Competition and Civilian Victimization*

Michael Gibilisco† Brenton Kenkel‡ Miguel R. Rueda§

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Abstract

Violence against civilians in civil war is widely thought of as a strategic choice by combatant groups. We argue that a common strategic logic of competition underlies diverse theories of civilian victimization. Drawing on this logic, we develop a theory of competitive outbidding in victimization, hypothesizing that an armed group's propensity to victimize civilians will increase with its expectation that its competitors will act likewise. We test this argument by structurally estimating a model of strategic interdependence between armed groups using data from the Colombian civil war. Our findings indicate that competitive outbidding is responsible for a substantial amount of violence against civilians. We estimate that each of the two major combatant groups would have carried out systematic anti-civilian violence in 12–16% fewer municipalities if the group had expected no violence by its rival. Examining causal mechanisms, we also find that victimization in the Colombian case was more likely aimed at inducing civilian cooperation than at influencing postwar negotiating positions.

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†Assistant Professor. Division of the Humanities and Social Sciences. California Institute of Technology. michael.gibilisco@caltech.edu

‡Assistant Professor. Department of Political Science, Vanderbilt University. brenton.kenkel@vanderbilt.edu.

§Assistant Professor, Department of Political Science, Emory University. miguel.rueda@emory.edu. Tarbutton Hall 315, 1555 Dickey Drive, Atlanta, GA 30322.

Why do rebel groups and other organizations commit violence against civilians during civil wars? In seeking to understand these atrocities, conflict scholars have found evidence that they result from a process of competition among civil war actors. Violence against civilians, according to these theories, is a strategic choice to gain advantage in a contest for valuable information (Kalyvas 2006), for positioning in postwar bargaining (Wood and Kathman 2014), or for access to material resources held by civilians (Bagozzi, Koren and Mukherjee 2017).

Though these theories advance distinct explanations about the precise benefit that armed groups expect to yield from violence against civilians, they are unified by their conception of victimization as a *strategic tool* in a process of *competition* among armed groups. In this article, we draw out a previously unexplored implication of the strategic logic underlying these diverse bodies of theory. If violence against civilians is a tool of competition, then an armed group's incentive to engage in it should be greater if it expects its competitors to employ similar tactics. In other words, the expectation of violence by one group may cause violence by other groups. We refer to this dynamic as *competitive outbidding* in civilian victimization.[1] We provide a theoretical foundation for competitive outbidding as a cause of civilian victimization, and we present evidence that competitive outbidding was a substantial cause of violence in the Colombian civil war.

Our theory of competitive outbidding in civilian victimization is built on two premises about the nature and motivations of this type of violence. First, violence against civilians is costly, not valued in itself by the leadership of armed groups. Second, the benefits a group gains from violence against civilians are primarily relative—what matters is to get more than one's competitors. For example, in competition over information, having better information than one's competitors is more important than the raw quantity of information one has.

[1]Our use of the outbidding metaphor is closely related to its use in the terrorism literature (e.g., Bloom 2004; Kydd and Walter 2006; Findley and Young 2012; Nemeth 2014). Though the substantive settings differ, the strategic logic is similar: competition creates an incentive to outdo one's competitors.

Under these conditions of absolute cost and relative benefit, strategic competition will follow an outbidding logic, in which each group has an incentive to commit just enough violence to gain a competitive edge. Our key prediction, therefore, is that the probability of victimization by one civil war actor increases with how much violence it expects its competitors to commit.

To evaluate this theory, we quantify the extent of civilian victimization due to competitive outbidding in the Colombian conflict between 1998 and 2005. We analyze municipality-level data on violence against civilians by the left-wing guerrilla group Fuerzas Armadas Revolucionarias de Colombia (FARC) and the right-wing paramilitary group Autodefensas Unidas de Colombia (AUC) during this period.

Colombia is a particularly good case to study competitive victimization as there are multiple armed actors fighting for territorial control that in the period of analysis held peace or disarmament talks with the government. Contention for territorial control and the pursuit of negotiations with the government are important scope conditions for the arguments that provide a basis for our theory. Moreover, research design and data quality considerations also make the Colombian case appealing. Strategic incentives to victimize civilians vary greatly at the local level, making a within-country design ideal for assessing our theory of competitive outbidding. Due to recent efforts by the Colombian government and non-governmental organizations, there is good quality sub-national data on the timing, location, nature, and perpetrator of victimization events—exactly the kind of data we need to assess our main hypothesis.

The key contributions of the analysis are as follows. First, we develop a unified theoretical and empirical model of strategic competition in violence against civilians. Our analysis is situated within a simple game-theoretical model in which the players are armed groups and victimization is a strategic choice. The structural estimation approach allows us to pin down the parameters of this model—including, critically, the existence and strength of competitive outbidding incentives—that are most consistent with what we observe in the

data. Second, applying the model to the Colombian case, we find a statistically significant and substantively strong effect of competitive outbidding. We estimate that each group (FARC and AUC) would have committed systematic violence against civilians in 12–16% fewer municipalities if it had expected the other group never to victimize civilians. Third, by extending this core model to incorporate different types of violence (selective versus non-selective) or multiple strategic actors, we are able to assess the relative explanatory power of competing explanations for competition in civilian victimization. Although we focus on the Colombian case here, our methodology could be used to study the overall effect of competitive outbidding and the underlying mechanisms in other civil war contexts, assuming appropriate data are available.

We model the interaction between civil war actors as a game in which each actor's utility from committing violence against civilians is a function of both municipality-level characteristics and the other actors' decisions. In terms of the model, competitive outbidding is present when one actor's utility from committing violence increases with others' choice to do the same.[2] As our theory implies that victimization choices are strategically interdependent, it is important to use an empirical model that allows for such interdependence. To isolate the effects of strategic competition in our empirical analysis, we rely on empirical techniques from the econometric literature on the estimation of game-theoretic models (Hotz and Miller 1993; Bajari et al. 2010).[3]

We find statistically significant and substantively strong evidence for competitive outbidding in victimization by the FARC and AUC. All else equal, if the FARC did not

[2]Critically, our model does not presume the existence of competitive outbidding. Our empirical analysis identifies the form of the model (specifically, the exact weight on each factor in each group's utility function) that best corresponds to the observed data. We hypothesize that each group places positive weight on the other's choice to victimize civilians, but we do not impose this restriction on the estimator—it is possible to find zero or even negative weight.

[3]A few studies of civil war have used structural estimation techniques (Gent 2007; Nieman 2015; Chatagnier and Castelli 2019; Koren Forthcoming). Ours is the first to use these methods to study the determinants of violence against civilians in civil war.

expect any violence against civilians by the AUC, then the FARC would victimize civilians in about 8% of municipalities. This represents a 16 percentage point decrease from the observed proportion of municipalities in which the FARC commits violence against civilians, which is about 24%. In other words, if not for competitive outbidding dynamics, we would observe systematic violence against civilians by the FARC in about two-thirds fewer municipalities. We find a similar effect of competitive outbidding for the AUC, namely a 12 percentage point decrease compared to baseline if it expected no civilian victimization by the FARC (58% versus 70%).

These empirical findings support our theory of competitive outbidding in civilian victimization. As our theory draws from the common notion of victimization as a strategic choice in a competitive process, our main result also lends support to the diverse set of theories premised on this idea. In extensions to our main analysis, we go a step further to consider *which* of these distinct bodies of theory finds the most support in the Colombian case. We focus on the distinction between theories of victimization as a tool to change the behavior of civilians themselves (e.g., Kalyvas 2006) and those that see it as a way to signal strength to other actors involved in postwar bargaining (e.g., Wood and Kathman 2014).[4] Following each theory, we draw out distinct implications about variation in the nature and strength of competitive outbidding across different types of violence (selective versus non-selective) and pairs of actors. We test these implications in auxiliary analyses, one distinguishing between choices of selective and non-selective violence and the other introducing a third strategic actor (the left-wing Ejército de Liberación Nacional). On the whole, we find more support for the idea of violence as a tool to induce civilian cooperation than as a signaling device for postwar bargaining in the Colombian case.

Our theory draws on a common strategic logic underlying theories of victimization as a strategic choice in competition between groups. By the same token, our analysis con-

[4]We discuss these bodies of theory in greater detail in the next section.

trasts with accounts of civilian victimization as the result of within-group influences, such as principal-agent problems or other internal control failures in armed groups (e.g., Abrahms and Potter 2015). To be clear, our theoretical analysis and empirical results both allow for the possibility that some violence against civilians is due to freelancing or vengeance by individuals rather than the strategic choices of groups. However, the magnitude of the competitive outbidding effects we find, particularly for the FARC, suggest that within-group influences at most provide a partial explanation for violence against civilians in the Colombian case.

A potential alternative explanation for the victimization patterns we observe is that they are driven by revenge dynamics, where a group victimizes civilians as an emotional response to prior victimization by its rivals. At a broad level, both our theory and this alternative explanation would predict relatively high FARC violence in areas where the AUC commits violence, and vice versa. We address the possibility of revenge dynamics in two ways. First, in our model and empirical analysis, our groups are forward looking: their victimization decisions in a locality are driven by their expectations about what their rival will do rather than the history of violence in the locality. Furthermore, the results of a robustness in which we purge the influence of realized violence within a municipality from our measure of expected violence there, indicate that revenge is not driving our results. Second, we investigate an empirical implication specific to the revenge explanation. If revenge dynamics were driving the interdependence we observe in victimization, we would expect this to show up in our data as non-selective violence by one group causing non-selective violence by the other. In fact, we find no such effect.

Theories of Competition and Victimization

In this section, we first identify a key commonality in theories of violence against civilians during civil wars—namely, the idea that armed groups victimize civilians for competitive

advantage. We consider two broad and influential bodies of existing theory: one that sees violence as a strategic tool to induce civilian cooperation, and one that considers its role in signaling strength to influence postwar bargaining. While these theories vary widely in their precise conception of the competition that is taking place, we show that a similar strategic logic underlies each of them. In particular, in these theories, violence against civilians is a strategic choice that carries an *absolute* cost and a *relative* (or positional) benefit.

We then establish our own theory of competitive outbidding in civilian victimization, drawing on the common strategic logic underlying these existing theories. We argue that the strategic logic of victimization ought to be similar to other political and economic processes where participants take on absolute costs in order to receive relative benefits. This gives rise to our prediction of an outbidding dynamic, and thus a positive relationship between expected violence by one group and the choice of violence by its competitors.

Victimization as Coercion

An influential body of work, originating with Kalyvas (2006), posits that armed groups strategically undertake violence in order to coerce civilians into cooperating with their goals. Kalyvas posits that violence against civilians is a strategic choice by combatants who want to maintain control in contested territory. The point of violence against civilians, in this telling, is to keep control of the civilian population out of the hands of other actors vying for sovereignty in the same location. A considerable line of research has expanded on this theory and examined empirical evidence for its major hypotheses (Lyall 2009; Balcells 2010; Wood 2010; Berman, Shapiro and Felter 2011; Condra and Shapiro 2012; Rueda 2017).

Civilians' possession of valuable information plays a central role in theories of victimization as a coercive tool in unconventional warfare. An armed organization can gain a battlefield advantage by extracting intelligence about its competitors' membership, location, movements, and resources, making information a key input to civil war success. The purpose

of violence, as posited by these theories, is to coerce civilians into providing information to one's own side, and to deter them from collaboration with competing actors.

Importantly for our purposes, however, information has little *intrinsic* value to armed organizations in these theories. Civil war actors do not derive consumption value from the information they extract from civilians, nor can they sell it on global markets. Instead, information is valuable insofar as it provides a military advantage over one's armed competitors. Kalyvas (2006, 174) describes information as "the link connecting one side's strength with the other side's weakeness." An armed group's success depends not on the raw quantity of information it possesses, but rather on having better information than the other side.

Another critical idea in the literature on victimization as coercion is that violence against civilians is costly to the groups that carry it out. In other words, victimization is valued primarily insofar as it achieves a political purpose, not desirable in itself. Kalyvas (2006, 23–28) emphasizes the limitations of "expressive" motivations as an explanation for widespread violence against non-combatants. Moreover, in formal theories of victimization as coercion, there is always a cost to an armed group for carrying out violence against civilians (Kalyvas 2006; Berman, Shapiro and Felter 2011; Rueda 2017). Victimization occurs only when the indirect informational benefits outweigh these direct costs.

A closely related strand of research focuses on victimization as a tool to extract material resources—particularly food but perhaps natural resources—from civilians, rather than information (Wood 2014; Bagozzi, Koren and Mukherjee 2017; Koren and Bagozzi 2017). These theories maintain the assumption that violence against civilians is costly and employed only instrumentally. However, they differ slightly from informational theories, because the benefits of food extraction are not purely relative or positional. When armed groups are distributing food to win hearts and minds among potential supporters, the strategic logic is broadly similar to the informational case. However, when the food extracted is used for the group's own subsistence (e.g., during droughts or famines), then the incentive to extract

food should depend little on how much other groups possess. Consequently, violence to extract material resources from civilians partially fits under the umbrella of our competitive outbidding theory, depending on how civil war actors use the resources they extract.

Victimization as Signaling

In contrast with research portraying victimization as a way to shape civilians' incentives, a separate body of work emphasizes its effects on bargaining power among civil war actors in eventual postwar negotiations. According to these theories, violence against civilians is a costly exercise of the "power to hurt,"[5] a coercive bargaining tactic to bring the other side to the negotiating table (Hultman 2007, 2009, 2012; Thomas 2014; Wood, Kathman and Gent 2012; Wood and Kathman 2014; Chu and Braithwaite 2018). Violence against civilians increases the costs of continued fighting, increasing the government's willingness to come to the negotiating table, while also signaling the perpetrator's willingness to bear costs to achieve its goals. The civilian population itself might also be the target of this kind of signaling (Kydd and Walter 2006).

Despite the differences between this body of work and the theories of victimization as coercion discussed above, there are two important commonalities in the underlying strategic logic. First, civilian victimization is perceived as a strategic tool in competition between armed groups. Here the competition is not over information held by civilians, but rather over bargaining power in the eventual negotiations to end the conflict. Bargaining power is relative—a group's expected value of negotiations depends not only on its own willingness to walk away from negotiations, but also that of the other parties involved (Nash Jr. 1950).[6] Therefore, as in competition over information held by civilians, what matters most

[5] See Schelling (1966) and Slantchev (2003).

[6] Signaling theories posit an asymmetry between rebel group and government incentives, under the assumption that victimization is disproportionately costly for the government (Wood and Kathman 2014, 691). If this is true, then the outbidding logic we describe below may not apply to victimization aimed at signaling in civil conflicts with a single rebel group. However, if there are multiple non-state actors with

in competition for bargaining position is to come out on top.

The second key commonality in the strategic logic of coercive and signaling theories is the assumption that violence is costly to undertake. Victimization is employed instrumentally to gain a competitive edge, not because armed organizations desire or value violence in itself. This is inherent in the costly signaling logic expounded by Kydd and Walter (2006) and Wood and Kathman (2014). Simply put, civilian victimization cannot be a costly signal unless it is costly. The argument that violence against civilians signals a group's willingness to keep fighting relies on the assumption that less-resolved groups would be unwilling to victimize civilians.

Our Theory: Competitive Outbidding

We build on these common theoretical ideas about violence against civilians as a tool of competition among civil war actors. Our central theoretical claim is that this competition produces *outbidding* in combatant groups' choice to victimize civilians. In the terminology of economic theory, we theorize that the strategic logic of competition produces strategic complements in the use of civilian victimization, meaning victimization by one group increases the incentives for others to victimize.[7]

The two main premises of our theory draw from the strategic logic common to both the coercion and signaling theories described above. First, we assume that whatever benefit a group derives from victimizing civilians is primarily relative or positional—i.e., the value of the resources gained depends on how much of that resource the group's competitors possess. For now, we remain agnostic about the exact nature of the benefit derived from victimization; it could be tactical information, material resources, or positioning for postwar bargaining.

distinct preferences—as we observe in Colombian case here, as well as in complex conflicts like the Syrian civil war—then the outbidding logic should still apply to strategic interactions among them.

[7]The converse of strategic complements are *strategic substitutes*, when taking an action decreases others' propensity to do the same. Strategic complements and substitutes have been studied in a wide variety of economic settings (Bulow, Geanakoplos and Klemperer 1985; Milgrom and Roberts 1990).

What is important is that the benefits come primarily from possessing more of the resource than one's competitors do.[8] Our second premise is that violence is a costly choice, not valued in itself. In the absence of a political benefit, armed groups would prefer not to spend their manpower or material to victimize non-combatants.

Under these two conditions of absolute cost and positional benefits, we expect the logic of competitive outbidding to apply, producing strategic complements in armed actors' choices to victimize civilians. Our premises imply that civil war actors face a strategic tradeoff in the choice to commit violence against civilians. On one hand, because violence carries direct costs, armed groups would ideally refrain from violence—or at least minimize the extent to which they partake in it. On the other hand, by refraining from violence, a group risks falling behind in the competition for whatever resource or input is at stake. Facing this strategic tradeoff, the optimal policy for an armed group is to commit just enough violence to keep up in the competition. How much is enough depends on the choices of one's competitors, meaning there are strategic complements in civilian victimization.

The strategic calculus we outline here is analogous to the logic of standard price competition models in economics, as well as in competitive settings like the war of attrition, the all-pay auction, and the rent-seeking contest (Tullock 1980; Hirshleifer 1989; Grossman and Helpman 1994). In an economic competition like an auction where the highest bidder wins, the ideal strategic choice is to bid just barely more than one's competitor. The relationship between victimization and strategic success in civil war is much more uncertain and probabilistic than that between bids and victory in an auction, so we cannot make such a stark behavioral prediction in this context. Nevertheless, we should observe an overall strategic complementarity between victimization choices, as long as victimization represents costly competition over positional benefits.

[8] This would not hold if, for example, the purpose of victimizing civilians were to obtain commodities for the groups' own consumption or to be sold on the world market.

Our theory is closely related to the analysis by Wood and Kathman (2015) on competition between rebel groups and the extent of violence against civilians. They focus on the effects of competition on the whole in the conflict, finding that increases in the number of contenders and the intensity of violent conflict among them significantly predict the extent of violence against civilians in African civil wars. Empirically, they proxy for competition using differences in the number of groups involved over time, whereas we directly estimate strategic competitive incentives via our structural approach.[9] In addition, our empirical analysis covers a distinct geographical context (Colombia), so our data is at the local rather than national level, thereby removing potential unobserved heterogeneity across countries or conflicts. Theoretically, we extend the logic of competition, producing the novel prediction of strategic complements in victimization decisions.

Our theory of competitive outbidding captures the strategic logic that underlies both the coercion and signaling models of civilian victimization. While these theories comprise a substantial portion of the literature, there are also important alternative theories disputing the idea of victimization as a strategic choice. This research portrays violence as the consequence of principal-agent problems within armed organizations (Humphreys and Weinstein 2006; Abrahms and Potter 2015) or between armed groups and outside funders (Hovil and Werker 2005; Salehyan, Siroky and Wood 2014). Our theory is not incompatible with the idea that some violence occurs due to internal control failures or other principal-agent problems. But if these are the primary drivers of civilian victimization, then we should expect to see close to zero (substantively if not statistically) strategic complements in the choice to victimize. If each group would ideally prefer to refrain from violence but cannot stop some members from freelancing, then there should be no systematic increase or decrease in one group's incentives to engage in violence as a result of others' behavior.

[9]During the 1998–2005 time frame, the number of major combatants in the Colombian conflict remains constant, so this proxy would not explain variation in victimization during this time.

Unified Formal and Statistical Model

Our theory leads us to expect an interdependence in civil war actors' choices to victimize civilians. The key mechanism linking the choices of violence by distinct actors is strategic incentives, according to the outbidding logic outlined above. In this section, we develop a simple strategic model of the choice to victimize civilians, in which groups' utility from victimizing in a particular locality depends on both local characteristics and on other groups' choices to victimize. Our central claim amounts to a parameter restriction on this model—namely, that violence by one group increases its competitors' utility from violence (strategic complements).

To subject our claims to empirical scrutiny, we estimate the parameters of the model using local-level data on victimization choices. This structural estimation process identifies the form of the model that best comports with the observed data, allowing us to verify whether our prediction of strategic complements holds up, or if an alternative hypothesis (strategic substitutes or no strategic interdependence) fits better. Moreover, the unified formal and statistical framework allows us to address counterfactual questions about strategic behavior. Specifically, our approach allows us to quantify the extent of victimization due to competitive outbidding incentives (assuming we find that they exist) and to ask how the frequency of violence would decrease in the absence of such incentives.

Consider an interaction between two competing civil war actors, indexed $i = 1, 2$, in a given locality.[10] Each actor simultaneously chooses whether to victimize civilians, where $v_i = 1$ indicates victimization and $v_i = 0$ indicates no victimization.[11]

We assume an actor's utility from victimization is a function of three components. The first is a set of fixed local-level characteristics, collected in the vector $\mathbf{x}_i$. These rep-

[10] It is straightforward to extend the model to incorporate additional actors, or a finer distinction among types or levels of victimization. We analyze such extensions below. For now, we consider the simplest strategic environment for ease of exposition.

[11] We discuss why we assume simultaneous choices below.

resent systematic, predictable influences on a group's incentive to commit violence against the civilian population, such as economic factors or local political sympathies. The second determinant of the utility from victimization is the other group's choice of whether to victimize, v_{-i}. Whether violence by one group encourages or discourages violence by the other plays a key role in our analysis. Finally, we allow for idiosyncratic private influences on the group's choice, modeled as a stochastic shock $\epsilon_i(v_i)$ to its utility from each possible choice. This reflects the idea that civil war actors might not perfectly understand each other's incentives, and therefore cannot perfectly predict their competitors' behavior. In general we will assume these shocks are drawn from a distribution with full support on the real line, and in estimation we further assume that these distributions are type one extreme value.

After both players choose whether or not to victimize, they receive their payoffs from the game. Each player's utility function is

$$u_i(v_i, v_{-i}, \epsilon_i) = v_i[\underbrace{\mathbf{x}_i \cdot \beta_i}_{\text{local factors}} + \overbrace{v_{-i} \cdot \alpha_i}^{\text{strategic interdependence}}] + \underbrace{\epsilon_i(v_i)}_{\text{stochastic shock}}. \tag{1}$$

There are two parameters to be estimated in the utility function. The first is α_i, which characterizes how a group's net benefit of victimization depends on the other group's choice to victimize.[12] This is the most important parameter for our substantive purposes. If $\alpha_i > 0$, then the group has a stronger incentive to commit violence against civilians when it expects its rival to do so; i.e., violence against civilians exhibits strategic complements. This is what we would expect from our theory of competitive outbidding. However, the model also allows for the possibility that $\alpha_i < 0$, a group's incentive to engage in violence decreases when its rival does so (strategic substitutes), or that $\alpha_i = 0$, indicating no strategic interdependence. Meanwhile, the β_i parameters capture the impact of contextual variables—e.g., political,

[12]The *ex ante* expected utility (i.e., before the stochastic shock) for no victimization is normalized to zero, which is a standard identification condition in discrete choice models.

economic, and geographic characteristics—on the group's net payoff from victimization.

Notice that both sets of parameters may vary by group. One group's incentives may be more sensitive to the other's choice of victimization, or their responses could even move in opposite directions. In addition, local characteristics might also have varying influences on the players' incentives to commit violence against civilians. For example, in the Colombian context, the FARC may prefer to refrain from violence in municipalities that have supported left-wing parties in prior elections, while the AUC may be more inclined toward violence in these areas (Steele 2011; Fergusson et al. 2019).

As this is a game of incomplete information with simultaneous moves, our solution concept is Bayesian Nash Equilibrium (equilibrium hereafter). Because each player's utility is stochastic, in equilibrium each player has a probability $p_i \in (0, 1)$ of choosing victimization. In fact, per McKelvey and Palfrey (1995), an equilibrium is characterized by a pair of probabilities satisfying a rational expectations condition:

$$\begin{aligned} p_1 &= \Pr(\mathbf{x}_1 \cdot \beta_1 + p_2 \cdot \alpha_1 > \epsilon_1(0) - \epsilon_1(1)), \\ p_2 &= \Pr(\mathbf{x}_2 \cdot \beta_2 + p_1 \cdot \alpha_2 > \epsilon_2(0) - \epsilon_2(1)). \end{aligned} \tag{2}$$

Substantively, this means each group's strategy maximizes its own utility, given the probability with which it expects the other group to victimize civilians. The equilibrium condition requires that these strategic expectations be correct on average, in that neither group systematically over- or under-estimates the other's likelihood of engaging in violence given the local environment.

Our assumption of simultaneous choice is, of course, a simplification. In reality, there may be dynamic effects, as groups observe and respond to each other's choices. Nonetheless, the simultaneous model is the best choice for a unified theoretical and empirical model given the Colombia context. First, as in similar analyses of violence in Colombia (e.g.,

Acemoglu, Robinson and Santos 2013), we aggregate data over time in order to discern whether there is a systematic pattern of violence indicating a strategic choice, as opposed to idiosyncratic incidents. Given the amount of noise in the raw data, we do not believe the temporal sequences could properly be interpreted as sequential strategic responses. Second, as a practical matter, in order to estimate a sequential model of victimization decisions, we would need to specify a particular group to act as the first mover in each locality. We know of no principled way to do this, nor any way to infer from observed violence data which group had the first opportunity to commit violence (which may be different than the first group that actually committed violence). In light of these considerations, we see the simultaneous model as a reasonable approximation, particularly for uncovering the broad shape of strategic interdependencies in the choice to victimize.

We structure our empirical analysis around the simple game-theoretic model outlined above. Our goal is to identify the parameters of the model, namely the strategic effects α_i and the local influences β_i, that best correspond to observed interactions in a civil war context. With these estimates of the model parameters in hand, we are able to say whether expectations of victimization by one armed group increase or decrease the probability of victimization by its rival. The model itself is agnostic as to the nature of the strategic interdependence, if any, in the decision to use violence. But our estimation procedure selects the values of each α_i, as well as the covariate weights β_i, that maximize the likelihood of the observed data assuming players employ best responses as in Equation 2. Following from our theory of competitive outbidding in victimization, we expect to find $\alpha_i > 0$, indicating that each group responds in kind to expected victimization by its rival.

In the empirical estimation of the model, we assume a game of this form is played across a set of N localities, indexed $n = 1, \ldots, N$. In each locality, we observe the groups' victimization choices, (v_1^n, v_2^n), as well as local characteristics that might influence their base-

line incentive for victimization, $\mathbf{x}_1^n$ and $\mathbf{x}_2^n$.[13] To estimate the parameters of the model from this data, we follow a two-step procedure originally proposed by Hotz and Miller (1993). In the first stage, we obtain an initial estimate of each group's likelihood of victimization in each location, $\hat{p}_i^n$. It is important that these be consistent estimates of the true choice probabilities, so we calculate them via a nonparametric regression of victimization choices, v_i^n, on local characteristics, $\mathbf{x}_i^n$.[14] In the second stage, we plug these estimated choice probabilities into each group's expected utility, then find the utility parameters α_i and β_i that maximize the corresponding pseudo-likelihood.[15]

Our estimation approach faces two identification challenges. The first is to disentangle the effects of strategic expectations from those of municipality characteristics, given that we estimate $\hat{p}_i^n$ as a function of $\mathbf{x}_i^n$. This requires that each player's net payoff from victimization depend on a continuous variable that has no direct effect on its rival's payoff (Bajari et al. 2010). In our application to the Colombian case, we use the distance between the municipality and the group's area of early influence, as we discuss further in the next section. The second identification challenge is the possibility of multiple equilibria, as we do not incorporate equilibrium selection into our data model (see, e.g., de Paula 2013). Nonetheless, our two-step estimates are consistent in the presence of multiple equilibria as long as the following condition holds: in any pair of localities with the same observable characteristics, the same equilibrium is played. This is likely the case if the armed groups have interacted with each other over time under similar circumstances, as in our Colombian application.

[13] The covariates included in $\mathbf{x}_1^n$ and $\mathbf{x}_2^n$ may overlap. As we discuss below, however, for identification we need each of these to contain at least one covariate not included in the other.

[14] We use the Nadaraya–Watson kernel estimator.

[15] See Appendix C for details.

The Colombian Case

We estimate our strategic model of civilian victimization using data from Colombian civil conflict between 1998 and 2005. In this section, we provide some brief background on the Colombian case and explain our selection of this case to study strategic choices in violence against civilians.

The conflict we study began in the 1960s when the FARC originated in reaction to anti-communist repression from government forces. Other left-wing groups fighting the state included the Ejército de Liberación Nacional (ELN); the Ejército Popular de Liberación (EPL); and later, during the 1970s, the Movimiento Anapista 19 de Abril (M-19). At first, the FARC was a small band led by Manuel Marulanda, operating in the departaments of Tolima and Huila. Later in the 1970s and 1980s, it grew into a powerful national organization, financed by kidnappings and extortion.

The Cold War dynamics that characterized the initial stages of the conflict changed in the 1980s with the flourishing drug trade. The drug cartels of Medellín and Cali expanded their operations to the countryside and bought land and ranches in rural areas. Soon they faced extortion and kidnapping threats from the guerrillas, prompting the creation of paramilitary groups. These groups benefited from the existence of armed private organizations that already protected cattle ranchers, banana growers, and other rural elites (Gutiérrez-Sanin 2019). The Self Defense Forces of Puerto Boyacá—a port by the Magdalena River at the border of the departaments of Boyaca and Antióquia—was one of these groups. Originally financed by local landowners and businessmen, they later allied with the Medellín Cartel drug lord Gonzalo Rodriguez Gacha.

The Magdalena Medio region also saw the rise of the Peasant Self-Defense force of Córdoba and Urabá, led by the Castaño brothers (Carlos, Vicente, and Fidel) whose father, a cattle rancher, was murdered by the FARC in 1981. Although these self-defense groups

did not have official ties with the government, they benefited from national legislation like Law 48 of 1965 and Law 356 of 1994, which provided legal bases for the training of private citizens by the military and the creation of neighborhood watch groups.

In April 1997, representatives of major self-defense organizations meet in Antióquia to form the AUC.[16] The organization, led by Carlos Castaño, then rapidly accelerated its territorial expansion. During these years, the AUC would send groups of fighters from Antióquia and Córdoba across the country to join local private forces in military campaigns against the guerrillas and civilians deemed to be guerrilla sympathizers. The arrival of the paramilitaries often came with massacres, forced displacement, and kidnappings—which were, by their own accounts, part of their military strategy (Aranguren 2001).

While the paramilitary expansion occurred, the FARC entered into peace negotiations with the government in a demilitarized zone. Although negotiations were ongoing, the military confrontation between guerrillas and the government continued, and the FARC used the demilitarized zone to consolidate territorial control in the south and to expand operations to other regions. After multiple high-profile kidnappings and other violent actions by the FARC, the government cancelled the negotiations in 2002. That year, Álvaro Uribe, whose father was also murdered by the FARC, was elected president on an anti-guerrilla platform. Uribe continued the strengthening of the military that had started during the previous administration, and the government gained the upper hand in the conflict. At the same time, the Uribe administration started negotiations with the AUC, which agreed to demobilize in 2005.

We analyze the strategic interaction between the FARC and the AUC from 1998 to 2005. We divide these years into two periods: 1998–2001 and 2002–2005. The first period is marked by the expansion of the paramilitaries that followed the AUC creation and the failed peaced negotiations with the FARC. In this period, both groups were expanding their

[16] "Paramilitares se habrían unido" (Paramilitaries have united), *El Tiempo*, 20 April 1997.

operations throughout the country. The second period, on the other hand, is one of military retreat for the FARC and the transition to demobilization for the AUC.

In contrast with internal conflicts involving civilian victimization by state forces themselves, in Colombia the presence of a powerful paramilitary organization allowed rogue members of the military to delegate this task. The ties between members of the military and the paramilitary groups have been extensively documented (e.g., Human Rights Watch 1996, 2000; Aranguren 2001; Gutiérrez-Sanin 2019), and recent empirical evidence is consistent with the idea that paramilitary and state forces shared logistical support, arms, and ammunition (Dube and Naidu 2015). Because the government in part acted through the paramilitaries, and because state forces themselves victimized civilians far less often than non-state groups in our data, we do not treat the military as a separate strategic actor in our analysis. We do account for government influence in our empirical analysis by including proximity to army bases as a covariate as discussed further below. Finally, it is important to note that there is nothing about our modeling framework that would preclude its use to study strategic interactions between a government and rebel groups in other civil war contexts.

The Colombian case is particularly well suited for the study of strategic victimization. There are multiple armed actors contending for territorial control, while at the same time pursuing peace negotiations or disarmament talks with the government. Contention for territorial control is an important scope condition for theories of victimization as a tool of civilian coercion (e.g., Kalyvas 2006) while the pursuit of negotiations is an assumption of theories of victimization as a costly signal in bargaining (e.g., Wood and Kathman 2014). Therefore, our theory of competitive outbidding, which draws on the strategic logic of these theories, ought to apply in the Colombian case.

Data quality is another paramount consideration in case selection. In order to estimate our model, we must be able to identify not only when and where civilian victimization took place, but also which group was responsible for undertaking attacks. As we describe in

further detail in the next section, recent efforts by the Colombian government and nongovernmental organizations have given scholars access to a complete dataset with the information we need regarding the timing, location, nature, number of victims, and identity of the perpetrator of violent events.

Data and Measurement

Our unit of observation is the municipality–period (either 1998–2001 or 2002–2005). Our information on civilian victimization comes from a database of conflict related events created by the Grupo de Memória Histórica, which was established in 2011 to gather and disseminate accurate information about Colombia's internal conflict. The database is based on reports from 10 sources, including the Interamerican Commission of Human Rights, official confessions from paramilitaries given to prosecutors, the Permanent Committee for the Defense of Human Rights, and the periodical *Noche y Niebla* published by the NGO Centro de Investigación y Educación Popular (CINEP). An advantage of these data is that the information was compared across all main sources to avoid duplication and misreporting. The CINEP information was originally collected from reports of 25 newspapers and complemented by reports of the Catholic church and the local public ombudsmen. The Catholic church reports are particularly valuable given the church's widespread presence across the Colombia and its neutral role in the conflict. Given its increased geographic coverage and the lower risk of ideologically driven misreporting, the CINEP reports have been used as a key input in other Colombian conflict datasets (e.g., Restrepo, Spagat and Vargas 2004).

For each incident in which civilians were killed, the dataset reports the geographic location, dates, groups involved, and the number of victims. Incidents are classified into six categories: massacres, selective killings, incursions into population centers, clashes between armed groups, attacks to infrastructure, and terrorist attacks with explosives. Massacres are

defined as the intentional killing of four or more civilians under the same set of circumstances. Selective killings are those in which three or fewer civilians are killed in the same incident. The terrorist attacks exclude attacks to infrastructure or to military targets.

We use this classification scheme to construct the dependent variables in our primary analyses. We construct a binary indicator for whether a group systematically chose to attack civilians in each municipality–period. In particular, we code victimization as occurring if the fraction of civilians killed intentionally by the group (victims of massacres, selective killings, or terrorist attacks) out of the total of the group's victims is above the sample median.[17]

The Grupo de Memória Histórica data only include incidents in which civilians were killed, but we also need to identify places where armed groups operated but where there were no civilian victims. To do this, we follow a growing literature on Colombian conflict that uses cumulative general violent incidents involving these groups to create indicators of presence (Acemoglu, Robinson and Santos 2013; Fergusson et al. 2016; Ch et al. 2018). We use information from the Centro de Estudios sobre Desarrollo Económico (CEDE) whose information comes from the Observatory of Human Rights of the Vice-Presidency and the National Department of Planning.[18] The CEDE dataset reports attacks with explosives, incendiary terrorist acts, assaults to private property, homicides, ambushes, kidnappings, incursion to population centers, overland piracy, illegal checkpoints, attacks to politicians, clashes with the state armed forces, and demobilization of its members. We code an armed group as present in a municipality in the period of interest if (1) the average of the annual number of violent incidents involving this group is above the median across municipalities or (2) the group engages in systematic civilian victimization as defined above. Admittedly, an indicator of presence based on observed violent actions might not accurately reflect the actual

[17] Formally, the indicator is coded as 1 if $\frac{\sum_{a \in C} K^i_{m,t,a}}{\sum_a K^i_{m,t,a}}$ is above the median of these fractions across municipalities and groups, where $K^i_{m,t,a}$ is the number of civilians killed by group i in the period t in municipality m in a type of attack a and C is the subset of types of attacks in which the intention was to kill civilians (massacre, selective, terrorist).

[18] The original sources of these data are newspaper and national police reports.

presence of non-state armed groups. Below, we undertake a number of tests to asses the robustness of our results to different assumptions about measurement error in our presence indicator.

As noted above, for each actor in our data, we need a variable that affects that actor's payoffs from victimization but does not directly affect the payoffs of other groups. For this we use the distance between the municipality and each group's respective area of early influence. Larger distances from areas where a group had an early influence could affect the perceived dominance of that group, its military capabilities, and itsw ability to maintain discipline among the troops—all of which might determine victimization choices. For example, the paramilitaries were known to send their most experienced fighters to different areas of the country to train new troops (Gutiérrez-Sanin 2019). It is more likely that those experienced fighters are located in areas where the paramilitaries first appeared. Once we hold constant other municipality–period characteristics (as described below), it is plausible that the distance to the place of origin of one group affects the payoffs of its rival only indirectly through the group's victimization choices.

We identify the areas of early influence using several sources on the historical development of each group (González 1991; Alonso 1997; Bejarano 1997; Carlos Medina Gallego 2009; Centro Nacional de Memoria Histórica 2014; Molano 2015; *Verdad Abierta* 2019). We compute the distance by road connecting each municipality to the closest municipality of early influence for a each group.[19] The early areas of influence of the FARC include 25 municipalities where the FARC operated in the mid-1960s, most of them in the departments of Huila and Tolima south of the capital, as well as municipalities where important bases operated in the 1970s and 1980s, such as Casa Verde in the municipality of La Uribe, Meta. We also identify 12 municipalities with self-defense group influence during the early 1980s. Most of them are located in the central area of the Magdalena River basin, the department

[19]If no road connects the municipalities, we use the distance along the geodesic.

of Meta, and the north of Antioquia.[20]

We account for the influence of political, economic, and other contextual variables that affect baseline variation in victimization across municipalities. Colombia's democracy has been regularly affected by the influence of armed groups in elections, and voting patterns have been found to drive violence (Acemoglu, Robinson and Santos 2013; Steele 2011; Balcells and Steele 2016; Fergusson et al. 2019). Because of this, it is important to control for pre-determined proxies of political preferences. As baseline controls we use data on the 1994 and 1998 national elections from the Registraduría Nacional to build the share of votes for left parties in the Senate following the classification of parties on the left used in Acemoglu, Robinson and Santos (2013).[21] We also include the standard deviation of the liberal party's election share in the 1974–1994 presidential elections as a proxy for stability of political preferences. Other controls are the fraction of the population with unsatisfied basic needs, the gini coefficient, the share of municipal revenue from royalties associated with the exploitation of oil and other minerals, the area of the municipality where coca is grown, and the distance to the Magdalena River.[22] All these variables come from the CEDE database.[23] Summary statistics for all contextual variables are reported in the online Appendix A.

As mentioned earlier, we do not treat government forces as separate actors in the victimization analysis, given the extensive links between paramilitary groups and rogue elements in the military.[24] It is important, however, to account for the presence of government

[20]The online Appendix B includes a map with the municipalitites of early influence of the FARC and the AUC.

[21]Using as an alternative proxy for left wing support, the vote shares of Jaime Pardo Leal a Unión Patriótica (unofficial political wing of the FARC) presidential candidate in 1986, gives us substantively similar results.

[22]We also examined specifications where the main measure of inequality was the time invariant land inequality measured in 1985 finding similar substantive results.

[23]We compute the gini coefficient and the unsatisfied basic needs index at the beginning of the period of analysis using a cubic spline interpolation. The original census data is only available for 1993 and 2005.

[24]Using the same indicators of victimization to government forces we find that in only 0.94% of all the municipality-period observations the police engages in civilian victimization. The number for the military is 8.23%. These numbers are relatively low compared to the FARC's 21% (in places where it operates) and the paramilitaries' 70%.

forces given the multiple ways their actions can alter the relative benefits and costs of victimization for the non-state armed groups. To this end, we identify the location of army military bases using information published in the Colombian Army web portal.[25] As a baseline control, we use the distance along the geodesic between the closest army base and a given municipality augmented by the variability of altitude connecting these points.[26] This is to account for potential difficulties to government force movement due to the mountainous terrain of Colombia.[27]

Variation in Victimization

As a first look at the data, Table 1 reports the frequency of victimization by the FARC and the AUC in municipality-periods in which both are present. We see that the FARC chooses to victimize civilians in 24% of these cases. The AUC exhibits a stronger proclivity to attack civilians, doing so in 70% of these observations. At a glance, the two groups choose the same action in less than half (45%) of these municipality-periods. But when we account for each group's baseline rate of civilian victimization, we see a tendency for each group to match its rival's actions, as illustrated in Figure 1. In particular, the proportion of victimization by the FARC is higher in those observations where the AUC victimizes (28%) than where the AUC does not (15%). The pattern is similar for the AUC, which victimizes 80% of the time where the FARC does so, compared to 66% where the FARC does not.

In the raw data we also see geographical variation in both groups' victimization strategies, even at small scale. To illustrate, Figure 2 shows the civilian victimization choices of the FARC and AUC during 2002–2005 in the department of Antioquia, where both groups

[25] Military bases that were built during the period of analysis or later are not included.

[26] We use the the distance along the geodesic multiplied by one plus the variation of altitudes along the same path. We take the variation of altitudes from Acemoglu, García-Jimeno and Robinson (2015).

[27] A map with the location of bases is included in the online appendix. Our main results are robust to using the distance without accounting for elevation changes.

	AUC		
	No Victimization	Victimization	Total
FARC			
No Victimization	156	308	464
	[25.49]	[50.33]	[75.82]
Victimization	28	120	148
	[4.58]	[19.61]	[24.18]
Total	184	428	612
	[30.07]	[69.93]	[100]

Table 1. Frequency of victimization patterns across all municipality-periods in which the FARC and the AUC were both present. Percentages are reported in brackets.

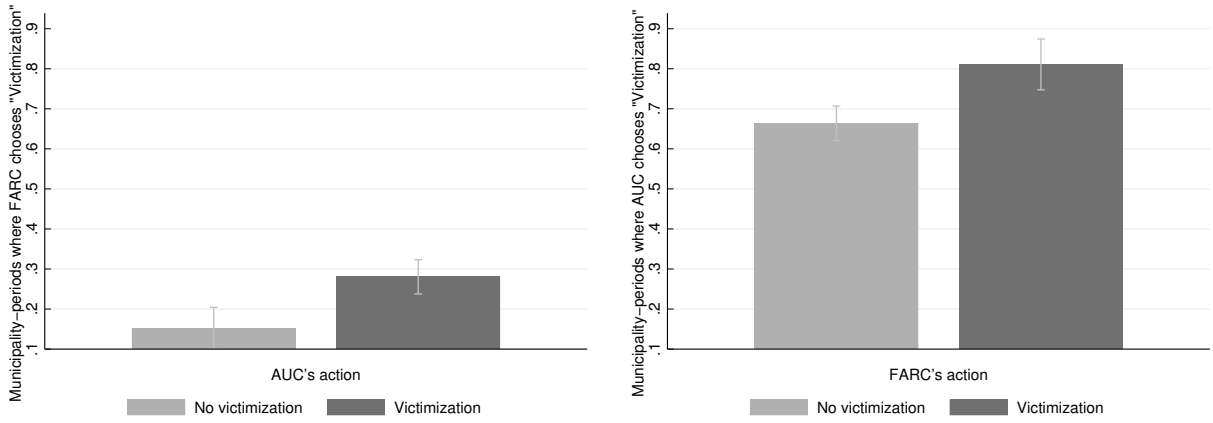

Figure 1. Each group's propensity to victimize civilians as a function of the other group's victimization choice. Error bars represent 95% confidence intervals.

had widespread presence. Solid dots represent systematic victimization of civilians, while crosses denote no victimization. We observe many municipalities where the choice of victimization is different than in neighboring municipalitites, which suggests that the treatment of civilians by armed groups is determined by localized factors. A similar picture emerges if one examines other regions of the country.[28]

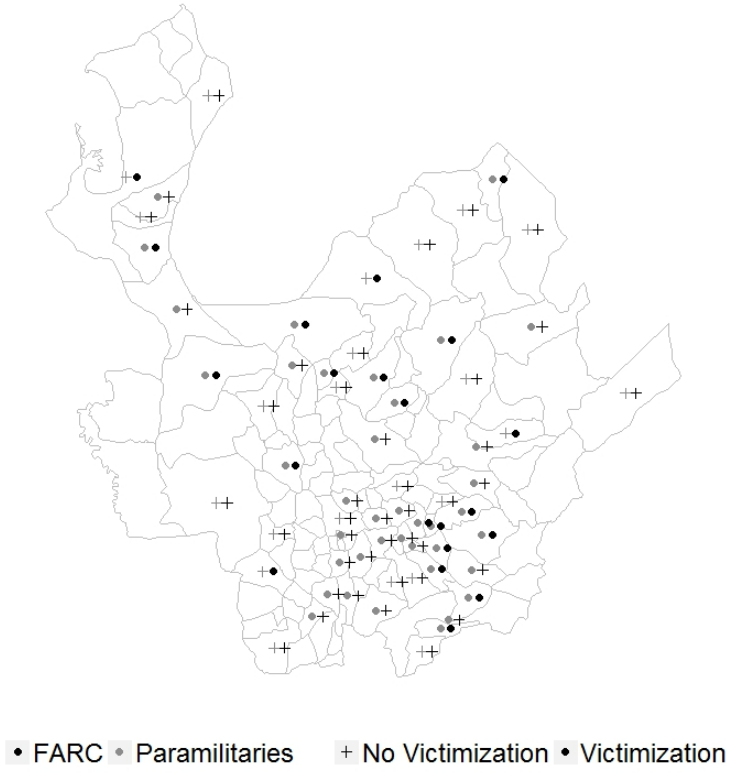

Figure 2. Geographical variation in victimization strategies, Antioquia 2002–2005.

Structural Estimation Results

We now estimate the parameters of the utility functions (Equation 1) of the FARC and the AUC, assuming the data are generated by equilibrium play of the victimization

[28]The online Appendix B presents the equivalent map of the country.

game described above. Recall that our goal is to characterize the effect on each group's utility of its rival's choice to victimize civilians, parameterized in our model by α_i. We also estimate the influence of municipality–period covariates, which are collected for each group in the parameter β_i. Table 2 presents our parameter estimates. A coefficient in the table can be interpreted as the change in log odds for choosing to victimize civilians relative to not victimizing them when a given explanatory variable changes by one unit.

In line with our theory of competitive outbidding, we find strong support for the presence of strategic complements in victimization decisions between the FARC and the AUC. As seen in Panel A, each group's payoff from choosing victimization increases with the probability of its rival doing the same. For example, if the FARC expected the AUC to increase its probability of victimization of civilians by 18 percentage points (a standard deviation in the sample), this would increase the odds of the FARC choosing victimization by 1.18 ($\approx e^{1.882} \times 0.18$). Broadly speaking, this result conforms with the idea of victimization as outcome of strategic interactions between civil war actors. We see that the choice of victimization is responsive not only to local conditions, but also to the expected decision of one's rival. In a counterfactual analysis below, we quantify just how much violence can be traced to these strategic competitive incentives.

Turning briefly to the estimated weights on predetermined characteristics, we see a few notable patterns. The FARC is more likely to victimize civilians in poorer regions and those who live closer to its early areas of influence. The AUC, on the other hand, is more likely to victimize those who live far from its areas of early operations, in poor regions, in places with more stable political preferences, and in the period 2002–2005, when it was preparing to demobilize. It is noteworthy that the municipality-level influences tend to work differently for each group. With the exception of population, each covariate that has a statistically significant impact on one group's utility has the opposite sign in the other group's utility function. This further increases our confidence that the tendency of the FARC

and the AUC's victimization decisions to coincide, reported above in Figure 1, is because of competitive outbidding incentives, not because certain types of municipalities are generally more attractive targets for violence.

	FARC	AUC
Panel A. Strategic factors: α_i		
Rival's victimization probability	1.882***	2.306***
	(0.363)	(0.461)
Panel B. Controls: β_i		
Coca area	-0.046	0.127
	(0.179)	(0.184)
Distance army base	-0.002	0.001
	(0.001)	(0.001)
Distance group's place of origin	-0.003**	0.002**
	(0.001)	(0.001)
Distance Magdalena river	0.002	-0.004**
	(0.002)	(0.002)
Gini	1.178	1.918
	(1.761)	(1.269)
Period 2002-2005	0.336	-0.48**
	0.229	0.224
ln(Population)	0.096	0.382**
	(0.139)	(0.159)
Poverty	0.026***	-0.013**
	(0.007)	(0.006)
Royalities (oil)	0.165	-1.192
	(1.111)	(0.982)
Variation Liberal party vote share	-1.018	7.13***
	(2.858)	(2.613)
Vote share left	0.02	0.015
	(0.017)	(0.018)
Log likelihood		-650.58
Observations		612

Table 2. Maximum likelihood estimates of the parameters of the civilian victimization model. The model includes region intercepts. Bootstrapped standard errors are in parentheses. *: $p < 0.1$, **: $p < 0.05$, ***: $p < 0.01$.

Figure 3 shows the average (across municipality-periods) probability of victimization by the AUC and the FARC under different assumptions about how victimization by a rival affects the group's own choice. The estimates at the top give the average probability of victimizing civilians according to our parameter estimates; notice that these are quite close to the raw proportions reported in Table 1. The estimates at the bottom represent the coun-

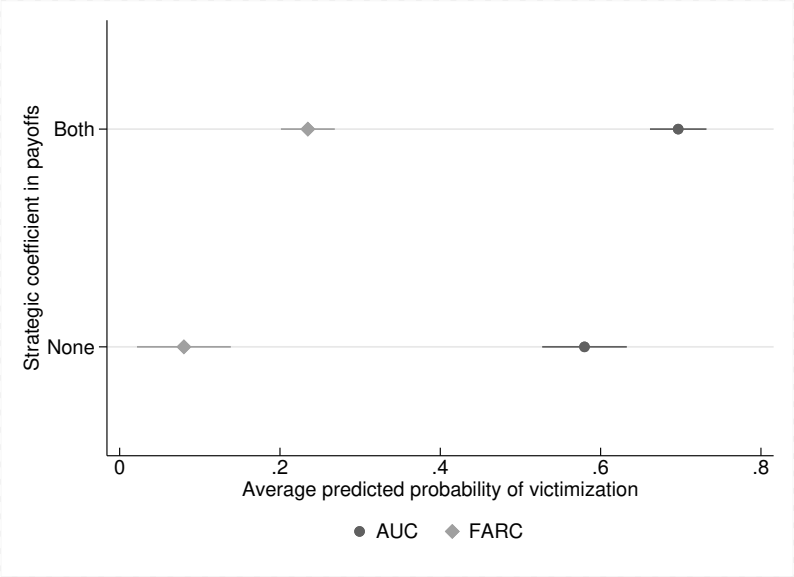

Figure 3. Counterfactual estimates of the probability of victimization by each group if competitive outbidding incentives were not present. Lines represent 95% confidence intervals.

terfactual average probability of victimization if both groups chose violence independently from their rivals' choices.[29]

This counterfactual exercise demonstrates the substantive strength of competitive outbidding as a driver of violence against civilians. According to our results, if these incentives did not exist and each group no longer cared about the violence exerted by its rivals, overall violence against civilians would be much lower. In particular, the FARC victimizes civilians on average with a probability of 24% in our baseline model. If the FARC were not accounting for the AUC's decision to use violence, its average probability of victimization would drop to 8%. In other words, about two-thirds of the violence committed by the FARC can be traced to these competitive incentives. The AUC would experience a similar 12 percentage point decrease in its probability of victimization if its utility did not depend on the FARC's decision, meaning about one-sixth of AUC violence is driven by competitive

[29]Specifically, it is the average probability of violence if we were to fix $\alpha_{\text{AUC}} = \alpha_{\text{FARC}} = 0$; or, equivalently, if each group expected zero violence by its rival.

incentives. We can also interpret the estimates at the bottom of the figure as the predicted victimization if the group's rival were no longer present in the municipality or if the rival were not engaging in civilian victimization. This shows how victimization by each group would change if the government forces drove its rival out of a municipality while the remaining group chooses to commit violence optimally.

Robustness Checks

We first consider the robustness of our results to alternative sample inclusion criteria. As described above, we use the CEDE dataset to identify municipalities in which armed groups operate but do not engage in systematic violence against civilians according to the Grupo de Memória Histórica information. Although our temporal aggregation should reduce the noise in the data, it is still possible that we have excluded municipalities where groups operated undetected or included those where groups tended not to operate but were detected in a one-off incident.[30] This can potentially bias our estimates. In this section, we examine these issues with two robustness checks. In the first one, we address potential under-inclusion by adding municipalities with only one group present to the baseline sample. To estimate our model in this case, we impute the beliefs of the group that is present about whether its rival would victimize civilians if it were present as well. In the second exercise, we vary our threshold on the number of incidents in the CEDE data that determine whether a group is considered to be present or not.

Recall that in our main analysis, we code an armed group as present in a municipality-period if the average number of CEDE incidents involving the group is above the pooled sample median or if the group engaged in civilian victimization there. With this coding,

[30]Using yearly data and survey based information in a subsample of municipalities, Arjona and Otálora (2011) find that indicators of presence based on the CEDE information underestimate presence of both FARC and AUC. Ch et al. (2018), however, show significant correlations of CEDE indicators of presence with measures based on areas where the groups demobilized for the periods 2007–2010 for the FARC and 1997–2002 for the AUC.

we identify 402 municipality-periods where only the FARC entered and 193 municipality-periods where only the AUC did. Our baseline sample excludes these observations, but in the first robustness exercise, we add them by imputing first-stage beliefs. If group i enters a municipality-period but its rival $j \neq i$ does not, we first assume i believes its rival j uses violence with probability $\frac{1}{2}$. That is, the group has maximum uncertainty about what its rival does. We also explore the scenario where i believes j uses violence with probability equal to j's pooled propensity to use violence, as measured in Table 1. These exercises add considerable noise to the estimation of the groups' best responses because, in more than half of the new sample, we are estimating the entering group's beliefs about a rival that does not in fact enter.

	Exercise	α_i	SE	t	p-value
Including single-entrant municipality-periods					
FARC	Random beliefs	1.55	0.52	3.01	<0.01
AUC	Random beliefs	1.57	0.49	3.23	<0.01
FARC	Mean beliefs	1.49	0.62	2.40	0.02
AUC	Mean beliefs	2.17	0.66	3.27	<0.01
Alternative entry criteria					
FARC	75% percentile	2.85	0.87	3.24	<0.01
AUC	75% percentile	3.37	0.99	3.41	<0.01
FARC	25% percentile	1.60	0.49	3.25	<0.01
AUC	25% percentile	2.67	0.77	3.48	<0.01
Alternative first-stage model					
FARC	Leave-one-out	2.58	0.91	2.85	<0.01
AUC	Leave-one-out	2.34	0.99	2.36	0.02

Table 3. Robustness of the strategic spillover parameter estimates across four alternative sample selection rules and first-stage estimates. Standard errors are estimated from the outer product of gradients.

With the expanded sample and the two methods of imputed beliefs, we re-estimate the model, and the first four rows of Table 3 report the strategic interdependence parameters. When compared to Table 2, the expanded samples indeed attenuate the strategic

complementarities in violence decisions, but the coefficients are still positive and significant at conventional levels. Consequently, we are confident saying that our main finding—that competitive outbidding incentives drive violence that would not otherwise occur—is not an artifact of our sample selection criteria.

In the second robustness check, we explore stricter or looser criteria of presence. Specifically, we examine requiring the average number of CEDE incidents to be above the 75th or 25th percentile in the sample, in contrast with the 50th percentile threshold in our main analysis. In loosening the threshold, we account for the possibility that low levels of reported group activity actually reflect a group's dominance (Kalyvas 2006). As noted by Ch et al. (2018), presence without reports of illegal activities is unlikely to occur in long periods of time because challenges by other groups eventually arise as well as opportunities to exploit that dominance by breaking the law. Nevertheless, our main results persist under these alternative criteria—see the middle four rows of Table 3. Even when municipality-periods where both groups are choosing not to victimize are eliminated by adopting a much more stringent requirement to classify groups as entering the municipality (CEDE incidents above the 75th percentile), we still find significant strategic complementarities. The strategic complementarities are also maintained if we include municipalities where one group's dominance might induce the other not to engage in many illegal activities captured by the CEDE indicators. In general, the coefficients reported in Table 2 are on the more conservative side.

We also would like to ensure that our finding of strategic complements is not driven by revenge dynamics or other non-strategic behavior within a municipality. Specifically, we want to ensure that our first-stage estimates of victimization probabilities only capture *ex ante* strategic expectations, not *ex post* observed violence within the given municipality. To this end, we recalculate our choice probability estimates using a leave-one-out procedure: to estimate each municipality's victimization probabilities, we take out-of-sample predictions

from a model trained using only the data from outside that municipality.[31] This rules out the possibility that our estimated *ex ante* probability of victimization is mistakenly picking up realized victimization within the given municipality. The estimated strategic complements in this robustness check are even stronger than those in the baseline model, as shown in the bottom rows of Table 3. This reinforces our claim that the correlation between FARC and AUC victimization is driven by strategic expectations in a competitive outbidding process.

Finally, we explore the robustness of our findings to changes in the controls used in the players' utility functions. Our ability to identify the strength of competitive incentives resides in isolating characteristics of the municipalities that could make different non-state armed actors treat civilians in the same way. Although our baseline specifications covers key demographic, economic, and political determinants of violence, as well as time-invariant region characteristics, it is possible there are still sources of unobserved heterogeneity driving our findings. To address this, we estimate a model in which we replace the region intercepts with state intercepts, a finer-grained geographical grouping. A drawback of this specification is that by focusing on within-state comparisons, the explanatory power of the distance to an armed group's early place of influence is necessarily reduced. With this caveat in mind, Table A3 in the online Appendix A presents the parameters of interest, showing that there are still strategic complementarities in the use of violence. Finally, we estimate a model that includes interaction terms of the period 2002–2005 dummy with all time-invariant municipality characteristics, finding substantively similar results.

Mechanisms of Competition: Coercion or Signaling?

Our theory of competitive outbidding in civilian victimization draws from two broad bodies of literature on the motivations behind violence against civilians in civil war, one

[31] Full details of the procedure and full coefficient estimates are reported in Appendix D.

portraying it as a tool to coerce civilians and the other viewing it as a way to signal resolve in postwar bargaining. We have argued that our baseline prediction—strategic complements in victimization decisions by rival armed groups—is broadly compatible with the strategic logic underlying both of these bodies of theory. Nevertheless, there remain important differences between these theories. In this section, we draw out distinct auxiliary implications about strategic behavior in civilian victimization from each of these theories. We then conduct additional analyses to identify which competitive mechanism finds more support in our data on the Colombian case. On the whole, we find more support for the idea of victimization as a tool of civilian coercion.

Selective versus Non-Selective Violence

Following the logic of violence as coercion, Kalyvas (2006) argues that only selective violence is effective at engendering civilian assistance. If civilians are liable to be the target of violence regardless of their choice to defect, then they have no reason not to defect. Consequently, we should expect to see strategic complements primarily in the choice of selective violence. Moreover, non-selective violence by one group should lower the amount of selective violence by its opponents (Wood 2010). Non-selective violence, by making civilians less sympathetic, decreases the price other groups must pay to buy their cooperation—i.e., it reduces the threat of selective violence necessary to prevent defection.

By contrast, if violence is primarily a tool to signal resolve, then we should expect a different pattern of strategic spillovers in the choice of non-selective violence. More frequent and less restrained attacks should convey the power to hurt even more strongly than selected limited killings. By this logic, competitive outbidding—and thus strategic complements—should be present in non-selective violence as well as in selective attacks.

To parse out these competing explanations, we extend our model, allowing for three choices of victimization: none, selective, or non-selective. For the municipality–periods in

our sample, we code no victimization the same as above. For the cases coded as victimization in our baseline analysis, we identify victimization as selective if the ratio of civilians killed in selective attacks to civilians killed in all intentional attacks (selective attacks plus massaces and terrorist attacks with explosives) is above the sample median. All other cases are coded as non-selective victimization. We then estimate an extended version of the model, in which each group's net utility to each variety of victimization depends on the type of victimization by its rival.[32]

Figure 4 presents the estimated best responses of this extended game.[33] Three observations are apparent. First, the FARC and the AUC respond with a higher chance of selective attacks when expecting selective attacks. This is consistent with the logic of victimization as coercion, which highlights the role of selective victimization as a tool to garner information. Second, each group's incentive to choose non-selective violence seems invariant to its rival's choices. This contradicts the logic of non-selective violence as a particularly effective mechanism to signal the power to hurt. Third, non-selective violence by one's rival raises the incentive for both groups, especially the FARC, to engage in selective violence. This does not directly contradict the logic of violence as signaling, but it shows a preference for each group to exercise restraint even when its rival does not, which lines up more closely with the logic of violence as coercion.

In addition to providing some leverage over these competing explanations for victimization, the analysis of types of violence also helps rule out an alternative explanation for our baseline findings. While we view our baseline results as evidence for a strategic outbidding incentive in violence against civilians, one might worry that our results are instead driven by non-strategic revenge dynamics in civil war. According to this class of explanation, a

[32] As we now have three actions per player, we adopt a semiparametric approach to first-stage estimation. We use a multinomial model with cubic splines for continuous explanatory variables to initially estimate each group's probability of choosing no violence, selective violence, or non-selective violence in each municipality–period.

[33] Full results are reported in Table A5 in Appendix A.

group's victimization choice triggers an emotional response in the opponent, leading to a non-strategic cycle of violence. Such an explanation could be aligned with theories that emphasize failures to control the troops (e.g., Weinstein 2007), as these emotional responses are likely to come from soldiers and lower-ranking officers who might not fully consider the full strategic consequences of their actions. Given how we aggregate data, if such revenge-based attacks occurred, our baseline model might mistakenly identify them as strategic complementarities.[34]

The results of our extended model do not appear to be consistent with such revenge dynamics, however. If violence against civilians were an emotional response triggered by victimization of the enemy, one would expect such responses to be stronger when the attacks were less restrained. This is not what we observe in Figure 4. Instead, non-selective victimization by the FARC barely alters the AUC's incentives; non-selective violence by the AUC weakly increases the chance of selective violence by the FARC, but does not change the chance of non-selective violence.

Actors with Similar Policy Preferences

Theories of victimization as a signaling mechanism emphasize the importance of positioning for postwar negotiations. We have argued that this produces a competitive outbidding logic between groups with competing goals. However, because violence against civilians is costly, then the signaling model should predict *free-riding* dynamics between groups with similar goals. If one group commits violence against civilians, thereby moving the expected postwar settlement toward its own ideological goals, then other groups that share those goals have less incentive to incur the costs of violence themselves. Therefore, under this class of explanation, we ought to observe strategic substitutes among ideological allies in the choice of violence.

[34] See also the robustness check in the previous section for an alternative method around this problem.

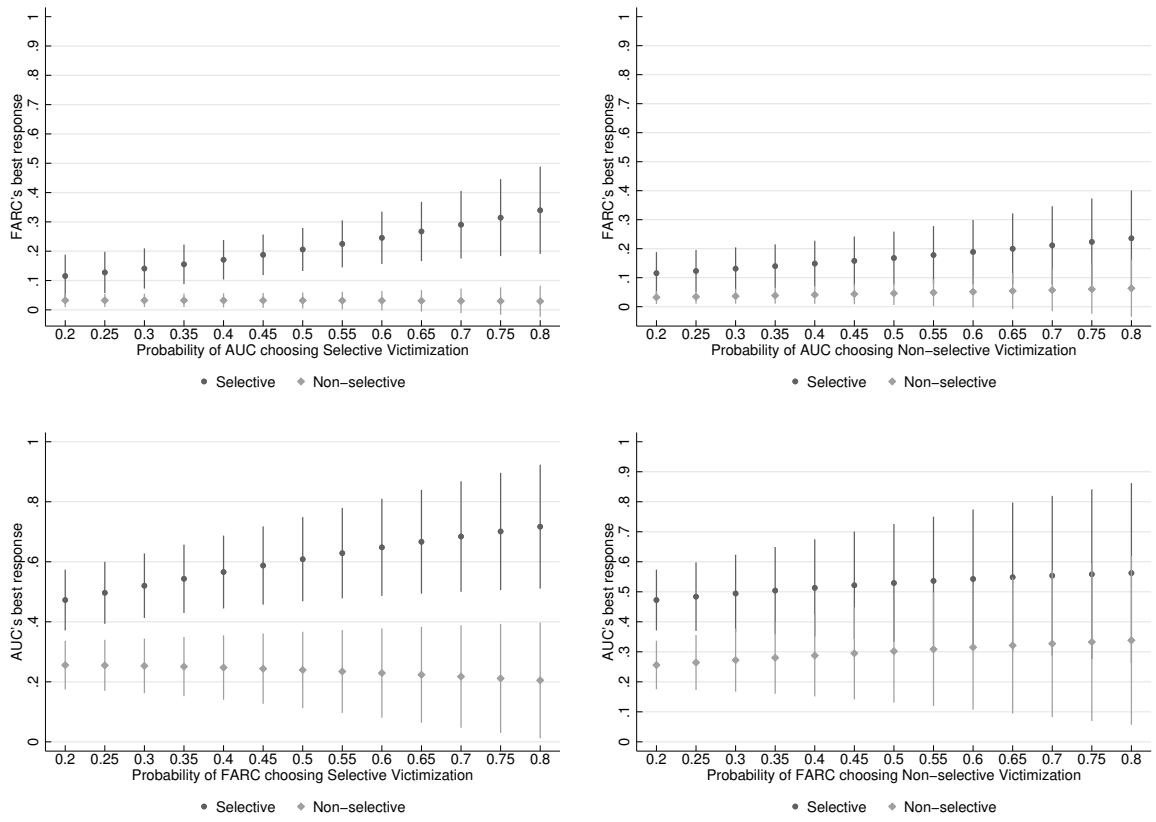

Figure 4. Estimated best response functions when we distinguish selective and non-selective violence.

To evaluate this prediction, we introduce a third actor to our model: the ELN, the second-largest left-wing guerrilla group in Colombia. The ELN was organized during the 1960s by radical members of left-wing political organizations and Catholic priests associated with the liberation theology movement. The goal of its founders was to replicate the Cuban revolutionary experience in Colombia. The ELN is relatively small compared to the FARC and the AUC. In 2002, the number of ELN combatants was calculated to be 4,000, while the FARC and the AUC had 19,000 and 12,000, respectively (Ugarriza and Ayala 2017). Although the FARC and the ELN operated jointly with other guerrilla groups during the period of 1987–1991, the groups sometimes clashed. The disputes were most often caused by competition over resources like royalties from mineral exploitation and control over drug trafficking routes.[35]

If civilian victimization in Colombia was aimed at influencing postwar bargaining positions, then we should observe clear strategic substitutes between victimization decisions by the ELN and its ideological ally, the FARC. On the other hand, if the purpose of victimization was to coerce civilians into cooperating, we should not expect such strong spillovers according to groups' ideological orientations. We extend the baseline model by including the ELN as a strategic actor and by allowing each player to have a separate strategic spillover parameter for each of the other two groups. Besides that, the information structure, timing, and available actions remain the same as in the baseline model.

Figure 5 presents the best responses computed after estimating the parameters of the three-player model. Contrary to what we would expect under the signaling mechanism, we find no evidence of strategic substitutes between the FARC and the ideologically similar ELN. It is important to note that during the period of analysis, the FARC sustained peace

[35]See, for example, "Enfrentamiento FARC y ELN" (Clashes between the FARC and ELN), *El Tiempo* 7 July 2000; "FARC contra ELN" (FARC against ELN), *Semana*, 3 February 2007; "Masacre in Cauca habría sido por enfrentamientos entre disidencia de las FARC y el ELN" (Massacre in Cauca linked to clashes between the FARC and ELN), *El Espectador*, 30 October 2018.

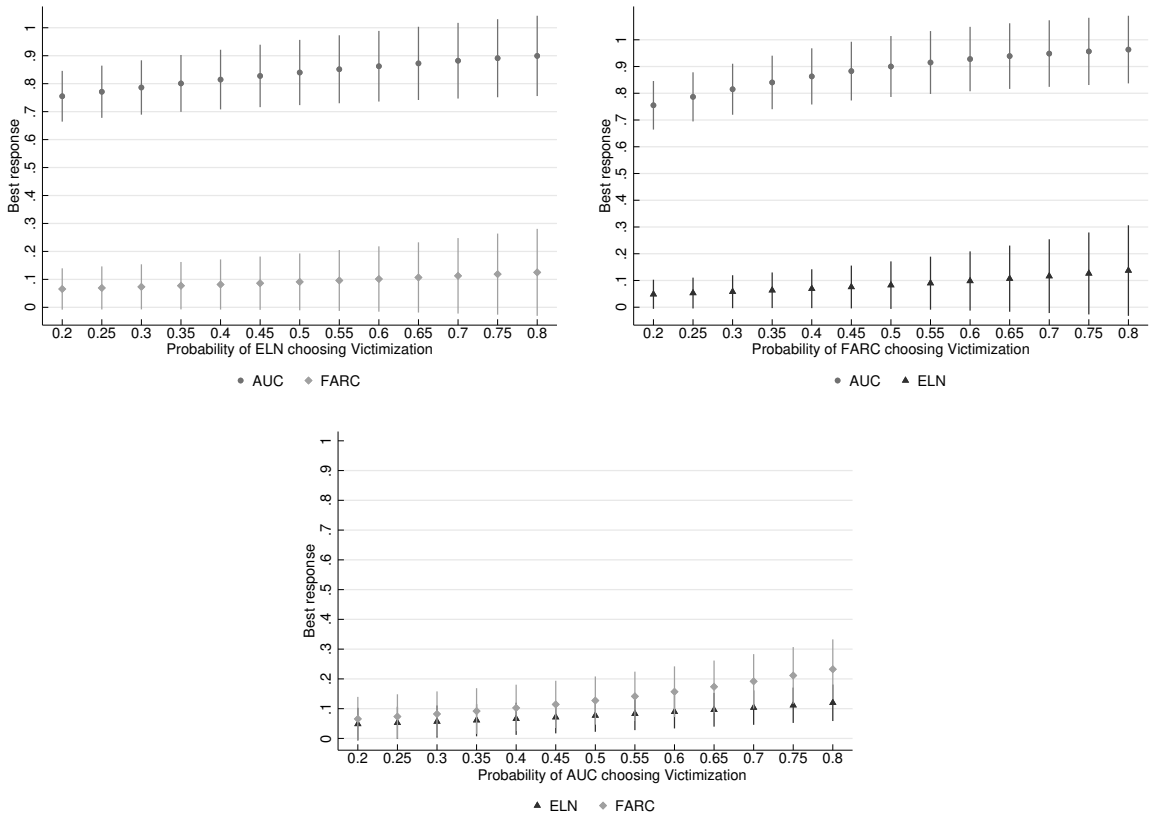

Figure 5. Estimated best response functions in the three-player extension.

negotiations with the government, a scope condition for these theories. Yet the ELN does not free ride on the victimization by the FARC that would theoretically push the government to offer policies favored by both left-wing guerrilla groups. If anything, the ELN responds with slightly more victimization when it expects victimization by the FARC.

A second observation is that the response of the paramilitaries to victimization by either guerrilla group is stronger than that of the guerrillas to each other's victimization decisions. This remains in line with our broader expectation of competitive incentives driving strategic complementarities between rivals. Moreover, given that the FARC and the ELN were not officially at war but clashed in some regions, we would expect the responses to each other's victimization to be attenuated—precisely what we observe in the figure.

Conclusion

Drawing from accounts of civilian victimization in civil war as a strategic choice by armed groups, we develop a theory of competitive outbidding as a causal influence on the extent of violence against civilians. We hypothesize that the expectation of victimization by a group's rivals increases the chance that that group will itself victimize civilians. We evaluate this hypothesis empirically in the context of the Colombian conflict and find strong support: violence would be about two-thirds lower for the FARC and one-sixth lower for the AUC if not for competitive outbidding incentives. Our prediction of strategic interdependence and our finding of such spillovers in the Colombian case are consistent with a wide set of theories about victimization as a strategic choice in a competitive environment. However, when we dig further in auxiliary analyses, we find more evidence that victimization was intended to coerce civilians than that it served as a signal for postwar bargaining in the Colombian case.

While we see the Colombian case as an ideal setting to test our theory, we expect our model to apply elsewhere as well. The basic premises of our theory—that victimiza-

tion has absolute costs and positional benefits—seem broadly applicable. Consequently, an important task for future research is to investigate the existence and magnitude of competitive outbidding incentives in other civil war contexts. Given appropriate data, it should be straightforward to adapt the structural estimation approach we take here to other civil war environments. In particular, in order to estimate strategic spillovers, we need to observe multiple interactions between the same actors, meaning any reasonable application of our empirical framework would require sub-national data.

An important avenue for theoretical and empirical extension is to incorporate civilians' strategic responses to the victimization decisions of armed groups. In order to study the strategic interactions between armed organizations, we have black-boxed the question of civilian behavior, simply assuming the armed participants see some strategic benefit to be gained. However, a recent line of behavioral research demonstrates that violence alters political attitudes and participation among its victims (Blattman 2009; Gilligan, Pasquale and Samii 2014; Bauer et al. 2016). One clear step for future theoretical research would be to characterize the assumptions about *civilian* incentives that could give rise to competitive outbidding dynamics between armed groups in victimization. For example, these dynamics might be reduced in contexts where civilians can coordinate on non-cooperation, effectively tamping down competition. A related empirical exercise would be to examine how strategic spillovers in victimization vary as a function of resistance, violent or nonviolent, by civilian populations in war-torn areas.

In addition to their theoretical interest, our findings also have some important lessons for policymakers. Insofar as violence against civilians results from a competitive process, this means a direct reduction in victimization by any single group should have beneficial externalities. In an environment with competitive outbidding, as the chance of violence by one group decreases, so too does the incentive for others to commit violence, as less is required to keep up in the competitive process. If a third party with leverage over a civil war

actor—e.g., a geopolitical ally of a government, or an external funder of an insurgency—can persuade its protege to refrain from victimization against civilians, doing so might have the indirect effect of reducing violence by the other side as well. If the effects of competitive outbidding are similar in other civil wars to what we find in the Colombian case, then these indirect effects could mean substantial increases in human welfare.

References

Abrahms, Max and Philip BK Potter. 2015. "Explaining Terrorism: Leadership Deficits and Militant Group Tactics." *International Organization* 69(2):311–342.

Acemoglu, Daron, Camilo García-Jimeno and James A. Robinson. 2015. "State Capacity and Economic Development: A Network Approach." *American Economic Review* 105(8):2364–2409.

Acemoglu, Daron, James A. Robinson and Rafael J. Santos. 2013. "The Monopoly of Violence: Evidence from Colombia." *Journal of the European Economic Association* 11(S1):5–44.

Alonso, Manuel A. 1997. *Conflicto armado y configuración regional: El caso del Magdalena Medio*. Medellin, Colombia: Universidad de Antioquia.

Aranguren, Mauricio. 2001. *Mi Confesión, Carlos Castaño Revela sus Secretos*. Bogotá, Colombia: Editorial Oveja Negra.

Arjona, Ana M. and Laura Otálora. 2011. "Presencia vs. violencia: problemas de medición de la presencia de actores armados en Colombia.". Last accessed 9/30/2019.
URL: *http://focoeconomico.org/2011/12/20/presencia-vs-violencia-problemas-de-medicion-de-la-presencia-de-actores-armados-en-colombia/*

Bagozzi, Benjamin E, Ore Koren and Bumba Mukherjee. 2017. "Droughts, Land Appropriation, and Rebel Violence in the Developing World." *The Journal of Politics* 79(3):1057–1072.

Bajari, Patrick, Han Hong, John Krainer and Denis Nekipelov. 2010. "Estimating Static Models of Strategic Interactions." *Journal of Business & Economics* 28(4):469–482.

Balcells, Laia. 2010. "Rivalry and Revenge: Violence against Civilians in Conventional Civil Wars." *International Studies Quarterly* 54(2):291–313.

Balcells, Laia and Abbey Steele. 2016. "Warfare, Political Identities, and Displacement in Spain and Colombia." *Political Geography* 51:15–29.

Bauer, Michal, Christopher Blattman, Julie Chytilová, Joseph Henrich, Edward Miguel and Tamar Mitts. 2016. "Can war foster cooperation?" *Journal of Economic Perspectives* 30(3):249–74.

Bejarano, Jesús A. 1997. *Colombia : inseguridad, violencia y desempenño econoómico en las áreas rurales*. Bogotá, Colombia: Universidad Externado de Colombia: Fondo Financiero de Proyectos de Desarrollo.

Berman, Eli, Jacob N Shapiro and Joseph H Felter. 2011. "Can Hearts and Minds Be Bought? The Economics of Counterinsurgency in Iraq." *Journal of Political Economy* 119(4):766–819.

Blattman, Christopher. 2009. "From violence to voting: War and political participation in Uganda." *American political Science review* 103(2):231–247.

Bloom, Mia M. 2004. "Palestinian Suicide Bombing: Public Support, Market Share, and Outbidding." *Political Science Quarterly* 119(1):61–88.

Bulow, Jeremy I., John D. Geanakoplos and Paul D. Klemperer. 1985. "Multimarket Oligopoly: Strategic Substitutes and Complements." *Journal of Political Economy* 93(3):488–511.

Carlos Medina Gallego. 2009. *FARC EP. Notas para una historia política 1958-2008*. Bogotá, Colombia: Universidad Nacional de Colombia facultad de derecho ciencias políticas y sociales.

Centro Nacional de Memoria Histórica. 2014. *Guerrilla y población civil. Trayectoria de las FARC 1949-2013*. Bogotá, Colombia: Imprenta Nacional de Colombia.

Ch, Rafael, Jacob Shapiro, Abbey Steele and Juan F. Vargas. 2018. "Endogenous Taxation in Ongoing Internal Conflict: The Case of Colombia." *American Political Science Review* 112(4):9961015.

Chatagnier, J. Tyson and Emanuele Castelli. 2019. "The Arc of Modernization: Economic Structure, Materialism, and the Onset of Civil Conflict." *Political Science Research and Methods* 7:233–252.

Chu, Tiffany S. and Jessica Maves Braithwaite. 2018. "The Effect of Sexual Violence on Negotiated Outcomes in Civil Conflicts." *Conflict Management and Peace Science* 35(3):233–247.

Condra, Luke N and Jacob N Shapiro. 2012. "Who Takes the Blame? The Strategic Effects of Collateral Damage." *American Journal of Political Science* 56(1):167–187.

de Paula, Áureo. 2013. "Econometric Analysis of Games with Multiple Equilibria." *Annual Review of Economics* 5:107–131.

Dube, Oeindrila and Suresh Naidu. 2015. "Bases, Bullets, and Ballots: The Effect of US Military Aid on Political Conflict in Colombia." *The Journal of Politics* 77(1):249–267.

Fergusson, Leopoldo, James A. Robinson, Ragnar Torvik and Juan F. Vargas. 2016. "The Need for Enemies." *The Economic Journal* 126:1018—1054.

Fergusson, Leopoldo, Pablo Querubin, Nelson A. Ruiz and Juan F. Vargas. 2019. "The Real Winner's Course." *American Journal of Political Science* . Forthcoming.

Findley, Michael G. and Joseph K. Young. 2012. "More Combatant Groups, More Terror?: Empirical Tests of an Outbidding Logic." *Terrorism and Political Violence* 24(5):706–721.

Gent, Stephen E. 2007. "Strange Bedfellows: The Strategic Dynamics of Major Power Military Interventions." *The Journal of Politics* 69(4):1089–1102.

Gilligan, Michael J, Benjamin J Pasquale and Cyrus Samii. 2014. "Civil war and social cohesion: Lab-in-the-field evidence from Nepal." *American Journal of Political Science* 58(3):604–619.

González, José J. 1991. "Espacio, sociedad y conflicto en Colombia. Las repúblicas independientes en Colombia 1955-1965." *Revista UIS Humanidades* 20(1):67–75.

Grossman, Gene M. and Elhanan Helpman. 1994. "Protection for Sale." *The American Economic Review* 84(4):833–850.

Gutiérrez-Sanin, Francisco. 2019. *Clientelistic Warfare. Paramilitaries and the State in Colombia (1982-2007)*. Oxford, United Kingdom: Peter Lang.

Hirshleifer, Jack. 1989. "Conflict and Rent-Seeking Success Functions." *Public choice* 63(2):101–112.

Hotz, V. Joseph and Robert A. Miller. 1993. "Conditional Choice Probabilities and the Estimation of Dynamic Models." *The Review of Economic Studies* 60(3):497–529.

Hovil, Lucy and Eric Werker. 2005. "Portrait of a Failed Rebellion: An Account of Rational, Sub-Optimal Violence in Western Uganda." *Rationality and Society* 17(1):5–34.

Hultman, Lisa. 2007. "Battle Losses and Rebel Violence: Raising the Costs for Fighting." *Terrorism and Political Violence* 19(2):205–222.

Hultman, Lisa. 2009. "The Power to Hurt in Civil War: The Strategic Aim of RENAMO Violence." *Journal of Southern African Studies* 35(4):821–834.

Hultman, Lisa. 2012. "Attacks on Civilians in Civil War: Targeting the Achilles Heel of Democratic Governments." *International Interactions* 38(2):164–181.

Human Rights Watch. 1996. "Colombia's Killer Networks: The Military-Paramilitary Parterships and the U.S.". Last accessed 9/30/2019.
URL: *https://www.legal-tools.org/doc/22208e/pdf/*

Human Rights Watch. 2000. "The Ties That Bind: Colombia and Military-Paramilitary Links.". Last accessed 9/30/2019.
URL: *https://www.hrw.org/legacy/reports/2000/colombia/*

Humphreys, Macartan and Jeremy M. Weinstein. 2006. "Handling and Manhandling Civilians in Civil War." *American Political Science Review* 100(3):429–447.

Kalyvas, Stathis N. 2006. *The Logic of Violence in Civil War*. Cambridge University Press.

Koren, Ore. Forthcoming. "Food Resources and Strategic Conflict." *Journal of Conflict Resolution* .

Koren, Ore and Benjamin E. Bagozzi. 2017. "Living off the Land: The Connection between Cropland, Food Security, and Violence against Civilians." *Journal of Peace Research* 54(3):351–364.

Kydd, Andrew H. and Barbara F. Walter. 2006. "The Strategies of Terrorism." *International Security* 31(1):49–80.

Lyall, Jason. 2009. "Does Indiscriminate Violence Incite Insurgent Attacks? Evidence from Chechnya." *Journal of Conflict Resolution* 53(3):331–362.

McKelvey, Richard D. and Thomas R. Palfrey. 1995. "Quantal Response Equilibria for Normal Form Games." *Games and Economic Behavior* 10(1):6–38.

Milgrom, Paul and John Roberts. 1990. "Rationalizability, Learning, and Equilibrium in Games with Strategic Complementarities." *Econometrica* 58(6):1255–1277.

Molano, Alfredo. 2015. Fragmentos de la Historia del Conflicto Armado 1920-2010. In *Conflicto social y rebelión armada en Colombia. Ensayos críticos.* Bogotá: Gentes del común.

Nash Jr., John F. 1950. "The Bargaining Problem." *Econometrica* pp. 155–162.

Nemeth, Stephen. 2014. "The Effect of Competition on Terrorist Group Operations." *Journal of Conflict Resolution* 58(2):336–362.

Nieman, Mark David. 2015. "Statistical Analysis of Strategic Interaction with Unobserved Player Actions: Introducing a Strategic Probit with Partial Observability." *Political Analysis* 23(3):429–448.

Restrepo, Jorge, Michael Spagat and Juan F. Vargas. 2004. "The Dynamics of the Colombian Civil Conflict: A New Data Set." *Homo Oeconomicus* 21(2):396–428.

Rueda, Miguel R. 2017. "Popular Support, Violence, and Territorial Control in Civil War." *Journal of Conflict Resolution* 61(8):1626–1652.

Salehyan, Idean, David Siroky and Reed M Wood. 2014. "External Rebel Sponsorship and Civilian Abuse: A Principal-Agent Analysis of Wartime Atrocities." *International Organization* 68(3):633–661.

Schelling, Thomas C. 1966. *Arms and Influence.* Yale University Press.

Slantchev, Branislav L. 2003. "The Power to Hurt: Costly Conflict with Completely Informed States." *American Political Science Review* 97(1):123–133.

Steele, Abbey. 2011. "Electing Displacement: Political Cleansing in Apartad, Colombia." *Journal of Conflict Resolution* 55(3):423–445.

Thomas, Jakana. 2014. "Rewarding Bad Behavior: How Governments Respond to Terrorism in Civil War." *American Journal of Political Science* 58(4):804–818.

Tullock, Gordon. 1980. Efficient Rent-Seeking. In *Toward a Theory of the Rent-Seeking Society*, ed. James M. Buchanan, Robert D. Tollison and Gordon Tullock. Texas A&M University Press pp. 97–112.

Ugarriza, Juan Esteban and Nathalie Pabón Ayala. 2017. *Militares y guerrillas. La memoria histórica del conflicto armado en Colombia desde los archivos militares 1958-2016*. Bogotá, Colombia: Editorial Universidad del Rosario.

Verdad Abierta. 2019. https://verdadabierta.com/. Accessed: 2019-02-04.

Weinstein, Jeremy M. 2007. *Inside Rebellion. The Politics of Insurgent Violence*. Cambridge University Press.

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.

Wood, Reed M. and Jacob D. Kathman. 2014. "Too Much of a Bad Thing? Civilian Victimization and Bargaining in Civil War." *British Journal of Political Science* 44(3):685–706.

Wood, Reed M. and Jacob D. Kathman. 2015. "Competing for the Crown: Inter-Rebel Competition and Civilian Targeting in Civil War." *Political Research Quarterly* 68(1):167–179.

Wood, Reed M., Jacob D. Kathman and Stephen E. Gent. 2012. "Armed Intervention and Civilian Victimization in Intrastate Conflicts." *Journal of Peace Research* 49(5):647–660.

APPENDIX: Competition and Civilian Victimization

(online only)

A Other Tables

Table A1. Summary Statistics

Variable	Observations	Mean	Std. Dev.	Minimum	Maximum
Coca area	612	0.16	0.96	0	9.74
Distance army base	612	92.13	107.2	0	884.99
Distance to FARC's area of early influence	612	199.86	170.77	0	750.76
Distance to AUC's area of early influence	612	293.27	200.61	0	918.67
Distance Magdalena river	612	106.99	74.82	0.2	409.96
Gini	612	0.43	0.12	0	0.53
Population	612	8.39	39.85	0.16	641.24
Poverty	612	45.16	19.74	8.17	100
Royalties	612	0.03	0.12	0	0.83
Variation Liberal party vote share	612	0.08	0.05	0.01	0.34
Vote share left	612	4.6	6.92	0	64.82

This table presents summary statistics of controls.

Table A2. Strategic victimization (alternative presence measure p75)

	FARC	AUC
Panel A. Strategic factors		
Rival's Victimization Probability	2.845***	3.373***
	(0.667)	(0.743)
Panel B. Controls		
Coca area	0.079	-0.064
	(0.176)	(0.386)
Distance army base	-0.002	-0.001
	(0.002)	(0.002)
Distance to group's area of early influence	-0.002	0.005***
	(0.001)	(0.001)
Distance Magdalena river	0.003	-0.002
	(0.002)	(0.003)
Gini	1.641	2.557
	(2.088)	(2.557)
ln(Population)	-0.196	0.322
	(0.167)	(0.245)
Poverty	0.012	-0.016
	(0.008)	(0.011)
Period 2002-2005	0.453	-0.53
	(0.277)	(0.344)
Royalities (oil)	0.542	-2.464*
	(1.362)	(1.383)
Variation Liberal party vote share	-1.216	6.96
	(2.765)	(4.343)
Vote share left	0.018	0.044
	(0.02)	(0.044)
Log likelihood		-395.21
Observations		401

This table presents maximum likelihood estimates of the parameters of the civilian victimization model where and armed group is present in a municipality without victimization if CEDE group activities in the municipality is above the 75th percentile of the sample the period. The model includes region intercepts. Bootstrapped standard errors are in parentheses. *** p<0.01, **p<0.05, *p<0.1.

Table A3. Strategic victimization (alternative specifications)

	FARC	AUC
Model 1. State effects		
Rival's victimization probability	1.588***	1.772***
	(0.333)	(0.367)
Distance to group's area of early influence	-0.002	0.002
	(0.002)	(0.002)
Log likelihood		-592.55
Model 2. Time invariant controls interacted with period 2002-2005 dummy		
Rival's victimization probability	1.964***	2.395***
	(0.392)	(0.492)
Distance to group's area of early influence	-0.005**	0.001
	(0.002)	(0.001)
Log likelihood		-635.62

This table presents maximum likelihood estimates of the parameters of the civilian victimization model. Model 1 includes state intercepts and baseline controls. Model 2 includes region intercepts, baseline controls, and interactions of the period 2002-2005 dummy with all the time invariant controls. Both models use 612 observations. Bootstrapped standard errors are in parentheses. *** p<0.01, **p<0.05, *p<0.1.

Table A4. Three-Player Game Estimates

	FARC	AUC	ELN
Panel A. Strategic factors			
AUC's Victimization Probability	2.436***		1.639**
	(0.604)		(0.605)
ELN's Victimization Probability	1.185**	1.774**	
	(0.597)	(0.899)	
FARC's Victimization Probability		3.574**	1.897**
		(1.204)	(0.835)
Panel B. Controls			
Coca area	0.371	-0.178	-1.087
	(0.932)	(0.759)	(5.061)
Distance army base	-0.002	0.002	0.001
	(0.003)	(0.002)	(0.003)
Distance to group's area of early influence	-0.002	0	-0.003**
	(0.002)	(0.001)	(0.002)
Distance Magdalena river	0.003	-0.006	-0.006
	(0.004)	(0.004)	(0.004)
Gini	13.484*	14.388*	4.641
	(7.49)	(7.695)	(8.667)
ln(Population)	0.049	0.619**	0.06
	(0.205)	(0.25)	(0.258)
Period 2002-2005	0.477	-0.642*	-0.414
	(0.364)	(0.343)	(0.409)
Poverty	0.006	-0.023	0.019
	(0.01)	(0.011)	(0.013)
Royalities (oil)	0.162	0.037	-1.01
	(5.955)	(1.176)	(2.402)
Variation Liberal party vote share	-0.101	7.963	-2.272
	(4.496)	(5.499)	(4.644)
Vote share left	0.011	-0.009	-0.024
	(0.039)	(0.036)	(0.06)
Log likelihood			-435.76
Observations			321

This table presents maximum likelihood estimates of the parameters of the three-player civilian victimization model. The model includes region intercepts. Bootstrapped standard errors are in parentheses. *** p<0.01, **p<0.05, *p<0.1.

Table A5. Selective and Non-Selective Victimization

	FARC		AUC	
	Selective	Non-Selective	Selective	Non-Selective
Panel A. Strategic factors				
Rival's selective victimization probability	2.298*	0.335	2.775***	1.711*
	(0.883)	(1.328)	(0.855)	(1.021)
Rival's non-selective victimization probability	1.516	1.454	1.965	2.14*
	(0.861)	(1.452)	(1.128)	(1.179)
Panel B. Controls				
Coca area	-0.142	0.313	0.068	0.124
	(0.183)	(0.887)	(0.242)	(0.242)
Distance army base	-0.002	0.001	0.001	-0.0003
	(0.002)	(0.003)	(0.001)	(0.001)
Distance to group's area of early influence	-0.003**	-0.005**	0.002**	0.002
	(0.001)	(0.002)	(0.001)	(0.001)
Distance Magdalena river	0.003	0.002	-0.006***	-0.001
	(0.002)	(0.004)	(0.002)	(0.002)
Gini	-0.957	18.53**	1.907	0.348
	(1.844)	(8.356)	(1.517)	(1.752)
ln(Population)	0.055	0.324	0.171	0.507***
	(0.172)	(0.305)	(0.182)	(0.179)
Period 2002-2005	0.248	0.518	-0.086	-1.193***
	(0.326)	(0.564)	(0.254)	(0.269)
Poverty	0.03***	0.01	-0.02*	-0.01*
	(0.008)	(0.01)	(0.01)	(0.01)
Royalties (Oil)	0.564	-2.54	-1.14	-1.4
	(1.203)	(27.45)	(1.025)	(1.638)
Variation Liberal party vote share	-0.059	-7.874	6.586**	8.516***
	(3.323)	(5.536)	(2.915)	(3.196)
Vote share left	0.011	0.042	0.013	0.007
	(0.021)	(0.027)	(0.024)	(0.021)
Log likelihood				-993.27
Observations				612

This table presents maximum likelihood estimates of the parameters of the civilian victimization model with three actions (non violence, selective victimization, and non-selective victimization). The model includes region intercepts. Bootstrapped standard errors are in parentheses. *** p<0.01, **p<0.05, *p<0.1.

B Other Figures

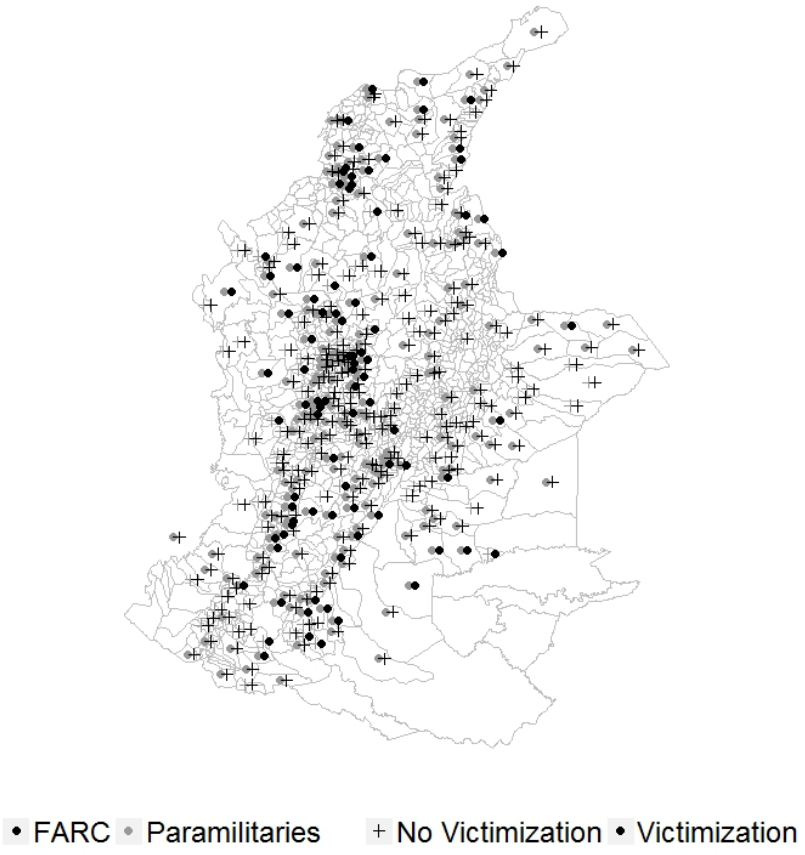

Figure A1. Geographic variation in victimization (Colombia 2002-2005)

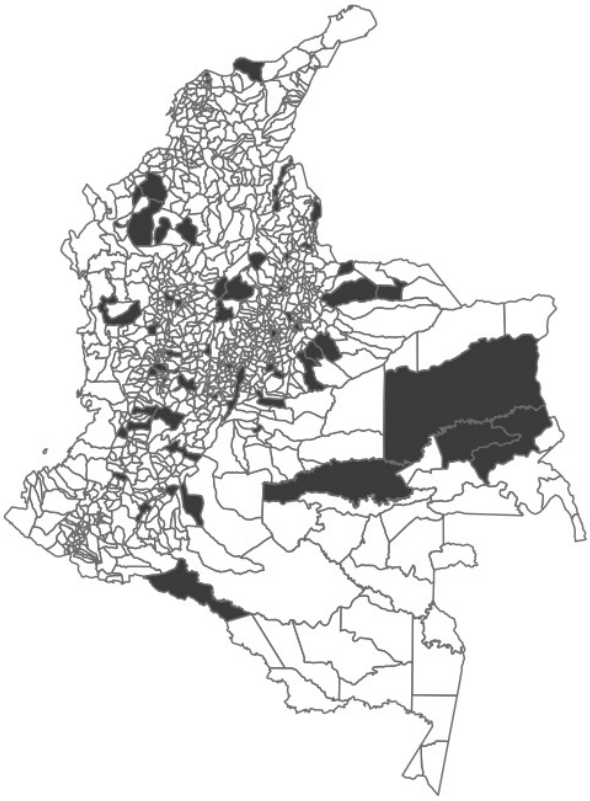

Figure A2. Location army bases (Colombia 2000)

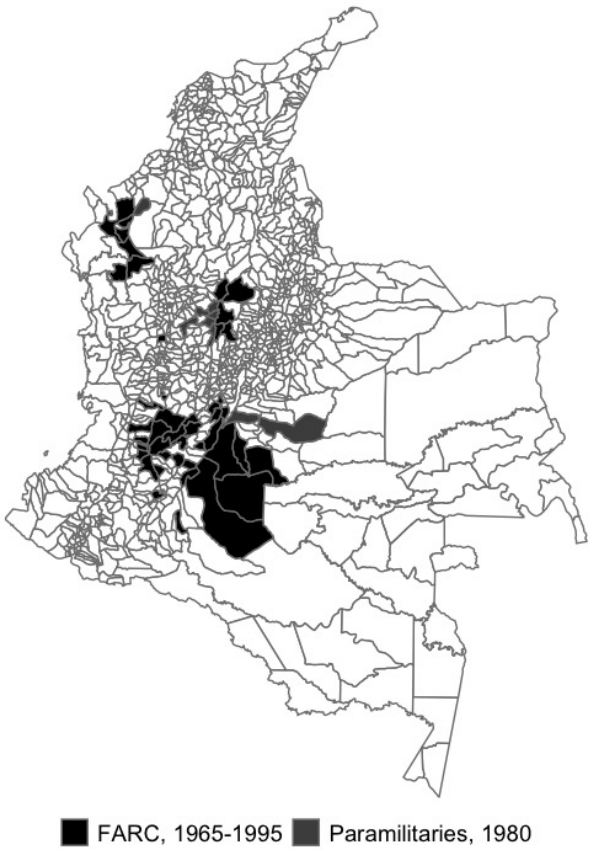

Figure A3. Municipalities of early influence of FARC and paramilitaries

C Pseudo-likelihood

Collect the parameters of the model in $\theta = (\alpha_i, \beta_i)_{i=1,2}$, and let $\Psi_i(\hat{p}_{-i}; \mathbf{x}_i, \theta)$ denote the corresponding best-response probabilities:

$$\Psi_i(\hat{p}_{-i}; \mathbf{x}_i, \theta) = \int \mathbb{I}[\mathbf{x}_i \cdot \beta_i + \hat{p}_{-i} \cdot \alpha_i > \epsilon_i(0) - \epsilon_i(1)]\, dF(\epsilon_i), \tag{A1}$$

where $\mathbb{I}$ is the indicator function and F is the prior distribution of the stochastic shocks. The equilibrium condition of Equation 2 is equivalent to $p_i = \Psi_i(p_{-i}; \mathbf{x}_i, \theta)$ for each $i = 1, 2$.

We obtain estimates of equilibrium beliefs from the Nadaraya-Watson kernel estimator for each group $i \in \{\text{FARC}, \text{AUC}\}$, in each municipality m and time frame $t \in \{1998 - 2001, 2002 - 2005\}$, $\hat{p}_i^{mt}$. Collect these estimates in vector $\hat{\mathbf{p}}$. Then we write the (conditional) pseudo-likelihood function from Hotz and Miller (1993) as

$$\mathcal{L}(\theta \mid \hat{\mathbf{p}}, \mathbf{X}) = \prod_t \prod_m \prod_i \Psi_i(\hat{p}_{-i}^{mt}; \mathbf{x}_i^{mt}, \theta). \tag{A2}$$

Given the definition of Ψ_i in Equation A1, Equation A2 has a natural interpretation: it is the likelihood assuming that each actor best responds to the equilibrium beliefs estimated in the first step. Furthermore, because ϵ_i^{mt} are drawn from the type one extreme value distribution and are independent across actions, the integral in Equation A1 takes the standard logistic form:

$$\Psi_i(\hat{p}_{-i}^{mt}; \mathbf{x}_i^{mt}, \theta) = [1 + \text{Exp}\{-\mathbf{x}_i^{mt} \cdot \beta_i - \hat{p}_{-i}^{mt} \alpha_i\}]^{-1}. \tag{A3}$$

D Leave-One-Out Robustness Check

Full coefficient estimates for this robustness check are reported in Table A6. The procedure for generating the first-stage estimates of choice probabilities is as follows. Remember that our goal in the first stage is to consistently estimate p_i^{mt}, the probability of victimization by group i in municipality m during period t. For each municipality m' in our data (441 total), we extract the subset of observations from other municipalities, i.e., in which $m \neq m'$. With this subset of data excluding observations from m', we train random forest models (one for FARC, one for AUC) to predict victimization as a function of the same set of covariates as in the baseline model.[36] Finally, for each time period t at which municipality m' enters our data, we let our first-stage estimate $\hat{p}_i^{m't}$ equal the out-of-sample prediction from our model of group i. Therefore, our first-stage estimate $\hat{p}_i^{m't}$ is not even partially a function of realized violence $v_i^{m't}$, as the model from which it is computed does not "see" data from within municipality m'.

Given the computational intensity of this procedure, resampling-based inference like the bootstrap is infeasible. We thus report nominal standard errors in Table A6. In order to conclude that the strategic complementarity parameters were statistically insignificant at the 0.05 level, the true standard errors would have to be 1.45 times the nominal ones in case of the FARC, or 1.21 times in case of the AUC.

[36] Our baseline specification uses kernel regressions rather than random forests. We use a random forest here due to technical problems extracting out-of-sample predictions from the kernel regression model.

Table A6. Strategic Victimization (leave one out)

	FARC	AUC
Panel A. Strategic factors		
Rival's victimization probability	2.577***	2.337***
	(0.905)	(0.988)
Panel B. Controls		
Coca area	-0.046	0.037
	(0.116)	(0.115)
Distance army base	-0.001	0.000
	(0.001)	(0.001)
Distance group's place of origin	-0.003***	0.002**
	(0.001)	(0.001)
Distance Magdalena river	0.003	-0.003**
	(0.002)	(0.002)
Gini	0.570	1.191
	(1.372)	(1.191)
Period 2002-2005	0.411*	-0.498**
	(0.214)	(0.202)
ln(Population)	0.115	0.376**
	(0.135)	(0.149)
Poverty	0.027***	-0.014**
	(0.006)	(0.007)
Royalties (oil)	0.224	-1.288
	(1.022)	(0.859)
Variation Liberal party vote share	-1.022	6.710***
	(2.470)	(2.683)
Vote share left	0.029*	0.014
	(0.016)	(0.020)
Log likelihood		-654.94
Observations		612

Maximum likelihood estimates of the parameters of the civilian victimization model using the leave-one-out first-stage procedure. The model includes region intercepts. Nominal standard errors are in parentheses. *: $p < 0.1$, **: $p < 0.05$, ***: $p < 0.01$.