Local Institutions and Armed Group Presence: Evidence from Colombia*

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Abstract

This paper investigates the causal impact of non-state armed groups on local institutions during armed conflict, and tests competing theoretical mechanisms that may shape such effect. Our identification strategy uses an instrumental variable approach that constructs straight lines connecting natural parks within 300 kilometers of each other, as parks are used by armed groups to hide, as well as mobilize arms, illicit crops and troops. The results show that the presence of armed groups is associated with increases in overall participation in local organizations, with a particularly strong effect on political organizations. This strengthening of local institutions during wartime appears to be driven by changes in local alliances by armed groups and their capture of decision-making processes for strategic war purposes, rather than being a reflection of a vibrant civil society.

Keywords: armed conflict, violence, institutions, Colombia
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1. Introduction

Research on armed conflict has taken a prominent place in development economics over the last decade. However, the analysis of the causes and consequences of violent conflicts has to date taken place without much consideration for the institutional settings that underpin the decisions of state actors, rebels and civilians during wartime. Throughout human history, armed violence has been used strategically by political actors to transform or appropriate the institutions that shape the allocation of power and resources (Acemoglu and Robinson 2006; Cramer 2006; Kalyvas 2006; North, Wallis and Weingast 2009). These forms of institutional change are likely to have profound implications for the survival, security and recovery of populations and countries emerging from conflict. Yet the relationship between civil wars and institutional change is under-researched.

This gap in the literature is largely due to armed conflict being generally theorized as a departure from social order, rather than intrinsic to the creation and change of institutions (Kalyvas, Shapiro and Masoud 2008). As a result, a large literature has focused on studying armed conflicts as symptoms of 'state collapse' (Milliken 2003; Zartman 1995) or 'state failure' (Ghani and Lockhart 2008), without much acknowledgement for the fact that the 'collapse' of state institutions is not always associated with the collapse of social, economic and political order. In reality, different political actors attempt to occupy the space left by weak or absent state institutions, by building new institutions that advance their war objectives, or capturing and controlling existing institutions. Control over the civilian population by non-state armed groups is often exercised through violent means, but not at all times, nor everywhere (Arjona 2010, 2014; Kalyvas, Shapiro and Masoud 2008; Mampilly 2011). This is in particular the case of insurgencies where rebel groups, unable to directly confront larger and better-equipped state forces through military means, must resort to co-

opting and organizing civilians in order to gain the necessary strength to effectively contest the state or control key territories (Kalyvas 2006; Lichbach 1995; Weinstein 2007). Well-known examples include Hezbollah in Lebanon, Hamas in Palestine, the Taliban in Afghanistan, the FARC in Colombia and the recently formed ISIS group in Syria and surrounding regions.

We take advantage of a unique dataset on the armed conflict in Colombia to analyze in this paper how armed groups affect local institutions during wartime. Specifically, we analyze the causal effect of armed group presence on individual participation in local collective organizations across 222 communities in Colombia, and explore empirically competing theoretical mechanisms that may plausibly shape the relationship between non-state armed groups and institutional change during wartime.

We focus on local collective organizations because these are key institutions in areas where public goods provision is limited, shaping key development outcomes. In these settings, local collective action may solve coordination problems (Ostrom 1990), and provide networks of support (Foster and Rosenzweig 2001; Fafchamps and Lund 2003). Local collective organizations are also important institutions that can be mobilized for political and economic purposes during and after armed conflicts (Riley 2005).

We use an instrumental variable approach to identify the causal link between the presence of armed groups and individual participation in local organizations. We construct an instrumental variable based on the proximity of each community to strategic paths that armed groups use to mobilize their troops – which increases the attractiveness of the community for non-state armed actors. This empirical approach is an important contribution of the paper because it enables us to control for potential endogeneity in the relationship between armed conflict and local institutions. In many contexts of armed conflict, violence is not random as specific individuals and localities may be targeted as part of the strategic objectives of armed

groups (Kalyvas 2006), or due to geographic characteristics that facilitate their movements (Fearon and Laitin 2003). The non-random nature of violence and armed group presence may result in an omitted variable bias as unobservable variables may determine jointly exposure to conflict and the organization of local institutions. Results may also be affected by reverse causality when armed groups choose to take over communities with weak institutions because capture is easier, or choose to target communities with strong institutions for deliberate destruction (if they resist their presence and objectives) or to establish control (if they are sympathetic to their cause and may help advancing their political goals once the war is over). We are able to address these concerns by exploiting the exogenous variation in the proximity to strategic paths followed by non-state armed actors within-community pairs across Colombia.

We find that the presence of armed groups in any given community is positively associated with an increase in overall individual participation in local organizations. This effect is driven by an increase in individual attendance of meetings of political organizations and assuming leadership positions, but is accompanied by reduced individual participation in political decision-making processes. We explore further whether increased participation in local collective organizations may be the result of communities organizing themselves to resist non-state armed groups, or driven by the capture of local institutions by armed groups. This theoretical distinction is important because each mechanism will have different implications for the dynamics of conflict locally, as well as for post-conflict recovery. Institutional change that results from resistance may sow the seeds for stronger organizational capacity among affected communities. The capture of institutions by armed groups may in contrast lead to lower social cohesion. Our findings are suggestive of the latter mechanism. The results show that armed group presence is associated with changes in who participates and how in local collective organizations. Notably, wealthier and less educated people

participate more, indicating that armed groups may capture local institutions favoring some members of the community. Decision-making processes appear to be controlled by the armed groups themselves.

These findings are an important contribution to how we understand the emergence of order and governance in conflict areas, by providing detailed evidence on strategies employed by non-state armed groups beyond the use of violence, including interventions in the design and operation of key local institutions in areas they attempt to control. This is an interesting result because it suggests that institutional change is endogenous to conflict processes. This observation may provide important micro-foundations to understand the duration and re-ignition of armed conflicts, as well as their long term development consequences, given the impact that local institutions will have on the strength and level of authority exercised by non-state groups, on the level of support armed groups can expect from local populations, and on the ability of the state to operate and provide public goods, services and security in areas they control.

The paper adds also new insights to recent work on the effect of war victimization on social capital. A number of studies have shown that individual exposure to violence during armed conflict may be associated with increases in pro-social behavior and engagement in collective action once conflicts are over (Bellows and Miguel 2009; Blattman 2009; Gilligan et al. 2014; Voors et al. 2012).[1] Although other studies have shown more nuanced effects of conflict on pro-social behavior (Bauer et al. 2011; Cassar et al. 2011, Nunn and Wantchekon 2011; Rohner, Thoenig and Zilibotti 2011), these results have led several authors to suggest that conflict may be associated with positive development outcomes in the long-term, by providing "new evidence against pessimistic views on the destructive legacies of civil war" (Voors et al. 2012: 962). The mechanisms that may explain these results have remained

[1] Bateson (2012) shows that crime is also associated with increases in pro-social behaviour and in social engagement.

untested. The results in this paper indicate that institutional change may be a plausible mechanism, but suggest caution about the prevalent positive interpretation. This is because we may observe an increase in what appears to be pro-social behavior when institutions are captured by armed groups. This is unlikely to result in inclusive development or democratic outcomes in the aftermath of conflict.

Another limitation of this body of work, and other recent studies on the micro-level effects of armed conflict, has been their focus on violence as a proxy for conflict exposure. This may be problematic because it may leave out general equilibrium effects of conflict caused by the presence of non-state actors and the institutional changes they impose – as shown in this paper. Since direct exposure to violence may be low when non-state armed actors are hegemonic (Kalyvas 2006), the coefficient on direct exposure is unlikely to capture fully how armed conflict influences local institutions and norms.

The paper has also important policy implications. In the last decade, the World Bank and other international donors have spent billions of dollars (the World Bank alone has spent over $85 billion) on participatory community-level development projects aimed at improving social cohesion and governance at the local level (Mansuri and Rao 2012; World Bank 2004). These programs have been particularly popular in countries emerging from armed conflict (Mansuri and Rao 2012). However, evidence on the effects of these community-driven development programs on social cohesion and the strength of local governance to date is at best mixed (Beath, Christia and Enikolopov 2013; Casey, Glennerster and Miguel 2012; Fearon, Humphreys and Weinstein 2014), with some studies having shown increases in conflict as a result of community-driven projects (Barron, Diprose and Woolcock 2011; Crost, Felter and Johnston 2014). The findings around armed group capture discussed in this paper provide a potential explanation for why local development projects may not achieve their stated objectives in post-conflict societies. If correct, these results draw attention to the

risk of designing external interventions to change local institutions and structures of governance without a solid understanding of how those institutions and structures may have been affected by the conflict itself.

The remainder of the paper is organized as follows. In the next section, we discuss the relationship between armed groups and local institutional change and identify a set of competing theoretical hypotheses that may explain the effects of armed group presence on local collective organizations. We then describe in section 3 how local institutional change has evolved in Colombia as a result of exposure to armed conflict. . In sections 4 and 5, we present the empirical strategy, and discuss our main econometric results and their robustness to alternative model specifications. Section 6 concludes the paper.

2. Theorizing the links between armed groups and local institutions

During wartime, different actors contest and sometimes win the control of territories and populations, transforming social, economic and political structures, organizations and norms (Kalyvas 2006; North, Wallis and Weingast 2009). Institutional change results from the interaction between armed groups and local populations (Justino 2009, 2013). Armed non-state actors opt for different strategies when attempting to control local populations: from victimizing, displacing and looting, to capturing or creating new institutions for the provision of public goods and security, the organization (and control) of local markets and political structures and the enforcement of social norms. Local populations, on their part, exercise some degree of agency despite the hardship of living under (the threat of) violence. Some endure the presence of armed non-state actors by obeying their rules, others resist (either peacefully or by forming armed defense groups) and others voluntarily participate and support different armed groups (Arjona 2014; Petersen 2001; Wood 2003).

Recent literature has shown that while some armed non-state groups act in violent and predatory ways towards local populations, others – particularly in the case of insurgencies – concentrate in gaining the support of civilians through the ways in which they organize local institutions, provide goods, services and security and impose social norms and behavior (Arjona 2010; Mampilly 2011; Weinstein 2007). Local populations may, in turn, resort to armed groups for physical and economic protection, especially when the state is weak, inadequate or abusive (Goodwin 2001; Justino 2009; Kalyvas and Kocher 2007), or may resist (actively or in hidden ways) the influence and presence of armed groups in their communities (Petersen 2001; Wood 2003). The effect of these complex interactions on local institutional change has remained weakly understood at both theoretical and empirical levels. We attempt here to build on this body of literature to extract a set of testable hypotheses on the causal mechanisms that may shape the effects of armed groups on local institutions.

First and foremost, local institutions are transformed by armed groups during conflicts through the establishment of (voluntary or coercive) alliances, coalitions and other forms of interaction and negotiation. Armed conflicts may lead to new political or economic alliances between armed groups and civilian populations (Kalyvas 2006; Wood 2003, 2008) when armed groups attempt to muster local support by coercive means or otherwise, and populations try to survive (Kalyvas and Kocher 2007). These could reflect patterns of (overt or covert) social and political mobilization prior to the conflict, or new alliances and networks shaped by the conflict itself (Wood 2008), not dissimilar by those observed in contexts where political actors offer patronage advantages in exchange for votes (Scott 1969; Stokes 2005). When confronted with the presence of armed groups, civilians adopt several strategies to minimize the risk of victimization and take advantage of economic opportunities: either forming alliances with political and military power holders, or avoiding political involvement to keep a low profile and restricting networks to the close family (Kalyvas 2006;

Korf 2004). In terms of participation in collective organizations – the main focus of this paper – some individuals may join in forms of collective action to either collaborate with or resist armed groups (or other behaviors in between). Others may remove themselves from local organizations for fear of being targeted (or are removed forcibly). These processes of coalition formation and negotiation will lead to changes in local institutions as behaviors, decisions and norms change in response to (violent or non-violent) incentives. This may be done through voluntary means when communities share the ideological views or other strategic objectives of armed groups, or through coercive means as armed groups appropriate local institutions for their own purposes, or replace community leaders with their own supporters (Acemoglu, Reed and Robinson 2014; Kaplan 2010). Communities may in turn be co-opted or may resist control by armed groups.

Armed groups often attempt to control local populations and territory through the outright capture of existing institutions or the establishment of new ones. Evidence for Italy and Germany has revealed how the Fascist and Nazi parties captured pre-existing civic organizations to spread their message, recruit members, co-opt leaders, and take advantage of successful organization techniques (Satyanath et al. 2013; Riley 2005). Wood (2008) discusses how the *Sendero Luminoso* in Perú forced people to attend meetings and killed publicly community leaders in order to impose control and fear. Similar accounts are described in Tambiah (1986) for the case of the LTTE in Sri Lanka and in Kaplan (2010) for the case of Colombia.

But institutional change may also result from civilians resisting the presence and control of armed groups. People in areas of conflict are not necessarily always peons used in strategic warfare. All suffer greatly from the effects of violence, but many resist armed groups and shape the dynamics of conflict and violence on the ground (Justino 2009; Kalyvas 2006; Petersen 2001). Wood (2003) reports how peasants in El Salvador resisted the state

army (by sometimes joining the rebel movement). Petersen (2001) discusses similar evidence in the case of Lithuanian resistance against Soviet occupation in the 1940s. Other resistance movements have taken the form of militia groups or civil defense groups, such as the notorious *Kamajor* in Sierra Leone or paramilitary groups in El Salvador, Perú and Colombia (Brockett 1990; Wood 2008). In Colombia, several accounts show that communities took control over their own security by creating self-defense and neighborhood watching groups (Kaplan 2010). Arjona (2010, 2014) shows that communities in Colombia with a history of stronger institutions were more likely to resist armed groups. As a response to resistance, armed groups may in turn inhibit the functioning of local collective organizations to prevent civil resistance movements or alienate support to the opponent group (Azam and Hoefler 2002; Engel and Ibáñez 2007).

We explore in the next sections how processes of coalition formation, control and capture by armed groups and resistance by civilians have shaped the relationship between armed group presence and local institutions in Colombia.

3. Armed conflict and local institutional change in Colombia

Colombia has been characterized by profound forms of institutional transformation as a result of decades of armed conflict. Two major internal conflicts have affected Colombia since 1940. The first conflict erupted during the first half of the 20th century as a result of a struggle between the two main political parties, the Liberals and the Conservatives. This period, known as *La Violencia*, ended in 1958 with a power sharing agreement between the two parties which excluded leftist movements. Peasant organizations that emerged during the late period of *La Violencia* turned into left-wing guerrilla groups during the early-sixties (Sánchez and Meertens 1983). The emergence of the illegal drug trade intensified the conflict by

providing resources to left-wing guerrilla groups, and promoting the creation of private armies for the protection of drug barons, and some large land-owners, from guerrilla attacks (Sánchez and Palau 2006; Gutierrez and Barón 2005). The conflict expanded then from isolated areas to areas with abundance of natural resources and economic dynamism, and aggressions against the civil population escalated sharply. The paramilitary demobilization in 2003, along with an increase in public efforts to improve the provision of national security, resulted in a decrease in the levels of violence. However, violence continues to persist in isolated areas of the country.

Violence against the civil population was intense in both conflicts. The period of *La Violencia* resulted in more than 200,000 deaths in rural areas (Palacio 1995, Sanchez and Meertens 1983). Between 1985 and 2013, approximately 166,000 people died due to the conflict, 4,700,000 people were forcibly displaced, 27,000 people were kidnapped and 25,000 people were abducted (Grupo de Memoria Histórica 2013).

The presence of different armed groups and their strategic objectives influenced strongly social relations and local institutions due to their imposition of norms of behavior and economic regulations. Guerrilla and paramilitary groups regulated daily matters, controlled movements of the population, and assumed the roles of the state in the regions under their control to marshal the support of the civil population (Arjona 2010, 2014; Gutierrez and Barón 2005; Grupo de Memoria Histórica 2011a, Ronderos 2014). These groups enforced economic regulations by defining rules of extraction for natural resources, acting as intermediaries between the communities and private enterprises, levying taxes, and defining rules for illicit crop cultivation (Grupo de Memoria Histórica 2010, 2011a, Ronderos 2014).

Non-state armed actors also co-opted or joined local authorities to control the population and capture local rents (Arjona 2010), aided by the decentralization process that

started in 1988 and facilitated a closer relation between local authorities and armed groups (Sánchez and Palau 2006). Armed actors sought to directly influence elections and frequently audited local authorities to enforce their government program (Acemoglu, Robinson and Santos 2012; Ronderos 2014; Grupo de Memoria Histórica 2010).

These strategies debilitated many social networks and community organizations. Non-state armed actors instilled fear among the population, and deliberately targeted community leaders and some organizations to force collaboration. Willingness to participate in community organizations or collective activities decreased in many communities. Fear and the risk of aggressions if being perceived as collaborators of opponent groups generated mistrust among the population. Many households retreated to private life and restricted social interactions to family and some close friends. The destruction of infrastructure, land mines and compulsory confinement created further physical obstacles to collective activities (Grupo de Memoria Histórica 2011a, 2010).

Armed groups also captured local organizations and created new ones, imposing leaders and new members. For example, guerrilla groups used some religious and productive organizations as well as unions to disseminate their political agenda.[2] In some areas, community organizations became a protection mechanism against violence. In others, armed groups faced civil resistance in communities with strong organizations (Kaplan 2010). In these places, armed groups busted into communities by coercing the actions of the JACs (*Juntas the Acción Comunal*), which are Community Action Boards formed in 1958 for the purpose of counteracting weak state presence in geographically isolated areas and strengthening social networks. Armed groups forced the population to attend JAC sessions and coerced its members to participate in public work. Community members attended meetings and participated in organizations out of fear. Paramilitary groups, in particular, used

[2] http://www.elespectador.com/noticias/judicial/los-documentos-ineditos-del-eln-articulo-537251 retrieved on January 15th 2015.

the JACs to construct infrastructure, disseminate their rules of social behavior and collect valuable information for war activities (Ronderos 2014).

At the same time, some communities devised creative strategies to avoid total control by non-state armed actors over their organizations and collective life. Communities created new organizations with an apparent non-political purpose, such as sports, religious and cultural organizations, to avoid targeting. Massive protests relying on religious signs were organized after the occurrence of overt human rights violations. Direct negotiations between armed groups and community representatives took place to ease rules of conduct, request mercy for threatened community members, and prevent asset seizure. Women started to play a predominant role in community organizations to reduce the visibility of men or after their death (Grupo de Memoria Historica 2011b, 2013).

We explore empirically in subsequent sections these complex interactions between armed groups and local institutions in conflict-affected areas in Colombia.

4. Data and empirical strategy

We make use of several sources of data to investigate the causal impact of armed group presence on local institutions in Colombia. Our main dataset is the *Encuesta Longitudinal Colombiana de la Universidad de los Andes* (ELCA). The sample of this survey covers 10,800 households: 6,000 in urban areas and 4,800 in rural areas. In this paper, we use the rural sample (surveyed in 2010) since the conflict in Colombia has mostly taken place in the rural areas. The rural sample is representative of small agricultural producers in four micro-regions: Atlantic, Central, Coffee-Growing and South. Within each region, municipalities and communities were randomly chosen. The sample includes 17 municipalities and 222 rural communities (each covering between 500 and 1,000 inhabitants). The household

questionnaire collected detailed information on individual participation in social organizations, among a wealth of other socio-economic variables. The exact geographical location of each household was recorded using GPS. The rural community questionnaire elicited information on social and public infrastructure, economic conditions and the conflict history of the community during the 10 years prior to the survey.

We complement the information in ELCA with several other sources of data. We gathered detailed information on geographical variables for the 222 ELCA communities based on sources from the official geographical institute in Colombia (IGAC) and the Global Land Cover Facility at the University of Maryland. We used additional municipal characteristics as controls in the different regressions based on data from a municipal panel collected by the Department of Economics of Universidad de los Andes, which regularly compiles information from several official sources.

The data on violence and on armed group presence is partly generated from the ELCA community surveys and partly from official government sources on armed group presence and fronts that were established in each rural community in Colombia between 2000 and 2009. We combined the two sources because we have identified under-reporting in both datasets. In the community questionnaire, we found that some leaders were afraid of answering truthfully if armed groups were present and/or exerting control. Others did not report armed group presence in order to avoid future attacks. Government sources seem also to under-report armed group presence. In rural communities where state presence is weak, government sources may not be aware of armed group presence. Government sources also do not report presence of armed groups for strategic reasons. Reports of armed group presence are slightly higher in the official government data than in the ELCA community questionnaire: 24.6 and 23.1 percent, respectively (table 1). Information for a large percentage of rural communities overlaps, but reports do not coincide in 32 percent of all

cases, justifying the combined use of the two data sources.

[Table 1 goes about here]

4.1. Empirical strategy

We use an instrumental variable approach to identify the impact of armed group presence on participation in organizations. Rural communities with and without armed group presence across the country differ systematically in terms of their history of violence, development of local institutions, local markets and geographic characteristics. Variations in the presence of armed actors across neighboring communities might be systematically correlated with unobservable factors that also determine local institutions. In order to address this concern, we use an instrumental variable based on the proximity of each community to hypothetical paths that armed actors could follow when mobilizing their troops across strategic nodes. Specifically, we constructed straight lines connecting natural parks within 300 kilometers of each other.[3] We assigned to each straight line a weight based on its length and the absolute terrain slope along its trajectory. These weights capture the fact that armed groups are more likely to choose shorter and more rugged paths.[4] The weighted sum of the distance from the centroid of each community to the closest five straight lines represents a measure of the proximity of each community to hypothetical strategic paths followed by armed actors and is used as an instrumental variable in our analysis.[5] Figure 1 in the Appendix displays a map

[3] Faber (2014) proposes a similar instrumental variable based on the least cost path spanning three networks between Chinese cities. Banerjee et. al. (2012) also use straight lines to deal with the endogenous placing of transport networks in China. More related to the topic of this paper, Dell (2011) uses predicted trafficking routes to explain violence in Mexico.

[4] Nunn and Puga (2012) show that rugged terrain provided protection against slave raiding in Africa. In the Colombian contexts hills provide lookout spots and hiding places for armed actors.

[5] The results are robust to the use of different cutoffs for the distance between national parks and a different number of lines included in the weighted sum of distances.

with a set of communities included in the sample and the constructed straight lines between natural parks. In addition to dealing with potential omitted variable biases, this instrumental variable approach also allows us to correct for potential bias from the measurement error in the armed group presence variable.

The use of natural parks by Colombian non-state armed groups is widely documented.[6] First, natural parks are usually located in regions distant to the cities and the main productive centers of the country. Therefore, state presence is weak at best and sometimes non-existent. Non-state armed actors have historically relied on natural parks to hide arms and victims of kidnap, shelter from the attack of government forces and cultivate illicit crops. For example, in 2013, UNODC, the United Nations Office in charge of monitoring illicit crops in Colombia, documented that illicit crops were present in 17 of the 58 natural parks (UNODC, 2014). Second, some natural parks lie on strategic routes for importing arms and exporting illicit crops. Third, natural parks are rich in natural resources that armed groups extract illegally to fund war activities.

The exclusion restriction assumes that the hypothetical paths followed by armed actors, and determined by the distance to the natural parks, affects participation in organizations only through its effect on armed group presence. This restriction will hold if community members are not able to predict the potential paths armed actors use when mobilizing troops, arms or illicit crops, among others. This is the case across Colombia. Given the strong military pressure of government forces since 2002 onwards, non-state armed actors needed to act with total secrecy to avoid the detection of military forces. For instance, Granada et al. (2009) show the pressure of armed state forces on non-state armed actors from 2000 onwards has concentrated the presence of non-state armed actors to fewer

[6] Bottia (2003) finds a strong correlation between presence of armed groups and closeness of natural parks. The Colombian press has widely documented the presence of non-state armed actors on natural parks. Two recent examples retrieved on the 15th of January of 2015 are http://www.semana.com/nacion/articulo/los-parques-de-las-balas-la-paz/358371-3 and http://www.elpais.com.co/elpais/judicial/noticias/parques-naturales-colombia-estan-merced-grupos-violentos.

municipalities and increased the number of civil population exposed to clashes between armed groups, indicating that community members were not informed and were not able to predict these potential paths.

There are nonetheless two potential sources of concern about the exclusion restriction. First, by construction, the proximity of a community to a straight line is correlated with the distance from the community to the terminal nodes. If communities that are closer to natural parks are systematically different from communities that are further away, our instrumental variable estimation might capture a spurious relation between the presence of armed groups and local institutions. To address this concern, our baseline estimation controls for the distance from the community to the closest natural park. Second, if the line is too short and too close to the community, the weights assigned to each line might be correlated with terrain ruggedness in the community, which has a direct effect on socio-economic outcomes. To take this into account, our baseline estimations include a measure of terrain ruggedness in the surroundings of each household. This measure was computed as the absolute average terrain slope within a radius of one squared kilometer from the sampled households.

We control in addition for other community characteristics such as historic rainfall, recent rainfall shocks, number of households in the community, a measure of cattle theft, the time to reach the municipality center and municipal homicide rates. The estimations include also individual and household controls such as education, age and its square, gender, a wealth index, number of household members, number of members under five years of age and a soil erosion index.

4.2. Empirical model

We estimate the following model for person *i,* in household *h,* located in rural community *j*

$$P_{ihj} = \alpha_0 + \boldsymbol{X}'_{ihj}\,\alpha_1 + \alpha_2 S_j + \alpha_3 A_j + u_{ihj} \quad (1)$$

where P_{hij} is our dependent variable of interest, representing individual participation in different types of local collective organizations: productive organizations (cooperatives, unions and producers' organizations), political organizations (mostly JACs, but also political parties and movements and organizations supported by the state) and non-political organizations (charity, environmental, cultural, sport or security organizations).

Thanks to an extensive module on local collective action in ELCA, we are able to distinguish between different dimensions of participation, including leadership, meeting attendance and engagement in decision-making. This is important because it allows us to assess not only *whether* individuals join collective organizations, but also *how they engage* in them and participate in decision-making processes. For instance, it is possible that armed conflict is associated with increased meeting attendance of community members (e.g. Bellows and Miguel 2009) when armed groups use meetings for indoctrination purposes or to spread fear. This apparent increase in individual participation in social organizations may, however, be accompanied by reductions in the appointment of certain individuals to leadership positions or their engagement in decision-making processes. The ELCA data allow us to disentangle these important mechanisms that underlie the structure of local collective organizations.

Almost one quarter of people in the ELCA sample participate in local collective organizations (table 2). Ten percent take up leadership roles, 22.8% attend meetings and 15.5% engage in decision-making processes. Interestingly, overall participation, leadership, meeting attendance and engagement in decision-making are higher in communities with presence of non-state armed actors, and mostly driven by participation in political

organizations.[7] In communities with armed group presence, 18.4% of individuals participate in political organizations, 7% are leaders in political organizations and 16.9% attend political meetings. The percentages for communities with no armed group presence are, respectively, 14.7%, 6% and 13.2%. The differences are statistically significant at conventional levels. However, only 0.10% of individuals in communities with armed group presence participate in decision-making processes within political organizations (versus 0.30% in communities with no armed group presence).

A_j is our main independent variable. It represents the years of presence of non-state armed actors during the 10 years prior to the survey in rural community *j*. S_j is the number of conflict-induced violent shocks that occurred in the rural community during the previous year. We control for violent shocks because, as discussed in Kalyvas (2006), violence typically intensify when two groups contest the same territory, but is likely to decline when one armed group takes control over a territory and its population. We define violent shocks as those clearly related to conflict such as homicides, illegal land seizure, kidnapping and threats from armed groups. We exclude cattle theft because it is difficult to establish whether it was performed by criminal bands (not necessarily involved in the conflict) or non-state armed groups. We nonetheless control for cattle theft in all regressions.

Sixteen percent of households suffered a covariate conflict-induced shock,[8] during the year prior to the survey (table 3). The most frequent shock is homicides (12%). Threats from armed groups – which are not violent attacks but instill fear in the population – affect four

[7] We define a dummy variable equal to one if during the period between 2000 and 2009 an armed group was present in the community for at least one year, according to any of the two sources of information discussed above.

[8] To measure household exposure to violent shocks, we have included a dummy variable equal to one if the household lives in a rural community that faced covariate violent shocks during the year before the survey.

percent of all households.[9] Violent shocks are in general more frequent in communities with presence of armed groups but this effect is dominated by threats from armed groups.

[Table 3 goes about here]

$\boldsymbol{X}_{ihj}$ is a vector of individual, household and rural community controls, as discussed above. ν_{hij} is a random error. All standard errors are clustered at the household level.[10]

Table 4 reports descriptive statistics for these controls. The ELCA data show that people living in rural communities with and without armed group presence have similar characteristics. Individuals living in rural communities with armed group presence are slightly less educated, poorer, and have younger household heads that are more likely to live in their town of birth. The magnitude of these differences is, however, very small and all other characteristics are similar across all communities. As expected, there are statistically significant and large community differences across rural communities with and without armed group presence. Rural communities with armed group presence are much less populated, are located in drier areas, are less isolated, faced more climatic shocks, lacked more water sources and are located in municipalities with higher homicide rates.[11]

[Table 4 goes about here]

The differences between communities with and without presence of armed actors motivate the use of our instrumental variable. Equation 2 describes the first stage estimation:

[9] The incidence of idiosyncratic shocks is also high: 9.8 percent of households have been individually exposed to violence. However, idiosyncratic violent shocks are related mostly to (cattle) theft, a shock not related to the conflict but rather to other criminal networks (and high in Colombia). The paper focuses therefore only on covariate violent shocks.

[10] Results are robust to clustering at the community level

[11] The number of state institutions at the rural community level include day care enters, primary schools, secondary schools, and health centres.

$$A_j = \beta_0 + \beta_1 I_j + \boldsymbol{X'}_{ihj}\beta_2 + \beta_3 S_j + \epsilon_{ihj} \quad (2)$$

Where the vector X_{ihj} contains the same control variables included in estimation (1). As explained above our instrumental variable, I_j, is the weighted sum of the distance between the centroid of community j and the five closest straight lines connecting natural parks with a maximum length of 300 kilometers. If we let Γ be the set of straight lines connecting natural parks within 300 kilometers of each other and $\xi_j \subseteq \Gamma$ the set of five lines straight lines closer to community j; I_j can be expressed as

$$I_j = \sum_l \frac{d(l,j)}{w_l} \qquad \text{for } l \in \xi_j \quad (3)$$

where $d(l,j)$ represents the distance between the centroid of community j and the straight line l; w_l and is given by

$$w_l = \sum_{k=1}^{K_l} \frac{L_k}{s_k} \quad (4)$$

K_l in equation (4) is the number of line segments with a common average absolute slope s and length L.

Table 5 reports the first stage results. The instrumental variable is statistically significant and has the expected sign. Communities that are further away from the straight lines are less likely to have armed group presence. For example, if we take a hypothetical line with a length of 300 km and a constant absolute slope of 7%,[12] the coefficient estimates imply that a 10 km increase in the distance from the community to its closest line, results in a reduction of 0.15 years of armed group presence, keeping everything else constant.

[12] These values represent the median of both variables in the sample.

[Table 5 goes about here]

5. Causal effect of armed group presence on local collective organizations

Table 6 presents our main econometric results for participation in community organizations and meeting attendance. Column (1) reports the OLS results and column (2) reports the IV results. The results suggest that the longer the presence of armed groups in any given community, the larger the increase in overall participation and meeting attendance, driven mainly by participation and meeting attendance in political organizations. The magnitude of the effects is large. The coefficient estimates from the IV estimation (column 6) show that one additional year of presence increases participation in political organizations by 10 percentage points and meeting attendance in political organizations by 9.6 percentage points.

[Table 6 goes about here]

These are striking results that suggest a positive and large association between armed group presence in Colombian communities and the strengthening of local collective institutions. It is, however, interesting to note that armed group presence is not necessarily associated with more democratic changes within the organizations. More years of armed group presence does not change individual participation in decision-making within political organizations, yet it increases the likelihood of people assuming leadership positions (Table 7). Different mechanisms could be at play and we explore these results further. First, we conduct robustness tests to confirm their validity. We then proceed to test the theoretical mechanisms that may explain them.

[Table 7 goes about here]

5.1. Validity of results

One potential source of threat to our empirical strategy is the selection that may result from migration. Colombia has one of the highest rates of population displacement in the world. The decision to move or stay in a community might be related to the presence of armed groups and participation in community organizations. The coefficient estimates will be overestimated if those who are more likely to participate in community organizations when armed groups are present are also more likely to stay in communities with presence. Supporters or people allied with one particular armed group might prefer to stay in communities controlled by that group and participate in organizations to obtain benefits or protection from attacks of other groups. The coefficient estimates will be underestimated if those who are more likely to participate when armed groups are present are also more likely to locate to communities without armed groups. Members of civil resistant movements or threatened community leaders might be in this group. Our results do not separate both types. However, we need to rule out the former given the positive impact we find.

The presence of armed groups in rural communities triggers two types of migration. First, individuals can move from rural to urban areas. This may pose a sample selection problem in our empirical analysis given that we only observe those who stay in rural areas. Second, individuals move across rural communities, as explained above. In this case, the positive effect we find in tables 6 and 7 could be driven by positive assortative matching. We perform two robustness checks to rule out potential biases due to these two types of migration.

First, we include in our main specification a measure of cumulative forced displacement in each community. Finding that the effects of armed groups on participation do not change after we include this control variable provides suggestive evidence that selection due to migration is not an important source of bias in our estimates. We construct this measure of migration as the total population of internally displaced persons in the municipality weighted by the share of population living in each community. The coefficient estimates of the effects of armed groups on participation are robust to controlling for this variable suggesting that the increases in participation in communities with armed group presence are not driven by selection (Table 8).

[Table 8 goes about here]

Second, we explore further the potential sorting of individuals across rural communities with a random coefficient model. We allow the effects of armed groups on participation to vary across individuals and follow a control function approach (Garen, 1984) to test for sorting. Using the notation introduced in section 4, participation by individual i from household h in community j can be described by the following random coefficient model

$$P_{ihj} = \boldsymbol{X'}_{ihj}\boldsymbol{\beta} + \alpha_{ihj}A_j + u_{ihj} \quad (5)$$

where $\boldsymbol{X}_{ihj}$ is k-dimensional and includes community and individual predetermined variables, A_j represents the years of presence of armed groups and u_{ihj} is a random error. The effect of armed groups on the outcome variable α_{ihj} is assumed be heterogeneous across individuals. In particular, let

$$\alpha_{ihj} = \bar{\alpha} + v_{ihj} \quad (6)$$

where $\bar{\alpha} = E[\alpha_{ihj}]$ measures the population mean effect and is the parameter we want to estimate. The random variable v_{ihj} captures unobservable heterogeneity across individuals.

Define the matrix of exogenous variables as $\boldsymbol{Z}_{ihj} = [\boldsymbol{X}_{ihj}\ I_j]$, where I_j represents the excluded variable from equation 5. The first stage equation can be written as

$$A_j = \boldsymbol{Z'}_{ihj}\boldsymbol{\Pi} + \epsilon_{ihj} \tag{7}$$

Our IV estimate identifies $\bar{\alpha}$ if:

1. $E\left[u_{ihj}\middle|\ \boldsymbol{Z}_{ihj}\right] = 0, \boldsymbol{\Pi} \neq \boldsymbol{0}$
2. $E[v_{ihj}A_j] = 0$

Condition 2 requires that individuals do not sort across communities on the basis of the presence of armed groups. It is violated if those who are more likely to participate in community organizations when armed groups are present, are also more likely to stay in communities with presence –i.e. $E[v_{ihj}A_j] > 0$-. In this case our IV coefficient will overestimate $\bar{\alpha}$. On the other hand, if those who are more likely to participate when armed groups are present are also more likely locate in communities without armed groups – i.e. $E\left[v_{ihj}A_j\right] < 0$-, our IV coefficient underestimates $\bar{\alpha}$.

Following Garren (1984), Card (1999) and Chay and Greenstone (2005) assume,

I. $E\left[u_{ihj}\middle|\boldsymbol{Z}_{ihj}\right] = E\left[v_{ihj}\middle|\boldsymbol{Z}_{ihj}\right] = 0$

II. $E\left[u_{ihj}\middle|\boldsymbol{Z}_{ihj}, A_j\right] = \lambda_1 A_j + \lambda_2 \boldsymbol{Z}_{ihj}$

III. $E\left[v_{ih}\middle|\boldsymbol{Z}_{ihj}, A_j\right] = \varphi_1 A_j + \varphi_2 \boldsymbol{Z}_{ihj}$

Note that assumptions II and III impose a linear structure to the conditional expectation of the unobserved heterogeneity. If assumptions I-III are satisfied the conditional expectation of the outcome variable defined in equation 5, is given by

$$E[P_{ihj}|\boldsymbol{Z}_{ihj}, A_j] = \boldsymbol{X'}_{ihj}\boldsymbol{\beta} + \bar{\alpha}A_j + \lambda_1\epsilon_{ihj} + \varphi_1 A_j\epsilon_{ihj} \tag{8}$$

A consistent estimate $\bar{\alpha}$ can be obtained by an OLS estimation of equation 8 with the residuals from equation 7 as ϵ_{ihj}. Furthermore, the magnitudes of $\widehat{\varphi_1}$ and $\widehat{\lambda_1}$ give us a measure of the relative importance of sorting and omitted variables bias in the OLS estimation of participation. To see this, note that by assumption III

$$\varphi_1 = \frac{cov(v_{ihj}, A_j)}{var(A_j)}$$

If there is positive sorting $E[v_{ihj}A_j] > 0$ then $\varphi_1 > 0$.

On the other hand, by assumption II,

$$\lambda_1 = \frac{cov(u_{ihj}, A_j)}{var(A_j)}$$

If the omitted variables in regression 5 are positively (negatively) correlated with armed group presence then $\lambda_1 > 0$ (< 0).

We report the results in table 9. The estimates for φ_1 are statistically significant and positive, showing evidence of positive, albeit small, sorting. Indeed individuals more likely to participate in political organizations are more likely to stay in communities with armed group presence. In contrast, $\widehat{\lambda_1}$ is negative, suggesting a negative correlation between the unobservables that determine participation and armed group presence. Moreover, the coefficients estimates for the population average effects, after controlling for sorting and omitted variables bias, are similar to those presented in tables 6 and 7, suggesting that sorting is not an important source of bias in our main specification.

5.2. Mechanisms

Competing mechanisms may shape increases in individual participation in collective organizations in communities with armed group presence. In light of the discussion in section 2, we may argue that local populations make use of existing collective political organizations

to better establish alliances and coalitions with armed groups, or to organize themselves to resist their presence. A less rosy outlook would interpret higher participation in local political organizations as a result of the control exercised by armed groups upon local institutions. We test these competing hypotheses below.

The formation of alliances, coalitions and other forms of interaction between armed groups and local populations is not easy to observe empirically because people may try to hide their social interactions and networks (some of these illegal) in areas where insecurity is high. One solution would be to look at patterns of voting behavior in communities with armed group presence (Acemoglu, Robinson and Santos 2010). Unfortunately, the ELCA 2010 survey does not include this information. Another solution would be to examine patterns of unequal membership of different local collective organizations. This is because the formation of strategic alliances in conflict-affected areas is likely to create certain clubs that may include some community members (or other individuals brought into the community) that will advance the objectives of the armed group, and exclude those that oppose those objectives (see, for instance, Korf 2004). We are able to test for these potential distributional effects of organizational membership by looking at patterns of individual wealth and education status across individuals that participate in local collective organizations. The underlying hypothesis is the following: if our results reflect a genuine increase in the strength of civil society then we would not expect much of a difference across socio-economic groups because there would be no barriers to entry. The communities in our sample are all poor rural communities where socio-economic differences are almost negligent (as reported in Table 4). Significant differences across socio-economic groups would indicate some preference for who participates in local organizations, particularly if the interests of that group are aligned to those of the armed group.

Table 8 shows the results across education and wealth levels. We divided households into educated (at least one household member with more than primary education) and less educated (no household members with more than primary education). We also separated households with low wealth (below the median) and high wealth (above the median). The results show that increases in individual participation in political organizations – participation, leadership and meeting attendance in particular – are driven mostly by less educated and wealthier individuals.

These results are suggestive of some degree of coalition being formed in areas of armed group presence. Similar results are reported in Korf (2004) for the case of Sri Lanka. This is also in line with the strategic objectives of some armed groups in Colombia – the FARC guerilla group in particular – which sought to ally themselves with peasant populations that held land, as discussed in section 3.

But it is also possible that peasants join local organizations as a way of strengthening local institutions and resist armed groups. Testing competing hypotheses about whether the findings above result from the capture of local institutions by armed groups or resistance by communities is very challenging because it is very difficult to obtain reliable data on these types of strategic objectives. We have only been able to gather some suggestive evidence that may substantiates the 'capture' hypothesis. The results, presented in table 8, show that the increase in participation in political organizations in communities with strong armed group presence are being driven by individuals that have not previously lived in the community. The results show substantial increases in all categories by non-native inhabitants of the community. This is in line with anecdotic evidence on how non-state armed actors in Colombia have strategically displaced some groups of the population in order to bring non-natives supportive of their ideology to communities they attempt to control[13] . Armed actors

[13] http://moe.org.co/home/doc/moe_mre/CD/PDF/arauca.pdf retrieved on the 5th of July.

provided also these non-natives with land and other productive assets.[14] This may indicate that the observed increase in individual participation in political organizations when armed groups are present is being determined by the capture of local institutions by armed groups through local alliances used as a strategic war objective.

6. Final discussion and implications

Wars change local institutions in dramatic ways. In conflict-affected countries, where the state may lack the capacity to exercise its functions, local institutions may play key roles in the economic, social and political recovery of populations and countries for years to come. Yet the relationship between armed conflict and local institutional change remains under-researched. This paper analyzed how armed conflict affects local institutions by examining the causal effect of armed group presence on individual participation in local forms of collective organization in Colombia. We made use of a unique dataset with specific modules designed to understand how institutions emerge and evolve during conflict. We derived causal effects of armed group presence on individual participation in local collective organizations by instrumenting the presence of non-state armed actors with the proximity of each community to hypothetical paths, determined by natural parks that armed actors could follow when mobilizing its troops across strategic nodes.

We found that the presence of non-state armed groups has a significant impact on the ability of communities to organize themselves collectively. The results showed that in communities with armed group presence people participate more in local collective political organizations. But larger individual participation does not necessarily translate into more

[14] For some examples see: http://www.centrodememoriahistorica.gov.co/documentos/informes/informes2013/guerrilla-poblacion-civil.pdf and http://www.verdadabierta.com/tierras/despojo-de-tierras/5015-el-fantasma-de-sor-teresa-gomez-en-territorio-chocoano retrieved on the 5th of July.

civic participation: although participation increases with armed group presence, the result is mostly driven by increases in the attendance of political meetings and people assuming leadership positions, while participation in decision-making processes is reduced.

We explored whether increased participation may be driven by communities organizing themselves to resist or counteract the influence of non-state armed actors, or by non-state armed actors using local alliances and coalitions to capture organizations and impose a stronger control over the population. Our results are suggestive of the latter mechanism. Evidence shows that poorer and more educated households are excluded from political organizations when armed groups establish local strategic alliances with organization members that may support their political cause.

These results contribute significantly to a better understanding of the links between armed conflict and institutional change. The paper has shown how local institutions may be manipulated by armed groups to advance and cement their war strategies and political objectives. This is an important contribution to the literature because the impact of these processes of institutional transformation – which take place in most armed conflicts and remain throughout the post-conflict period – can be significant, affecting the ability of people to rely on and participate in community networks and organizations, as well as how countries will rebuild and resources will be accessed and distributed in the aftermath of armed conflict. In particular, the results point to some caution in current policy agendas that target aid to communities in the hope of strengthening local institutions, governance and social cohesion (Mansuri and Rao 2012; World Bank 2004). If the type of institutional capture we observe in Colombia is also present in other countries, post-conflict community-level interventions may well reinforce war dynamics and the power of armed groups and their allies, thereby sowing the seeds for conflict re-ignition (as found in Crost, Felter and Johnston 2014).

The results have also important significance for the ongoing peace process in Colombia, where the role of local institutions will be central to the economic and social recovery of communities affected by several decades of violent conflict. It is very possible that, after demobilization, armed groups in Colombia may attempt to make use of the networks and institutions they have created and controlled over the last decades to gain political leverage. However, as the evidence discussed in the paper shows, these institutions and networks may not necessarily represent the interests and needs of local populations. Real democratic outcomes will require serious investment by the Colombian national government to create strong and independent local institutions that will ensure the interests of all citizens – and not just those part of ongoing patronage networks – are represented in the political arena. This will not be an easy task.

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Table 1. Armed group presence

% of rural communities (ELCA)		Armed group presence (Government) No	Yes	Total
Armed group presence (self-reported)	No	60.1	16.75	76.85
	Yes	15.27	7.88	23.15
	Total	75.37	24.63	100

Source: Author's calculations based on ELCA (2010) and Government of Colombia (2010).

Table 2. Participation outcomes across shock exposure and armed group presence

	Whole Sample	Armed groups presence		
		No	Yes	
	(1)	(4)	(5)	+
Participation in organizations	24.48%	23.80%	25.70%	*
Participation in productive associations	1.25%	1.40%	1.00%	
Participation in political organizations	16.06%	14.70%	18.40%	***
Participation in other organizations	10.10%	10.60%	9.30%	*
Leadership	10.14%	9.80%	10.70%	
Leader in productive associations	0.52%	0.50%	0.60%	
Leader in political organizations	6.36%	6.00%	7.00%	*
Leader in other organizations	4.27%	4.30%	4.20%	
Meeting attendance	22.79%	22.00%	24.10%	**
Meeting attendance productive associations	1.16%	1.30%	0.90%	
Meeting attendance political organizations	14.53%	13.20%	16.90%	***
Meeting attendance other organizations	9.63%	10.10%	8.90%	*
Decision-making	15.54%	15.40%	15.80%	
Decision-making productive associations	0.91%	1.00%	0.80%	
Decision-making political organizations	0.19%	0.30%	0.10%	*
Decision-making other organizations	0.35%	0.40%	0.20%	*
Observations	7,496	4,745	2,751	

Source: Author's calculations based in ELCA (2010) and Government Data (2010)

+ Difference between samples with and without presence of armed groups. Test for mean differences *** p<0.01, ** p<0.05, * p<0.1

Table 3. Incidence of violent shocks – Whole sample and by armed group presence

Covariate Shocks	Whole Sample	Armed Groups Presence		
		No	Yes	
=1 at least one shock during last year	16.2%	14.9%	18.6%	***
=1 if shock: homicides	12.2%	12.6%	11.5%	
=1 if shock: land eviction	0.9%	0.8%	1.2%	*
=1 if shock: kidnapping	1.2%	0.8%	1.8%	***
=1 if shock: threats from armed groups	4.0%	2.3%	7.0%	***
Idiosyncratic Shocks	Whole Sample	Armed Groups Presence		
		No	Yes	
=1 if at least one shock during last year	9.8%	9.2%	10.8%	**
=1 if assets/property destruction	1.2%	1.0%	1.6%	**
=1 if victims of violence	0.4%	0.4%	0.4%	
=1 if property theft	7.0%	6.7%	7.5%	
=1 if robberies	1.9%	1.6%	2.2%	*
=1 if extortion	0.2%	0.1%	0.3%	*
Observations	7496	4745	2751	

Source: Author's calculations based on ELCA (2010)

Test for differences in sample means between communities with and without armed group presence *** p<0.01, ** p<0.05, * p<0.1

Table 4a. Descriptive statistics of main household variables across shock exposure and armed group presence

Mean (S.D.)	Whole Sample	Armed Groups Presence		+
		No	Yes	
	(1)	(4)	(5)	
=1 if male headed	0.49	0.49	0.49	
	(0.50)	(0.50)	(0.50)	
Age	44.44	44.69	44.02	**
	(13.45)	(13.73)	(12.94)	
Years of completed education	4.41	4.46	4.32	*
	(3.38)	(3.48)	(3.18)	
=1 if lives in town of birth	0.09	0.06	0.13	***
	(0.28)	(0.24)	(0.34)	
Number of household members	4.61	4.63	4.57	
	(1.94)	(1.97)	(1.88)	
Children under 5 years	0.54	0.53	0.55	
	(0.78)	(0.79)	(0.77)	
Wealth Index	-0.01	0.09	-0.19	***
	(2.50)	(2.67)	(2.17)	
Monthly rainfall average 1980-2008 (mm)	144.32	145.51	142.25	***
	(31.51)	(29.55)	(34.55)	
Months rainfall one S. D. below the mean	1.41	1.27	1.65	***
	(1.09)	(1.11)	(1.02)	
Months rainfall one S. D. above the mean	0.79	0.77	0.84	***
	(0.90)	(0.95)	(0.82)	
Soil erosion index	3.26	3.10	3.53	***
	(2.06)	(2.09)	(1.97)	
Years of presence	1.05			
	(1.88)			
Violent shocks (number of types)	0.18	0.165	0.214	***
	(0.45)	(0.41)	(0.50)	
Number of households on community	107.11	124.47	77.17	***
	(120.41)	(137.94)	(72.60)	
Time to reach urban center (hrs.)	0.78	0.75	0.82	***
	(0.70)	(0.72)	(0.66)	
Lack of water in rural community	0.48	0.44	0.54	***
	(0.50)	(0.50)	(0.50)	
Municipal homicide rate (2000-2008)	39.89	36.36	46.34	***
	(29.69)	(26.93)	(33.00)	
Cattle theft	0.27	0.27	0.28	
	(0.44)	(0.44)	(0.45)	
Terrain Slope	0.05	0.04	0.07	***
	(0.05)	(0.05)	(0.06)	
Observations	7,496	4,745	2,751	

Source: Author's calculations based in ELCA (2010) and Government Data (2010)
+ Difference between samples with and without presence of armed groups. Test for mean differences *** p<0.01, ** p<0.05, * p<0.1

Table 5. First Stage estimates- Dependent variable: years of armed group presence

	(1)
Hypothetical path proximity	-65.110**
	[25.996]
Violent shocks (number of types)	0.907**
	[0.443]
Monthly rainfall average 1980-2008 (mm)	-0.025***
	[0.005]
Months rainfall one S. D. below the mean	0.115
	[0.367]
Months rainfall one stand. dev. below the mean^2	-0.089
	[0.098]
Months rainfall one S. D. above the mean	0.668*
	[0.358]
Months rainfall one stand. dev. above the mean^2	-0.233*
	[0.123]
Age	0.027***
	[0.010]
Age^2	-0.000***
	[0.000]
= 1 male	0.006
	[0.016]
Years of completed education	0.001
	[0.008]
Wealth Index	0.011
	[0.013]
=1 if lives in town of birth	0.312***
	[0.098]
Number of household members	-0.007
	[0.017]
Children under 5 years	-0.012
	[0.040]
Number of households on community	-0.004***
	[0.001]
Time to reach municipality	0.278
	[0.172]
Lack of water in rural community	0.282
	[0.264]
Soil erosion index	0.165***
	[0.053]
Cattle theft	-0.324
	[0.280]
Mean absolute slope	10.591***
	[3.151]
Constant	3.387***
	[0.953]
Observations	7,496
R-squared	0.344
F-Excluded instruments	6.27

Community clustered robust standard errors in brackets
*** p<0.01, ** p<0.05, * p<0.1

Table 6. Participation and meeting attendance in local organizations and years of presence of armed groups

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A:				Participation				
	Any		Productive		Political		Other	
	OLS	IV	OLS	IV	OLS	IV	OLS	IV
Years of presence of armed groups	-0.005	0.103**	0.001	0.000	-0.006	0.099**	-0.001	0.010
	[0.006]	[0.052]	[0.001]	[0.005]	[0.005]	[0.050]	[0.003]	[0.016]
Violent shocks	-0.002	-0.093*	0.002	0.003	-0.006	-0.095*	0.012	0.002
	[0.022]	[0.053]	[0.004]	[0.005]	[0.019]	[0.054]	[0.011]	[0.017]
Observations	7,496	7,496	7,496	7,496	7,496	7,496	7,496	7,496
R-squared	0.054	-0.096	0.029	0.028	0.060	-0.135	0.032	0.029
Panel B:				Meeting Attendance				
	Any		Productive		Political		Other	
	OLS	IV	OLS	IV	OLS	IV	OLS	IV
Years of presence of armed groups	-0.006	0.108**	0.001	0.001	-0.007	0.096**	0.000	0.013
	[0.006]	[0.052]	[0.001]	[0.005]	[0.005]	[0.047]	[0.003]	[0.016]
Violent shocks	-0.001	-0.097*	0.003	0.003	-0.003	-0.091*	0.008	-0.003
	[0.022]	[0.054]	[0.004]	[0.005]	[0.018]	[0.052]	[0.012]	[0.017]
Observations	7,496	7,496	7,496	7,496	7,496	7,496	7,496	7,496
R-squared	0.053	-0.120	0.024	0.024	0.060	-0.144	0.032	0.028

Instrumental variable: Weighted Distance to predicted paths. Control variables included: Monthly rainfall mean 1980-2008, Months rainfall one stand. dev. below the mean, Months rainfall one stand. dev. below the mean^2, Months rainfall one stand. dev. above the mean, Months rainfall one stand. dev. above the mean^2, Age, Age^2, Years of completed education, Sex, Wealth index, = 1 if lives in town of birth, Number of household members, Children under 5, Number of households in community, Time to reach municipality, Lack of water in community, Soil erosion index, Cattle theft Terrain slope (1 km radius from household). Community clustered standard errors in brackets. *** p<0.01, ** p<0.05, * p<0.1.

Table 7. Decision making and leadership in local organizations and years of presence of armed groups

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A:					Decision-Making			
	Any		Productive		Political		Other	
	OLS	IV	OLS	IV	OLS	IV	OLS	IV
Years of presence of armed groups	-0.003	0.066*	0.001	0.001	-0.001**	-0.000	-0.001	0.001
	[0.004]	[0.034]	[0.001]	[0.004]	[0.000]	[0.002]	[0.000]	[0.003]
Violent shocks	-0.002	-0.061	0.001	0.001	0.001	0.001	0.001	-0.000
	[0.016]	[0.038]	[0.003]	[0.004]	[0.001]	[0.002]	[0.002]	[0.002]
Observations	7,496	7,496	7,496	7,496	7,496	7,496	7,496	7,496
R-squared	0.051	-0.037	0.019	0.019	0.004	0.004	0.007	0.005
Panel B:					Leader			
	Any		Productive		Political		Other	
	OLS	IV	OLS	IV	OLS	IV	OLS	IV
Years of presence of armed groups	0.001	0.039*	0.001	0.002	0.000	0.037*	-0.001	0.001
	[0.003]	[0.022]	[0.001]	[0.003]	[0.002]	[0.020]	[0.002]	[0.010]
Violent shocks	-0.002	-0.034	0.000	-0.000	0.001	-0.030	-0.004	-0.005
	[0.012]	[0.024]	[0.002]	[0.004]	[0.010]	[0.023]	[0.006]	[0.011]
Observations	7,496	7,496	7,496	7,496	7,496	7,496	7,496	7,496
R-squared	0.048	0.010	0.011	0.011	0.035	-0.018	0.027	0.027

Instrumental variable: Weighted Distance to predicted paths. Control variables included: Monthly rainfall mean 1980-2008, Months rainfall one stand. dev. below the mean, Months rainfall one stand. dev. below the mean^2, Months rainfall one stand. dev. above the mean, Months rainfall one stand. dev. above the mean^2, Age, Age^2, Years of completed education, Sex, Wealth index, = 1 if lives in town of birth, Number of household members, Children under 5, Number of households in community, Time to reach municipality, Lack of water in community, Soil erosion index, Cattle theft Terrain slope (1 km radius from household). Community clustered standard errors in brackets. *** p<0.01, ** p<0.05, * p<0.1.

Table 8. Participation outcomes: robustness checks and heterogeneous impact

			(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
		Observations		Participation			Leader			Meeting Attendance			Decision-Making	
		F-fist stage	Any	Prod.	Pol.	Any	Prod.	Pol.	Any	Prod.	Pol.	Any	Prod.	Pol.
I	Baseline	7,496	0.103**	0.000	0.099**	0.039*	0.002	0.037*	0.108**	0.001	0.096**	0.066*	0.001	-0.000
		6.27	[0.052]	[0.005]	[0.050]	[0.022]	[0.003]	[0.020]	[0.052]	[0.005]	[0.047]	[0.034]	[0.004]	[0.002]
II	Forced displacement control	7,496	0.098*	0.001	0.096*	0.038	0.002	0.037*	0.104**	0.001	0.093*	0.064*	0.001	-0.000
		5.96	[0.053]	[0.006]	[0.051]	[0.023]	[0.003]	[0.020]	[0.053]	[0.005]	[0.049]	[0.035]	[0.004]	[0.002]
III	No educated	5116	0.110**	0.001	0.102**	0.046*	0.000	0.046**	0.109**	0.000	0.101**	0.063*	0.001	-0.000
		7.413	[0.052]	[0.006]	[0.047]	[0.024]	[0.004]	[0.021]	[0.050]	[0.006]	[0.045]	[0.035]	[0.004]	[0.001]
IV	Educated	2380	0.093	-0.005	0.101	0.008	0.008	0.009	0.110	0.000	0.090	0.075	-0.002	-0.001
		2.917	[0.082]	[0.011]	[0.085]	[0.038]	[0.008]	[0.035]	[0.087]	[0.011]	[0.077]	[0.060]	[0.010]	[0.007]
V	Low wealth	3,666	0.054	0.002	0.051	0.013	-0.000	0.018	0.043	0.002	0.038	0.031	0.002	0.001
		7.009	[0.045]	[0.004]	[0.043]	[0.020]	[0.002]	[0.019]	[0.040]	[0.004]	[0.038]	[0.028]	[0.003]	[0.002]
VI	High wealth	3,830	0.147**	-0.004	0.144**	0.055*	0.003	0.049*	0.169**	-0.002	0.152**	0.093**	-0.001	-0.001
		4.987	[0.073]	[0.009]	[0.071]	[0.032]	[0.006]	[0.027]	[0.079]	[0.009]	[0.072]	[0.046]	[0.007]	[0.004]

Each entry in rows II-VIII presents the coefficient estimate for the years of presence of armed groups in an IV estimation using as dependent variable the outcome indicated in each column. The instrumental variable is the weighted sum distance to straight lines as in the main estimations. All estimations include household and community controls. Row II controls for cummulative forced displacement at the municipality level. Roes III-VIII restrict the sample as indicated in each row. Standard errors (in brackets) are estimated clustering at the community level. *** p<0.01, ** p<0.05, * p<0.1.

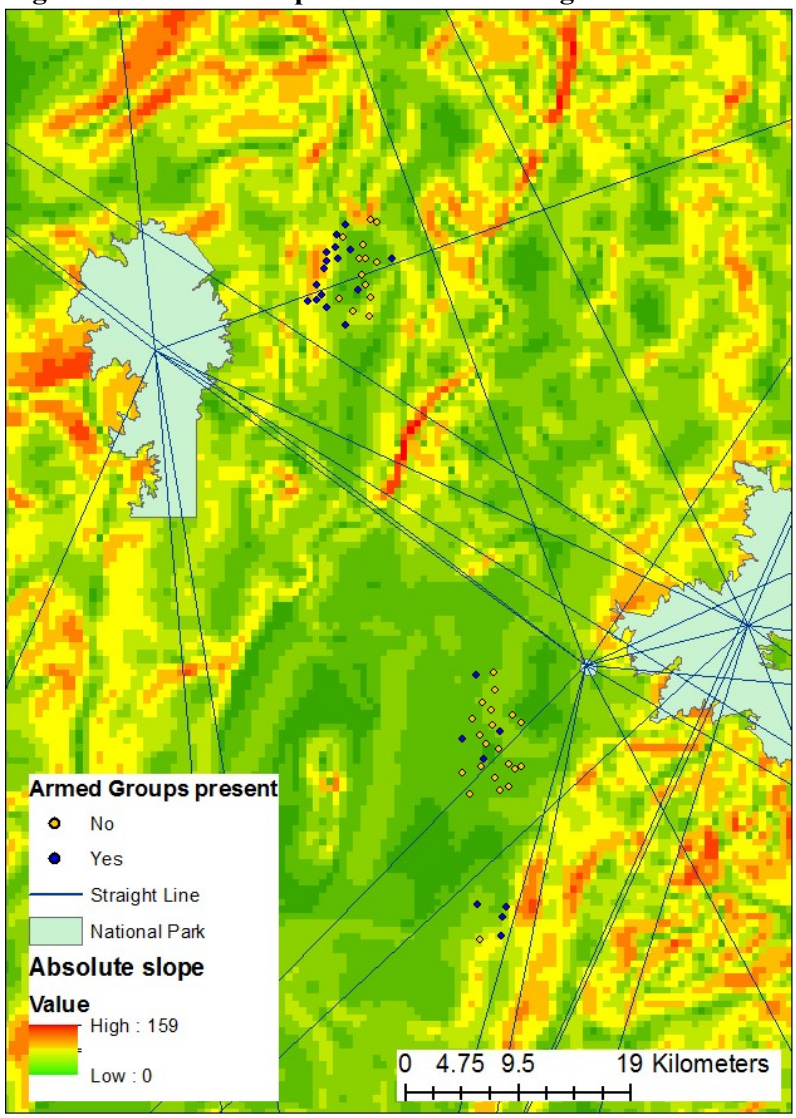
Table 9. Coefficient estimates control function approach

	Participation				Meeting Attendance			
	Any	Productive	Political	Other	Any	Productive	Political	Other
$\hat{\alpha}$	0.087	-0.001	0.090	0.002	0.094	0.000	0.089	0.005
	(0.022)	(0.005)	(0.020)	(0.014)	(0.022)	(0.004)	(0.019)	(0.014)
$\widehat{\lambda_1}$	-0.120	0.000	-0.113	-0.016	-0.124	-0.001	-0.110	-0.017
	(0.022)	(0.004)	(0.021)	(0.014)	(0.022)	(0.004)	(0.020)	(0.014)
$\widehat{\varphi_1}$	0.005	0.001	0.003	0.003	0.005	0.001	0.002	0.003
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Number of Observations	7,496	7,496	7,496	7,496	7,496	7,496	7,496	7,496
	Leader				Decision-Making			
	Any	Productive	Political	Other	Any	Productive	Political	Other
$\hat{\alpha}$	0.031	0.001	0.033	-0.002	0.055	0.000	-0.001	0.000
	(0.015)	(0.003)	(0.013)	(0.010)	(0.018)	(0.004)	(0.002)	(0.003)
$\widehat{\lambda_1}$	-0.044	-0.001	-0.041	-0.002	-0.079	-0.001	0.000	-0.002
	(0.015)	(0.003)	(0.013)	(0.009)	(0.018)	(0.004)	(0.002)	(0.003)
$\widehat{\varphi_1}$	0.003	0.000	0.002	0.001	0.004	0.001	0.000	0.000
	(0.001)	(0.000)	(0.001)	(0.001)	(0.001)	(0.000)	(0.000)	(0.000)
Number of Observations	7,496	7,496	7,496	7,496	7,496	7,496	7,496	7,496
Household controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Municipality displacement	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Instrumental variable: Weighted Distance to predicted paths. Controls included are the same as in main specification (tables 6-7).
Bootstrapped standard errors 1,000 replications

Appendix I.

Figure 1. Armed Group Presence and Straight lines connecting natural parks



Source: Author's calculations based on ELCA (2010), U.S. Geological Survey (2014) and Government of Colombia (2010).