

We have a theory!

Abstract

We do many things with imaginary models and useless data.

Introduction

Central puzzle: why do armed groups victimize?

Pull anecdotes from data

Novel contribution:

Civilian Victimization During War

Previous explanations of civilian victimization have largely 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 (Idean Salehyan 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.” Drawing on the intuition that the networked dynamics of armed groups influence violence against civilians, we develop an agent-based model that incorporates insights about how the interdependent nature of multi-party intrastate conflicts influences armed groups’ decision to harm civilians.

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 the government controls more territory than non-state actors. In general, armed groups’ primary motivation is to hold territory containing resources that can be mobilized (Kalyvas, 2006). 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 which underscores civilian agency in conflict areas (Mampilly, 2011; Kasfir, 2015; Arjona, 2017). *Ceteris paribus*, 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 (ϕ_i). Groups that are more ideological benefit (suffer) more from having other groups with similar (dissimilar) preferences controlling territory, and thus have less (more) motivation to fight them.¹ 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:

$$D(a, b) = ||z_a - z_b|| \quad (1)$$

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

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

In this game, armed groups draw resources from civilian mobilization. This “instru-

¹We treat the government actor as non-ideological, because in most cases a government will not allow a strong challenger to hold territory simply because they have politically congenial views.

mentalist” 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).² 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 move 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 calculate 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 $1 > k > 0$). The nexus of civilian-armed

²A 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) [add literature on different types of resources here]

group relations 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 casualties occur in all territories that are the source or target of an attack.³ When a group decides which 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 likelihood that they will victimize a non-supporter is based on how much information they are able to obtain from their supporters in the population (Lyll, Shiraito and Imai, 2015). Groups are more likely to accurately (selectively) victimize as the number of supporters in the territory increases.⁴ We define this

³Because 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.

⁴An exception here is when they have either all supporters, or no supporters. 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.

probability⁵ as:

$$\zeta_q \equiv P(\text{selective victimization in territory } q) = 1 - \epsilon \left(\frac{||\text{nonsupporters}|| + 1}{||\text{civilians}||} \right) \quad (3)$$

where ϵ is the baseline rate of error in the case where all but one civilian supports the armed actor. 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.⁶

Civilian Preferences

When civilians choose whether or not to support an armed group, they do so fully cognizant 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 necessary to “go along” with it in order to avoid the risk of violence. Each other civilian is assumed to support the incumbent with probability based on their inverse ideological distance (so civilians will support a maximally close group all of the time and never support the maximally distant 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 (so *ceteris paribus*, civilians will support a maximally close group regardless of the number of other

⁵Except in the edge-case where there are no supporters or no non-supporters.

⁶Fjelde 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.

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). 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 inverse ideological distance 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 relocating and often paying serious material costs. 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 figures ?? and ?. In these graphics, territories are represented by the rectangles, with the size of the rectangle determined by its civilian population. Territories of the same color are held by the same group. In ?? we show the decision of which territory to attack (if any). Civilians are arranged in the territory based on their ideological preferences, and this graphic also shows the decisions of civilians to support the armed actor, as well as the results of both armed actor and civilian decisions. In figure ?? we show the choice for a third actor to victimize civilians or not. The calculus here depends on both whether an attack is likely, as well as the possible consequences of victimization. We then discuss the specific decision rules for each group which lead to these choices.

(0) *Generation 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 this game. The territories are connected via a random adjacency matrix that we define such that no territory is totally isolated. We then generate

**ATTACKS
&
SUPPORT**

Genesis: armed actors
(rebels, government)
territories assigned to
each armed actor; support determines
"size" of territory

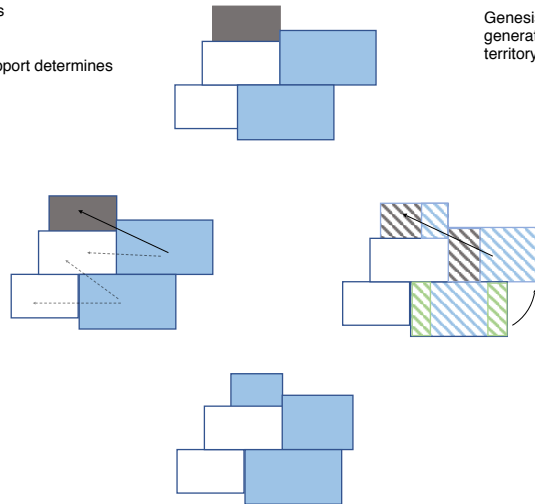
Genesis: unarmed actors (civilians)
generate level of resources in each
territory via civilian support

Locking intentions:
armed actor observes contiguous
territories, decide whether or not to
attack based on utility

- chance of winning
- Improvement over status quo
- cost to civilians in home territory

Intentions revealed:
Civilians support groups based on

- ideological agreement
- history of victimization
- expectations of fellow civilians
- expectations of victory



Battle occurs:

- victory is a function of local resources (resources group had and civilian support in territory that is attacked)
- Territories in battle incur losses

Figure 1: 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 their size based on the size of the civilian population. For the solid colors, color represents the group controlling the territory. The arrows represent the potential territories this group can attack, with the solid arrow representing 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, the civilians choose between the 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 the blue group winning.

Civilian Victimization

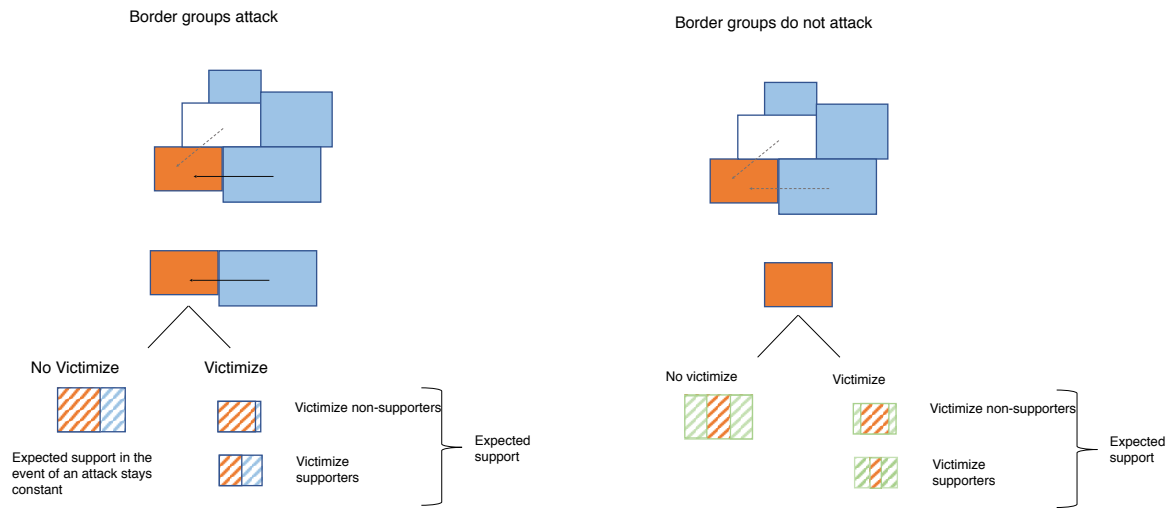


Figure 2: Graphic illustrating the choice of an armed actor to victimize civilians. The orange group first determines whether any of their neighbors are likely to attack. If they are, they decide whether to victimize to maximize their support and chance of winning in a battle, if not, they do so to maximize 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.

some number of armed actors, each with a random ideal point (x_i) and a level of ideology (ϕ_i). Each armed actor is assigned a territory, and then the remaining territories are given to the last group, the government.⁷ We then generate a number of civilians in each territory, each with a random ideal point (η_i). With this set up, 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 particular, we call the local resources of group i in territory L :

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

where δ is the spatial discount factor – how much less useful distant resources are than proximate ones – $d_{l,L}$ is the distance from region l to L , $n_{s,i,l}$ are the number of supporters of group i in territory l , $n_{ns,i,l}$ are non-supporters of i in l , and $n_{o,i,l}$ 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:

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

where a group’s probability of winning in territory (L) is determined by the groups

⁷We also define the government as having an extreme ideal point $x_i = 0$, and being non-ideological $\phi_i = 0$.

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:

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

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 unknown⁸ and so armed groups 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:

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

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) 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. When civilians choose who to support, they assume

⁸We will determine this in equations 9 and 10 in the next stage.

that other civilians will make support decisions probabilistically based on their proximity to armed groups, such that:

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

Civilians that are extremely close ideologically 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 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.

Civilians 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:

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

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:

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

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 ideological 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:

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

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:

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

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:

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

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:

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

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 ??.

(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:

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

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.

(6) Territories Experience Growth.

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. To understand the strategic environment, consider three ideal types of conflict networks.

The first type of conflict network is the empty network. Here, while there are a number of groups that have the capacity to attack, no actual conflict takes place. In this network, territorial control is fixed, and 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 victimization, we will pretty quickly approach an equilibrium where most civilians support the groups

in control of their territory, and no victimization occurs.

A second stylized network we could see is a polarized network. In this type of network, we have (usually) two groups of actors who are clustered so that all of their interactions are with the groups in the other cluster. For example, in many civil conflicts, we see this dynamic where a number of different separatist groups are all fighting the central government and are not fighting each-other. In this game, this will be especially likely if we see ideologically oriented groups that cluster at two points on the spectrum. Here, some territories 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 rise in the likelihood of victimization in these border territories. Similarly, there will be territories that trade back and forth between groups, and when control of a territory changes hands, we can expect to see increased victimization because supporters of the old controlling group were likely in the majority. That being said, victimization due to both causes should only be moderate, because many territories will not be at risk of attack, and when territory changes hands, it will usually alternate between two groups.

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. There will also likely be a fluid control of territory and frequent changes in the ruling groups leading to even more incentives for violence against civilians.

To determine the macro-level effects of the strategic environment in this game, we

ran 10000 simulations of this game, with parameters chosen at random, and recorded 3 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. Returning to our three stylized networks, the empty network would have both a low density and a low level of conflict, and the full network would be more dense, but not necessarily have a higher level of conflict than the polarized network.

As you can see in figure ??, 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 a higher frequency of civilian victimization. This leads to our main hypothesis for the empirical investigation.

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

Empirical setup

Empirical Results

Discussion

-
- Arjona, Ana. 2017. "Civilian Cooperation and Non-Cooperation with Non-State Armed Groups: The Centrality of Obedience and Resistance." *Small Wars & Insurgencies* 28(4-5):755–778.
- Azam, Jean-Paul and Anke Hoeffler. 2002*a*. "Violence against civilians in civil wars: looting or terror?" *Journal of Peace Research* 39(4):461–485.
- Azam, Jean-Paul and Anke Hoeffler. 2002*b*. "Violence against civilians in civil wars: Looting or terror?" *Journal of Peace Research* 39(4):461–485.
- Fjelde, Hanne and Lisa Hultman. 2014. "Weakening the enemy: A disaggregated study of violence against civilians in Africa." *Journal of Conflict Resolution* 58(7):1230–1257.
- Idean Salehyan, David Siroky and Reed M. Wood. 2015. "External rebel sponsorship and civilian abuse: A principal-agent analysis of wartime atrocities." *International Organization* 68(3):633–661.
- Kalyvas, Stathis. 2006. *The Logic of Violence in Civil War*. New York: Cambridge University Press.
- Kasfir, Nelson. 2015. "Rebel governance—constructing a field of inquiry: Definitions, scope, patterns, order, causes." *Rebel governance in civil war* pp. 21–46.
- Lyall, Jason, Yuki Shiraito and Kosuke Imai. 2015. "Coethnic bias and wartime informing." *The Journal of Politics* 77(3):833–848.
- Mampilly, Zachariah Cherian. 2011. *Rebel rulers: Insurgent governance and civilian life during war*. Cornell University Press.
- Valentino, Benjamin A. 2014. "Why we kill: The political science of political violence against civilians." *Annual Review of Political Science* 17:89–103.

Wood, Reed M. 2010. “Rebel capability and strategic violence against civilians.” *Journal of Peace Research* 47(5):601–614.

Wood, Reed M. 2014. “From loss to looting? Battlefield costs and rebel incentives for violence.” *International Organization* 68(4):979–999.