Civilian Self-Defense Militias in Civil War

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Abstract

To mitigate the costs associated with suppressing rebellion, states may rely on civilian self-defense militias to protect their territory from rebel groups. However, this decision is also costly, given that these self-defense groups may undermine control of its territory. This raises the question: why do governments cultivate self-defense militias when doing so risks that these militias will undermine their territorial control? Using a game theoretic model, we argue that states take this risk in order to prevent rebels from co-opting local populations, which in turn may shift power away from the government and toward the rebels. Governments strategically use civilian militias to raise the price rebels must pay for civilian cooperation, prevent rebels from harnessing a territory's resources, and/or to deter rebels from challenging government control in key areas. Empirically, the model suggests states are likely to support the formation of self-defense militias in territory that may moderately improve the power of rebel groups, but not in areas that are either less valuable or areas that are critical to the government's survival. These hypotheses are tested using data from the Colombian civil war from 1996 to 2008.

> "We have both what we call popular defense forces. They are not official [...] forces. They are asked to join in. ..."
> - Sudanese President Omar al-Bashir, 22 June 2007

An often overlooked aspect of civil wars is the process by which civilians organize into self-defense militias. In cases such as the Autodefensas Unidas in Colombia, the Kamajors in Sierra Leone, and the Civilian Joint Task Force in Nigeria, groups of civilians mobilized to defend their communities from hostile rebel groups. In these cases, governments viewed these self-defense groups as essential tools of counterinsurgency. These civilian groups offered better intelligence, local knowledge, and fighters with a personal stake in the conflict. However, the empirical record demonstrates that, while organized civilians may initially be effective in fighting rebels, these self-defense militias may themselves threaten the territorial integrity of the state. These groups frequently transition into criminal activity, including extortion, looting, and drug trafficking. In other cases, these civilian militias may carve out areas of the state for themselves, thereby undermining the government's control over its population. This raises the question: when and why are governments willing to support the creation of civilian self-defense militias, given the risk that doing so may ultimately further erode their sovereignty and territorial control?

Using a game theoretic model, this study argues that governments take the risk of supporting self-defense militias to prevent rebels from co-opting local populations in territories that can substantially improve the rebels' power. At the micro-level, growing rebel movements may attempt to gain control over smaller pockets of territory by co-opting the local population in the area. The acquisition of both territorial control and civilian support may endogenously strengthen the rebel movement and simultaneously weaken the government. These shifts are likely to be more acute if the rebels gain civilian support in strategically valuable territories, such as major cities or natural resources. To forestall these shifts in power, governments may organize self-defense militias to encourage civilians to reject rebel offers of cooperation. Rather than acquiescing, these civilian militias may fight to keep control of the territory, thereby denying the rebels the ability to harness the territory's resources. Empirically, we demonstrate that governments are likely to cultivate these self-defense militias in areas that can moderately increase rebel power, such as those areas with easily tradable natural resources, but not in areas that are of low value or areas that are too valuable for the state to lose, such as major cities.

We develop this argument in several steps. First, we begin by outlining the current literature on civilian militias in civil war. We next develop the game theoretic model to identify the specific conditions under which governments take the risk of encouraging self-defense militias. After discussing our equilibria and developing our hypotheses, we present an empirical test using data on the Colombian civil war from 1991-2008. Specifically, we explore the presence of Autodefensas Unidas de Colombia (AUC), a loosely tied network of civilian militias, in Colombian municipalities from 1996 to 2008. The Colombian civil war is an appropriate context in which to test the implications of our formal model because of the uncertainty present for the civilian self-defense group, the insurgents, and the state; the varying degrees of valuable resources in different municipalities; and the length of time over which the conflict continued. We conclude by discussing the implications of our results and presenting avenues for future research.

Civilian Militias in Civil Wars

The vast majority of studies treat civil war as a dyadic contest between a government and rebels (Arreguin-Toft, 2001; Bapat, 2005; Cunningham, Salehyan and Gleditsch, 2009; Melander, Harbom and Wallensteen, 2008; Walter, 2002). Recent work, however, is beginning to unpack civil wars by examining divisions within rebels, as well as the strategic behavior of civilians in times of civil war (Bapat and Bond, 2012; Christia, 2012; Cunningham, 2014; Kalyvas, 2006; Krause, 2013; Findley and Rudloff, 2006; Weinstein, 2007; Wood, 2010). In this vein, scholars increasingly find that civilians, rather than remaining passive observers of civil war, take on a more active role by promoting their own self defense via independent armed militias (Colaresi, Mitchell and Carey, 2015; Cohen and Nordas, 2015;

Jentzsch, Kalyvas and Schubiger, 2015; Mitchell, Carey and Butler, 2014). Empirically, the emergence of these militias in civil wars tends to increase the duration and intensity, as well as influences the outcomes, of these conflicts (Branch and Wood, 2010; Cunningham, 2006; Walter, 2009). Militias also vary substantially in terms of size, strategic aims, and degree of reliance on the government. These groups often share the same task as the government, which is to defend and control civilian populations in areas targeted by hostile insurgents where the state is less capable. These militias are often referred to as self-defense forces or groups because they are frequently organized from local civilians. We therefore define civilian self-defense militias as actors that organize to protect themselves and their property from rebel organizations. These groups' motivations for continuing the fight, however, may be shaped by government incentives and changes in rebels' strength and strategy. We focus here on governments' provision of incentives to certain civilian self-defense militias as a strategic tool to push rebels out of key territories that, if acquired by the rebels, would moderately shift the balance of power in the rebels' favor.

Governments often perceive such civilian militias as valuable tools of counterinsurgency. Several studies conceptualize governments' use of civilian militias as a principal/agent (P-A) relationship (Mitchell, Carey and Butler, 2014; Eck, 2015; Stanton, 2015). The government serves as the principal, which may be weak, inefficient, constrained by cost, or simply unable to fight hostile rebels within its territory. Governments therefore delegate authority to fight the rebels to civilian groups, which serve as an agent of the state. Militias offer several advantages in prosecuting counterinsurgency. First, these groups often rely at least partly on their own resources, thereby saving the government both the economic and political costs of mobilizing their own conventional armies (Eck, 2015; Saab and Taylor, 2009). Second, militias may be more efficient because civilians in these groups may possess local knowledge and better intelligence about the government's rebel challengers (Branch, 2007; Eck, 2015; Kalyvas and Arjona, 2005; Lyall, 2010). A common observation is that both rebels and militias tend to draw fighters from the same pool of recruits (Jentzsch, Kalyvas and Schubiger, 2015; Eck, 2015; Saab and Taylor, 2009). This suggests that both leaders and fighters within militias may share links to the rebels, which in turn provides these organizations with improved intelligence than the government possesses. Staniland similarly suggests that militias have diverse ideological bases that affect their relationship with civilians, making them a valuable informational tool for governments (2015). Third, because militias are independent agents, the government can allow these groups to engage in indiscriminate acts of violence against the rebels, while avoiding the political ramifications from both its internal constituency and the international community. Carey et al. (2015) argue that governments delegate violence to militias precisely to avoid cuts in economic and military aid from international donors. By contracting to militias, governments can plausibly deny responsibility for the violence perpetrated by these organizations. Governments may also promise to reign in militias in exchange for even more aid and support, which further increases the payoff for outsourcing violence to these organizations.

From the existing scholarship, there appears to be three rational motivations for governments to encourage civilians' organization into self-defense militias: 1) to avoid the costs of conventional military operations, 2) to increase the efficiency and effectiveness of military operations using the local knowledge of these groups, and 3) to avoid accountability for indiscriminate acts of violence against the rebels.[1] However, if we examine each of these motivations more closely, it is unclear if the delegation of violence to militia groups accomplishes any of these objectives. The standard P-A model argues that the agent has an incentive to cooperate partially with the principal's wishes so she can be hired again or retain her job. However, if a government provides a militia with weapons, intelligence, and logistic support, the government cannot easily fire the group or re-take the provisions allocated to the militia members. Should the government later need to rein in the group, military force may be required to overcome the support previously given. Moreover, since

[1] Cohen and Nordas (2015) and Stanton (2015) note that militias are not always more violent or more extreme than government forces, and that patterns of violence are often dependent on other conflict characteristics.

the government was initially weak and needed the militias to fight its conflict, punishment is unlikely to succeed (Carter, 2012; Bapat, 2012). At the very least, the government will be required to pay the cost of conventional conflict, thereby negating the cost savings from resorting to the militia in the first place. In short, state support for militias may exacerbate moral hazard problems (Mitchell, Carey and Butler, 2014).

These problems may be aggravated if we further assume that the power of militant organizations is endogenous to the territory these groups control (Fearon, 1996; Carter, 2010). Once militias seize territory and grow in power, these groups may be unable to credibly commit themselves to faithfully executing the government's wishes over their own. The key problem is that, once the government empowers a militia, it cannot regulate how the militia behaves and may be unable to prevent the militia from acting in accordance with its own interests. This raises the theoretical question: why would rational governments encourage civilian militia formation and action if doing so undermines the state's power and territorial control?

The Logic of Forming Civilian Militias

To understand why governments take this risk, let us first consider how militants transition from weak non-state actors into significant threats. While the majority of violent non-state actors fail to achieve their aims, some successfully transition into viable rebellions by seizing control of territory (de la Calle and Sanchez-Cuenca, 2012; Findley and Young, 2012; Jones and Libicki, 2008; Shapiro, 2013). Once a group assumes control of some portion of territory, it may begin using the territory's resources to augment its own power. For example, if a group seizes control of a diamond mine, it may sell the diamonds on the open market, thereby increasing the revenue it has to fight the state. Similarly, if the group seizes a mountain pass, it may cut all commercial traffic through the pass that benefits the government, thereby weakening its adversary. This suggests that the rebels' power is endogenous to the amount of territory they control, as well as the value of the territories in their possession (Bapat and Zeigler, 2016). To illustrate, consider the case of the Islamic State of Iraq and Syria (ISIS). ISIS was not considered particularly threatening when the group was largely confined to eastern Syria and Iraq's Anbar province. However, when ISIS expanded and seized control of Mosul in the summer of 2014, the group's power and influence rapidly increased. By taking control of Mosul, ISIS gained a substantial economic resource while depriving the Iraqi regime of that same resource. Similarly, ISIS seized control of the Mosul dam, giving the group the ability to flood Mosul, Tikrit, Samarra, and Baghdad itself. The advance of ISIS into these critical territories rapidly grew its power. Similarly, the loss of these critical territories substantially weakened the Iraqi regime and left it more vulnerable to the rebel attacks.

This leads to a key question: how do a few rebels consolidate control over a territory and it civilians, which are often more numerous than the rebels? One possibility is to use force to disarm or kill anyone in the territory that opposes their rule. However, war and mass killings both require extensive resources and may destroy the very assets that will allow the rebels to gain power (Fearon, 1995; Kalyvas, 1999; Powell, 2006; Reiter, 2003; Wagner, 2000). To again refer to the example of ISIS at the height of the caliphate, the group depended on a vast array of engineers, technicians, doctors, smugglers, and other skilled labor to convert the oil in its territory into cash and weapons. This suggests that rebels cannot simply kill all of their adversaries. Instead, rebels need to gain the cooperation of locals in the population and elites in particular if they wish to translate their territorial gains into power. This situation resembles a bargaining problem, where the rebels can provide locals with security and some benefits in order to draw on the captured territory's resources. If the rebels can reach such a deal with elites in the territory, the group may draw resources from the territory and thus gain in military power.

Although these trades are positive sum for both the rebels and the local elites, these deals pose a clear threat to the government, which may also draw its power from the same territory. For example, if Hezbollah Al-Hejaz were to seize control of Saudi Arabia's Eastern

Province by allying itself to the local civilian leaders, the Saudi monarchy would lose control of its vast oil reserves and face a heightened risk of collapse. The kingdom should therefore view any cooperation between Hezbollah Al-Hejaz and its civilians as a clear and present danger. More generally, governments should view any effort by rebels to co-opt civilian leaders in strategic localities as significant threats. We would therefore expect governments to do all in their power to undermine these settlements.

How might governments prevent rebels from successfully co-opting civilians? Presumably, the rebels should be able to offer some deal that the local elites prefer to the group's attempt to seize the territory using violence (Fearon, 1995; Lake, 2010; Wagner, 2000). However, if the government funds and arms the local population by organizing a civilian militia, the local elites may demand greater concessions from the rebels in exchange for their cooperation. The government's decision to develop such a militia suggests an effort to "broaden" deterrence against violent nonstate actors by limiting the expected utility of rebellion against the state (Wilner, 2011). The population's greater demand increases the price rebels must pay for civilian cooperation, but the government's strategy to arm a local militia may not be sufficient. The territory may be so valuable that the rebels would be willing to pay the extra resources to procure civilian cooperation. However, if the government were to covertly organize a civilian self-defense group, the rebels might be unable to identify the level of concessions needed to procure civilian cooperation in the territory. As a result, the government's decision to arm civilians into a self-defense group may increase the price rebels must pay to procure civilian cooperation, or may prevent the rebels from consolidating the territory entirely by rendering the broader population non-cooperative (Colby, 2008). Theoretically, the government's decision to covertly encourage civilian self-defense militias introduces uncertainty into the bargaining between rebels and a local population, thereby undermining the chance that the rebels will co-opt the territory and shift power in its favor.

We therefore see a possible logic for why governments quietly arm civilians and encourage them to form self-defense militias. This strategy decreases the chance that the rebels gain control over a given territory, thereby decreasing the possibility that power may shift to favor the rebels. Interestingly, we see that this strategy does not necessarily strengthen the government in any way. Instead, it is simply a defensive strategy aimed at preventing an unfavorable power transition. Even if the government arms civilians who subsequently fight the rebels, the government may ultimately lose the territory to the militia it helped create. However, the loss of territory to militias is less costly than losing territory to rebels, particularly when territory is valuable and could increase rebels' future chance of victory. The government's loss of territory to civilian self-defense militias that may be more or less aligned with the state on political or strategic objectives, or at least opposed to the government's primary target (the rebels) is, therefore, less painful than loss of territory to the government's clear enemy (the rebels). Moreover, civilian self-defense militias, even those without tangible covert or overt links to the government, are primarily interested in protecting their resources and communities rather than challenging the state violently, which poses a less significant threat than the loss of areas with such communities or resources to rebels, who typically challenge the government's control and have broader, possibly political goals. The next question is: where and when would governments use civilian self-defense groups instead of its own conventional forces? To address this, we turn to the formal model.

Model

Figure 1 presents a stylized model of a conflict between a government (G) and rebels (R).[2] The conflict may substantively represent an effort by the rebels to depose the government, secede from the government's control, or alter the state's economic system. Regardless of the specific strategic aim, the rebels seek to achieve their objectives by using violence against the state. In order to maximize the effectiveness of this violence, the rebels must capture parts of the government's territory to draw resources. Let us therefore assume

[2]We refer to the government as "she", the rebels as "they."

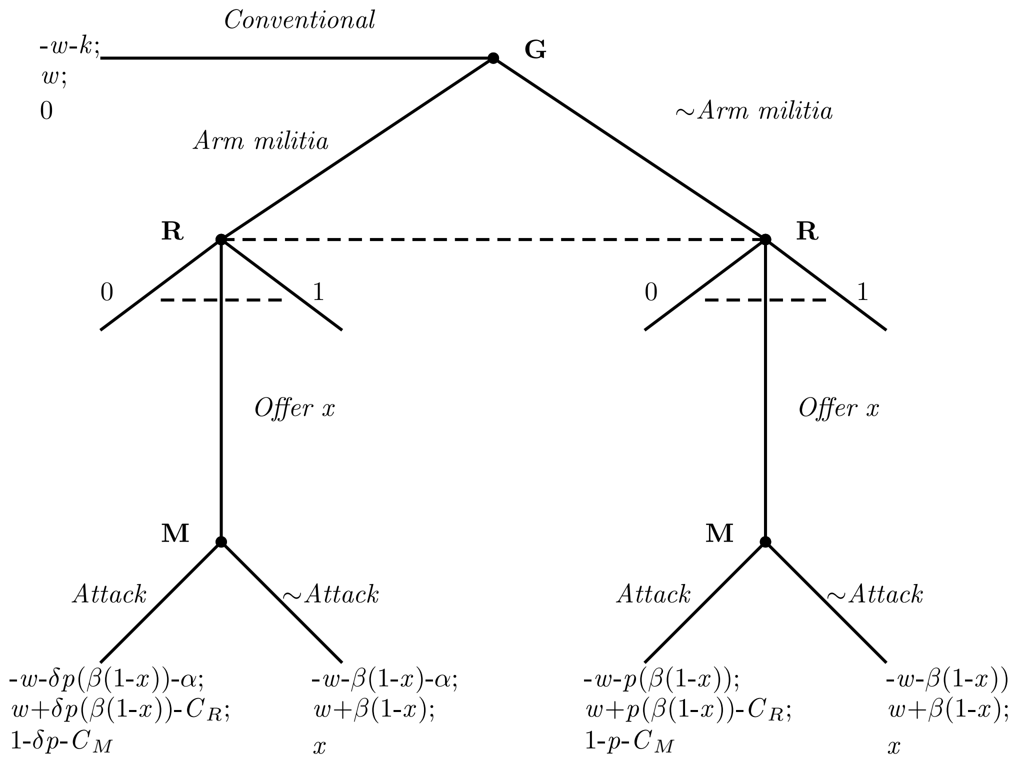

Figure 1: Militia Game

that the rebels' power is endogenous and will become more powerful if the group consolidates control over territory and draws greater resources from it. Let us further assume that not all parts of the state's territory have equal value. While desert areas may marginally increase the group's power, areas with natural resources, major highways, or strategic mountain passes may increase the power of the group more substantially.

To capture this dynamic, let us represent the payoffs to the government and the rebels for their current military positions at the start of the game are equal to $(-w, w)$, where $w \in [0, 1]$. This assumes that the government and the rebels view the conflict in zero sum terms, and any gain by the rebels is a loss for the government, and vice versa. At the start of the game, the rebels are attempting to gain control over some pocket of territory. Gaining control of this territory would increase the rebels' power by $1 - x$, where $x \in [0, 1]$ and represents the concessions the rebels provide to pacify the elites (M) within the local population. Securing the cooperation of these local elites will allow the rebels to harness the territory's resources into their war fighting effort. The price of these concessions x are therefore paid immediately by the rebels and cannot be recouped. However, since not all territory is equally valuable, represent the strategic value of the territory that is contested as $\beta \in [1, B]$. Assume that $\beta \to 1$ if gaining control of the territory will not drastically shift power in favor of the rebels. On the other hand, assume that $\beta \to B$ in cases where the territory is particularly valuable and will substantially improve the power of the rebels. If the rebels successfully co-opt the local elites and take control of the territory, the rebels' payoff increases to $w + \beta(1 - x)$, whereas the government's payoff falls to $-w - \beta(1 - x)$.

Prior to the start of the game, the government observes that the rebels are threatening the disputed territory. The game then begins with the government choosing from one of three options. First, the government may secure the territory by mobilizing her conventional forces. Should it do so, the government ensures that the rebels cannot take control of the territory, but she must pay a relatively higher cost $-k$. Alternatively, the government may choose not to fortify the territory at all, which saves the government the cost of mobilizing her conventional military, but leaves the territory vulnerable to the rebels. The government's third choice is to provide arms to the local elites (M) within the territory.[3] Assume that providing weapons to the local elites in the territory is cheaper for the government than using its conventional military force. Although this is a positive, the downside is that empowering the elites may encourage them to take control of the territory for themselves. The government therefore risks sacrificing her influence within the territory if she arms the elites, even though doing so provides a possible defense against the rebels at a cheaper price than mobilizing the conventional military. Formally, assume that the government pays a cost $-\alpha$ for providing arms to the local elites, where $\alpha \in$ (0,k), indicating that $\alpha <$ k.

For simplicity, let us assume that, if the government moves its conventional military into the territory, she guarantees that the rebels are denied control.[4] The game therefore

[3]Although we use the term 'arm', we can think of this as any behavior that will strengthen military power of the militias relative to the rebels. Other behaviors may include providing the militias with training, funds, or intelligence.

[4]This assumption is intended to simplify the model's presentation. It is certainly possible that some

terminates with this decision. On the other hand, if the government does not mobilize its conventional military, the game moves to the rebels' first choice node. While the rebels can observe if the government mobilizes her conventional military, the group cannot perfectly observe if the government provides arms to the local elites. The information set captures the rebels' uncertainty regarding whether the government armed the elites or the elites will need to draw on their own resources to mount a resistance.

If the game reaches the rebels' move, the group may offer some level of concessions x to win over the local elites in the area. R pays these costs immediately in hopes of pacifying the population. If the elites accept the offer, R can draw resources $(1-x)$ from the territory, while providing the benefits x to the local elites. Substantively, this offer might represent a deal in which the rebels use experts in the population to trade oil resources but keeps some portion of the profits from the trade to fund their campaign against the government. The resources kept by the rebels $(1-x)$ would then be used in the war effort against the government, leading to a payoff of $w+\beta(1-x)$ for the rebels and a payoff of $-w-\beta(1-x)$ for the government.

After receiving the offer, the local elites choose from one of two options. The first option is to cooperate with the rebels by playing *˜Attack*. Alternatively, the local elites may choose to resist the rebels' occupation of their territory by playing *Attack*. The elites do this by mobilizing members of the local population into a militia, which fights the rebels for control of the territory. Substantively, we can think of this militia as a collection of civilians favoring the state, criminal gangs, or warlords. These group fights on behalf of the local elites to prevent the rebels from gaining control of the territory. However, while these elites seek to keep the rebels out of the territory, the elites also prefer seizing the territory for themselves rather than allowing the government to maintain control. If the elites take the first option

rebels will be able to defeat the conventional forces of the government, which can be represented as a costly lottery. It is also possible that the conventional forces of the government are less effective than civilian militias are. In the latter case, the motivation for governments to use civilian militias is straightforward. In the former case, adding the costly lottery complicates the solution without adding any extra explanatory power. We therefore focus only on the cases where militias are less effective than conventional forces, but using militias can save the government resources.

and acquiesce, they receive a payoff of x, representing the value of the concessions made by the rebels. On the other hand, if the elites play Attack and try to seize the territory for themselves, an armed conflict begins between the elites' civilian militia and the rebels. Let us assume that, if the civilian militia is not supported by the government and draws only on the elites' own resources, the rebels defeat the militia in this armed conflict with probability p and the militia expels the rebels with the corresponding probability $(1 - p)$. However, if the government provides arms to the elites, the civilian militia is better equipped to fight and defeat the rebels. Formally, assume that, if the militia is armed by the state, the rebels' probability of disarming the group falls from p to δp, where $\delta < 1$. As is standard, let us also assume that conflict is costly, and that both the rebels and the elites pay a cost to fight $c_{(R,\, M)} \in [0, 1]$.

Solution

The game is solved using the Perfect Bayesian Equilibrium Solution Concept. While the complete formal solution is presented in the appendix, this section discusses the intuition behind the solution and the model's empirical implications. Let us begin the discussion by examining the final move, which is the local elites' decision to accept or reject the rebels' offer of cooperation. First, consider the case where the elites are not supported by the government and instead rely on their own resources. In this case, the elites accepts R's offer if $x \geq 1 - p - c_M$. On the other hand, elites that are armed by the government only accept R's offer if $x \geq 1 - \delta p - c_M$. We immediately see one effect of the government's decision to arm: doing so raises the price the rebels must pay to procure the cooperation of the local elites. To ease the discussion, let us define the rebels' offer to elites that must fund their own militias as $x_1 = 1 - p - c_M$ and to elites with state support for their militias as $x_2 = 1 - \delta p - c_M$. It is possible that the rebels may value the territory so much that the group offers x_2 to co-opt the elites. However, by making an offer of x_2, the rebels weaken their gains from the newly acquired territory. Interestingly, the government's decision to arm the elites does not stop power from shifting in favor of the rebels, but it does minimize the size of the shift. We therefore see a rational reason for why governments would arm local elites and their militias, despite the damage they cause. Arming militias might not stop rebels from acquiring territory, but it will raise the price these groups must pay and therefore diminish the benefits their rebel opponents will receive from territorial gains.

Yet, even if she encourages the local elites to form militias by providing arms, the government cannot stop rebels from gaining control of the territory. The rebels can simply increase their offer and gain the elites' cooperation. Even though the gains are minimized, the rebels may still take control of territories by making larger concessions and taking less for their own war effort. The problem, however, is that rebels are uncertain if they are facing elites with state support for their militias or elites that must fund militias from their own resources. Here, we see an instrumental advantage in keeping the government's support for militias private. If the rebels do not believe that the militias are armed by the government, her optimal offer is x_1. If such an offer is made and the elites are armed by the government, they will reject the offer and begin fighting. Consequently, the government makes herself better off by arming the elites and their militias. At worst, the conflict with the militias will undermine the gains the rebels will obtain from the territory. At best, the militias will keep the rebels out of the territory entirely. In both cases, the government is better off since she prevents power from shifting to the rebels while avoiding the cost of a conventional mobilization.

We therefore see a strategic logic behind the use of militias and an explanation for why governments seek to keep their support for militias private. By creating uncertainty about their ties to militias, governments increase the difficulty rebels will have in co-opting local elites. The use of strategic uncertainty either prevents rebels from striking deals with local elites and drawing the benefits of the territory or raises the price that rebels must pay to take control of contested areas. The government's decision to arm elites and their militias may therefore either slow shifts in power in favor of the rebels or prevent them entirely.

The solution then provides a set of cutpoints that identifies the conditions under which the government chooses to arm militias as a function of β, or the strategic value of a territory the rebels are threatening.[5] The solution divides into three regions. In the first region, governments do not support the local elites in equilibrium. This occurs because the value of the territory is relatively lower, indicating that power will not shift considerably even if the rebels take power. Consequently, the equilibrium in this region is that the government makes no effort to defend the territory, and the rebels seize it by offering x_1.[6]

Proposition 1. For territories with relatively lower strategic value ($\beta < \frac{\alpha}{(p+c_M)(1-\delta p)}$), the government does not use militias, and the following strategies and beliefs constitute a Perfect Bayesian Equilibrium:

1. G: ˜Arm

2. R: Offer x_1

3. M: Accept if $x \geq x_{1.}$

4. Beliefs: Pr(Arm|˜Conventional) = 0 & Pr(˜Arm|˜Conventional) = 1.

Proof. See appendix.

The most interesting case occurs in the second region, where β takes on a moderate value. Here, the loss of territory would be harmful to the government, but the territory is not valuable enough to justify the expense of the conventional military. Instead, in this zone, the government prefers to arm the local elites if she believes that the rebels will offer x_1, but prefers not to arm the elites if the rebels make the larger offer of x_2, given that the elites will accept and these resources will be lost. The rebels, on the other hand, cannot perfectly determine whether the government arms the elites. The rebels prefer to offer x_2 if

[5] We plot this equilibrium, or the probability of militia violence over the range of β, in Figure 3 in our formal appendix.

[6] Empirically, this might resemble the Iraqi regime's indifference to the presence of ISIS in the Anbar territories. Since these areas are Sunni heartlands and have little economic or strategic value, the Iraqi regime appears more or less content to allow ISIS to maintain these areas. Bashar Assad's Syria appears to have made a similar calculation by deciding to cede southeastern Syria to ISIS and focus on more strategically important areas.

they believe that the government is arming the elites but prefer to offer x_1 if they believe that the government is not arming the elites since a lower offer will translate into larger strategic gains for the rebels. Let us represent the rebels' belief that the government arms the local elites as ϕ. The rebels are indifferent between offering x_1 and x_2 if:

$$\phi(\delta p(\beta(1-x_1)-c_I)+(1-\phi)(\beta(1-x_1)=\beta(1-x_2) \tag{1}$$

$$\phi=\frac{p\beta(-1+\delta)}{\beta(-1+\delta p)(p+c_M)-c_R} \tag{2}$$

If we define $\phi^*=\frac{p\beta(-1+\delta)}{\beta(-1+\delta p)(p+c_M)-c_R}$, we can state that R prefers to offer x_1 if $\phi<\phi^*$ and x_2 otherwise. Substantively, this indicates that the rebels will make the lower offer of concessions to civilians in the territory if the group believes that the local elites are not armed by the government, but will make the larger offer otherwise. Let us assume that the rebels believe that the government has not armed the local elites ($\phi<\phi^*$), indicating that the optimal strategy is to make the lower offer x_1. In this case, the government's optimal strategy is to arm the elites, such that they will reject the rebels' offer, form a militia, and weaken the rebel group. However, since the rebels know that the government prefers to arm when $\phi<\phi^*$, the rebels should switch strategies and offer x_2. Yet, if the rebels offer x_2, the government knows that arming the militia is burning resources and should switch her strategy from Arm to ˜Arm. This again causes R to prefer switching strategies. Since the militia are not armed by the government, the rebels should again prefer offering x_1, which again induces G to switch her strategy to Arm. We see that there is no stable pure strategy Nash equilibrium in this set of cases.

Rather than a pure strategy equilibrium, we instead see a mixed strategy equilibrium in the set of cases where the territory's value is moderate. The government provides arms to local elites with probability q and plays ˜Arm with probability $(1-q)$, whereas the rebels make the smaller offer of x_1 with probability j and the larger offer of x_2 with probability $(1-j)$. The combination of mixed strategies indicates that there is some positive probability that local elites will form militias, and we will observe militia violence in areas where the value of territory is moderate. The probability of militia violence is only positive in this region. Empirically, the model's expectation is that the probability of militia violence maximizes in areas of the state that may moderately shift power in favor of the rebels, but not in areas that are less strategically valuable or areas that are of high strategic import.

Proposition 2. For territories with moderate strategic value ($\frac{\alpha}{(p+c_M)(1-\delta p)} < \beta < \frac{k}{(p+c_M)}$), the government uses militias with some positive probability. The following strategies and beliefs constitute a Perfect Bayesian Equilibrium:

1. G: Arm with probability $q = \frac{\beta p(-1+\delta)}{-c_R+\beta(p+c_M)(-1+\delta p)}$, ˜Arm with probability $(1-q)$.
2. R: Offer x_1 with probability $j = -\frac{\alpha}{\beta(p+c_M)(-1+\delta p)}$, Offer x_2 with probability $(1-j)$.
3. M: Accept if $x \geq x_2$ and Reject otherwise if G plays Arm; Accept if $x \geq x_1$ and Reject otherwise if G plays ˜Arm.
4. Beliefs: Pr(Arm|˜Conventional) $= \phi^*$ & Pr(˜Arm|˜Conventional) $= 1 - \phi^*$.

Proof. See appendix.

We also see that governments do not provide weapons to local elites in the equilibrium in the zone where β is relatively higher. In this area, the value of the territory is exceptionally high. Any loss of this territory would radically alter the conflict in favor of the rebels. Since the stakes are so high, the government strictly prefers using her conventional military to fortify areas with great strategic value. By doing so, the government eliminates any possibility that the territory will fall into the rebels' hands and that her power base will drastically collapse. Since the government prefers conventional forces in areas with high strategic value, we again do not see the use of militias.

Proposition 3. For territories with relatively greater strategic value ($\beta > \frac{k}{(p+c_M)}$), the government does not use militias, and the following strategies and beliefs constitute a Perfect Bayesian Equilibrium:

1. G: Conventional
2. R: Offer x_2
3. M: Accept if $x \geq x_{2.}$
4. Beliefs: Pr(Arm|˜Conventional) = 1 & Pr(˜Arm|˜Conventional) = 0.

Proof. See appendix.

Empirical Implications

From the model, we are able to establish a rational explanation for why governments encourage the creation of self-defense militias, despite the risk that doing so may ultimately cost them control over a local territory. Governments may see the creation of militias as a tactical tool to prevent rebels from drawing resources from territories that fall under their control. Encouraging local elites to form militias accomplishes this task in two ways. First, by covertly providing weapons and support, governments may increase the willingness of local elites to fight rebels for total control of local territories. Forcing rebels to devote resources to fighting militias limits the amount that rebels can devote toward fighting the government. Additionally, if local elites are armed, rebels must devote more resources toward appeasing them, which decreases the gains rebels can use from the territory against the government. An even better outcome for the government is if covert support to the militias undermines any peace in the territory, which further limits the resources the rebels can draw from the territory.

The strategy of arming local elites and unleashing their militias to engage in significant violence only makes coherent sense if we believe that the rebels' power is endogenous to the territory they control. Empirically, several older and newer studies suggest that rebels draw power either from the population they control or from foreign patrons. In the former case, preventing rebels from consolidating control of territories that might improve their power appears to be a reasonable tactical decision. The model demonstrates that governments will only adopt this tactic in areas of moderate strategic value. Since using militias requires the government to also cede control of the territory, governments will use their conventional forces in the most valuable areas of their state. These may include critical shipping areas, airports, major cities, or industrial areas. On the other hand, governments may be perfectly willing to cede areas of limited value to the rebels, which may explain why these groups tend to thrive in geographically 'difficult' terrain such as mountains and jungles.[7] In moderately valuable territories, the government may be unwilling to mobilize its conventional forces but may also prefer to prevent the rebels from taking these areas. Governments may therefore turn to militias in these areas, not to defeat the rebels outright, but to limit the group's ability to draw considerable resources from these areas. If the model does capture the strategic logic of turning to militias, it suggests that governments are willing to tolerate significant human rights abuses, and perhaps increased popularity for the rebels, all to prevent groups from consolidating major territorial gains.

TABLE 1: Control of Territory by Conventional Forces

Territorial Value	Empirical Prediction
Low	No Militia Presence
Moderate	Militia Presence with Some Positive Probability
High	No Militia Presence

The model further identifies where militias are likely to appear. Table 1 presents these empirical predictions. The expectation is that militias will surface in territories that may moderately shift power in favor of the rebels. Governments are unlikely to use militias in economically insignificant areas, such as mountains or rural areas with little activity. In these areas, the government may allow the rebels to take territory since the territory itself does not provide the rebels with a drastic increase in power. On the other hand, militias are also less likely to appear in areas of critical import to the state. Instead, we would expect the government to use its conventional military to secure its major cities, oil installations,

[7]See Fearon and Laitin (2003).

or airports. Thus, we expect to see militias emerge in moderately valuable areas, which may increase rebels' power if gained but not significantly harm the state if lost.These empirical implications are summarized in the following hypotheses:

H_1: Civilian militia presence is more likely in territories that are of moderate value to the state.

H_2: Civilian militia presence is more likely in territories that are of moderate value to the rebels.

Data and Methods

To test the implications of our formal model, we employ data from several sources on the long-standing conflict in Colombia. The Colombian conflict is an appropriate selection for testing our theory, as paramilitary groups were an important actor alongside rebel groups and government forces in a civil war spanning more than 50 years. Further, the Colombian state's moderate strength allowed for the selective use of conventional military efforts and encouraged civilians to create self-defense militias elsewhere, indicating that variation exists in our dependent variable. The data from Colombia that we discuss below provide a valuable glance into the micro-level dynamics – particularly, differences in territorial value – that we outline. However, it is important to note that the implications of our model apply to a wide range of additional intrastate conflicts in which self-defense militias were present such as the Sudanese civil war and the conflict in Sierra Leone. We employ a large-n, cross-municipality quantitative test, and a qualitative discussion of three municipalities representative of different territorial values: Jordán or Jordán Sube, Bojayá, and Yumbo.

Civil war began in Colombia in 1964 between leftist rebel groups, notably the Fuerzas Armadas Revolucionarias de Colombia (FARC) and the Ejército de Liberación Nacional (ELN), and the Colombian state. Right-wing militias originally formed to protect individuals' and communities' property in rural areas then grew in strength and importance to the conflict through the 1980s and 1990s. Their degree of organization and involvement with the Colombian state and local politics varied (Acemoglu, Robinson and Santos, 2013). In 1996, with some assistance from the Colombian government, the Autodefensas Unidas de Colombia (AUC) organized as an umbrella organization consisting of several regional and local self-defense groups. Although the AUC coordinated and encouraged individual militias' efforts to combat the influence of guerrilla groups, each militia was regionally based, autonomous, and relied on local leadership. Therefore, while both the FARC and ELN could use local informants and gather intelligence about militia activity in particular localities, neither had perfect information about the ties between the Colombian state and local defense militias.

The long-standing presence of the AUC, FARC, and ELN provides us with a significant window of time in which to analyze the interaction between the Colombian state, militias, and rebel groups. Additionally, due to the presence of oil that is highly valuable to both the state and rebels and drug crops that can significantly augment the power of rebel groups, the Colombian case has the high amount of variation in territorial value that drives our theoretical expectations. These characteristics, combined with the presence of detailed, municipal-level data, makes Colombia a suitable case with which to test our theory.

Our unit of analysis is the municipality-year, which allows us to assess self-defense militia presence at a highly local level that can be tied to resource access and transfers of power due to territorial value. The geographically coded data divides Colombia into 1120 municipalities, which are the smallest administrative units in the country. QGIS software was used to aggregate locations of time-invariant natural resources–notably drug crops–to the municipal level, which were then paired with time-variant municipal characteristics about the conflict and municipal governance.

The Universidad de los Andes' Centro de Estudios sobre el Desarrollo Económico (Center for the Study of Economic Development, or CEDE) (*Facultad de Economia: Centro de Datos*, N.d.) has collated fine-grained data on geography, governance, socio-economic conditions and violence in Colombian municipalities over time. A selection of these data were merged with our municipality-year data to include a variety of control covariates into our models. The municipality coding by CEDE for Colombia differed from the coding used in our original data and the municipalities were matched manually by name. Since the development of the municipality borders is not static over time and some municipality names did not have exact matches, our final merged dataset includes 904 matched municipalities.

Dependent Variable

Our dependent variable captures AUC presence in each municipality-year. The CEDE data provides this dichotomous variable from 1996-2008; thus, we study the Colombian conflict during these years. This is an appropriate window of time to study the conflict since civilian militias were primarily active in the late 1990s and early 2000s, despite the much longer time frame of the overall Colombian conflict. This set of years and number of municipalities provides 10,730 observations. The AUC is an appropriate choice as it represents a larger umbrella organization that is coded to include a variety of civilian self-defense militias. Our DV includes multiple Colombian militias that vary in degree of formality, mobilization, and size, but are all coordinated by the AUC organization during this time frame. Given the difficulty of collecting information about militia activity, sub-group or associated militia presence would likely be attributed to the AUC in the data and are thus captured in our dependent variable. While the AUC is the primary umbrella organization of self-defense militias in the Colombian case, these observations may not fully capture variation in the extent to which smaller, community militias were formed exclusively by elites versus with government support. However, this distribution of different militia types reflects the uncertainty that drives our model, and we are confident that the AUC appropriately captures civilian militia presence. The example municipalities' records of AUC activity in the data are helpful benchmarks for understanding the distribution of our dependent variable. The AUC is never present in the low-value municipality of Jordán, recorded as active for four years in Bojayá, and active in only one year in Yumbo.

Key Explanatory Variables

Our first independent variable, revenue from taxes earned in each municipality, captures the value of that particular territory for the government. This is tied to our first hypothesis that civilian militia violence occurs in areas that are moderately valuable to the state - municipalities with taxation revenues near the median should be most likely to experience AUC presence. This variable, collected by CEDE, is a comprehensive measure of the income from taxation in each municipality, as it covers earnings from property tax, taxes on businesses and industry, gasoline tax, and other forms of tax earnings for the state (*Facultad de Economia: Centro de Datos*, N.d.). Because states can be expected to concentrate their resources on areas that provide the most income, this variable further addresses variation in state capacity. States should use conventional military deployment in areas with high state capacity (including tax capacity), but should employ informal civilian self-defense militias in areas of moderate state capacity or taxation value. Thus, this measure captures government-earned revenue from primary commodities such as oil as well as taxes collected from the population, providing a rough estimate of the value of territory for the government that will inform the Colombian state's security choices. We log-transform this measure due to the wide range of values that it takes.[8] For reference, the value of this logged revenue variable is at or near the minimum in Jordán – ranging over time from 0.01 to 5 in our 13-year period. In Bojayá, the logged values of revenue are near the median, ranging from 1 to 7.5. Finally, the maximum value in our data of 14 is for Bogotá, while the valuable municipality of Yumbo has logged values of tax income ranging from 9.5 to nearly 12. We also include a squared measure of revenue since our theory predicts a non-linear relationship between value of territory and probability of militia presence. Specifically, municipalities with median-level tax income are most likely to experience self-defense militias. Because the government's ability to tax may be both affected by and affect rebel group activity, we also

[8]A histogram of the distribution of this log-transformed variable can be found in our statistical appendix (Figure 3).

lag this measure by one year in an additional test in our appendix (Table 7). This allows us to determine the effect of municipality value in the year prior on the current year's militia formation.

We further hypothesized that civilian militia presence is more likely in territory that can moderately increase the rebels' capability. Territory may be differently valued for the rebels and the government when it contains illicit commodities from which rebels can profit but the state cannot. In particular, for the Colombian conflict, drug crops were an important part of rebels' financing and capacity. This indicates that, although the government cannot profit from illicit commodities such as drugs,[9] the presence of such commodities may encourage self-defense militia formation to prevent rebel access to valuable territory. We therefore use data on illegal drug production from Buhaug and Lujala (2005) as a measure of resource value for rebels. In Colombia, large-scale production of cannabis was present in two municipalities, coca production was present in 128 municipalities, and opium was present in 229 municipalities. We include a dummy for each of these drug types. Of the three, coca was the primary source of profit for leftist groups such as the FARC and the ELN.[10][11][12]

In addition to the importance of territory's economic value, our theory further suggests that militia formation should occur to counteract rebel activity as a substitute for conventional military force. In the Colombian case, this means that we expect civilian militias to emerge in municipalities that are threatened by leftist groups. To capture leftist group activity, we aggregate counts of FARC and ELN attacks on civilians in each municipality for each year. Including these two main rebel groups should encompass most of the leftist violence during a given municipality-year. This variable runs from a minimum of no attacks

[9]While some state actors may indeed profit from the sale of narcotics, we focus here on state gains from the licit economy.

[10]None of the municipalities were recorded to have diamond deposits, thus, we do not need to account for diamond resources within a territory (Gilmore et al., 2005).

[11]For the example municipalities discussed above, the high-valued municipality of Yumbo is recorded as having drug crop presence while Jordán and Bojay á are not narcotics producers.

[12]In our appendix, we also include a model in which the presence of coca crops is interacted with the tax value of the state.

to a maximum of 32 attacks per year.[13] We also include the time-invariant distance of each municipality from the Colombian capitol of Bogotá, which helps to capture the state's ability to access each municipality with conventional military force. Municipalities close to Bogotá will be of high priority to the government for protection and easier to access with conventional force, but we might expect that the Colombian state cannot make use of standard military force in distant muncicipalities.[14] Our model also includes a log-transformed population variable since densely populated areas are more likely to correspond to urban areas that may instead be conventionally protected by the state.

Finally, the model predicts that militia activity should only occur in areas where the rebels' territorial control is tentative enough that a militia can effectively contest the territory. As such, we control for the departments[15] where FARC activity and territorial control was historically highest: Caquetá, Meta, Putumayo, and Guaviare (Holmes, Amin Gutierrez de Pineres and Curtin, 2008). Our primary analysis includes a dummy variable for whether or not a municipality is located within each of these departments. Because the FARC solidified territorial control in much of these areas, we should expect that the AUC would be less effective in such departments than in those with tentative FARC control.[16] As an additional robustness check (found in the appendix) we drop these departmental dummy variables and include a single measure of whether the 1948-1953 period of civil war known as 'La Violencia' affected the municipality. FARC and the overall Colombian leftist revolutionary movement had their local origins in the conflict of this era, and the departments where this period of violence originated remain the primary areas of leftist violence (Acemoglu, Robinson and Santos, 2013). Thus, this binary measure is an appropriate proxy for the areas in which the FARC/ELN might maintain the highest level of territorial control and political sway. The

[13]In Jordán, leftist groups did not commit any attacks during the time in which our data is collected. Bojayá experienced four years with multiple attacks on population. Yumbo similarly does not have recorded attacks on population.

[14]The municipalities of Jordán, Bojayá and Yumbo are all close to the mean distance from Bogotá.

[15]In Colombia, this is the administrative level above municipalities. The United States' equivalent for municipalities would be counties, and for departments would be states.

[16]None of the municipalities discussed in detail are part of such FARC controlled departments.

results of the model do not substantively differ from the primary model with departmental dummies for FARC control.

Results

Quantitative Analysis

To test the empirical implication of our formal model, we use a probit model since our dependent variable of militia presence is binary. The regression includes the independent variables previously discussed, as well as fixed effects to account for any particular periods of excessive violence.[17] We present the results of this model in Table 2. Our primary independent variables of tax revenue, tax revenue squared, coca crops, and leftist group activity are statistically significant predictors of self-defense militia presence at the 0.01 level. Our theory suggests that self-defense militias should be active in territory that is moderately valuable for both the state and the rebel groups. Because drug crops increase the value of territory for non-state actors, we expect leftist groups' municipal-level access to drug crops to be positively correlated with AUC presence. Our results indicate that opium in a municipality is a negative and statistically significant predictor of AUC presence, but coca crops are positively and statistically significantly correlated. Full exploration of the criminality of both leftist groups and the AUC lies outside of the scope of this paper. However, during the time period examined, coca was by far the most important source of funding for the FARC (Gutiérrez Sanín, 2008; Saab and Taylor, 2009). This suggests that the AUC was likely to be present in areas where the FARC or ELN had access to the coca crops that were known to fuel their conflict against the state.

The substantive effects of these coefficients require additional consideration due to the complexity of the squared term. To this end, we also include a plot of the predicted

[17]The coefficients and standard errors for the year fixed effects are included in the full model in the appendix. Here, we report only the results from our substantive independent variables. An identical model without year fixed effects can be found in our appendix as well.

TABLE 2: Probit with FARC-Dominant Departments and Year Fixed Effects

	Dependent variable:
	AUC Presence
Ln(Tax Revenue)	0.250***
	(0.046)
Ln(Tax Revenue)^2	−0.014***
	(0.004)
Leftist Group Attacks	0.153***
	(0.012)
Distance from Bogotá	0.001***
	(0.0001)
Opium	−0.229***
	(0.040)
Coca	0.193***
	(0.053)
Cannabis	−0.037
	(0.285)
Ln(Population)	0.201***
	(0.034)
Caquetá	−0.104
	(0.144)
Meta	0.737***
	(0.096)
Putumayo	−0.062
	(0.158)
Guaviare	0.107
	(0.288)
Constant	−9.543
	(30.145)
Observations	10,730
Log Likelihood	−3,630.235
Akaike Inf. Crit.	7,310.469
Note:	*p<0.1; **p<0.05; ***p<0.01

probability of a municipality experiencing civilian militia presence over the range of values for tax revenue. For generating these predicted probabilities and simulated confidence intervals, the distance to Bogotá is set at the third quartile, the population at its mean value, attacks on population at the mean, the year at 2003, and FARC-controlled departments set at 0, and the municipality does not contain opium or cannabis but does contain coca. This allows us to look at how the tax value of territory matters for militia presence in the hypothetical 'average case' of a municipality that is somewhat distant from the capitol, contains coca but no other drug crops, experiences average levels of leftist violence, and is not a FARC territorial stronghold. The year 2003 was chosen as the middle value in the time range, but generating predicted probabilities for other years in the sample does not change our results. Our theory suggests that self-defense militia presence should occur in response to leftist group presence (captured by the non-zero value of attacks on the population, here) and for moderately valuable territories. From this plot, the curvilinear relationship between territorial value and militia presence is clear–the highest predicted probabilities of militia presence correspond to values of tax revenue near the median value of our data.[18] We include additional specifications of this model, including tests for spatial dependence and a spatial model, as robustness checks in the appendix.[19] As a test of the model's predictive power, we also include the Receiver-Operator Characteristic (ROC) plot. The value of the area under the curve for our model is .81, indicating that the model's predictive power for whether or not we observe militia presence is high.

[18]The width of the confidence interval for high levels of revenue account for the scarcity of attacks in very wealthy municipalities, and, more broadly, the relative scarcity of such municipalities relative to less valuable territories.

[19]In addition to the model checks listed above, we also provide a model replacing distance from Bogotá with the municipality's distance from its department capital and a model that limits our year range from 1997-2005, when the AUC legally disbanded. We also include a count model of AUC activity as an alternate measure of our dependent variable. Estimates and levels of statistical significance in these models are akin to those in our primary model.

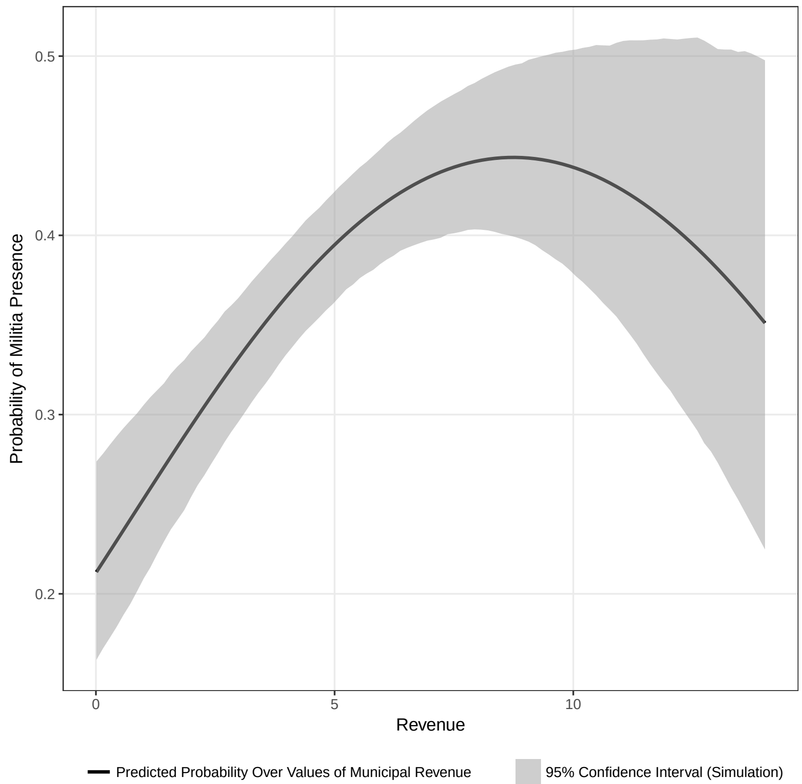

Figure 2: Predicted Probability of AUC Presence, Primary Model

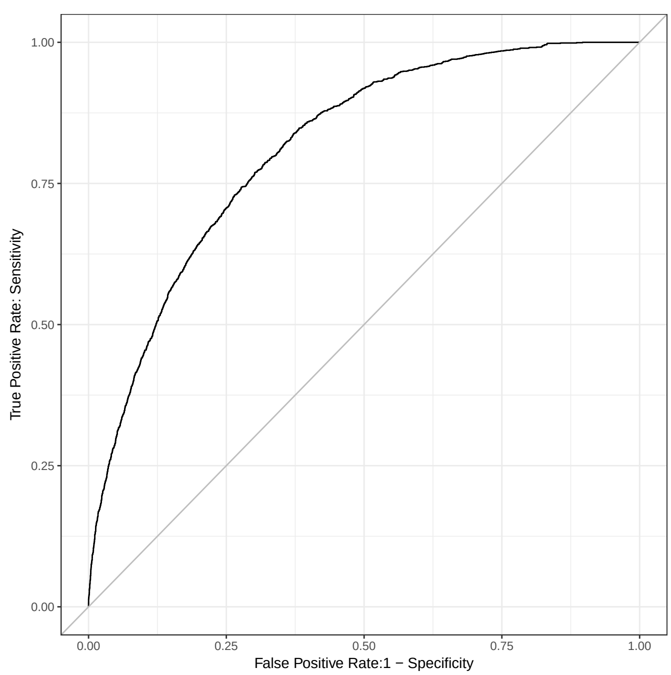

Figure 3: ROC Plot, area under the curve =.81

Our statistical test provides empirical support for the implications generated by our formal model. Specifically, we predicted that municipalities that are moderately valuable for the state and those that generate moderate increases in capacity for the rebels should see militias emerge. In the Colombian case, this means that militias such as the AUC should appear in municipalities that generate reasonable levels of revenue for the government but are not key economic areas. Further, the AUC should be present in areas where coca crops can generate revenue for rebel groups that can be translated into fighting power. As is evident in Figure 2, municipalities with tax revenue values near the median range are those with the highest probability of militia presence. Additionally, as expected, tax value and leftist group attacks have a statistically significant effect on explaining where paramilitary groups are operating. Overall, this large-N test of AUC presence in Colombian municipalities should be seen as evidence toward our theory that governments employ civilian militias in areas that are of moderate strategic value for conflicts. Conversely, governments are less likely to use civilian self-defense militias in areas of low value, which they do not contest, or areas of high value, which governments defend using conventional military means.

Municipality-level Illustration

In addition to the results from the full quantitative test, we qualitatively consider details from three municipalities matching the levels of territorial value outlined in Table 1. Our formal model predicts a curvilinear relationship between territorial value and militia formation. These example cases and our model's predictions for AUC presence can be found in Table 3. Jordán, or Jordán Sube, is a small municipality in the department of Santander which generates little economic value for the Colombian state. Bojayá, in the department of Chocó, is an example of a moderately valued municipality due to its agricultural production and access to the Atrató river (EFE, N.d.). Yumbo, in the Valle del Cauca department near Cali, is a small but valuable industrial city with numerous domestic and internationally owned factories (de Comercio de Cali, N.d.).

To illustrate these cases and better situate them in the context of the Colombian conflict and our empirical test, we provide a series of maps. Figure 4 pinpoints the location

TABLE 3: Empirical Cases: Colombian Municipalities

Territorial Value	Empirical Prediction	Municipality (Department)
Low	No Militia Violence	Jordán (Santander)
Moderate	Militia Violence with Some Positive Probability	Bojayá (Chocó)
High	No Militia Violence	Yumbo (Valle del Cauca)

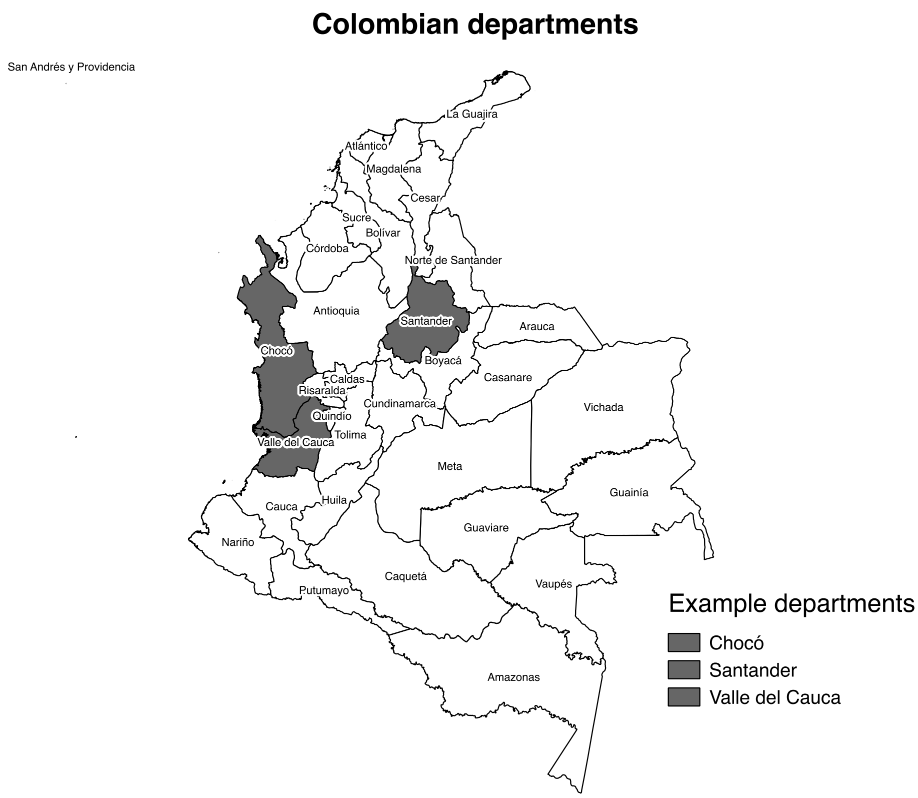

Figure 4: Map of Key Colombian Departments

of the departments that house our three example municipalities: Santander, Chocó, and Valle del Cauca. Figures 5, 6, and 7 map characteristics of the municipalities present in each department in detail, illustrating not only our example municipalities of Jordán, Bojayá and Yumbo, respectively, but also relevant characteristics of surrounding municipalities. To generate these maps, we use the year 2003 because this year represents the midpoint in our sample and matches the predicted probabilities plotted in Figure 2 covering our full sample of municipalities. For the municipalities in each of these departments, we map the taxation level and whether or not if AUC presence was recorded. In our appendix, we also include maps of whether the municipalities in these departments contained coca crops.

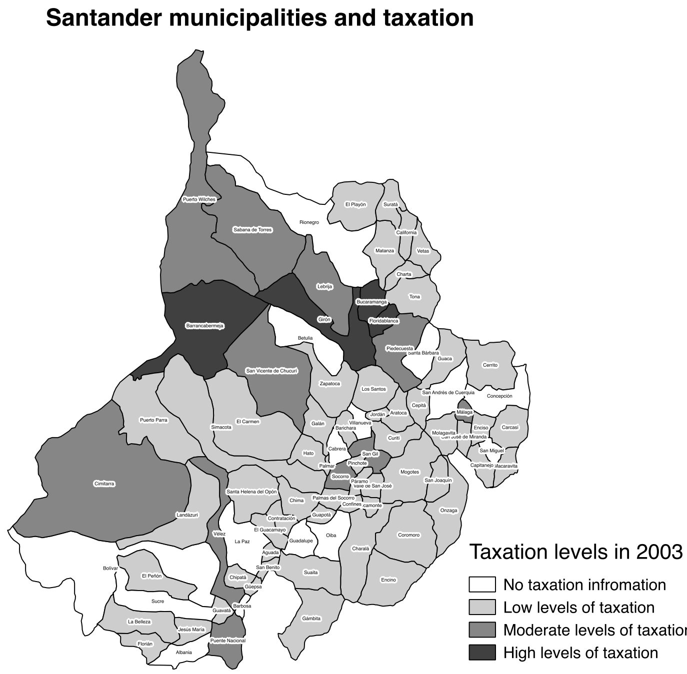

Figure 5: Territorial Value of Santander Municipalities, 2003

The connection between municipality value and AUC presence emerges when looking in greater detail at the municipalities of Jordán, Bojayá, and Yumbo. Rebel and government forces alike ignored the small and poor municipality of Jordán, which generates little tax income due to its minimal population and lack of other taxable production (*La tierra del olvido*, 2004). As our formal model predicts and our maps demonstrate, Jordán never attracts any paramilitary presence. Bojayá, as a moderately valuable municipality given its agricultural production, saw several years of paramilitary presence and clashes with leftist rebels. In addition to this regular paramilitary presence, the municipality was the site of a horrific clash between rebels and paramilitary groups under the AUC umbrella in 2002 (Sanchez, 2010; EFE, N.d.). Finally, given Yumbo's income driven by the prevalence of

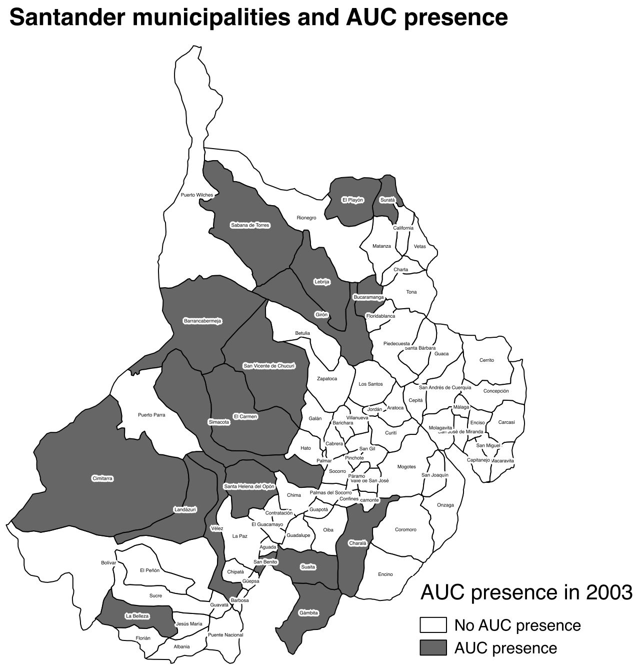

Figure 6: AUC presence in Santander, 2003

internationally owned factories and its location close to the city of Cali, paramilitary involvement was sparse, with the AUC active in just one year (de Comercio de Cali, N.d.) - 2003, the midpoint of our sample and the year used to generate our map above. As our theory suggests, this valuable municipality was less likely to see a paramilitary group emerge than moderately valuable municipalities such as Bojayá. Thus, both our quantitative test and a more detailed, municipal-level look at territorial value and AUC presence provide evidence in support of our hypothesis that militias are most likely in moderately valuable territories. Unlike in minimally valuable territory that is uncontested by the state or very highly valued territory where the state uses conventional force, municipalities of moderate value are those that see civilian militia presence.

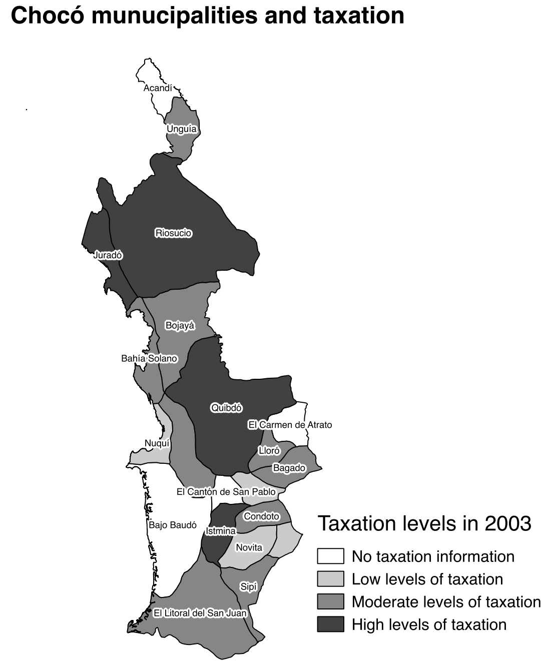

Figure 7: Territorial Value of Chocó Municipalities, 2003

Conclusion

This study proposes a rationalist explanation for why governments encourage the formation of civilian self-defense militias, despite the possibility that these groups may ultimately compromise their sovereign territory. We argue that, at the tactical level, government support for civilian militias may make it more difficult for rebels to draw resources from areas they capture. Many of the qualitative and systematic studies of rebels indicate that the power of these groups is drawn from the territories that fall under their control. Gaining these resources requires rebels to co-opt local elites living and working in these areas. The use of militias represents an effort by governments to stop rebels from drawing new resources from captured areas in two ways. First, arming militias may increase the willingness of these groups to fight the rebels for control of the territories. This limits the amount of resources the rebels can gain from the territory and forces it to burn more resources fighting militias,

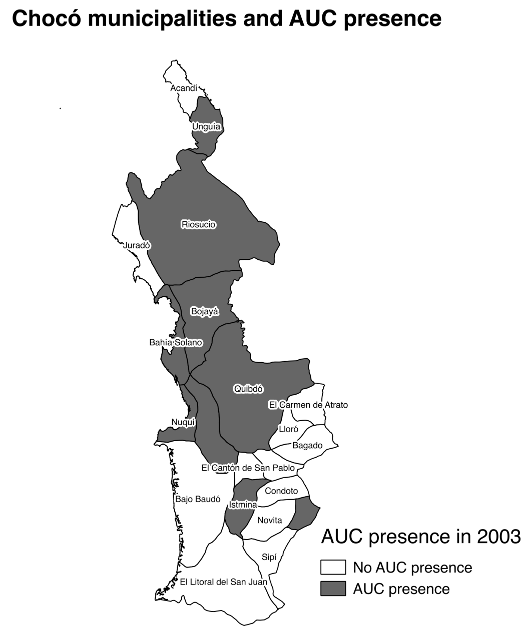

Figure 8: AUC Presence in Chocó, 2003

rather than fighting the state. Second, even if the rebels are able to co-opt the local elites, arming militias likely raises the number of concessions the rebels must make. This also burns resources the rebels could use to fight the state. In the Colombian case, for example, the AUC engaged in high levels of violence against civilians as a means of gaining or effectively controlling territory. While the FARC did victimize noncombatants, the group's primary tactic in gaining civilian cooperation was to form economic and security partnerships with local farmers, thus expending valuable group resources (Saab and Taylor, 2009). Taken together, even if self-defense militias appear counterproductive, governments may use them in the short term to guard against the higher threat of rebels drawing increased power from newly captured territories. The tragedy, however, is that, while this strategy may be rational, militias typically cause considerable destruction and damage in their wake.

The findings of this analysis are informative to academics, by contributing to debates

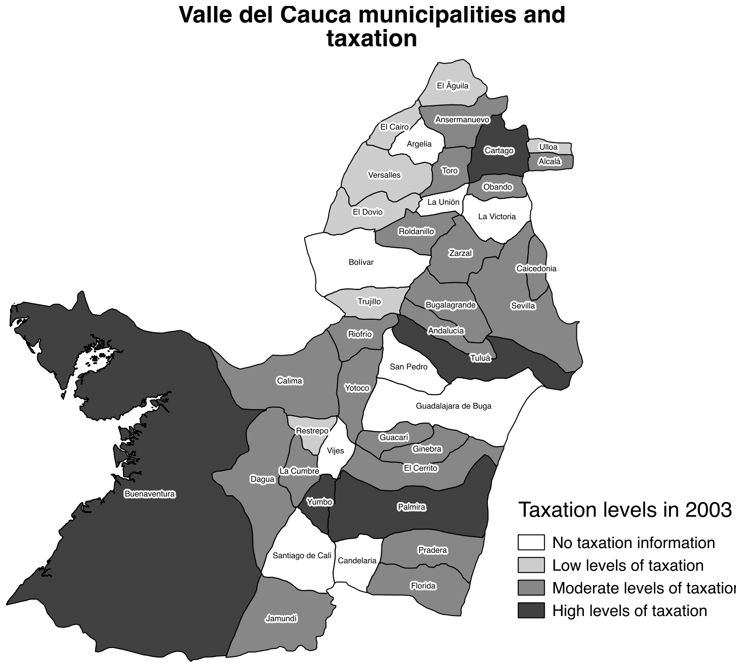

Figure 9: Territorial Value of Valle del Cauca Municipalities, 2003

regarding the incentives and consequences related to the use of militias by state actors, and policymakers, by providing knowledge on the impact of numerous conflict actors in civil war. Several scholars have highlighted the double-edged sword self-defense militias may embody for states in that they can prevent rebels from consolidating territory but also may overuse violence against civilians. We provide a strategic explanation for why state actors might be incentivized to employ such militias but also to keep these relationships private. Furthermore, we provide empirical evidence that the degree to which the state values different issues, territory in the case of Colombia, influences when militias (instead of conventional militaries) will enter the conflict. While we test our argument with the specific Colombian case, our theory is generalizable to other regions and types of conflict. Based on our findings, policymakers can develop expectations about when civilian self-defense militias should emerge and the manner in which the state may use them.

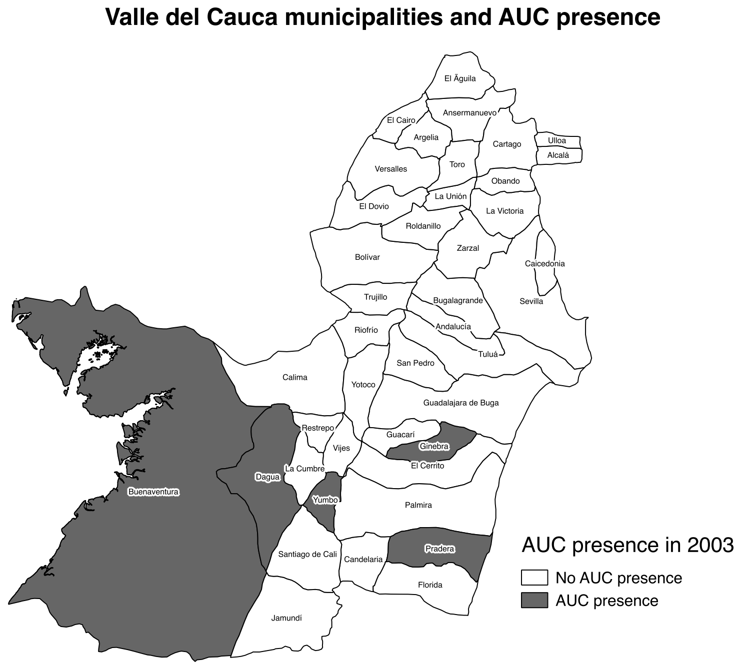

Figure 10: AUC Presence in Valle del Cauca, 2003

Formal Appendix

The game is solved using the Perfect Bayesian Equilibrium (PBE) Solution concept, which specifies that the players' strategies are sequentially rational given their beliefs, which are calculated using Bayes' Rule. The model is intended to demonstrate that militias are likely to mobilize in areas of moderate control.

Militia

M's willingness to Attack is a function of R's offer, and its reservation price is a function of whether or not G plays Arm Militia versus $\sim$ Arm Militia. If G plays Arm Militia, M plays $\sim$ Attack if:

$$x \geq 1 - \delta p - c_M \tag{3}$$

If G plays $\sim$ Arm Militia, M plays $\sim$ Attack if:

$$x \geq 1 - p - c_M \tag{4}$$

Rebels

R is uncertain if G plays Arm Militia or $\sim$ Arm Militia. Represent R's belief that G arms M as ϕ. Since M should prefer a deal when $x = 1-p-c_M$ versus a deal when $x = 1-\delta p-c_M$, R may risk offering the low amount ($x_1 = 1-p-c_M$) versus the larger amount ($x_2 = 1-\delta p-c_M$). R chooses to offer x_1 if the probability ϕ that G arms M is sufficiently low. R is indifferent between offering x_1 versus x_2 if:

$$\phi(\delta p(\beta(p+c_M)-c_R)+(1-\phi)(\beta(p+c_M)\geq\beta(\delta p+c_M)$$

$$\phi=\frac{(\beta p(\delta-1))}{(-c_R+\beta(p+c_M)(-1+\delta p))}$$

Define $\phi* = \dfrac{(\beta p(\delta-1))}{(-c_R+\beta(p+c_M)(-1+\delta p))}$.

R therefore offers x_1 if $\phi < \phi*$ and offers x_2 otherwise.

Government

G's behavior can be identified using the strategic form of the game.

		R		
		$x=0$	$x=1-p-c_M$	$x=1-\delta p-c_M$
	$\sim$ Arm	$-w;w$	$-w-\beta(p+c_M);w+\beta(p+c_M)$	$-w-\beta(\delta p+c_M);w+\beta(\delta p+c_M)$
G	Arm	$-w-\alpha;w$	$-w-\delta p(\beta(p+c_M))-\alpha;w+\delta p(\beta(p+c_M)-c_R$	$-w-\beta(\delta p+c_M)-\alpha;w+\beta(\delta p+c_M)$
	Conventional	$-w-k;w$	$-w-k;w$	$-w-k;w$

Remark 1.

If R x=0, G plays $\sim$ Arm.

Proof. G's payoff for $\sim$ Arm is equal to $-w$, which is preferable to playing Arm since $-w > -w-k \equiv 0 > -k$. ■

Remark 2.

If R $x = 1-p-c_M$, G prefers Arm to $\sim$ Arm if $\beta > \frac{\alpha}{(p+c_M)(1-\delta p)}$ and prefers $\sim$ Arm to Arm otherwise.

Proof. If R plays $x = 1 - p - c_M$, G prefers Arm if $-w - \delta p(\beta(p + c_M)) - \alpha > -w - \beta(p + c_M)$. Simplifying in terms of β, we see that this is true if:

$$\beta > \frac{\alpha}{(p + c_M)(1 - \delta p)}$$

G therefore prefers playing Arm to $\sim$ Arm in response to R's offer of $x = 1 - p - c_M$ if $\beta > \frac{\alpha}{(p+c_M)(1-\delta p)}$ and prefers $\sim$ Arm otherwise. ∎

Remark 3

If R $x = 1 - p - c_M$, G prefers Conventional to Arm if $\beta > \frac{(k-\alpha)}{(\delta p c_M + \delta p^2)}$ and Arm otherwise.

Proof. G prefers Conventional to Arm if $-w - k > -w - \delta p(\beta(p + c_M))$. Solving in terms of β, this is true if:

$$\beta > \frac{(k - \alpha)}{(\delta p c_M + \delta p^2)}$$

G therefore prefers Conventional to Arm if $\beta > \frac{(k-\alpha)}{(\delta p c_M + \delta p^2)}$ and prefers Arm to Conventional otherwise in response to R's offer of $x = 1 - p - c_M$. ∎

Remark 4

If R $x = 1 - p - c_M$, G prefers Conventional to $\sim$ Arm if $\beta > \frac{k}{(p+c_M)}$ and prefers $\sim$ Arm to Conventional otherwise.

Proof. G prefers Conventional to $\sim$ Arm if $-w - k > -w - \beta(p + c_M)$. Solving in terms of β, this is true if:

$$\beta > \frac{k}{(p + c_M)}$$

G therefore prefers Conventional to $\sim$ Arm if $\beta > \frac{k}{(p+c_M)}$ and prefers $\sim$ Arm to Conventional otherwise in response to R's offer of $x = 1 - p - c_M$. ∎

Remark 5

If R $x = 1 - \delta p - c_M$, G strictly prefers $\sim$ Arm to Arm.

Proof. G prefers $\sim$ Arm to Arm if $-w - \beta(\delta p + c_M) > w - \beta(\delta p - c_M) - \alpha \equiv 0 > -\alpha$. Since this must be true, G should always prefer $\sim$ Arm to Arm if R offers $x = 1 - \delta p - c_M$. ∎

Remark 6

. If R $x = 1 - \delta p - c_M$, G strictly prefers Conventional to $\sim$ Arm if $\beta > \frac{k}{(\delta p + c_M)}$.

Proof. G prefers Conventional to $\sim$ Arm if $-w-k > -w-\beta(\delta p+c_M)$. Simplifying in terms of β, we see that this is true if:

$$\beta > \frac{k}{(\delta p + c_M)}$$

G therefore prefers Conventional to $\sim$ Arm if $\beta > \frac{k}{(p+c_M)}$ and prefers $\sim$ Arm to Conventional otherwise in response to R's offer of $x = 1-\delta p - c_M$. ■

The above remarks allow us to identify G's behavior as a function of β. We can see that $\frac{(k-\alpha)}{(\delta p c_M+\delta p^2)} > \frac{\alpha}{((p+c_M)(1-\delta p))}$ if $k > \frac{\alpha}{(1-\delta p)}$. If $k > \frac{\alpha}{(1-\delta p)}$, it is also true that $\frac{k}{(p+c_M)} > \frac{\alpha}{((p+c_M)(1-\delta p))}$. Let us therefore impose a restriction that $\underline{k} = \frac{\alpha}{(1-\delta p)}$, meaning that $k > \frac{\alpha}{(1-\delta p)}$. This allows us to identify G's behavior as a function of β using four cutpoints. According to the Remarks above:

1. If $\beta < \frac{\alpha}{((p+c_M)(1-\delta p))}$, G's preferences are $\sim$ Arm $>$ Arm $>$ Conventional
2. If $\frac{\alpha}{((p+c_M)(1-\delta p))} < \beta < \frac{k}{(p+c_M)}$, G's preferences are Arm $> \sim$ Arm $>$ Conventional
3. If $\frac{k}{(p+c_M)} < \beta < \frac{(k-\alpha)}{(\delta p c_M+\delta p^2)}$, G's preferences are Arm $>$ Conventional $> \sim$ Arm
4. $\frac{(k-\alpha)}{(\delta p c_M+\delta p^2)} < \beta$, G's preferences are Conventional $>$ Arm $>\sim$ Arm.

Equilibrium:

Proposition 1

If $\beta < \frac{\alpha}{((p+c_M)(1-\delta p))}$, the following strategies and beliefs constitute a Perfect Bayesian Equilibrium:

1. G: $\sim$ Arm
2. R: $x = x_1$
3. M :$\sim$ Attack
4. Beliefs: Pr $\{\phi \mid\sim$ Conventional$\}$=0.

Proof. Since G plays $\sim$ Arm in this case, R has a dominant strategy to offer $x = x_1$. This offer is accepted by M since $x_1 \geq 1-p-c_M$. ■

Proposition 2

If $\frac{\alpha}{((p+c_M)(1-\delta p))} < \beta < \frac{k}{(p+c_M)}$, the following strategies and beliefs constitute a Perfect Bayesian Equilibrium in mixed strategies:

1. G: q(Arm), (1-q)($\sim$ Arm)
2. R: $j(x = x_1)$, $(1-j)(x = x_2)$

3. M: qj(Attack), $(1-qj)(\sim$ Attack)

4. Beliefs: Pr $\{\phi\ |\sim$ Conventional$\}$=$\phi*$.

Proof. If $\frac{\alpha}{((p+c_M)(1-\delta p))} < \beta < \frac{k}{(p+c_M)}$, G plays Arm if R sets $x = x_1$, but plays $\sim$ Arm if R sets $x = x_2$. If $\phi < \phi*$, R sets $x = x_1$. G responds by playing Arm. However, since R knows that G will play Arm in this case if $x = x_1$, R updates that $\phi = 1$ and G has armed M and plays $x = x_2$. If R plays $x = x_2$, G plays $\sim$ Arm. However, if G plays $\sim$ Arm, R should offer $x = x_1$, at which point G plays Arm. We therefore see that there is no stable pure strategy equilibrium in this case.

Let us therefore determine if a mixed strategy equilibrium exists. Suppose G plays Arm with probability q and plays $\sim$ Arm with probability $(1-q)$. G sets q such that R is indifferent between offering x_1 and x_2. The E$U_R(x_1)$ =E$U_R(x_2)$ if:

$$q(\delta p(\beta(p+c_M)-c_R)+(1-q)(\beta(p+c_M)) = \beta(\delta p+c_M)$$

Solving for q:

$$q = \frac{(\beta p(-1+\delta))}{(-c_R+\beta(p+c_M)(-1+\delta p))}$$

G therefore plays Arm with probability q and $\sim$ Arm with probability (1-q) in mixed strategies. In response, R offers x_1 with probability j such that the EU_G(Arm)=EU_G($\sim$Arm). This is true if:

$$j(-\beta(p+c_M)+(1-j)(-\beta(\delta p+c_M))$$

Solving for j:

$$j = -\frac{\alpha}{(\beta(p+c_M)(-1+\delta p))}$$

R therefore plays $x = x_1$ with probability j and plays $x = x_2$ with probability $(1-j)$. M will only play Attack if G plays Arm and R offers x_1, which occurs with probability qj. M plays $\sim$ Attack in all other cases, or with probability $1-qj$.

Let us now examine what occurs if $\phi > \phi*$. In this case R believes that G is playing Arm, and prefers to offer x_2. However, if R offers $x2$, R knows that G should always play $\sim$Arm, and R should play $x = x_1$. If R plays $x = x_1$, G plays Arm, and R should play $x = x_2$. As in the previous case, there is no stable pure strategy equilibrium. Therefore, G plays q(Arm), $(1-q)(\sim$ Arm) and R plays $j(x = x_1), (1-j)(x = x_2)$ for all prior beliefs ϕ in this region of β. ■

Proposition 3a

If $\frac{k}{(p+c_M)} < \beta < \frac{(k-\alpha)}{(\delta p c_M+\delta p^2)}$, the following strategies constitute a Perfect Bayesian Equilibrium:

1. G: Conventional
2. R: $x = x_2$.
3. M: Accept if $x \geq x_2$

Proof. G's preference ordering in this region is Arm > Conventional >∼ Arm. R therefore knows that G will never play ∼ arm. In this case, R's best response is to set $x = x_2$. If R sets $x = x_2$, Remark 5 indicates that G strictly prefers playing ∼ Arm to Arm. While this is true, G strictly prefers playing Conventional to ∼ Arm in this region. G therefore adopts a strategy of Conventional and immediately ends the game. ■

Proposition 3b

If $\frac{(k-\alpha)}{(\delta p c_M + \delta p^2)} < \beta$, the following strategies constitute a Perfect Bayesian Equilibrium:

1. G: Conventional
2. R: $x = x_2$
3. M: Accept if $x \geq x_2$

Proof. Remark 6 indicates that if $\frac{(k-\alpha)}{(\delta p c_M + \delta p^2)} < \beta$, G's top preference is to play Conventional. G therefore ends the game immediately. ■

Figure 11, below, plots the equilibrium of the game, showing the changes in the probability of militia violence over the values of β or the value of the territory for the government G.

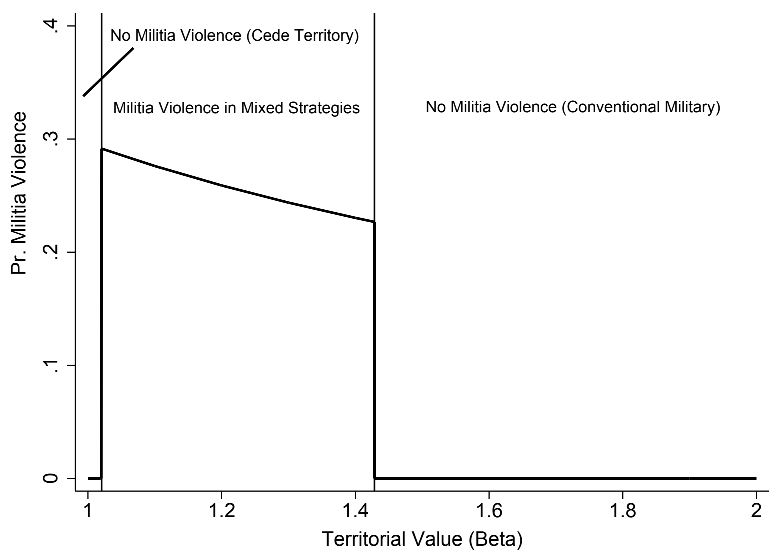

Figure 11: Plotted Equilibrium

Statistical Appendix

Table 4 shows the full specification of our model, including the year fixed effects, which are not reported in the text. Tables 5 and 6 are alternate specifications. Table 5 is the same as Table 4, but with a dummy variable for all drugs. The model reported in Table 6 does not include year fixed effects. Table 7 uses a different measure of FARC controlled departments: whether or not the department experienced La Violencia, which preceded the FARC's formation. Table 8 reflects an alternative model which replaces the distance from Bogot'a with a measure of distance from each department capital. Table 9's model changes the format of our dependent variable, substituting a count of AUC armed activity to capture militia activity rather than militia presence. The model in Table 10 limits our year range to 1997-2005, the years in our data in which the AUC was formally active. In 2005, the umbrella militia organization of the AUC officially and legally disbanded (*Desmovilizacion de AUC a finales del 2005*, N.d.). Finally, the model in Table 11 is identical to that in Table 5 but with tax income and the squared tax income lagged one year to counteract potential endogeneity concerns. Table 12 replicates our primary model but interacts tax with coca presence. Across each of these models, the same pattern with coefficient estimates and statistical significance should be evident.

We also include descriptive statistics of our primary independent variables. Statistically significant values (at the 0.01 level) in each model are represented with bold text. Figures 12, 13, 14 show the distributions of the logged measure of tax income for the municipalities, drug type in each municipality, and whether or not the municipality experienced La Violencia, respectively. Table 13 includes descriptive statistics of our other independent variables.

Finally, we include our test of spatial dependency in Table 14. Table 15 presents the results from a Spatial Durbin model estimated on an imputed dataset, which accounts for spatial dependence in both the independent and dependent variables in our model.

TABLE 4: Probit, FARC-Dominant Departments, Year Fixed Effects, Disaggregated Drug Types

	Estimate	Std. Error	z value	Pr(>|z|)
(Intercept)	-9.5428	30.1446	-0.32	0.7516
Ln(Tax Revenue)	0.2505	0.0462	5.42	0.0000
Ln(Tax Revenue)^2	-0.0143	0.0036	-3.96	0.0001
Leftist Group Attacks	0.1529	0.0119	12.81	0.0000
Distance from Bogotá	0.0007	0.0001	6.19	0.0000
Dummy, Opium Production	-0.2292	0.0401	-5.72	0.0000
Dummy, Coca Production	0.1927	0.0526	3.66	0.0003
Dummy, Cannabis Production	-0.0369	0.2850	-0.13	0.8970
Ln(Population)	0.2011	0.0344	5.85	0.0000
Caquetá	-0.1040	0.1439	-0.72	0.4698
Meta	0.7372	0.0962	7.66	0.0000
Putumayo	-0.0616	0.1578	-0.39	0.6964
Guaviare	0.1069	0.2879	0.37	0.7106
1997	4.4058	30.1432	0.15	0.8838
1998	4.7687	30.1431	0.16	0.8743
1999	4.9784	30.1431	0.17	0.8688
2000	5.5110	30.1431	0.18	0.8549
2001	5.7547	30.1431	0.19	0.8486
2002	5.7338	30.1431	0.19	0.8491
2003	5.7354	30.1431	0.19	0.8491
2004	5.7559	30.1431	0.19	0.8486
2005	5.4685	30.1431	0.18	0.8560
2006	4.8873	30.1431	0.16	0.8712
2007	5.1492	30.1431	0.17	0.8644
2008	4.5070	30.1432	0.15	0.8811

TABLE 5: Probit with FARC-Dominant Departments and Year Fixed Effects, Drug Dummy

	Estimate	Std. Error	z value	Pr(>|z|)
(Intercept)	-9.4519	30.5617	-0.31	0.7571
Ln(Tax Revenue)	0.2294	0.0459	4.99	0.0000
Ln(Tax Revenue)^2	-0.0135	0.0036	-3.74	0.0002
Leftist Group Violence	0.1530	0.0119	12.87	0.0000
Distance from Bogotá	0.0008	0.0001	7.40	0.0000
Drugs	-0.0747	0.0364	-2.05	0.0401
Ln(Population)	0.2035	0.0343	5.94	0.0000
Caquetá	0.1240	0.1387	0.89	0.3710
Meta	0.9507	0.0906	10.50	0.0000
Putumayo	0.1500	0.1531	0.98	0.3272
Guaviare	0.3901	0.2846	1.37	0.1704
1997	4.3359	30.5604	0.14	0.8872
1998	4.6999	30.5603	0.15	0.8778
1999	4.9082	30.5603	0.16	0.8724
2000	5.4447	30.5602	0.18	0.8586
2001	5.6835	30.5602	0.19	0.8525
2002	5.6620	30.5602	0.19	0.8530
2003	5.6671	30.5602	0.19	0.8529
2004	5.6896	30.5602	0.19	0.8523
2005	5.4104	30.5602	0.18	0.8595
2006	4.8319	30.5603	0.16	0.8744
2007	5.0967	30.5603	0.17	0.8675
2008	4.4521	30.5603	0.15	0.8842

TABLE 6: Probit with FARC-Dominant Departments

	Estimate	Std. Error	z value	Pr(>|z|)
(Intercept)	-3.4342	0.2651	-12.96	0.0000
Ln(Tax Revenue)	0.2829	0.0421	6.72	0.0000
Ln(Tax Revenue)^2	-0.0138	0.0034	-4.11	0.0000
Leftist Group Attacks	0.1871	0.0113	16.53	0.0000
Distance from Bogotá	0.0008	0.0001	8.84	0.0000
Drugs	-0.0429	0.0338	-1.27	0.2044
Ln(Population)	0.0876	0.0278	3.15	0.0016
Caquetá	0.0710	0.1316	0.54	0.5894
Meta	0.7905	0.0843	9.38	0.0000
Putumayo	0.1319	0.1440	0.92	0.3598
Guaviare	0.2518	0.2664	0.94	0.3447

TABLE 7: Probit with La Violencia and Year Fixed Effects

	Estimate	Std. Error	z value	Pr(>|z|)
(Intercept)	-8.9710	30.7242	-0.29	0.7703
Ln(Tax Revenue)	0.2250	0.0457	4.93	0.0000
Ln(Tax Revenue)^2	-0.0109	0.0036	-3.03	0.0024
Leftist Group Attacks	0.1583	0.0119	13.30	0.0000
Distance from Bogotá	0.0008	0.0001	7.40	0.0000
Drugs	-0.0037	0.0352	-0.10	0.9172
Ln(Population)	0.1463	0.0341	4.29	0.0000
La Violencia	0.2403	0.0460	5.22	0.0000
1997	4.3198	30.7229	0.14	0.8882
1998	4.6898	30.7228	0.15	0.8787
1999	4.8926	30.7228	0.16	0.8735
2000	5.4215	30.7228	0.18	0.8599
2001	5.6512	30.7228	0.18	0.8541
2002	5.6222	30.7228	0.18	0.8548
2003	5.6277	30.7228	0.18	0.8547
2004	5.6442	30.7228	0.18	0.8542
2005	5.3640	30.7228	0.17	0.8614
2006	4.8032	30.7228	0.16	0.8758
2007	5.0520	30.7228	0.16	0.8694
2008	4.4199	30.7228	0.14	0.8856

TABLE 8: Probit with Distance from the Capital and Year Fixed Effects

	Estimate	Std. Error	z value	Pr(>|z|)
(Intercept)	-10.1561	30.6325	-0.33	0.7402
Ln(Tax Revenue)	0.1875	0.0455	4.12	0.0000
Ln(Tax Revenue)^2	-0.0138	0.0036	-3.83	0.0001
Leftist Group Attacks	0.1491	0.0118	12.61	0.0000
Distance to Department Capital	0.0019	0.0003	6.41	0.0000
Drugs	-0.0954	0.0366	-2.61	0.0091
Ln(Population)	0.3078	0.0301	10.23	0.0000
Caquetá	0.1484	0.1396	1.06	0.2878
Meta	0.8463	0.0907	9.34	0.0000
Putumayo	0.3135	0.1531	2.05	0.0406
Guaviare	0.5160	0.2837	1.82	0.0689
1997	4.3633	30.6313	0.14	0.8867
1998	4.7237	30.6312	0.15	0.8774
1999	4.9498	30.6312	0.16	0.8716
2000	5.4833	30.6311	0.18	0.8579
2001	5.7301	30.6311	0.19	0.8516
2002	5.7135	30.6311	0.19	0.8520
2003	5.7295	30.6311	0.19	0.8516
2004	5.7592	30.6311	0.19	0.8509
2005	5.4850	30.6311	0.18	0.8579
2006	4.9174	30.6312	0.16	0.8725
2007	5.1884	30.6312	0.17	0.8655
2008	4.5490	30.6312	0.15	0.8819

TABLE 9: Poisson model for counts of AUC armed activity

	Estimate	Std. Error	z value	Pr(>|z|)
(Intercept)	-25.2936	297.9483	-0.08	0.9323
Ln(Tax Revenue)	0.7827	0.0768	10.20	0.0000
Ln(Tax Revenue)^2	-0.0466	0.0051	-9.07	0.0000
Leftist Group Attacks	0.1578	0.0053	29.94	0.0000
Distance from Bogotá	-0.0007	0.0005	-1.34	0.1790
Drugs	-0.2569	0.0581	-4.42	0.0000
Ln(Population)	0.3606	0.0484	7.45	0.0000
Caquetá	-0.6584	0.3371	-1.95	0.0508
Meta	0.3042	0.1512	2.01	0.0442
Putumayo	-0.2717	0.3049	-0.89	0.3728
Guaviare	-0.3853	0.5799	-0.66	0.5064
1997	15.1454	297.9481	0.05	0.9595
1998	15.8067	297.9480	0.05	0.9577
1999	16.5309	297.9480	0.06	0.9558
2000	17.5867	297.9480	0.06	0.9529
2001	17.7368	297.9480	0.06	0.9525
2002	17.2231	297.9480	0.06	0.9539
2003	17.0945	297.9480	0.06	0.9542
2004	16.8394	297.9480	0.06	0.9549
2005	16.6130	297.9480	0.06	0.9555
2006	15.3690	297.9480	0.05	0.9589
2007	14.9377	297.9480	0.05	0.9600
2008	14.6972	297.9481	0.05	0.9607
2009	-0.3902	422.2511	-0.00	0.9993
2010	-0.4082	422.7025	-0.00	0.9992

TABLE 10: Probit With FARC-Dominant Departments, Year Fixed Effects through 2005

	Estimate	Std. Error	z value	Pr(>|z|)
(Intercept)	-10.5148	48.7704	-0.22	0.8293
Ln(Tax Revenue)	0.2184	0.0535	4.08	0.0000
Ln(Tax Revenue)^2	-0.0176	0.0044	-3.97	0.0001
Leftist Group Attacks	0.1622	0.0133	12.20	0.0000
Distance from Bogotá	0.0019	0.0004	5.20	0.0000
Drugs	-0.1721	0.0441	-3.90	0.0001
Ln(Population)	0.3202	0.0359	8.93	0.0000
Caquetá	0.1821	0.1684	1.08	0.2797
Meta	0.7344	0.1133	6.48	0.0000
Putumayo	0.4054	0.1858	2.18	0.0291
Guaviare	0.7937	0.3395	2.34	0.0194
1997	4.5835	48.7693	0.09	0.9251
1998	4.9438	48.7693	0.10	0.9193
1999	5.1757	48.7693	0.11	0.9155
2000	5.7082	48.7693	0.12	0.9068
2001	5.9546	48.7693	0.12	0.9028
2002	5.9369	48.7693	0.12	0.9031
2003	5.9542	48.7693	0.12	0.9028
2004	5.9924	48.7693	0.12	0.9022

TABLE 11: Probit with FARC-Dominant Departments and Year Fixed Effects, Lagged Tax Measures

	Estimate	Std. Error	z value	Pr(>|z|)
(Intercept)	-5.0008	0.3307	-15.12	0.0000
Ln(Tax Revenue)$_{t-1}$	0.2371	0.0448	5.30	0.0000
Ln(Tax Revenue)$^2{}_{t-1}$	-0.0141	0.0036	-3.92	0.0001
Leftist Group Attacks	0.1510	0.0121	12.46	0.0000
Distance from Bogotá	0.0008	0.0001	7.03	0.0000
Drugs	-0.0518	0.0368	-1.41	0.1589
Ln(Population)	0.1967	0.0345	5.70	0.0000
Caquetá	0.1391	0.1399	0.99	0.3201
Meta	0.9504	0.0914	10.40	0.0000
Putumayo	0.1464	0.1551	0.94	0.3450
Guaviare	0.3889	0.2845	1.37	0.1717
1998	0.2547	0.1318	1.93	0.0533
1999	0.5058	0.1207	4.19	0.0000
2000	1.0223	0.1146	8.92	0.0000
2001	1.2973	0.1119	11.60	0.0000
2002	1.2575	0.1118	11.25	0.0000
2003	1.2796	0.1124	11.39	0.0000
2004	1.2929	0.1123	11.51	0.0000
2005	1.0051	0.1147	8.76	0.0000
2006	0.4390	0.1220	3.60	0.0003
2007	0.6860	0.1192	5.75	0.0000
2008	0.0380	0.1338	0.28	0.7768

TABLE 12: Probit with FARC-Dominant Departments, Year Fixed Effects, and Tax Interacted with Coca Presence

	Estimate	Std. Error	z value	Pr(>|z|)
(Intercept)	-9.5929	30.1586	-0.32	0.7504
Ln(Tax Revenue)	0.2768	0.0525	5.27	0.0000
Ln(Tax Revenue)^2	-0.0162	0.0039	-4.12	0.0000
Leftist Group Attacks	0.1526	0.0119	12.77	0.0000
Distance from Bogotá	0.0007	0.0001	6.25	0.0000
Opium	-0.2316	0.0402	-5.77	0.0000
Coca	0.6640	0.3618	1.83	0.0665
Cannabis	-0.0426	0.2851	-0.15	0.8813
Ln(Tax Revenue)*Coca	-0.1807	0.1215	-1.49	0.1370
Ln(Tax Revenue)^2*Coca	0.0156	0.0099	1.57	0.1159
Ln(Population)	0.1990	0.0346	5.75	0.0000
Caquetá	-0.0715	0.1456	-0.49	0.6237
Meta	0.7532	0.0968	7.78	0.0000
Putumayo	-0.0438	0.1592	-0.27	0.7835
Guaviare	0.1020	0.2905	0.35	0.7254
1997	4.3927	30.1571	0.15	0.8842
1998	4.7540	30.1570	0.16	0.8747
1999	4.9629	30.1570	0.16	0.8693
2000	5.4945	30.1570	0.18	0.8554
2001	5.7388	30.1570	0.19	0.8491
2002	5.7190	30.1570	0.19	0.8496
2003	5.7202	30.1570	0.19	0.8496
2004	5.7396	30.1570	0.19	0.8491
2005	5.4521	30.1570	0.18	0.8565
2006	4.8702	30.1570	0.16	0.8717
2007	5.1317	30.1570	0.17	0.8649
2008	4.4877	30.1571	0.15	0.8817

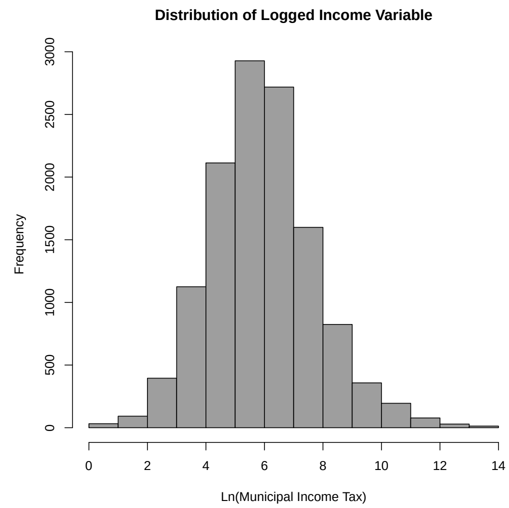

Figure 12: Distribution of Ln(Tax Revenue)

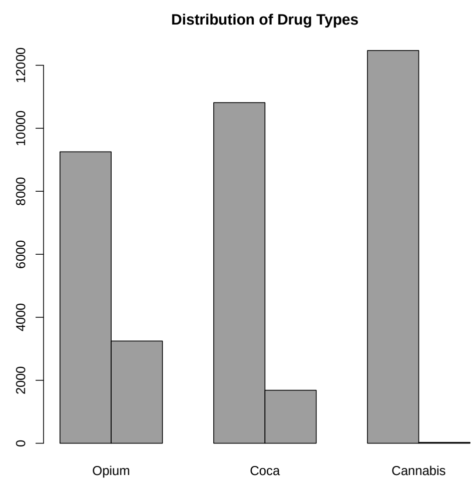

Figure 13: Distribution of Drugs

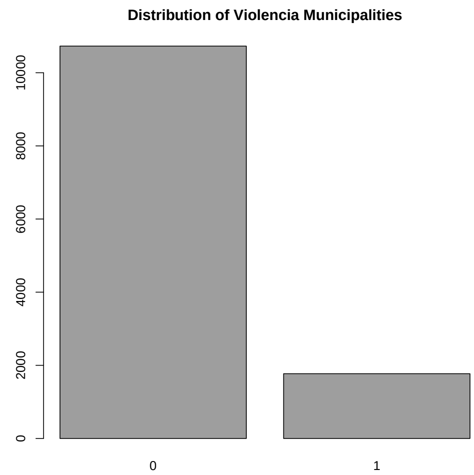

Figure 14: Distribution of La Violencia Municipalities

TABLE 13: Descriptive Statistics, Independent Variables

	Min.	1st Qu.	Median	Mean	3rd Qu.	Max.
Leftist Attacks on Civilians	0.00	0.00	0.00	0.42	0.00	32.00
Distance from Bogota	11.92	157.69	258.88	297.27	417.43	997.99
Ln(Population)	6.53	8.87	9.46	9.58	10.17	14.67

TABLE 14: Spatial dependency tests of variables

Weights matrix					
Name: Ws Type: Imported (binary) Row-standardized: Yes					
Moran's I					
Variables	I	E(I)	sd(I)	z	p-value*
AUC	0.171	-0.001	0.022	7.842	0.000
Ln(Tax Revenue)	0.399	-0.001	0.022	18.212	0.000
Ln(Tax Revenue)^2	0.382	-0.001	0.022	17.445	0.000
Leftist Group Violence	0.294	-0.001	0.022	13.531	0.000
Distance from Bogotá	0.946	-0.001	0.022	43.049	0.000
Drugs	0.832	-0.001	0.022	37.822	0.000
Ln(Population)	0.387	-0.001	0.022	17.655	0.000
Caquetá	0.778	-0.001	0.021	37.040	0.000
Meta	0.732	-0.001	0.022	33.998	0.000
Putumayo	0.762	-0.001	0.021	36.966	0.000
Guaviare	0.194	-0.001	0.016	12.495	0.000

*1-tail test

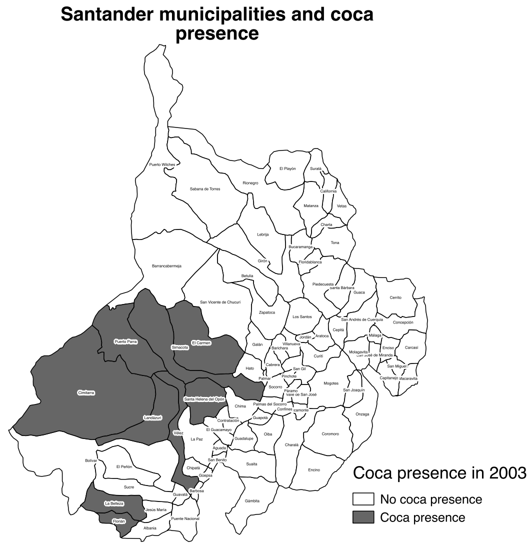

Figure 15: Coca in Santander, 2003

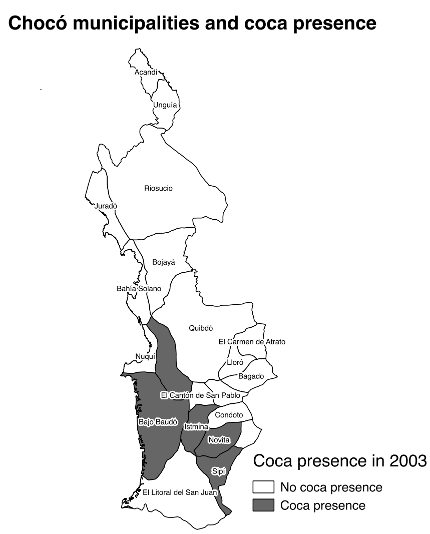

Figure 16: Coca in Chocó, 2003

TABLE 15: Total Effects from Spatial Durbin Regression Models

	(1) Spatial Durbin Model (SDM)	(2) SDM Year Fixed effects	(3) SDM Year Random effects
Ln(Tax Revenue)	0.0626***	0.0851***	0.0851***
	(5.00)	(6.07)	(6.07)
Ln(Tax Revenue)^2	-0.00294**	-0.00368**	-0.00368**
	(-3.21)	(-3.27)	(-3.27)
Leftist Group Violence	0.0879***	0.105***	0.105***
	(19.76)	(20.48)	(20.48)
Distance from Bogotá	0.000203***	0.000238***	0.000238***
	(7.59)	(8.58)	(8.58)
Drugs	-0.0426***	-0.0395***	-0.0395***
	(-5.07)	(-3.49)	(-3.49)
Ln(Population)	0.0105	-0.0107	-0.0107
	(1.02)	(-1.23)	(-1.23)
Caquetá	0.0381	0.0250	0.0250
	(1.08)	(0.50)	(0.50)
Meta	0.239***	0.221***	0.221***
	(8.61)	(5.97)	(5.97)
Putumayo	0.0530	0.0432	0.0432
	(1.28)	(0.74)	(0.74)
Guaviare	-0.125	-0.149	-0.149
	(-1.09)	(-0.98)	(-0.98)
N	17100	17100	17100

t statistics in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

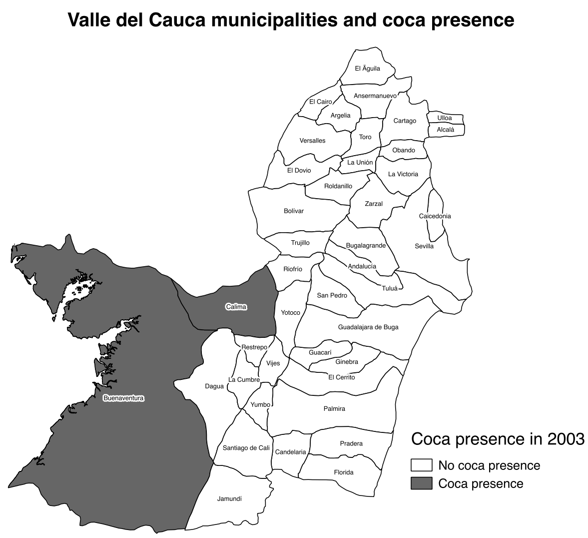

Figure 17: Coca in Valle del Cauca, 2003

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