \tag{4}$$

This can be written in terms of the threshold p_f,

$$p_2 - p_f \geq p_f - p_1 \tag{5}$$

Conversely, (Stay, Stay) is risk dominant when

$$p_2 - p_f < p_f - p_1 \tag{6}$$

In the game, selecting the equilibrium by risk dominance has an intuitive result. The players will choose to both flee when the deviation from their willingness to flee threshold and the gains to coordination, $p_2 - p_f$, is greater than the deviation from the threshold and the risk of going at it alone, $p_f - p_1$.

Figure 2 displays how the equilibria of the coordination game works. In each of the plots, the probability of success if a player flees alone increases along the horizontal axis. The probability of success if both players flee increases along the vertical axis. The gray lines bound where the players coordinate and the risk dominant equilibrium is labeled.

Across the three plots, the critical willingness to flee threshold, p_f decreases. Holding the cost of fleeing and benefits of protection constant, this change can be interpreted as an increase in violence. Notably, as violence increases the set of probabilities (p_1, p_2) for which (Flee, Flee) is the equilibrium expands. As violence increases, the proportion of the set of probability for which (Flee, Flee) is risk dominant also expands as violence increase, but at a lower rate.

The plots also depict the difference between the individual decision making model and the two-player game in predicting who flees. The vertical gray line in each plot marks the lowest individual probability, p_1, for which an individual is willing to flee. To the right, the region marked (Flee, Flee) are probabilities of success for which individuals will choose to flee as individuals. To the left, the region marked Coordinate (Flee, Flee), is the space for which (Flee, Flee) is risk dominant coordinating equilibrium. Depending on the gains to coordination (the value of p_2), there is a range of values of the individual probability of success in fleeing, p_1, where fleeing would not occur in the decision making model, but does

Plot 1: Least Violence ($p_f = 2/3$)

p_2

$p_2 = 2p_f - p_1$ $p_1 = p_f$ $p_1 = p_2$

COORDINATE
(FLEE, FLEE)   (FLEE, FLEE)

COORDINATE
(STAY, STAY)

$p_2 = p_f$

(STAY, STAY)

EXLUDED BY ASSUMPTION
$(p_2 > p_1)$

p_1

Plot 2: Moderate Violence ($p_f = 1/2$)

p_2

$p_2 = 2p_f - p_1$ $p_1 = p_f$ $p_1 = p_2$

COORDINATE
(FLEE, FLEE)

(FLEE, FLEE)

COORDINATE
(STAY, STAY)

$p_2 = p_f$

(STAY, STAY)

EXLUDED BY ASSUMPTION
$(p_2 > p_1)$

p_1

Plot 3: Greatest Violence ($p_f = 1/3$)

p_2

$p_1 = p_f$ $p_1 = p_2$

COORDINATE
(FLEE, FLEE)

(FLEE, FLEE)

$p_2 = 2p_f - p_1$

COORDINATE
(STAY, STAY)

$p_2 = p_f$

(STAY, STAY)

EXLUDED BY ASSUMPTION
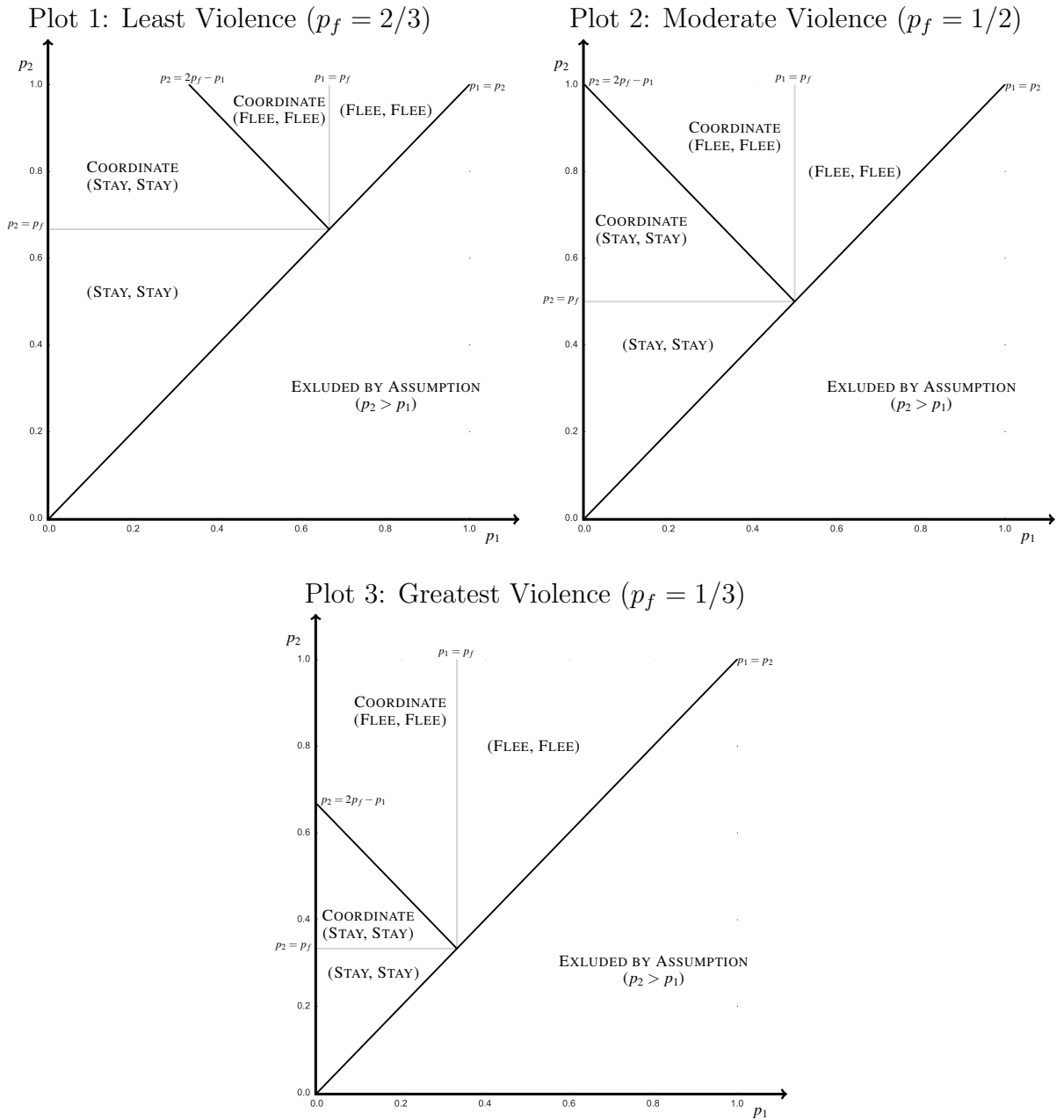$(p_2 > p_1)$

p_1

Figure 2: Equilibrium Selection as the Gains to Coordination Change and Violence Increases

because of the possibility of fleeing with the other player. Later in the discussion of the model, I extrapolate implications from this two-player model to the context of community flight.

Uncertainty regarding Future Violence

In this final part I outline a decision making model that incorporates the possibility of anticipatory migration in a Bayesian framework.[6] Individuals must choose to Stay or Flee. The individual is uncertain about future violence. He receives a signal about violence, $v_i = \eta + \varepsilon_i$. There are two parts to the signal: a common component, η, which is distributed normally with mean, $\bar{\eta}$ and variance σ_η^2 and an individual component, ε_i, which distributed normally with mean, 0 and variance σ_ε^2.[7] The common component can be thought of as about the quality of communal information. The individual component can be thought of as a distribution of types. When $v_i > \bar{\eta}$, individual i is a reactive type. The reactive type's expectation about violence is greater than that of the community on average. When $v_i < \bar{\eta}$, individual i is the under-reactive type. The under-reactive type's expectation about violence is less than the community on average.

Individual updates as a Bayesian through Normal Learning. After receiving his signal, individual i has a posterior that is normally distributed with mean $\bar{v}_i$ and variance σ_v^2. These parameters are defined as follows:

$$\bar{v}_i = \lambda v_i + (1 - \lambda)\bar{\eta} \tag{7}$$

$$\sigma_v^2 = \lambda \sigma_\varepsilon^2 \tag{8}$$

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6. In this exposition, I set aside the interaction between coordination and private information to more clearly focus on what each of these developments contribute to understanding surge-like refugee flows.

7. In the coordination game, in the coordination game the individual component is private information.

$$\lambda = \frac{\sigma_\eta^2}{\sigma_\eta^2 + \sigma_\varepsilon^2}. \tag{9}$$

The individual uses his updated beliefs about future violence to determine his willingness to flee, $p_{fi} = \frac{c}{\beta + \bar{v}_i}$ when the probability of success in making it to the border and getting protection, is sufficiently sufficiently small ($p < p_{fi}$), the individual chooses to Stay. When the probability of success is large enough ($p < p_{fi}$), the individual chooses to Flee.

The critical threshold, p_{fi} can be defined explicitly in terms of updated beliefs about future violence, $\bar{v}_i$, and the posterior distribution. Specifically,

$$p_{fi} = \frac{c(\sigma_\eta^2 + \sigma_\varepsilon^2)}{\sigma_\eta^2(\beta + v_i) + \sigma_\varepsilon^2(\beta + \bar{\eta})} \tag{10}$$

Written explicitly like in Equation 10, the Bayesian willingness to flee threshold p_{fi}, can be analyzed much like the threshold, p_f, in the complete information framework. Like the comparative statics on the threshold in the complete information model, p_{fi} has some intuitive features. The threshold is increasing in the cost of flight, c and decreasing in the benefits of protection, β. The threshold is also decreasing in the individual signal about future violence and the common belief about future violence, v_i and $\bar{\eta}$, respectively.

Comparative statics on the components of uncertainty are non-monotonic in the threshold, but suggest conditions under which refugee flows will be larger. When $v_i > \bar{\eta}$, the individual probability of success threshold for fleeing, p_{fi} is increasing in communal uncertainty, σ_η^2, and decreasing in individual uncertainty, σ_ε^2. Conversely, when $v_i < \bar{\eta}$, p_{fi} is decreasing in communal uncertainty and increasing in individual.

When $v_i > \bar{\eta}$, the individual has a heightened belief about future violence, or the individual is a reactive type. Similarly, when $v_i < \bar{\eta}$. the individual has a diminished belief about future violence, or the individual is a under-reactive type.

Thus, there is a clear set of predictions for Reactive and Under-reactive types.

	Reactive Type $(v_i > \bar{\eta})$	Under-Reactive Type $(v_i > \bar{\eta})$
Communal Uncertainty (σ_η^2)	Increasing	Decreasing
Type Uncertainty (σ_ε^2)	Decreasing	Increasing

For example, as communal certainty about violence gets more precise (uncertainty decreases), the threshold for fleeing among those who have a heightened response to future violence (Reactive Types) decreases. This maps onto more willingness to flee. However, for the same group of people, Reactive Types, greater individual uncertainty will lower the threshold, making the individual more willing to flee. This means that when communal beliefs about violence are relatively certain and individual signals are very noisy, anticipatory refugee flight is largest. This insight may help explain why those in the north and center of Burundi fled earlier and in greater numbers. I turn to this and other substantive implications, later in the discussion.

Rather than formally developing the game that includes both gains to coordination and uncertainty about future violence, I provide some intuition for how these interact. Because type is private information, each player in the coordination game use the common information in the signal to posit a distribution over what the other player's type is, and then choose how to optimally coordinate.

The uncertainty generates substantially more heterogeneity in possible equilibria. It is possible now for one player's willingness to flee threshold to be sufficiently low that they always flee while the other player's willingness to flee threshold is sufficiently high that they always stay. This suggests a possibility about surge-like refugee flows: Absolute numbers of refugees are quite large while at the same time a relatively small proportion of the total population flees. At the same time, when individuals best response is to coordinate, information about their signal and the structure of common information allows them to both flee or both

stay, much like the risk dominance criteria applied in the complete information game.

Discussion

Throughout the development of the model, I analyze a threshold at which an individual is willing to flee. The model itself says little about what a population does, but thinking of the cost and benefits of fleeing in the threshold as distributed over a population helps extrapolate to some broader implications.

The coordination game can be compared to the decision making model in this context. In the decision making model, for a given level of violence, some proportion of the population flees, everyone whose willingness to flee threshold is lower than the probability of success if fleeing alone. For the same distribution of cost and benefits and level of violence, a greater proportion of the population will flee when there is a higher probability of success when fleeing as a group. When there are gains to coordination, everyone who flees in the decision making model will flee as will people for whom choosing to flee is the risk dominant equilibrium.

One macro implication of this extrapolation is that countries in which people flee as groups will have larger refugee flows than countries in which people flee as individuals. There are two reasons for this: one is that groups have higher success rates by assumption. The second is because the group's improved success, makes more people willing to flee in the first place. Thus, a second empirical implication is that a greater proportion of a community will flees when the members flee as a group than when the members flee as individuals.

Introducing uncertainty about future violence into the decision-making problem of potential refugees structures a theory more consistent with the early arrivals in a surge-like refugee crisis, like the 1993 Burundian crisis. The analysis of the impact of uncertainty generates a typology of potential refugees: those who react to communal information about future violence with heightened beliefs about violence and those who under-react and expect

lower violence.

The distribution of types may capture a distribution of vulnerability toward violence. In this case, the reactive type are those who are more vulnerable like women and the elderly. The model suggests that more precise communal information will drive the reactive type's (or the most vulnerable's) willingness to flee down, and thus greater numbers will flee. Meanwhile, the model suggest that those who are under-reactive, or the least vulnerable, will respond to greater communal certainty with a higher willingness to flee threshold. Fewer of the least vulnerable will flee. These comparative statics relationships have a macro implication too. In situations in which there is more precise information about violence, the refugee population should have more vulnerable groups.

Finally, modeling uncertain beliefs about violence yields predictions that help explain some of the variation in refugee flight from the North and Center to Rwanda versus flight from the South and East to Tanzania. In the model with uncertainty, more certain communal information drives Reactive Types, those who believe violence will be worse because of their individual signals, to accept lower threshold of success. News of the coup and problems in the capital were broadcast by Radio Rwanda. Those who were closer to Rwanda thus had a shared, more precise, signal about future violence than those in the South and East who received no radio broadcast at all. A more precise communal signal is consistent with a greater volume of anticipatory migration from the North and Center to Rwanda.

Conclusion

In this paper I explain surge-like refugee flight, identifying why refugee arrivals drastically fall off. I incorporate community dynamics and uncertainty about future violence into a theory of the potential refugee's choice to flee. The result of the model is that choosing to flee is driven by violence, but also by the usefulness of fleeing in a group and uncertainty about future violence. Thus, the model allows for large initial flows rather than flows that

generally track the violence that occurs.

I use the 1993 Burundian case to concertize some of the features of surge-like refugee flows and identify the salient dynamics to model. Importantly, despite widespread violence, a minority of the Burundians actually become refugees. Despite continuing violence, after about ten days, most of the refugees who will migrate, already have. Initial Burundian refugees seem to have fled in anticipation of violence, not in direct response to violence. Ultimately the model helps explain a fourth feature of the 1993 Burundian refugee flows: in the first 5 days following the coup, refugees from the North migrate in much larger volume than refugees from the South and East.

A formal theory in which there are gains to coordinate on refugee flight and uncertainty about future violence, yields results that mirror surge of refugees in Burundi in 1993. Gains to coordination in fleeing increase the set of scenarios in which people will choose to flee. When fleeing with another improves the probability of getting to safety, people will flee because others are fleeing and not because it would be optimal to flee alone. Thus gains to coordination begin to setup a pattern of refugee flight that differs from a model in which refugee flows merely track violent events.

Surge flows of refugees present remarkable logistical problems for receiving countries and for international and humanitarian aid organizations. Understanding dynamics apart from violence that underly the size and scope of refugee flows may help countries and aid groups to better anticipate surge-like flows. The theory itself, is applicable to situations in which there is migration in groups in the midst of uncertain future.

Of growing importance is what people do in the wake of natural disasters. This model is best applied not to the uncertainty of whether a natural disaster will occur, but to the uncertainty of the status of a country or region in the aftermath. Similar to the case of a refugee's decision, uncertainty about how widespread damage is or how slow recovery will be can generate greater outflows of "climate refugees," but these numbers will precipitously

drop off when individuals have generally overestimated the extent of the damage.

The humanitarian community has adjusted to respond to surges in refugee outflows. Knowing when these outflows will dwindle will allow aid to be used more effectively and help aid agencies respond more nimbly. Realizing that mass migration because of natural disasters may operate similarly to surge refugee crises, the international aid community can similarly anticipate patterns in climate refugees. This article provides a foundational first step at understanding how and why migrant flows may appear to surge.

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