Networks of Violence and Civilian Targeting During Civil Conflict

Abstract

Increasingly, empirical and theoretical evidence reveals that armed groups' decision to kill civilians is a politically strategic choice. Most examinations of this choice assume a simple environment where the main conflict is between a government and a unified opposition. Yet, we know that civil conflicts are more complicated than this and often involve three or more actors. We investigate the strategic incentives for victimization in a complex multi-actor conflict environment using an innovative agent based model. We find that, irrespective of the overall intensity of conflict, more dense strategic environments – where conflict between any two actors is more likely – lead to higher rates of civilian victimization compared to environments with lower network density. We test this hypothesis in multi-actor civil conflicts using ACLED to generate measures of both intensity and network density. Empirical analysis is supportive of our findings, more dense strategic environments are associated with a higher level of violence against the civilian population.

Introduction

Why do armed groups victimize civilians during civil conflicts? For years, political scientists considered the violent targeting of unarmed civilians “irrational, random, or the result of hatreds between ethnic groups." (Valentino, 2014, see summary on p. 91). More recently, however, a consistent body of research shows that violence against civilians is in fact a highly rational and well-coordinated strategy used by armed groups to gain more resources, territory, or to achieve broad military and political goals (Condra and Shapiro, 2012; Berman and Matanock, 2015; Stanton, 2016). Under this framework, information plays a critical role in armed groups’ choice to victimize during civil wars. Groups who target civilians are immediately disadvantaged because civilian targeting produces an incentive for civilians to share information with a group’s rivals. Consequently, armed groups must weigh the potential costs of targeting civilians, such as losing supporters and control of information, against the so-called benefits, such as punishing rival constituencies [1].

Despite the meaningful implications of this theoretical framework for both policymakers and civilian populations, this approach rests on the assumption that civil wars and intrastate conflicts are driven by a conflict between governments and a unified opposition. Yet, due an increase in empirical data on intrastate conflicts over time, we now know that conflicts are more complicated than this and are not in fact dyadic in nature. Instead, conflicts often involve at least three or more warring parties driving the dynamics of war. In Nigeria, multiple armed groups proliferate in the southern Niger Delta region alone, competing over oil resources and interethnic rivalries (Obi, 2009). In the Democratic Republic of Congo, event data reports around at least 20 armed ac-

[1] Add citation here

tors in 2001 and upwards of over 50 ten years later, by 2011.[2] To further illustrate this point, we show the number of active armed groups per country case for each year of the ACLED data in Figure 1. The data clearly show that the majority of intrastate conflicts are much more complex than a war between the government and one mobilized armed challenger. The data also reveal that highly complex conflicts where a country has 10 or more active armed groups in a given year are on the rise. [3]

To understand the risk to civilian life during the course of war, we need to better understand the logic of victimization in multi-actor settings. A natural starting point is to apply strategic theories to multi-actor conflicts. Doing so results in two plausible conclusions. First, in a traditional dyadic conflict, civilians might have to face tradeoffs between groups that treat civilians well and those whose political aims civilians support (see Lyall, Blair and Imai 2013). In a multi-actor environment, however, we can expect to observe more competition for civilian support between an array of ideologically motivated armed groups. Civilians, in these settings, are more likely to identify, and consequently support, groups that both treat civilians well and are ideologically attractive. If this relationship holds, we would then expect to observe armed groups refrain from victimization in contexts where they fight against many ideologically similar armed groups in order to win civilian support.

Alternatively, one could also argue that in a traditional dyadic civil war the sides are clear, and civilians can always seek redress from the opposition [government] following

[2] According to ACLED. For a deeper understanding of dominant conflict narratives and summaries of this case see (Autesserre, 2012).

[3] In this graph, we make a few important decisions that necessarily decrease the number of total actors over time. First, we consolidate government actors into one group, such as different branches of the military, second we clean and remove vague labels for group names such as 'unidentified' or 'opposition' group labels; third we only include actors who were involved an event with at least 10 fatalities.

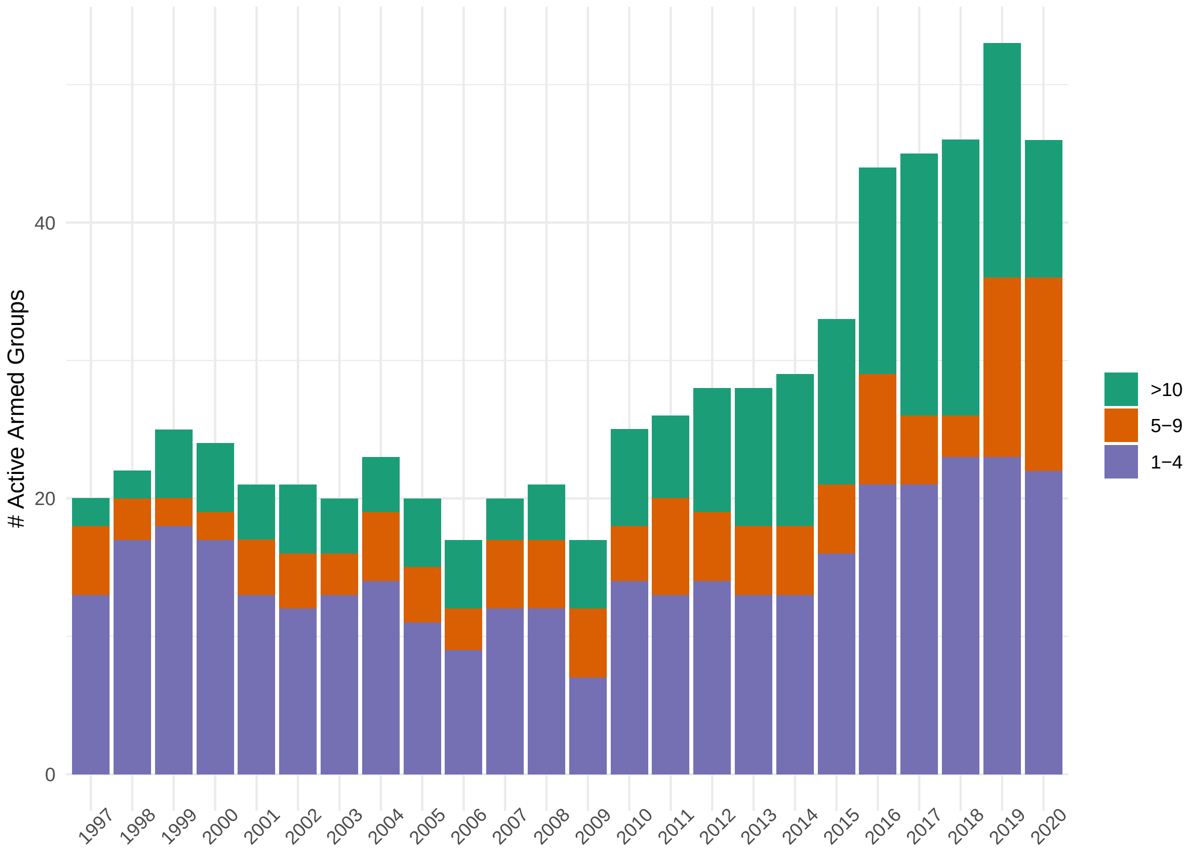

Figure 1: Number of total active armed groups in each country case across conflicts in ACLED from 1997 to 2020. Purple represents armed conflicts with 1-4 active armed groups, orange represents armed conflicts with 5-9 active armed groups, and green represents armed conflicts with 10 or more armed groups.

victimization by the government [opposition]. In a more dense strategic environment, we would then observe shifting alliances and multilateral conflicts. In this context, civilians will have no guarantee that the group they support will target rival groups who committed violence against civilians, instead of an unrelated third party. Hence, we would expect that civilians are less likely to punish perpetrators of victimization and thus suffer higher levels of victimization in these contexts.[4]

[4] cite someone here, Fotini? Does her alliance stuff say something about vic?

Both of these stories are drawn from the literature on civilian victimization and plausibly follow what we know about network structure in civil conflict. Given the complexity of networks of civil conflict, and the ability to tell contradictory “just-so" stories about how these networks influence civilian victimization, we require a principled way of generating network hypotheses, rather than simply choosing a story that fits our empirical results. To do so, we turn to an agent based model to better investigate the link between network structure and victimization. This allows us to posit a set of assumptions about actors’ incentives and possible actions, and discern how these assumptions affect our outcome of interest.

In addition to network complexity, preexisting work tends to overlook the role that civilians’ own choices might play in affecting the strategic logic of armed groups (Dorff, 2019). Modern day warfare is fought on battlegrounds shaped by civilian behavior and their willingness to support armed actors. The interactive nature of conflict, wherein civilians assess their likelihood of survival by balancing the risks and benefits of supporting armed groups, is a dominant feature of conflict. Unpacking the intricate relationship between civilians, their experience with violence, and armed actors has been a growing trend in conflict and peace studies with an emphasis on rebel governance (Mampilly, 2012; Arjona, 2016), civilian victimization (Eck and Hultman, 2007; Wood, 2014), civilian displacement (Steele, 2011), and civilian organization and resistance (Kaplan, 2013; Arjona, 2017; Dorff and Braithwaite, 2018). Our study contributes to recent scholarship on both sides of the civilian victimization puzzle by directly addressing the strategic implications of multi-actor armed conflicts and their relationship to civilian behavior during war.

We investigate the strategic incentives for civilian victimization in a complex multi-actor conflict environment using an innovative agent based model. Our model’s key finding is that a more dense conflict network–one in which any two actors are more likely to fight–leads to more civilian victimization *irrespective* of the overall level of violence or the number of armed groups. We investigate the relationship between network density and civilian victimization empirically and find support for our computational models' predictions.

Civilian Victimization During War

Extant research into the underlying logic of civilian victimization has focused on key characteristics of armed groups, such as a group's fighting capability (Wood, 2010), resource base (Azam and Hoeffler, 2002*a*) and external support (Salehyan, Siroky and Wood, 2015). Yet, these studies also acknowledge that an armed actor's decision to victimize civilians is conditional on the conflict landscape at large, wherein the decisions of armed groups are informed by the actions of both rival armed challengers and the civilian population. As (Wood, 2010, p. 612) explains, "Unraveling these dynamics is particularly important if scholars wish to fully understand the dense web of interactions that guide insurgent's decisions to use violence." We draw on the intuition that the networked dynamics of armed groups influence violence against civilians to support each turn of our modeling decisions described below.

Model Environment

In this model, a country is composed of territories, filled with two types of actors: civilians and armed groups. Armed groups represent both rebel groups and governments. The main difference between the government and non-state actors is that at the start of the game the government controls more territory than non-state actors. In general, armed groups' primary motivation is to gain territory containing resources that can be mobilized (Kalyvas, 2006), where resources in our game are represented by civilians. Failing this, actors prefer that territory is held by groups with similar preferences.

The other main actors in this model are civilians. Civilians are primarily motivated by their personal safety; their secondary motivation is ideological. The inclusion of civilian preferences follows research on rebel-civilian relationships that underscores civilian agency in conflict areas (Mampilly, 2012; Kasfir, 2015; Arjona, 2017). Holding all else constant, civilians would prefer that their territory is held by groups with similar political preferences. When political preferences align, even if weakly, all actors experience the benefits of political stability and resource sharing.

Actor Overview

In our model, we characterize armed groups using two variables, a measure of their ideal point (x_i) on a one-dimensional preference space (bounded between 0 and 1), and a measure of how ideological they are ($\phi_i \in [0, 1]$). Groups that are more ideological benefit (suffer) from having other groups with similar (dissimilar) preferences controlling territory, and thus have less (more) motivation to fight them.[5] Civilians are also characterized by their ideal point (η_i), but whereas the ideal points of armed groups are public, armed groups cannot directly observe the preferences of the civilian population. We define the distance between any two groups as:

$$D(a, b) = ||z_a - z_b|| \tag{1}$$

where $z_a = x_a$ if a is an armed group. If a is a civilian, $z_a = \eta_a$. In particular, we define the ideological benefit that armed group i gets from changes to group j's utility

[5]We treat the government actor as moderately ideological, because in most cases a government will not allow a strong challenger to hold territory simply because they have politically congenial views, but they will still prefer to attack more ideologically distant groups.

as:

$$\alpha_{i,j} = 2\phi_i * (.5 - D(i,j)) \tag{2}$$

We use $2\phi_i$ so that a group that is both maximally ideological ($\phi_i = 1$) and extreme ($x_i = 0$ or 1) will be indifferent between a gain for themselves, and a loss for a group at the other end of the spectrum.

In this game, armed groups draw resources from the civilian mobilization. This "instrumentalist" perspective follows from research conceptualizing victimization as a strategic choice shaped by the desire to control resources and territory while capturing civilian support and undermining support for opponent groups (Wood, 2014).[6] To extract resources, armed groups try to mobilize support from the civilian population and gain more resources as support increases. Furthermore, when the territory that civilians inhabit is under attack from another armed actor, civilians can choose to support the attacking group in order to increase the group's likelihood of victory.

Each actor makes two potential choices: (1) armed groups can choose to attack other armed groups in order to conquer additional territory, and gain more resources; and (2) armed groups can victimize civilians in territory they control. Civilians choose whether to support an armed group in their territory, and which group to support. In addition, civilians can choose to flee from one territory to another in search of a more congenial (or less indiscriminately violent) armed group.

When an armed actor attacks another territory, each group in the territory has a probability of winning based on their share of spatially weighted resources. To calcu-

[6] A modification of the game would be to allow for groups to have natural resources or foreign support which depends on territorial control but not civilian support (Ross, 2004; Salehyan, Gleditsch and Cunningham, 2011).

late resources, we need to understand the extent to which civilians support the armed groups. A supporter of the group gives the total possible resources (normalized to 1). Conversely, because a non-supporter of the group requires effort to coerce into yielding resources, the armed group only captures ψ resources (where $0 < \psi < 1$). Finally, if a civilian supporter is in one of the territories where the conflict is taking place, and they support one of the opposing armed groups, that civilian will actually reduce the resources available to the group that controls the territory by k (where $0 < k < 1$). This civilian-armed group nexus follows previous scholarship on the incentives for civilian abuse which argues that both governments and non-state actors target the population in order to gain support or shift support away from their opponent (Valentino, 2014; Azam and Hoeffler, 2002*b*; Kalyvas, 2006; Wood, 2010).

If the attacking group wins, they take control of the territory, and in any case, resources are lost and civilians causalities occur in all territories that are the source or target of an attack.[7] When a group decides a territory to attack, they compare all their neighboring territories, and choose to attack the one that gives the biggest difference in utility between fighting in a battle, and the status quo if they were to refrain from attacking.

Decision to Victimize

Armed groups can also choose to victimize civilians in territories they control. These groups' ability to be selective relies on their access to resources and trustworthy information, as in Kalyvas (2006). The probability of successful victimization (targeting a non-supporter) is a non-linear function of support in a territory. This probability is a

[7]Because armed groups must mobilize resources from one territory in order to attack another, civilians that are killed during an attack in one location are necessarily civilians that have been mobilized from another location.

combination of the probability of successful victimization given information, and with no information. On the one hand access to information increases as support increases (Lyall, Shiraito and Imai, 2015), on the other hand, in the absence of information, the armed groups will victimize at random, and the more supporters they have, the more likely they are target a supporter. We define the probability of successful victimization by group i in territory q (denoted ζ_{iq}) [8] as:

$$1 - \zeta_{iq} \equiv \epsilon(\frac{n_{\text{supp},i,q}}{n_{\text{civilians},i,q}}) + (\frac{n_{\text{civilians},i,q} - n_{\text{supp},i,q}}{n_{\text{civilians},i,q}}(\frac{n_{\text{supp},i,q}}{n_{\text{civilians},i,q}})) \tag{3}$$

Where $n_{\text{supp},i,q}$ is the number of supporters of group i in territory q, and $n_{\text{civilians},i,q}$ is the total number of civilians in territory q. The first term here is the probability (ϵ) of unsuccessful victimization given information times the probability of receiving information. The second term is the probability of unsuccessful victimization (the proportion of supporters in the territory) given no information times the probability of not receiving information. In this model selective violence is effective at coercing civilians into giving support, whereas indiscriminate violence (targeting ones' own supporters) is counterproductive. When an actor targets a supporter, the range of ideologies that will provide support to the actor shrinks (since the safety provided by supporting the actor is illusory) and when they target a non-supporter, the range of ideologies grow.[9]

[8] An exception here is when they have either universal support, or no support. In the first case, the decision rule prohibits them from victimizing. In the second case, there is no risk of unintentionally targeting a supporter since there are no supporters to target.

[9] Fjelde and Hultman (2014) show that that the number of civilians targeted by armed groups (government and non-state alike) is higher in areas populated by the enemy's ethnic constituency.

Civilian Preferences

When civilians choose whether or not to support an armed group, they do so with knowledge of the risk of violence. In particular, if the territory is not the site of a battle, civilian's decision for who to support is based on their expectation of who other civilians will support. This is because if they believe other civilians will support the incumbent power in a region, it becomes more effective to "go along" with it in order to avoid the risk of violence.

Civilians are assumed to support the incumbent with a probability that is based on their ideological proximity to the group. Civilians will then support the group if their ideological distance, modified by the effect of past victimizations, is less than half of the expected number of other supporters of the armed group.[10] If a territory is the site of a battle, the calculations for civilians change. Now civilians seek to trade off between ideological distance and the chance a group will triumph. In particular, civilians choose to support the group that has the greatest product of ideological proximity and expected probability of victory. When civilians decide whether to remain in a territory they are not simply looking for the best armed actor controlling a territory, they are also often paying serious material costs in order to relocate. Thus, the decision to flee begins with a high threshold in the model and becomes more plausible over the course of the conflict.

Sequential Order of Events

We depict the main stages of the game in Figure 2 and Figure 3. In these graphics, territories are represented by rectangles, rectangle size is determined by its civilian

[10] All else equal, civilians will support a maximally close group regardless of the number of other supporters. If a civilian is half the preference space away, then she will only support the armed group if they are supported by the rest of the population, or if they have a history of very effective victimization.

population. Territories of the same color are held by the same armed group. The beginning stages of the game are shown in row 1, Figure 2. In row 2 (left panel), we illustrate an armed groups' choice to attack in a given territory (if any). Civilians are arranged in the territory based on their ideological preferences (row 2, right panel); this graphic also shows civilians' decision to support an armed actor. The outcomes for both armed actor and civilian decisions are in the final row. In Figure 3 we depict how a third actor represented in this conflict environment would choose to victimize civilians. This actor's calculus depends on both whether an attack is likely, as well as the possible consequences of victimization. Below, we discuss the specific decision rules for each group in the graphic.

(0) Genesis of Country and Actors

We begin by generating all of the relevant actors and territories. We first generate a number of territories that is at least as large as the number of armed actors in the game. The territories are connected via a random adjacency matrix that we define such that no territory is totally isolated. We then generate some number of armed actors, each with a random ideal point (x_i) and level of ideology (ϕ_i). Each armed actor is assigned a territory, and the remaining territories are given to the last group, the government.[11] We then generate the number of civilians in each territory, each with a random ideal point (η_i). With this foundation, we are ready to begin the game.

(1) Armed groups choose which territories to invade

When an armed actor attacks another territory, each group involved in the territory has a probability of winning based on their share of spatially weighted resources. In

[11] We also define the government with an extreme ideal point $x_i = 0$, and as non-ideological $\phi_i = 0$.

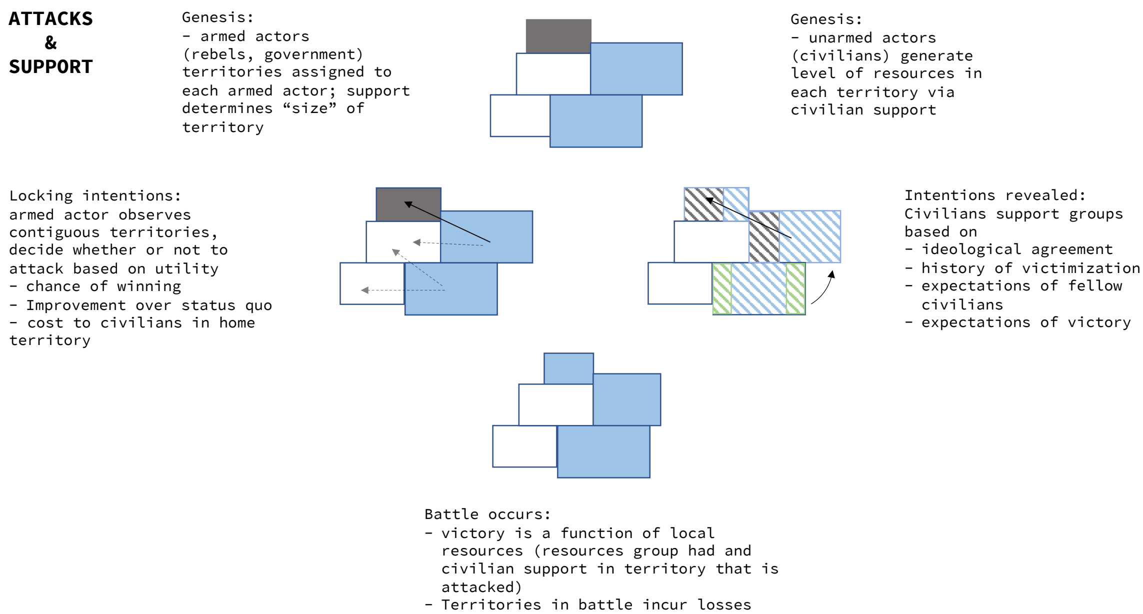

Figure 2: Graphic illustrating the choice of an armed actor to attack, and the choice of civilians to support the actor or not. Rectangles represent territory, with its size based on the size of the civilian population. For the solid colors, color represents the group controlling the territory. The arrows illustrate the potential territories this group can attack. A solid arrow indicates the actual choice. The diagonal lines represent the civilian population in each territory, ordered by ideology. In the two territories that are part of the battle, civilians choose between two combatants; in the other territory, the civilians choose between supporting the blue group or supporting no one. Based on the resources from civilian support, the battle concludes with blue group’s victory.

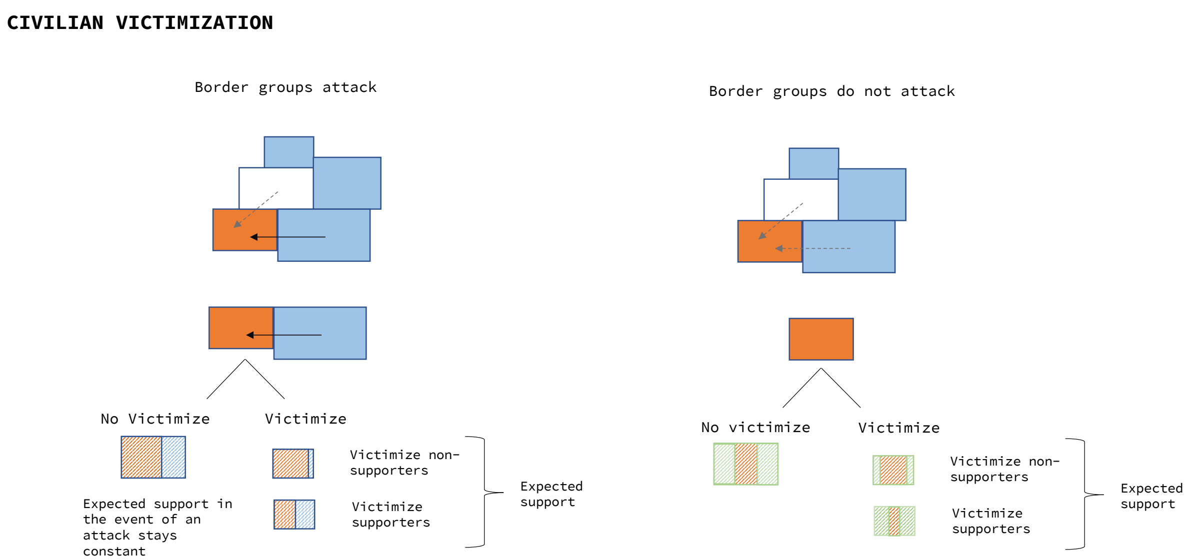

Figure 3: Graphic illustrating the choice of an armed actor to victimize civilians. The orange group first determines whether any of their neighbors are likely to attack. If they are likely to attack, the orange group decides whether to victimize to maximize their support and chance of winning in a battle, if they choose not to victimize, they do so to maximize the resources they gain from the territory. Victimizing can either succeed (in killing a non-supporter) or fail (and indiscriminately kill a supporter) based on both levels of support in the territory and random chance. If it succeeds, the ideological range of support for the incumbent group increases, if it fails, the range contracts.

particular, we call the local resources of group i in territory L:

$$\Gamma_{i,L} = \sum_{l} \delta^{d_{l,L}}(n_{s,i,l} + \psi n_{ns,i,l} - k n_{o,i,l}) \tag{4}$$

where δ is the spatial discount factor – how much less useful distant resources are than proximate ones – and $d_{l,L}$ is the distance from region l to L. $n_{s,i,l}$ denotes the number of supporters of group i in territory l and $n_{ns,i,l}$ are non-supporters of i in l. $n_{o,i,l}$ are the number of opponents of group i in territory l as long as territory l is part of the “battlefield" – the set of territories that are either the source or the target of the battle in question. Finally, ψ and k are the resources you get from non supporters, and those you lose from supporters of your opponent respectively.

For each group in the battle, the probability of winning is:

$$p_{i,L} \equiv P(i \text{ wins in territory L}) = \frac{\Gamma_{i,L}}{\sum_j \Gamma_{j,L}} \tag{5}$$

where a group's probability of winning in territory (L) is determined by the group's local resources within the territory relative to the sum of all combatant's local resources in the same territory. Next, a group decides which territory to attack by looking at all territories they border, and compares their utility for attacking that territory compared to doing nothing. In particular, for each territory q, they look at:

$$U_i(q|G) = \sum_{g \in G} E(p_{g,L}|G))\alpha_{i,j}(R_q - c) \tag{6}$$

where G are the groups already committed to battle within a territory, R is the number of civilians within a territory, c is the cost of war. We include the expectation here because at the time of the decision, civilian support is unknown,[12] so armed groups

[12]We will determine this in equations 9 and 10 in the next stage.

estimate their likelihood of victory using either their prior beliefs about the distribution of civilian preferences, or the past actions taken by civilians in a territory towards a particular armed group. Specifically, the potential attacker assesses how much utility they will gain from attacking a territory compared to how satisfied they will be if they do nothing. For comparison, the utility for group i of the status quo in territory q, held by group j is:

$$U_i(j \text{ controls } q) = \alpha_{j,i} R_q \tag{7}$$

The difference between these two factors is the payoff for attacking a given territory. Groups choose to attack in a territory where there will be the biggest payoff from attacking compared to the status quo (or if none of these are positive, they attack nowhere). This decision is illustrated in Figure 2.

(2) Civilians choose whether to support armed groups

Civilians' decisions are conditioned not just on the characteristics of armed actors, but on the behavior of other civilians.[13] When civilians choose who to support, they assume that other civilians will make support decisions probabilistically based on their proximity to armed groups, such that:

$$E(P(\text{Civilian l supports Group } i)) \equiv \text{max}(\text{min}(1 - D(i,l) + v * \chi_j, 1), 0) \tag{8}$$

Civilians that are ideologically close to the armed group are assumed to be highly likely to support them and groups that are very far from the armed group will be much

[13]This is admittedly difficult to observe, but the assumption holds in the broader literature on collective action. Larson et al. (2019) show how protest participation is driven by network relations; Steele (2017) describes how civilians' decision to leave their community is interdependent across individuals.

less likely to support them. Here χ_i is the net discriminacy of victimization by group i, which decreases when they victimize a supporter and v is the penalty for indiscriminately victimizing civilians. If a group has a history of killing supporters, all civilians are perceived as less likely to support the group.

Civilian behavior is also conditioned on the actions of armed groups in the territory and battle occurrence, as determined in the previous stage. If no battle is taking place in territory q, civilian l will support an armed group i if:

$$\frac{E(n^{-}_{s,i,q})}{2} > D(i,l) + v * \chi_i \tag{9}$$

where the expected number of supporters is calculated as discussed in equation 8.

On the other hand, when a battle is taking place in a territory q, civilian h will support group g such that:

$$\text{argmax}_{(g \in G)} E(p_{g,q}) * (1 - D(g,h) + v * \chi_g) \tag{10}$$

It is worth highlighting here that $E(p_{g,q})$ is determined by using beliefs from equation 8 to calculate the values in 4 and 5. Civilians try to meet both their goals by choosing the group that gives them the best combination of plausibly winning the battle and ideologically congruence.

(3) Battles take place and winners are determined

This occurs as discussed above in equation 5, in each territory, c civilians at random are removed.

(4) Armed groups choose in which territories to victimize.

Armed groups first determine if each territory is at risk of an attack next period. This means a group i will evaluate, for each neighbor j and territory they control q, whether:

$$\alpha_{j,i}R_q < E(p_{i,q})\alpha_{j,i}(R_q - c) + E(p_{j,q})(R_q - c) \tag{11}$$

Note that these are the same utilities from equation 6 and 7. In any territory where this is true for all neighbors j, the armed group will victimize to maximize their potential of winning in a future period. If it is not true, they will victimize in order to maximize resources in a future period.

Armed groups believe that the proportion of the preference space made by their supporters is $s \equiv \frac{x_{s,i,q}}{n_{ns_i,q}+n_{s,i,q}} + v * \chi_i$. The proportion believed to be composed by non-supporters is of course $1 - s$. If the territory is not at risk of attack, the group will victimize if:

$$\zeta_q * (\frac{v * (1-c) * n_{ns,i,q-1}}{(1-s)} - c) - (1-\zeta_q) * (\frac{v * (1-c) * n_{s,i,q-1}}{s} - 1) > 0 \tag{12}$$

Here $\frac{(v * n_{ns,i,q-1})}{1-s}$ is the expected number of non-supporters coerced to support the armed group in the event of selective victimization, $(1 - c)$ is the benefit of coercing non-supporters into support, and $\frac{(v * n_{s,i,q-1})}{s}$ are the number of supporters pushed to non-support in the event of indiscriminate victimization. In addition, victimization has a direct effect of either killing a supporter or a non-supporter.

When considering whether to victimize in a territory at risk of an attack, the armed group needs to separate civilians into potential supporters of the attacker and non-supporters. Their belief is that the division for support for groups i and j, defined such that $x_i > x_j$ is that a civilian, f, will support group i if:

$$\eta_f > x_i E(p_{i,q}) + x_j E(p_{j,q}) \equiv \lambda_q \tag{13}$$

This combined with their beliefs about the distribution of supporters and non-supporters, allow an armed group to estimate the number of supporters both for themselves and the attacking group, as well as the range of preferences occupied by each group, which, are of length λ_q and $1 - \lambda_q$ respectively. They then victimize if:

$$\zeta_q * \frac{v * (1+k) * E(n_{o,i,q})}{\lambda_k} + k) - (1 - \zeta_q) * (\frac{v * (1+k) * E(n_{s,i,q})}{(1 - \lambda_k)} + 1) > 0 \tag{14}$$

Similar to the case where there is no risk of battle, this is the net effect of victimization on local resources, which is the probability of gaining new supporters and the negative effect of civilian death on resources. The tradeoffs for the armed group in each of these cases is illustrated in 3.

(5) Civilians Choose to Flee

After victimization civilians choose whether or not to flee from a territory into an adjacent territory. Civilian k will choose to flee a territory controlled by group i for a territory controlled by group j if these territories are contiguous and:

$$D(i,l) + v * \chi_i < e^{3-t*3/T} D(j,l) + v * \chi_j) \tag{15}$$

The exponential decay function is such that in the first turn of a game (t) another group needs to be at least e^3 times better than the incumbent in a civilians territory for the civilian to move, but by the final turn of the game (T) the group will move to whichever territory has a more congenial incumbent.[14]

(6) Game Iterates

[14]Second, in each territory, there will be new civilians added to the game based on the global growth rate parameter G (rounded down to the nearest integer).

Stages 1-6 will continue until one of three end conditions are met: a) the government controls all the territories, b) the government controls no territories, c) the game reaches the predetermined turn limit and ends in a stalemate.

Hypotheses

As we model it, the decision for armed groups to victimize civilians is a strategic action. Armed groups target civilians to help extract resources from the population and to increase their likelihood of prevailing in expected conflicts with other groups. Civilians likewise act strategically to minimize their personal likelihood of being killed by armed groups. Thus, to understand when and where civilian victimization is likely to take place, we need to evaluate the strategic environment.

To do this, we conceptualize the overall strategic environment as a social network, wherein the nodes in this network are armed groups, and the edges are battles between these groups. Density measures the number of edges (or connections) proportional to the total number of possible edges. To understand the strategic environment, we illustrate three ideal types of conflict networks in figure 4. In each network the number of battles (edge thickness) and the number of actors (nodes) stay the same, but the distribution of these events change across actors. Our conceptual illustration demonstrates that even though the number of actors and battles are constant across all three networks, the third network exhibits the highest density.

The first type of conflict network is the sparse network. Here, conflict occurs between a few distinct dyads. In this network, the strategic decision to victimize civilians is simple – victimization takes place if the coercive effect (causing more non-supporters to begrudgingly support the group in charge) outweighs the resources that could be mobilized from non-supporters. In this environment, while there may be some initial low levels of victimization, we will pretty quickly approach an equilibrium where most

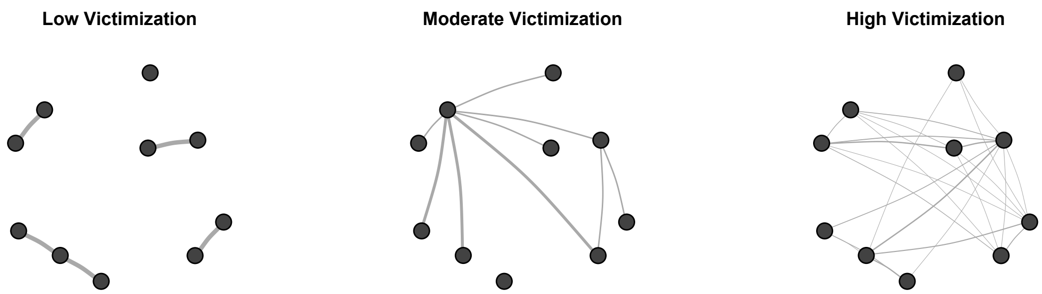

Figure 4: Conceptual networks demonstrate the expected relationship between density and civilian victimization. The number of conflictual events and the number of actors stay constant, while the distribution of these events between actors changes in each example.

civilians support the groups in control of their territory, and no victimization occurs.

A second stylized network we might observe is a polarized network. In this type of network, we have two clustered groups of actors where actors' interactions are with groups in the other cluster. For example, in many civil conflicts, we see a dynamic where a number of different separatist groups are all fighting the central government and are not fighting each-other. In this game, this layout would be especially likely if we see ideologically oriented groups that cluster at two points on the spectrum. Here, some territories that groups control will be at risk of attack, and so these groups will have incentive to victimize civilians not just to coerce them into support, but also to avoid the risk of civilians supporting an attacking group. This will lead to a moderate level of victimization in these border territories. That being said, victimization should only be moderate, because many territories will not be at risk of attack.

The final stylized network is the full network. This conflict network functions as a Hobbesian war of all against all, where each armed group is ready to attack each other armed group. In these cases, the dynamics that led to victimization in the polarized network are intensified. Almost all territories are at risk of an attack, and they are at risk of an attack from multiple sources leading to even stronger incentives towards victimization, since even if victimization is counterproductive against some opponents, it will be beneficial against others. In this case, there would also likely be a fluid control of territory and frequent changes in ruling groups, which generates even more incentives for violence against civilians.

To determine the macro-level effects of the micro-actions described above, we run our game 10,000 times. In each instantiation of our game, we chose parameters at random and record three main network statistics – the number of armed groups in the network, the overall level of violence in the network, and the density of the conflict network. We also capture the frequency of civilian victimization in each run of the game. Returning to our three stylized networks in figure 4, all three networks have the same level of violence, but the sparse network would have both a low density, and the full network would be most dense, but does not have a higher level of conflict than the polarized network or the sparse network.

To estimate the effect that our three network statistics have in relation to civilian victimization, we employ a negative binomial regression. We depict the results of this analysis in figure 5. Here we can see that even when controlling for the level of violence between armed groups and the number of actors, more dense conflict networks had both a higher likelihood and frequency of civilian victimization.[15] This leads to our main hypothesis for empirical investigation.

Hypothesis: Even when controlling for the overall level of violence, a more dense conflict network leads to higher levels of civilian victimization.

[15]It is worth noting here that in the ABM, victimization both refers to the overall number of civilians killed strategically by armed groups and the number of incidents of victimization.

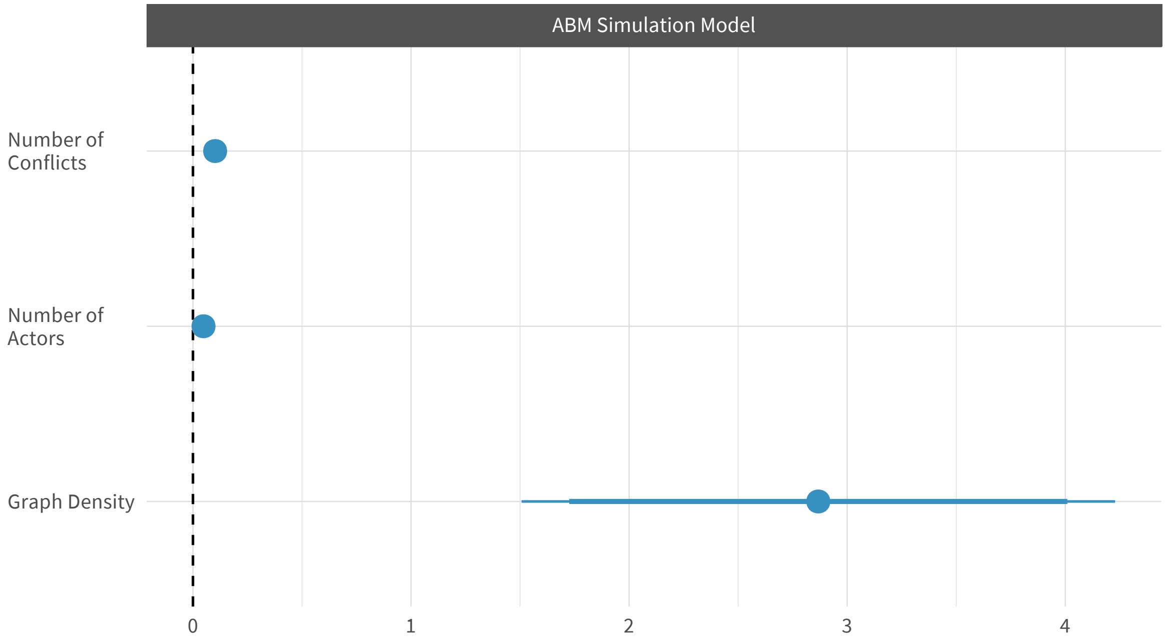

Figure 5: Analysis of determinants of victimization in computational model.

Empirical analysis

To investigate the implications of our computational model empirically, we utilize the Armed Conflict Location and Event Dataset (ACLED) dataset developed by Raleigh et al. (2010). Our first step is to calculate conflict network densities for countries experiencing intrastate conflict according to the *battles* data provided by ACLED. Our sample ranges from 1997 to 2016 and includes 39 countries.

For each of these countries we construct a conflict adjacency matrix in which a value of one is recorded if there was a battle between armed groups.[16] Given that untangling who initiated a particular battle can be difficult, the conflict adjacency matrices we construct are symmetric. The set of actors in these adjacency matrices include both

[16]The criterion we use for battles includes: "Battle-No change of territory", "Battle-Government regains territory", "Battle-Non-state actor overtakes territory".

rebel groups and government forces.[17] Once we have generated our set of adjacency matrices for every country-year we then calculate the number of actors, number of conflictual events, and the graph density of the conflict networks.

We also control for a number of factors that have been argued to affect the level of civilian victimization at the country-year:

- Graph Density (Raleigh et al., 2010)
- Number of Conflicts (Raleigh et al., 2010)
- Number of Actors (Raleigh et al., 2010)
- Polity (Marshall, Jaggers and Gurr, 2009)
- Log(Population) (World Bank Group, 2016)
- Log(GDP per Capita) (World Bank Group, 2016)
- Ethnic Fractionalization (Vogt et al., 2015)
- Presence of Peacekeepers (Kathman, 2013)
- Rebel(s) Stronger than Govt. (Cunningham, Gleditsch and Salehyan, 2013)
- Rebel(s) Supported by Foreign Govt. (Cunningham, Gleditsch and Salehyan, 2013)
- Govt. Supported by Foreign Govt. (Cunningham, Gleditsch and Salehyan, 2013)

Our dependent variable is a count of the number of civilians killed during a country-year. We retrieve this information from the "Violence against civilians" event type in the

[17] We exclude international actors from our analysis.

ACLED dataset. To model this, we utilize a negative binomial model with fixed effects for countries.[18]

We report the results for our models of civilian victimization in Figure 6 below.

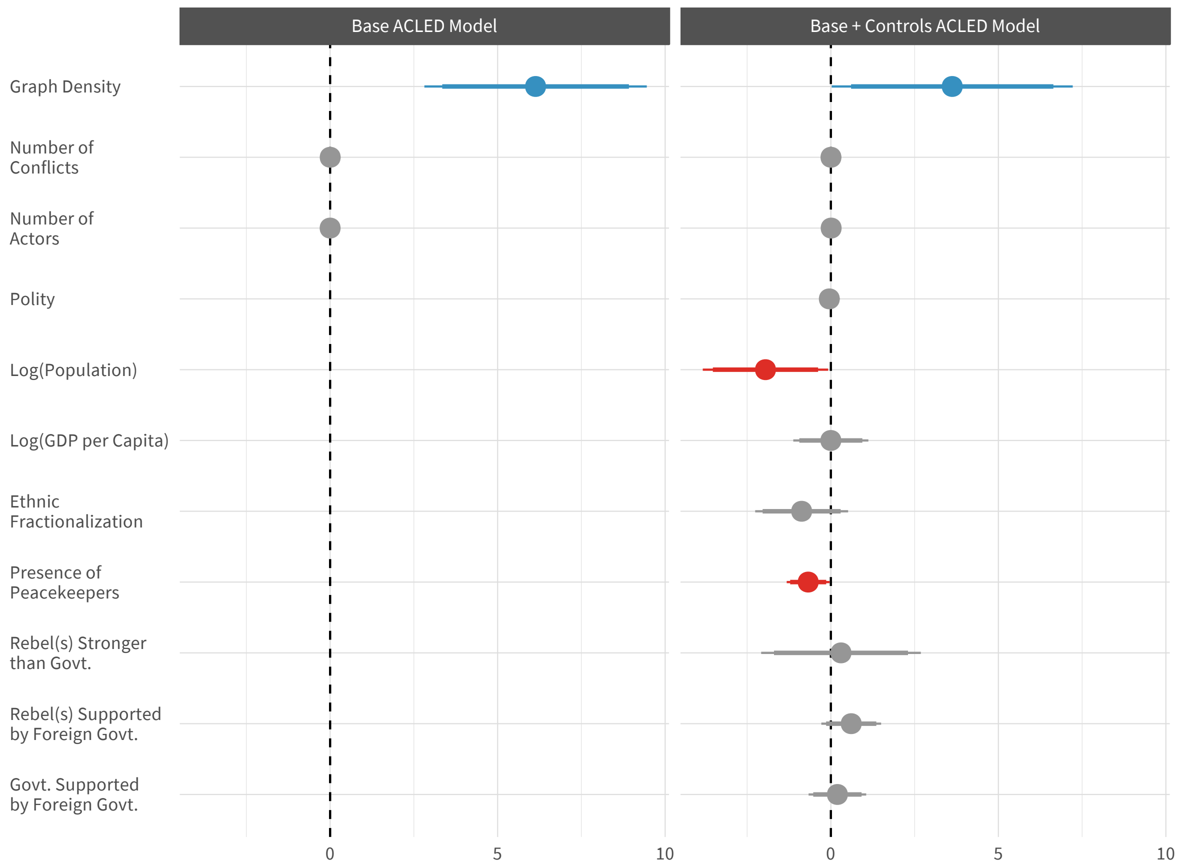

Figure 6: Analysis of determinants of victimization based on ACLED data.

In the left panel, we show results without using any of the controls. Within this fixed effects framework, graph density has a notable effect on the level of civilian victimization observed in a country-year. Whereas simple counts of the number of actors involved in a conflict or the number of conflicts seem to be less meaningful in explaining levels of civilian victimization. In the right panel, we show that our findings are

[18] Results are similar when using a random effects framework.

robust to a number of controls.[19]

Discussion

We have shown that frequency of civilian victimization depends, in large part, on the strategic environment. If conflict between armed groups is rare, civilian victimization will similarly be rare; if conflict is polarized between two groups (for example a government and different opposition groups, or armed groups of two opposing religions or ethnicities) then there will be a moderate level of civilian victimization; if we have a conflict where any two conflict groups are likely to fight, then civilian victimization will be at its highest. This result holds even when accounting for the number of belligerents and the total volume of fighting. There are two primary reasons for this pattern of victimization. First, groups are more likely to victimize civilians in a territory if that territory is at risk of an attack. Second, victimization is most common when groups are newly in control of territory, since a combination of past victimization, and civilians' choice to flee make territories more ideologically homogeneous and congruent with the ruling group over time. Both of these factors are at their most intense in dense conflict networks.

We test these dynamics in a cross-national analysis of multi-actor civil wars using ACLED data to construct conflict networks. We find a consistent positive effect of network density on civilian victimization even when controlling for other characteristics of the conflict network. Going forward, we aim to make a number of advances in both empirical and theoretical research. On the empirical side, we would like to investigate

[19]To deal with missingness in our sample, we employ a multiple imputation method developed by Hoff (2007) and shown to have comparable performance to alternatives such as AMELIA and MICE by Hollenbach (2014).

whether these results hold when using event data from other sources such as UCDP's GED data. Theoretically, we will investigate whether other empirical regularities concerning civilian victimization, like the tendency for more violent battles to increase the risk of victimization, are borne out in our model. We also plan to incorporate other important factors into our model, such as the ability for armed groups to endogenously enter and leave the model and the possibility that armed groups' reliance on foreign support or lootable goods influences patterns of victimization.

While this paper has focused on civil war and civilian victimization, we believe it has wider implications. First, it shows the implications of moving from a relatively simple dyadic interaction or model to a more complex multi-actor model. We can see similar dynamics at play for example in the median voter theory, where the equilibrium breaks down in the presence of a third candidate (Patty et al., 2009) in coalition bargaining, where circumstances with only two major parties are trivial, and appropriately modeling and measuring negotiations with three or more parties is fraught (Laver, De Marchi and Mutlu, 2011); and in the bargaining model of war, where the fundamental finding that war is irrational ceases to hold with more than two potential combatants (Gallop, 2017). We can also apply the substantive findings, of the tradeoffs between resource extraction, support, and foreign threats to the dynamics of authoritarian politics in the presence of international conflict.

In sum, our study models the choice for armed groups to victimize civilians as a strategic one. Armed groups choose to victimize civilians to improve their ability to mobilize resources and to maximize their chances to defend themselves if their territory is attacked. Civilians can decide to provide or withhold support, as well as flee, out of self-preservation and to achieve ideological goals. Importantly, our study unites the strategic decision-making of both armed groups and civilians into a single multi-actor framework of civil war that reveals how actors' incentives change according to the network dimensions of their strategic environment.

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