# Sticking Together

## *The impact of cooperatives on forced displacement in Colombia*

Master Thesis

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**Abstract**

In this paper, I investigate the impact of the presence of cooperatives on forced displacement due to the conflict in Colombia. I postulate that integrative firm structures make individuals and their households more resilient to conflict consequences, thus lowering displacement due to conflict violence in municipalities with higher cooperative presence. I use extensive governmental data on Colombian cooperatives, displacement and a set of controls, all on the municipal level from 2003 to 2013. Zero-inflated beta models are employed to account for features of the dependent variable (a fraction with an excess of zeros). Results suggest that the number of cooperative membership rate is a significant (negative) predictor of the rate of displaced people, and these estimates are robust to a number of alternative specifications. These results support the case for the social and solidarity economy in unstable countries, as they seem to provide communities with resilience to violent contexts.

*Keywords:* Internally displaced people, Cooperatives, Civil conflict, Community resilience

*There is but one mode by which man can possess in perpetuity all the happiness which his nature is capable of enjoying, that is, by the union and co-operation of all for the benefit of each.*

— Robert Owen, *Lectures on an Entire New State of Society*

# 1 Introduction

Internal displacement is a global issue that affects millions of people each year. In 2017, 30.6 million people were displaced, mostly from China, the Philippines and Syria. Forced internal displacement poses issues similar to that of refugees, often triggering major humanitarian crises while simultaneously endangering and destabilizing the lives of the victims. Conflicts and natural disasters are the main causes of forced displacement. In 2017, conflict was the reason behind 11.8 million or 40% of new displacements. The past decade saw a resurgence of conflicts around the world, effectively doubling the number of newly displaced people from 2016 to 2017. As of today, 40 million people remain displaced because of conflict, 6.5 million of them in Colombia.

Colombia has been the victim of decades of conflict, triggered by the uprising of rural peasants against the central power in the 1960s. Since 1985 and the beginning of victim reporting, official statistics recorded more than 7 million internally displaced people — representing close to 7% of the population. Forced displacement was used by all armed groups as a warfare tactic, aimed to destroy local communities and hinder potential support for opponents. Displacement also enabled guerrillas to set up illegal activities such as drug production, extortion of local businesses and kidnaping, all essential to their financial survival.

Internal displacement in Colombia has had major consequences. Displaced individuals are the first affected, suffering violent uprooting and loosing most of their assets in the process. Subsequently, they experience difficult relocation in urban settings with substantial drops in consumption, and face increased probability of mental health disorders. The expelling communities endure loss of work force and human capital, and are left with deprecated social networks. During this rapid exile, land is abandoned and quickly becomes unproductive due to lack of maintenance. Receiving communities are not left unharmed, as they experience increased rental prices for low-income housing, decreased unskilled wages and the build up of tensions with local, low-income populations.

Identifying and understanding drivers of forced displacement is thus crucial in order to mitigate its negative outcomes. Violence, in the Colombian context, plays a prominent role, and the official end of the fights in November 2016 will relieve most of the pressure from vulnerable populations. Nevertheless, investigating factors preventing forced displacement would help design and implement future policies able to mitigate the effects of conflict on local populations around the world. In this study, I propose to explore the impact of cooperatives on displacement and the potential resilience they could provide to communities in conflict settings.

Cooperative forms of organizations — also known as the Social and Solidarity Economy, or SSE — enable the development of specific forms of social networks and links, also called social capital. Cooperative decision-making, involving all members on an equal basis, creates a favourable environment to the development of trust, solidarity, cooperation and negotiation competences. This set of social skills and the close-knit social network generated around these organizations can

produce critical resilience in conflict settings, especially in rural areas. Collective organizations also help provide communities with better bargaining and negotiation power when confronted to hostile groups. Organized and united peasants might feel more attached to their communities, increasing their incentives to resist aggressions, than if they were small isolated landowners.

This paper examines two hypotheses. First, it suggests that cooperatives' presence in local communities mitigates displacement due to conflict, and second, that the resilience provided by cooperatives increases as conflict intensifies. In order to test these, I use Colombian municipal data on displacement rates, cooperative presence (in the form of cooperative membership) and conflict intensity measures from 2003 to 2013. My results confirm these postulates, indicating that cooperatives indeed provide resilience to communities, reducing average displacement rate up to 6% for a one standard deviation increase in cooperative membership. They also suggest that displacement decreases thanks to cooperatives to a greater extent the more intense the conflict — up to 14% at average conflict intensity for a one standard deviation increase in membership.

The present study adds to the displacement determinant's literature by investigating the role a specific type of firm has on communities and, subsequently, on conflict outcomes. Specifically, it looks at the role that social capital and networks, stemming from cooperative organizations, have in displacement reduction. As the SSE literature shows, cooperative organizations enhance the social capital of their members as well as their surrounding communities, giving credit to the hypothesis that cooperatives could have a positive impact on displacement. This paper also contributes to the cooperative literature by examining quantitatively the social capital and network effects of these organizations in conflict environments. To the best of my knowledge, this paper is the first to aggregate individual cooperative data at the municipal level and examine the impact of such organizations on conflict consequences on a ten-year timespan.

The remainder of the paper is organized as follows. In the next section, I review the Colombian context in terms of conflict and the SSE. Section 3 reviews the relevant related literature, and section 4 describes the data and the process required to build the dataset. Section 5 presents some issues of the data and the empirical strategy developed in order to tackle them. Finally, section 6 presents and discusses the main results of the paper, while section 7 concludes.

## 2 Colombian context

Because this study draws heavily on contemporary Colombian history and the situation of the Social and Solidarity Economy (SSE), the following section will remind the reader of the main events of the Colombian conflict, particularly focusing on the issue of forced internal displacement. It will then cover the institutional history and context of the SSE in Colombia.

### 2.1 The Colombian conflict and forced internal displacement

The Colombian conflict has been one of the longest internal conflicts endured by a country in contemporary times. With roots stemming from the 1940s *Violencia* period where Liberals and Conservatives fought for power, the conflict escalated after the Cuban revolution and the subsequent support of communist Cuba to socialist revolutionary groups in Latin America. In this context, the Revolutionary Armed Forces of Colombia (*Fuerzas Armadas Revolucionarias de Colombia*, or FARC)

emerged as the main opposition force, recruiting dissatisfied peasants in impoverished regions and starting guerrilla warfare (Pizarro Leongómes, 2004; Sánchez and Palau, 2006; Jorge Iván et al., 2018).

A further step in the escalation of violence was taken with the development of illegal drug trafficking, especially coca crops. Initially limited to specialized drug-traffickers, outlawed groups such as the FARC got involved in the business, in an attempt to compensate for waning resources from the declining Soviet block in the late 1980s. This new source of funding enabled them to continue their fight after the fall of the Berlin Wall (1989), with notable military victories in the late 1990s and early 2000s. Simultaneously, narco-traffickers and big land owners encouraged the formation of paramilitary groups, later united into the United Self-defence Organization of Colombia (*Autodefensas Unidas de Colombia*, or AUC), to fight against the socialist armed groups, which by now also included the National Liberation Army (*Ejército de Liberación Nacional*, or ELN).

At the turn of the millennium, the Colombian government enacted strong security policies, with significant assistance of the United States (US) through "Plan Colombia", initially an important development aid program and subsequently converted into direct military support after the 9/11 terrorist attacks. While demonstrating fierce resistance, the FARC and ELN lost grounds in most of the country. Meanwhile, the AUC was officially dismantled in 2002, although it is thought to have maintained an important underground influence, primarily in the form of criminal bands (*bandas criminales*, or BACRIM). With the election of Mr. Juan Manuel Santos at the presidency of Colombia in 2010, serious negotiations with the FARCs started at Havana, Cuba, which culminated with the ratification of the final peace agreement on November 30, 2016. This document officially brought the 50-years conflict to an end, and started the process of reconstruction and reintegration of former rebels into Colombian society.

A conflict of such length and severity brought many tragic consequences to Colombia. According to the Centralized Register of Victims (*Registro Único de Víctimas*, or RUV), 7.3 million people have been reported as victims of forced displacement, while close to one million homicides (direct and indirect) were linked with the conflict. Colombia comes second in the number of internally displaced persons (IDPs), just after Syria (IDMC, 2018). Most of them originate from rural areas and are relatively young, with lower education levels (Ibáñez and Vélez, 2008; Carrillo, 2009).

Internal displacement was mostly the consequence of violence committed by non-governmental armed forces, namely the FARC, ELN, and AUC groups, later joined by the BACRIM. These groups took control of areas in the country, often rural, extorting, kidnapping, or forcing local producers into coca cultivation. Intimidation, kidnappings and massacres were widespread. Attacks on populations enabled illegal armed groups to impede collective action and social networks, weaken support for the opponent and obstruct civilian uprising. The local populations under these threats lived in a context of constant fear, leading many of them to emigrate to safer parts of the country (Engel and Ibáñez, 2007). A number of Colombian authors — especially Ana María Ibáñez and her colleagues — explore the issue of displacement determinants. They have identified a set of risk factors, both at the individual and community level, which explains displacement. At the community level, violence and security perception are evidently the main forces pushing people to leave. On the individual factors' side, being a small landowner or being more involved in one's community can also cause greater probability of displacement (Ibáñez and Vélez, 2008; Ibáñez,

Moya and Velásquez, 2002; Dueñas, Palacios and Zuluaga, 2014).

Internal displacement has a very important impact on Colombia's economy and society. When peasants leave their communities, they abandon assets and leave unattended parcels of land which could account for as much as 3.5% of agricultural GDP loss (Ibáñez and Velásquez, 2009). A number of studies explore the consequences of displacement on the receiving communities. They find that they suffer lower unskilled labour wages and higher low-income housing price levels (but lower high-income rental prices), due to the large influx of a mostly impoverished population (Calderón-Mejía and Ibáñez, 2016; Depetris-Chauvin and Santos, 2016). Receiving municipalities also undergo higher crime rates and see frictions between "native" low-income populations and the IDPs (Carrillo, 2009). On the individual-level, internal displacement induces higher risks of mental health issues and school dropout for children (Riaño-Alcalá, 2008; Rodríguez and Sánchez, 2012; Shultz et al., 2014; Siriwardhana et al., 2014), as well as substantial aggregate consumption drops for the victims (Ibáñez and Velásquez, 2009; Ibáñez and Moya, 2010). These negatives consequences highlight the need for enhanced comprehension of mechanisms underlying displacement and possible mitigation channels.

## 2.2 The Social and Solidarity Economy in Colombia

Cooperatives have formally existed in Colombia since Law 134 of 1931 (Dávila Ladrón De Guevara, 2017), but cooperative organization of labour goes back to the country's first inhabitants and pre-colonial times. According to (Coque Martínez, 2002), indigenous populations had already set up cooperative organizations dealing with various tasks in society (productive, religious, community tasks, and the like). The Christianization of these first people came along with colonization, and religious orders sent missionaries to the most rural areas. Jesuits' reductions (*reducciones*) were unique examples of 17$^{th}$ century collective organization of native populations under the protection of the congregation.

Later immigration waves of the late 19th and early 20th century from Europe brought new ideologies associated with the cooperative movement and socialism, initiated by pioneers such as Robert Owen in Scotland (first buyers' cooperatives), Charles Fourier in France (utopian socialism and cooperative mouvement theorist) and Friedrich Wilhelm Raiffeisen in Germany (first cooperative financial institutions). As mentioned earlier, Law 134 first officialized the status of Colombian cooperative firms in 1931. However, cooperatives did not grow extensively until the end of Second World War and the first development aid programs from the US, the expansion of unions and rural savings programs initiated by the church (Coque Martínez, 2002; Dávila Ladrón De Guevara, 2017). The Cuban revolution and the general context of social change in the 1960s further encouraged the development of cooperatives in Latin America.

Currently, in Colombia, cooperatives are part of the Solidarity Economy System (*Economía Solidaria*) regulated by Law 454 of 1998. Article 2 defines it as a "socioeconomic, cultural, and environmental system shaped by a collection of social forces organized in associative ways identified by solidarity, democratic, and humanist self-governing practices, not motivated by profit, for the comprehensive development of the human being as a subject, actor, and ultimate beneficiary of

the economy".[1] Article 4 enumerates the principles of solidarity organizations, such as voluntary membership, democratic governance, and associative and joint ownership of the means of production. As of December 2017, 3,220 cooperatives under supervision of the Superintendence of the Solidarity Economy (*Superintendencia de la Economía Solidaria*, or Supersolidaria) were in activity, with a total of six million members and 67,000 workers.

# 3 Literature review

## 3.1 The determinants of forced displacement

Migration and displacement are commonly linked together as a single phenomena. While they share broad features — e.g., large geographical movements of persons — forced displacement should be considered as a subset of migration, characterized by involuntary migration. Furthermore, internal forced displacement is to be distinguished from the catch-all "refugee" category and should refer specifically to refugees not crossing international borders. These definitions are crucial as the categories of migrants they relate to display different characteristics and migrate for distinct reasons. IDPs have only recently been identified as a distinct population with unique issues requesting specific investigation (UNHCR, 2018; IDMC, 2018).

The literature on the topic of forced displacement is quite plentiful and many studies are concerned with Colombia, as it has consistently been one of the most affected countries in the past thirty years. The literature can be divided in two broad topics: (1) the determinants of internal displacement, and (2) the consequences of displacement, both approached from either micro or macro angles. While the repercussions are well documented and investigated by the literature (see previous section), displacement causes are less systematically scrutinized, possibly due to the apparent absolute prominence of violence as the driver of displacement in Colombia. However, a few authors attempt to spell out the specifics of conflict-related forced displacement.

The primary, undisputed determinant of forced internal displacement is acute external stress or shock, pressing individuals to flee their homes and communities. Conflict and natural disaster are the major causes of these exogenous shocks, the former being the undisputed dominant one in Colombia. Other sources of displacement put forth by researchers include opportunistic, land-grabbing behaviours from big agribusiness (Gómez, Sánchez-Ayala and Vargas, 2015; Rey Sabogal, 2013; Hurtado, Pereira-Villa and Villa, 2017; Gómez, Sánchez-Ayala and Vargas, 2015), as well as development-project that induce forced migration (also the latter is less pregnant in Colombia) (Maldonado, 2012).

Ibáñez and Vélez (2008) suggest a comprehensive forced displacement micro-model. Starting from a migration framework, the authors suggest that potential IDPs might follow only some of the classic migration drivers, such as wage differentials, migration costs or employment availability at destination. They show that IDPs differ in key aspects from voluntary migrants: risk aversion, for example, might deter voluntary migration candidates to move, while playing the opposite role in forced displacement by pushing individuals to migrate in front of upcoming danger. Using household surveys covering both IDPs and non-IDPs (the latter from displacement-prone regions),

[1] *Ley 454 de 1998 Nivel Nacional, Diario Oficial No. 43.357 de agosto 6 de 1998* , Secretaría Jurídica Distrital de la Alcaldía Mayor de Bogotá D.C. website, retrieved May 20, 2018.

they identify key drivers of displacement as the following: violence, security perception and high-stress levels. Illegal armed groups seem to target key-community figures to maximize disruption, and the authors find that individuals with more community ties (measured by community involvement, for example) or more location-specific assets (such as land) endure higher risks of displacement, whereas the contrary would have been true in a voluntary migration setting.

Similarly, Dueñas, Palacios and Zuluaga (2014) examine push and pull displacement components of Colombian municipalities between 2004 and 2009. Violence, once more, stands out as the main push factor of displacement. However, receiving municipalities are characterized by counter-intuitive attributes such as lower security and economic performance. Yet, this study suffers methodological issues, which puts its reliability into question. Gómez Botón, Botero Ospina and Rincón Torres (2013) study regional-socio-economic conditions' role in explaining displacement. They show that higher economic activity (proxied by municipal-public revenue) and lower levels of inequality reduce displacement rates. Also stressing the importance of structural elements but in the Somalian context, Schon (2015) investigate the geographical scope of conflict and the balance of power between armed actors to demonstrate that they drive fluctuations in displacement patterns.

Resilience to displacement, the topic of the present study, has been studied by a handful of authors. The notable contribution of Krakowski (2017) explores drivers of resiliences in rural Colombian communities and suggest that community collective decision-making organizations effectively reduce the probability of displacement by increasing civil resistance. The authors call for further investigation of mechanisms that could induce more collective decision-making, a role that cooperatives could well fulfill, as the next section shows.

The literature on displacement seems to agree that violence is the primary driver of displacement in conflict-burdened areas. Social aspects such as community integration and cohesion or collective-decision mechanisms display more unclear effects, apparently contextual and dependent upon a variety factors. Investigating the role of cooperatives adds to this stream of literature and could help disentangle the ambiguous effects of social capital and community structures on conflict outcomes.

### 3.2 The impact of cooperatives on local communities

The hypothesis that cooperatives play a role in fostering resilience amongst threatened communities builds upon a body of literature interested in the impacts of coops on their surroundings, and more specifically on social capital spillovers.

As economic entities, cooperatives are built upon seven founding principles: (1) open and voluntary membership, (2) democratic member control, (3) economic participation of the members, (4) autonomy and independence, (5) education, training, and information, (6) cooperation among cooperatives, and (7) concern for the community.[2] These fundamental precepts make cooperatives stand out in the economic landscape, sparking interest amongst researchers to study the impact such organizations have on their communities.

This literature has identified social capital as one of the main aspects of communities affected by coops. Social capital is defined by the ability to trust and cooperate between individuals within networks (Paldam, 2000). In contemporary literature, Putnam (1993) has been influential in argu-

[2] *Guia práctica para entidades supervisadas*, Supersolidaria website, retrieved May 20, 2018.

ing the central role of civil organizations as producers of social capital. Building upon the findings of the Civil Survey (Almond and Verba, 1963), he contends that associations instil political awareness, social trust and "subjective civic competences" to their members. Later, different authors have tested this hypothesis usually through case-study designs. For example, Degli Antoni and Sabatini (2013) and Grimalda and Degli Antoni (2014) investigate samples of Italian cooperatives and show that social cooperatives effectively foster worker's social capital. Becchetti, Castriota and Conzo (2010) use randomized experiments in the Philippines and find that members of sugar producing cooperatives display higher levels of trust. Svendsen and Svendsen (2000) take a historical approach and show that agrarian development in rural Denmark at the end of nineteenth century was driven by cooperatives and the trust they fostered within the communities, making the latter more resilient to economic downfalls. Wells et al. (2017) stress the potential of collective identity as a driver of social change through collective action, a critical factor in conflict resilience.

Colombia cooperatives have been the subject of a handful of recent studies.[3] Cuéllar Gómez and Ramírez Anaya (2017) show that cooperatives were instrumental in shifting households away from illegal crops, liberating them from violent contexts. Looking at social capital effects, Dávila Ladrón De Guevara (2017) stresses the role of cooperatives in community identity-building in a conflict environment and their ability to rebuild trust and solidarity. Moreover, they mention anecdotal cases where cooperatives directly participated in conflict negotiations, a topic further developed by López Cerón (2017) who show the power of cooperatives to teach critical conflict-negotiation skills to their members, effectively securing peace. Vásquez-León and Burke (2017) outline the positive impact of cooperatives as peace-building actors, community-identity builders, and substitutes to local government. Conversely, conflict has been shown to change the economic organization of threatened communities: Orozco Collazos, Forero Pineda and Wills Herrera (2013) demonstrate that conflict has incited smallholders to federate under cooperative organizations, decreasing their vulnerability against adversity and securing access to otherwise unreachable markets.

This body of works emphasizes the critical role of cooperatives as community binders. However, none of these studies has looked at large-scale effects of this type of organizations. The study I propose here fills this gap by aggregating cooperative data at the municipal level for the entire Colombian territory.

# 4 Data

In this section, I present the data I will be using throughout this study. Detailed description of the original sources and required transformations of the data can be found in appendix B.

## 4.1 Main variables

Displacement data is provided by the RUV, a branch of the Colombian Ministry of Interior, responsible for victim relief programs. Data are gather from various sources, both governmental and non-governmental. Governmental sources rely on displaced people voluntarily registering to an official agency. This process is unavoidable in order to receive victim aids. While some authors

[3] The edited volume *Cooperatives, Grassroots Development, and Social Change: Experiences from Rural Latin America* (2017), from which these articles originate from, includes a whole part devoted to Colombian cooperatives and their impacts on different aspects of local communities.

argue that government records could underestimate displacement by 30% (Ibáñez and Velásquez, 2009; Oslender, 2016; Carrillo, 2009), the RUV has since expanded its sources to include non-governmental organizations figures as a result of several Constitutional Court rulings.[4] Moreover, this dataset has been validated by the literature and is used in several publications (Calderón-Mejía and Ibáñez, 2016; Depetris-Chauvin and Santos, 2016).

The data contains information on the number of displaced by municipality for every year since 1995. Displaced totals are categorized by gender, age group, ethnicity and disability. To compute the key variable of this study, these figures are divided by municipality population, characterizing displacement rate as the percentage of each municipality's population displaced every year. Population data is provided by the National Administrative Department of Statistics (*Departamento Administrativo Nacional de Estadística*, or DANE) and is based on the 2005 general census, from which previous and later years' population are extrapolated.

Supersolidaria, a branch of the Colombian ministry of Finance, is responsible of monitoring the SSE, effectively recording every cooperative and cooperative organization in the country since 2002. The SSE is subject to Law 454 of 1998[5] and requires cooperatives organizations to officially register to Supersolidaria. For each cooperative firm, Supersolidaria records its name, address, number of members, number of employees, type of cooperative entity, economic activity and a variety of financial figures — such as assets, liabilities and profits, depending on the level of supervision. I sum number of cooperatives, members and employees by municipality and year.

I also attempt to distinguish between different types of cooperatives: from the type of cooperative variable, I identify five out of eighteen that imply financial activity. Since most of displacement occurs in rural areas, I expect financial institutions to have less of an impact compared to other types of cooperatives: while they are instrumental in rural agrarian development, financial cooperatives are generally less localized. Therefore, I also compute the number of cooperatives, members and employees from the financial sector for each municipality and year. I repeat the operation for non-financial cooperatives. As shown in table B.1, type of cooperatives do not provide very valuable information regarding the cooperatives' main activity. Despite the large values and inconsistence of this variable's coding, I performed keyword matching for specific terms such as "coffee", "cultivation" or "financial". I thus identify production-orientated firms and an alternative set of financial cooperatives, and compute the same variables as above. All these figures are divided by municipalities current population and multiplied by 1,000 to provide more readable numbers. In the subsequent analysis, I will concentrate on cooperative membership rates, as I expect members to have the tightest connections with cooperatives.

The literature has shown that conflict is the major source of displacement of Colombia. However, measuring conflict is challenging. Following Duranton (2016) and Depetris-Chauvin and Santos (2016), I use the sum of attacks by illegal armed groups in each municipality and year. This data is aggregated by the Center for Economic Development Studies (*Centro de Estudios sobre Desarrollo Económico*, or CEDE) from the Economics Faculty at the Universidad de los Andes, and is based on police and army sources. Data is available from 2003 to 2014.

Drawing from the same CEDE database, I retrieve a set of time-invariant-municipal controls

[4] Sources used for the RUV can be found in *Interpretación Y Análisis Sobre las Cifras del Registro Único De Víctimas*, available on the desaparicionforzada.co website, retrieved May 20, 2018.

[5] See footnote 1.

Table 1: Main variables of interest

| Variable | Definition | Source | Mean | SD | SD btw. | SD wth. | Min | Max |
|---|---|---|---|---|---|---|---|---|
| Displaced | Total number of displaced people divided by the municipality's population. | Registro Único De Víctimas, Colombian Government | 0.0144 | 0.332 | 0.0208 | 0.0259 | 0 | 0.782 |
| Coop. members | Total number of cooperative members divided by the municipality's population and multiplying by 1000. | Supersolidaria, Colombian Ministry of Finance | 39.47 | 313.39 | 300.26 | 90.19 | 0 | 10771 |
| Conflict intensity | Sum of violent events by armed groups. | CEDE Municipal Panel Database, Universidad de los Andes | 0.995 | 4.07 | 2.716 | 3.038 | 0 | 211 |
| *n* | | | 1,122 | | | | | |

*Note:* Timespan is 2003 to 2013. *n* is the number of panels (municipalities). *SD btw.* and *SD wth.* report between and within panels standard deviations, respectively. Each measure is computed for each municipality in every year. Population is from the 2005 census and projected population estimations of the National Administrative Department of Statistics of Colombia (DANE).

(TIMC). It consists of municipalities' distance to departmental capital, distance to the nearest wholesale food market, area in square kilometres, altitude, year of foundation and land aptitude (measured as the amount of work necessary to make the land productive). A few municipalities have missing values for these variables and are therefore omitted in the estimations.

Large shares of zero values are observed in the three main variables of interest. I deal with the econometric issues this creates in the next section, while here I reflect upon the potential processes underlying these zero values and how they could affect the analysis. Important portions of zero values raise the question of whether the data generation process generated "true" zeros or indicates an absence measurement (i.e., missing values). This issue is particularly significant in the displacement variable: as I show in appendix 4, displacement data is originally coded such that only municipalities with displacement in the year of interest were entered in the database, which results in the utter absence of zeros in the original file. When displacement data is merged to the main dataset, these municipality-years are coded as missing. It is clear that some of them did not experience displacement at different points in time, but the particular way displacement was originally coded creates uncertainty and confusion between true measurement error (i.e., true missing values) and true zero values (i.e., true zero displacement). Dismissing all them could be problematic, as these municipalities potentially hold important explanatory value upon the relationship between displacement and cooperatives, while considering them all true zeros could denote excessive faith in the institutions gathering displacement data (which has been shown to be difficult to measure, see Ibáñez and Velásquez (2009), Oslender (2016) or Carrillo (2009)). These considerations made, I consider missings in the original displacement dataset as zeros, while removing them as a robustness check.

Alternatively as a robustness check, I make an attempt to differentiate between true measurement error and true zero values by using reception of displaced, as proposed by González (2018). As figure 2 shows, an important fraction of absence of displacement is concentrated in the department of Boyacá (center, North–East of the map). However, this department has been shown to be severely affected by the conflict, and evidence suggests lower rates of victims' registration in the area, implying higher measurement error (Hernández, Acevedo Guerrero and Nuñez, 2007). Thus in this department, I keep zero displacement values only in municipalities which have received vic-

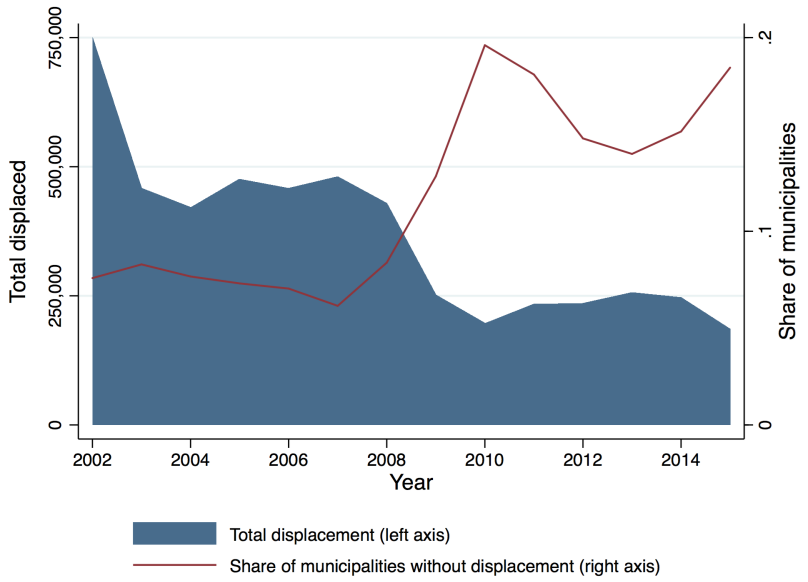



FIGURE 1: Evolution of displacement across time — Total (absolute) number of displaced and share of municipalities with zero displacement

tims in the following or preceding year. This imperfect statistical-reliability check partly mitigates measurement error concerns in the department most affected by the issue.

The final panel is composed of Colombia's 1,122 municipalities, from 2003 to 2013.[6] For consistency, I drop municipality-years with higher displacement than inhabitants. This occurred only once, in Bojaya in 2002, where displacement reached 1,500 people per thousand inhabitants.[7]

## 4.2 Descriptive statistics

The main variables are summarized in table 1. On average, 1.4% of municipalities' population was displaced, while a maximum of 78.2% were expelled. On average, there were 39.47 cooperative members per thousand inhabitants, with the biggest share reaching 10,771. These extreme rates of cooperative membership can stem from two main sources. First, individuals can be members of multiple cooperatives. Second, cooperatives active in multiple locations may have their headquarters in urban centres, thus underestimating membership in surrounding municipalities and concentrating membership rates in important cities. This issue might have an impact on the analysis by underestimating the impact of cooperative members in small municipalities and overestimating it in bigger ones. I deal with this issue by excluding large urban centres from the estimations as a robustness check (see appendix D.2).

Figure 1 shows the evolution of total displacement (in absolute terms) across our time-frame and the share of municipalities with zero displaced each year. We notice that the share of municipalities

[6] Belén de Bajirá is coded as a municipality in the displacement dataset but not considered as one in official registers — I decide to drop it.

[7] The municipality was victim of a severe massacre in 2002, perpetrated by the FARCs. To account for the infeasible displacement rate, recall that population figures are based on the 2005 census, from which extrapolations for previous and subsequent years were derived by DANE. It is highly likely that the 2002 massacre displaced a very large amount of inhabitants, to the point that the 2005 census recorded a much lower population, which in turn underestimated the 2002 figure we use to compute displacement rates.

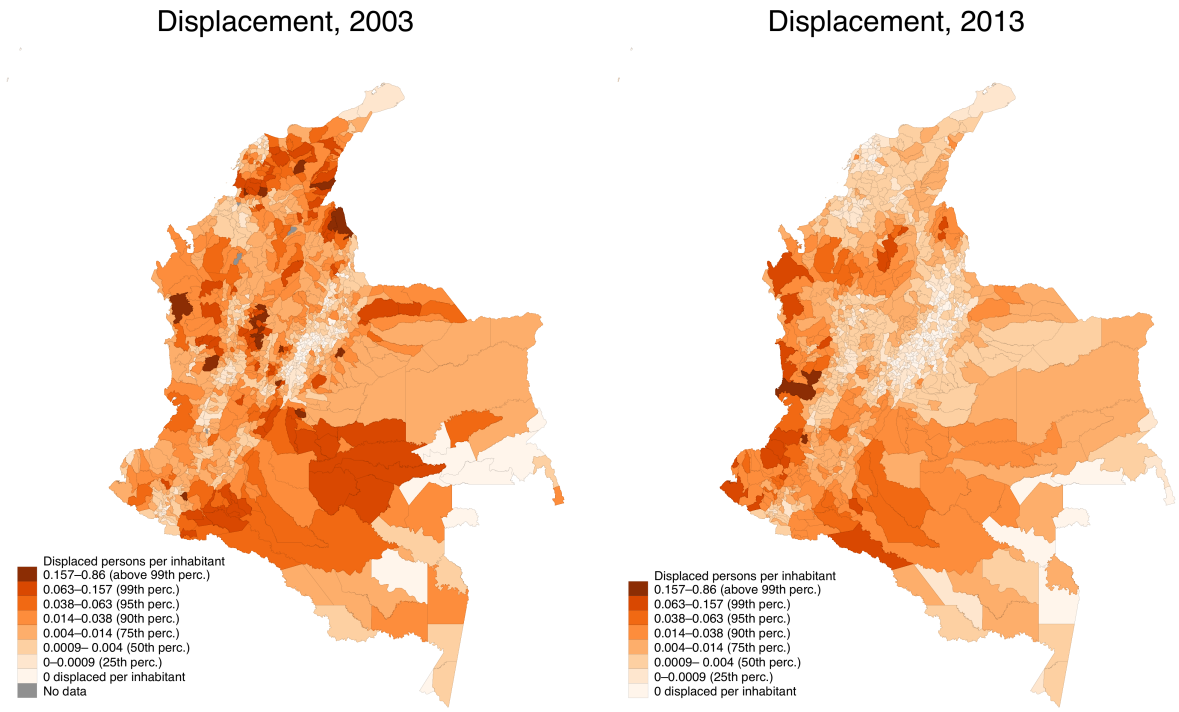



FIGURE 2: Displacement's spatial distribution, 2003 and 2013[8]

follows an opposite trend compared to number of displaced. The share of municipalities without displacement averages 11.8% and reaches up to 20%. As mentioned earlier, this feature might create econometric issues, which I will discuss further in the next section. Figures 2, 3 and 4 display the spatial distribution of the main variables at the beginning and end of the period. The relationship between displacement and conflict intensity is perceivable.

## 5 Empirical strategy

This study aims to estimate the effect of cooperatives on displacement rates, and to check the relevance of cooperatives as a resilience builder at higher levels of conflict. The relationship I wish to estimate can be summarized by equation 1,

$$Displ = f(CoopMemb, Conflict), \tag{1}$$

where $Displ$ is the ratio of displaced persons per municipality-year, $CoopMemb$ the log-transformed number of cooperative members per thousand inhabitant and $Conflict$ a log-transformed measure of conflict intensity. The most basic relationship would estimate displacement as a function of cooperative membership — lagging the independent variable in order to prevent reverse causality — and would be specified as

$$Displ_{i,t} = \beta_0 + \beta_1 \cdot CoopMemb_{i,t-1}. \tag{2}$$

However, this specification would suffer from endogeneity at several levels. First, conflict intensity and violence has been shown to be a major driver of displacement (Ibáñez and Vélez, 2008; Ibáñez and Velásquez, 2009; Carrillo, 2009) and might correlate with cooperative membership for

[8]For figures 2, 3 and 4, percentiles were computed on the overall sample, not specific years mapped.

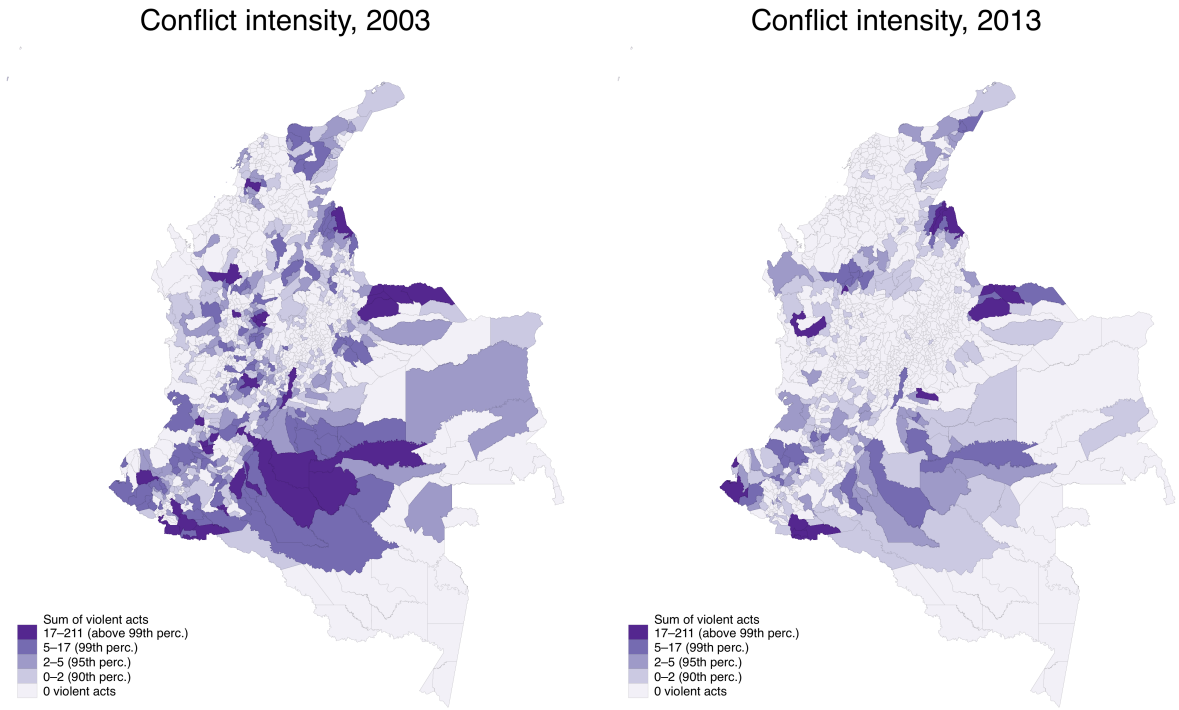



FIGURE 3: Conflict's spatial distribution, 2003 and 2013

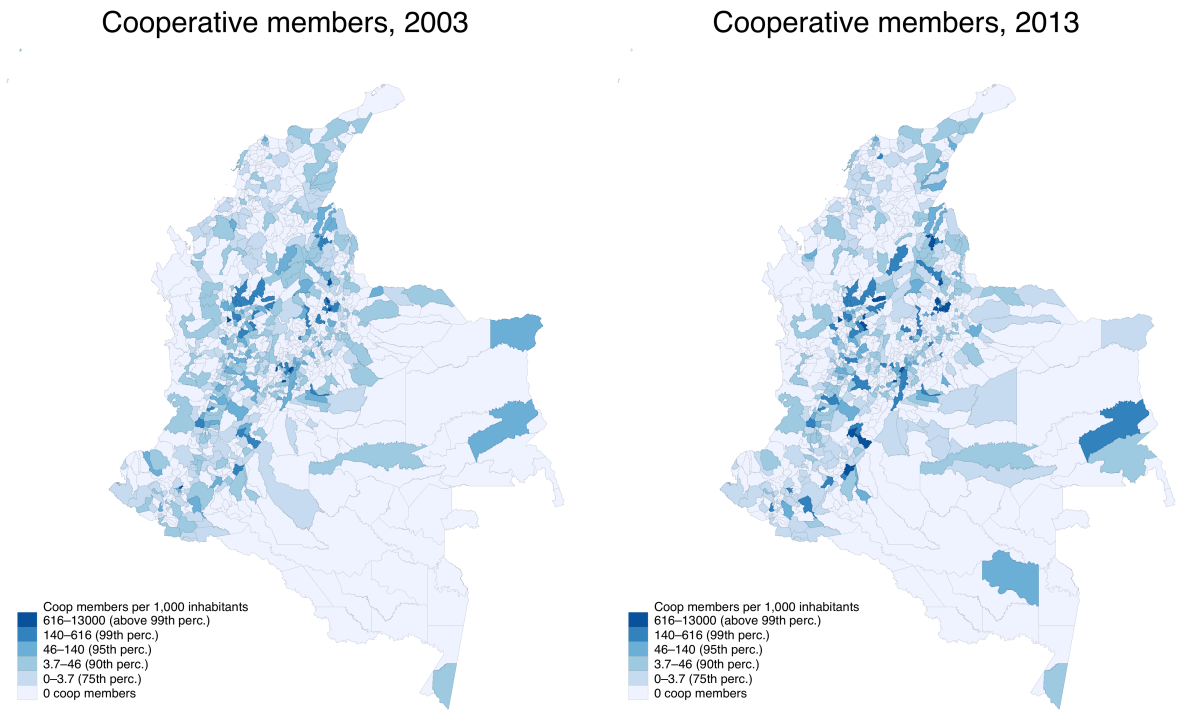



FIGURE 4: Cooperative membership's spatial distribution, 2003 and 2013

a variety of reasons. Hence omitting it would lead to severely bias the estimates of the effects of cooperative membership. Second, omitted municipalities' characteristics might also play a role in displacement, and adding a large set of municipal controls would be a natural fix. However, most socio-economic variables are expected to be endogenous. For instance, displacement decisions and particularly displacement consequences might change socio-economic qualities of municipalities, IDPs deciding to migrate to those with better amenities and higher development levels. Thus, in order to deal with municipalities' endogeneity and following Duranton (2016), I add only geographical variables as municipal confounders. By their nature, these factors are time-invariant. Importantly, they should have an effect on the attractiveness of municipalities, as they should have a pregnant impact on their economic activity. The primary sector remains very important in Colombia, thus productivity and economic prosperity is dependent upon geographical factors. This approach is widespread in the field (Duranton, 2016). Finally, year-fixed effects are added, accounting for period-specific shocks and trends. Accordingly, the model can be rewritten as follows

$$Displ_i = \beta_0 + \beta_1 \cdot CoopMemb_{i,t-1} + \beta_2 \cdot Conflict_{i,t-1} + \boldsymbol{\beta_3} \cdot \boldsymbol{TIMC_i} + \mu_t, \tag{3}$$

where $\boldsymbol{TIMC_i}$ is a vector of time-invariant-municipal controls and $\mu_t$ year-fixed effects.

In order to test the effect of cooperative membership on displacement at different levels of conflict intensity, I allow for the interaction between membership and conflict. These additions yield the following, final specification

$$\begin{aligned} Displ_{i,t} = \beta_0 + \beta_1 \cdot CoopMemb_{i,t-1} + \beta_2 \cdot Conflict_{i,t-1} + \beta_3 \cdot \left(CoopMemb_{i,t-1} \cdot Conflict_{i,t-1}\right) \\ + \boldsymbol{\beta_4} \cdot \boldsymbol{TIMC_i} + \mu_t + \mu_i. \end{aligned} \tag{4}$$

Estimating this model, I expect cooperative membership to have a negative impact on displacement (i.e., higher levels of membership yielding lower displacement rates), while conflict should positively predict displacement. Moreover, the greater the conflict, the higher cooperatives' positive externalities on displacement are expected, social capital becoming more critical in difficult times.

As mentioned earlier, the dataset I use holds several features which could impede a standard, linear estimation. The dependent is continuous fractional variable with values between 0 and 1, it includes a high number of zeros and has highly left-skewed distribution. However, some authors argue that linear models still provide consistent estimations when concerned with average effects Angrist and Pischke (2009). Nevertheless I use a zero-inflated beta model, which takes into account two key characteristics of my data, building upon a body of works dealing with similar data features (Cook, Kieschnick and McCullough, 2008; Stewart, 2013; Masserini, Bini and Pratesi, 2017). First, it takes into consideration the fractional nature of the dependent variable (i.e., ranging from 0 to 1): as Ferrari and Cribari-Neto (2004) and Buis (2010) point out, linear estimations of fractional data can lead to biased and inconsistent results. Second, it allows for a different generation process of zero values — i.e., zeros can be determined by different factors as opposed to positive values. Considering these qualities as well as my data's features, the zero-inflated beta is, to the best of my knowledge, the most flexible model at my disposal.

Going back to endogeneity concerns, and despite the additions of time-invariant-municipal controls, omission of relevant variables is arguably still a threat to the correct estimation of cooperative membership's effect on displacement. To address this concern, I considered the inclusion

of a local specific effect, $\mu_i$. This effect is expected to correlated with the observed controls, an thus a correlated random effects (CRE) is considered (Wooldridge, 2009). Wooldridge (2009) has crucially shown that this estimator is equivalent to the fixed effects one. Moreover, the CRE is technically feasible in the zero-inflated beta framework, unlike fixed effects, thus providing comparable estimates across the linear and non-linear models.

Still, reverse causality can remain an issue, so I make a final attempt to deal with endogeneity by specifying an instrumental variable (IV) estimation. Hence, I define the instrument for cooperative membership as the number of cooperatives per inhabitant in 2002, for each municipality. As shown by Engel and Ibáñez (2007), Ibáñez and Vélez (2008) and Depetris-Chauvin and Santos (2016), the decision to displace is predominantly impulsive and sudden for individuals, mostly the result of direct and recent threats and violence. Therefore, my assumption is that cooperative presence in a municipality in 2002 should not affect directly future displacement, but only through its effect on the number of members in the future. In practice, the social capital available to individuals within a community is the one provided by the current structure and quality of social networks, to which present cooperative membership largely contributes. Hence, the proportion of cooperatives (at least) five years before potential displacement should not weigh in the displacement decision of the individual. However, previous cooperative presence should explain the level of cooperative membership: firms tend to maintain themselves through time and cooperative presence might encourage the creation of new ones, increasing the number of members over the years — hence making cooperative presence an interesting instrument for cooperative membership. Still, cooperatives might not be exogenously distributed in 2002, and armed groups might target municipalities based on similar criteria explaining cooperative distribution. However, controlling for conflict intensity should alleviate this concern, removing municipality selection bias. Finally, in order to maximize exogeneity of the instrument, I restrict the estimation to the 2007–2013 period. The instrumental variable strategy is only implement in the linear version of the model, as the interpretation of the zero-inflated beta version would not be straightforward.

# 6 Results

## 6.1 Main results

Estimation of the linear model is first performed, starting with the simple relationship between cooperative membership and displacement, adding time-invariant-municipal controls and year-fixed effects. Results are displayed in the first column of table 2. I gradually add conflict intensity and its interaction with membership. Columns 1 and 2 already reveal a negative relationship between cooperative membership and displacement. Column 3 indicates a negative and significant effect of cooperative membership on displacement rates. Column 4 shows the average marginal effect of membership taking into account the interaction with conflict. It can be interpreted as the percentage points decrease in displacement rate if cooperative membership was to double.[9] For an average municipality with yearly displacement rate of 1.49%, doubling its cooperative membership would reduce it by 0.000354 percentage points, which represents a 2.37% decline from average

[9]Note that the coefficients displayed in the tables are multiplied by 100 for clarity.

TABLE 2: Linear and Correlated Random Effects estimations — Displaced rate as dependent variable

| *Figures multiplied by 100* | Pooled | Pooled | Pooled | | Random effects | |
|---|---|---|---|---|---|---|
| | (1) Coeff. | (2) Coeff. | (3) Coeff. | (4) Avg. ME | (5) Coeff. | (6) Avg. ME |
| L.Log Coop. presence | -0.0179** | -0.0351*** | -0.103*** | -0.0354*** | -0.0572*** | -0.0150 |
| | (0.00780) | (0.00662) | (0.0194) | (0.00652) | (0.0197) | (0.0114) |
| L.Log Conflict intensity | | 0.180*** | 0.149*** | 0.191*** | 0.0319*** | 0.0581*** |
| | | (0.0129) | (0.0119) | (0.0136) | (0.0120) | (0.0116) |
| L.Log Coop. presence × L.Log Conflict intensity | | | -0.00877*** | | -0.00545*** | |
| | | | (0.00187) | | (0.00156) | |
| Constant | -5.676*** | -3.878*** | -3.738*** | | -1.732** | |
| | (1.10) | (0.758) | (0.763) | | (0.695) | |
| Year fixed effects | Yes | Yes | Yes | Yes | Yes | Yes |
| TIMC | Yes | Yes | Yes | Yes | Yes | Yes |
| Members × Conflict inter. | No | No | Yes | Yes | Yes | Yes |
| Correlated RE | No | No | No | No | Yes | Yes |
| Observations | 11637 | 10580 | 10580 | 10580 | 10580 | 10580 |

* p < 0.1, ** p < 0.05, *** p < 0.01. Standard errors in parentheses.

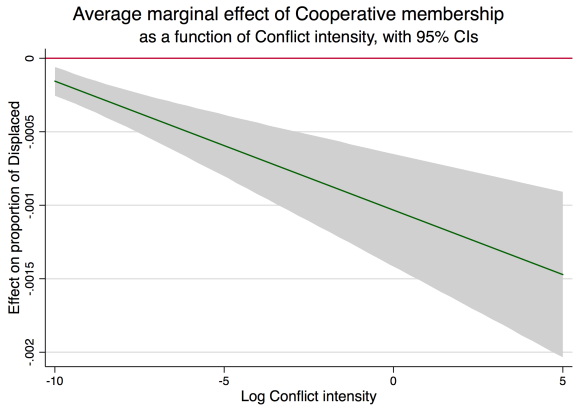
*Note:* Here and in subsequent tables, displacement per habitant is the dependent variable, unless specified otherwise. Figures (coefficients, marginal effects and standard errors) have been multiplied by 100 for clarity. Column (1)–(4) estimate the pooled model, while column (5)–(6) use a random effect model, correlated with independent variables (equivalent to a fixed-effect estimation). Column (5) and (6) report average marginal effects of estimations of column (3) and (5), respectively. Average marginal effects are interpreted as the percentage point change for a doubling (+100%) of the independent variable. For instance in model (4), a doubling of cooperative membership reduces displacement by 0.0354/100 percentage points.

displacement rate.[10] Conflict, as expected, impacts displacement positively, a doubling of violent acts leading to a 0.00191 percentage points increase in displacement, or a 13.2% rise from mean displacement rate.

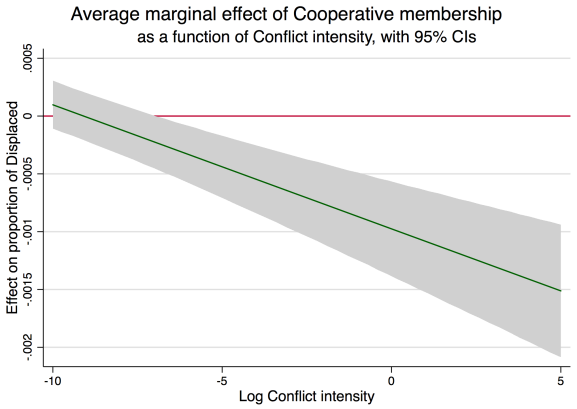
These interpretations depict the average effect of cooperatives across all levels of conflict. Alternatively, one could be interested at displacement abatement at average conflict intensity. Conflict intensity averages 0.99 violent event perpetrated by illegal armed groups per year and municipality (see table 1). Still considering column 4 and computing the marginal effect of cooperative membership at the average level of conflict yields a decrease of 0.00103 percentage points, which represents a 7.17% decrease from displacement rate average. These results can be interpreted as the upper bound magnitudes of cooperative membership effects on displacement rates. Controlling for unobservables using correlated random effects in column 5 and 6, the effect drops to an average 1.03% reduction from mean displacement, and 3.97% decrease at average conflict level when doubling membership.

The zero-inflated beta estimates confirm these results: displacement decreases with cooperative membership, while the magnitude of the effect is slightly reduced. Nonetheless, they maintain statistical significance when controlling for correlated random effects (column 4 of table 3). Average marginal effects range from a 0.000187 percentage point decrease (1.25%) from mean displacement for column 3 model, to a 0.000134 diminution (0.75%) when allowing for CRE (column 4). At average conflict level (0.99 violent acts), the marginal effect of membership reaches 0.0020 (3.89%) and 0.000301 (2.09%) percentage point (percent) diminution of mean displacement rate

[10] To obtain percent changes from mean displacement, divide the percentage point decrease by mean displacement and multiply by 100. In this case, $0.000354 : 0.0149 \cdot 100 = 2.37\%$. This procedure is used throughout this section.




(A) No correlated random effects




(B) Including correlated random effects

FIGURE 5: Linear models — Marginal effects of cooperative membership on displacement as a function of conflict intensity

TABLE 3: Zero-inflated beta estimations — Total average marginal effects

| *Figures multiplied by 100* | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| L.Log Coop. members | -0.00403 | -0.0165*** | -0.0187*** | -0.0134*** |
| | (0.00423) | (0.00379) | (0.00401) | (0.00398) |
| L.Log Conflict intensity | | 0.111*** | 0.114*** | 0.0212*** |
| | | (0.00858) | (0.0105) | (0.00346) |
| Year fixed effects | Yes | Yes | Yes | Yes |
| TIMC | Yes | Yes | Yes | Yes |
| Coop × Conflict inter. | No | No | Yes | Yes |
| Correlated RE | No | No | No | Yes |
| Observations | 11637 | 10580 | 10580 | 10580 |

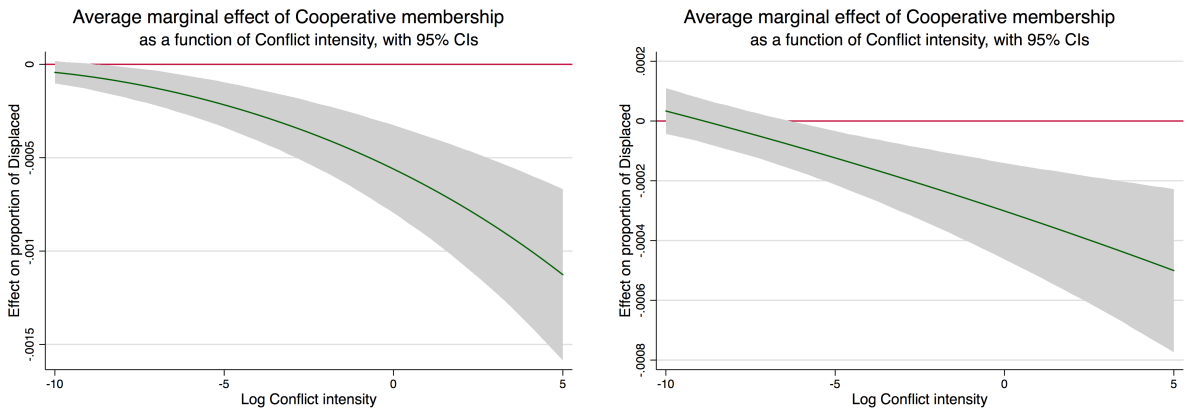
* p < 0.1, ** p < 0.05, *** p < 0.01. Standard errors in parentheses.

*Note:* Figures (coefficients, marginal effects and standard errors) have been multiplied by 100 for clarity. Only average marginal effects are displayed here, see figure C.1 for the full reporting the estimations.

when doubling membership rate, for column 3 and 4 respectively.[11] The zero-inflated beta model with CRE is the most demanding specification estimated, and sets the lower bound of cooperative membership's effect on displacement. While the importance of the effect from this stringent specification might seem limited, let us recall the important variability of cooperative membership (see table 1): for a one standard deviation increase, average displacement in fact reduces by 0.000149 percentage points or 7.18% in this specification. This magnitude is non-trivial, and shows that municipalities with higher membership rates saw significantly less displacement.

The second important aspect of these results is the relationship cooperative membership entertains with conflict intensity. Figures 5 and 6 consistently show that the effect of membership on displacement increases with the level of conflict. This result is of particular interest, and indicates that cooperatives play an important role in the municipalities strongly hit by the conflict. These figures also enable the estimation of thresholds of conflict above which membership plays a significant role in displacement abatement. In the most biding specification (figure 6b), cooperative

[11] To obtain the percentage change from mean displacement rate, I first compute cooperative membership's average marginal effect at average violence log-transformed, then repeat the procedure defined in footnote 10. In the case of column (3), average marginal effects at $log(0.99) = -0.0046$ log conflict is -0.00103, which is then treated as in footnote 10.




(A) No correlated random effects (B) Including correlated random effects

FIGURE 6: Zero-inflated beta models — Marginal effects of cooperative membership on displacement as a function of conflict intensity

membership has a non-zero effect above 0.004 violent attacks committed by illegal armed groups. In other words, cooperatives are just about always significantly reducing displacement when conflict is present in municipalities. These results — along with the previous ones — hold for an alternative measure of conflict, based on population-dependent violent events (see appendix D.1).

As a robustness check, I instrument cooperative membership with the presence of cooperatives in 2002 (i.e., the number of cooperatives per inhabitant) and restrict the timespan to the 2007-2013 period. As the implementation of an IV strategy is far from straightforward in the non-linear, zero-inflated beta model, I perform the IV approach in the linear specification. Results are displayed in table 4 next to the equivalent linear specification, and show very similar estimates, both in magnitude and statistical significance. If anything, instrumenting cooperatives leads to slightly higher estimates on the effects of interest. Plotting the marginal effects of membership against conflict intensity (figure 7) also confirms the trend observed in non-instrumented estimations: membership's effect on displacement increases as conflict intensifies. While the instrument might not be a perfect one, its estimates participate to make a stronger case for the previous estimations. The test for weak instruments clearly rejects the null hypothesis of weak instruments, which indicates that cooperative presence in 2002 effectively explains variation in cooperative membership in later periods.

## 6.2 Additional results

I now move towards estimating the impact of membership on various IDPs' subpopulations, as well as preliminary results on the effects of different types of cooperatives. Heterogenous results are obtained, however careful interpretation of the coefficients is necessary. Future research will address these question with more detail and care.

The original internal displacement database distinguished victims according to various demographic variables, enabling the estimation of cooperative' effect for different subpopulations, which are reported in table 5 and 6. Brought back to percentage changes of mean displacement of each categories, cooperative membership seems to have a reasonably constant effect across subpopulations. However, women and seniors seem to be less affected by membership and display lower decreases in average displacement compared to overall displaced. Identifying vulnerable populations is of

Table 4: Instrumental variable estimations — 2007–2013

| *Figures multiplied by 100* | Baseline linear | | IV | |
|---|---|---|---|---|
| | Coefficient | Avg. ME | Coefficient | Avg. ME |
| L.Log Coop. members | -0.103*** | -0.0298*** | -0.126*** | -0.0354*** |
| | (0.0190) | (0.00567) | (0.0288) | (0.00921) |
| L.Log Conflict intensity | 0.129*** | 0.172*** | 0.129*** | 0.181*** |
| | (0.0106) | (0.0136) | (0.0120) | (0.0146) |
| L.Log Coop. members × L.Log Conflict intensity | -0.00896*** | | | |
| | (0.00183) | | | |
| L.Log Coop. members × L.Log Conflict intensity (IV) | | | -0.0110*** | |
| | | | (0.00274) | |
| Constant | -2.146*** | | -2.718*** | |
| | (0.626) | | (0.638) | |
| Year fixed effects | Yes | | Yes | |
| TIMC | Yes | | Yes | |
| Members × Conflict inter. | Yes | | Yes | |
| Correlated RE | No | | No | |
| Observations | 7406 | 7406 | 7406 | 7406 |
| *Weak identification test* | | | | |
| Cragg-Donald Wald F statistic | | | 3106.324 | |
| Kleibergen-Paap rk Wald F statistic | | | 481.299 | |
| Stock-Yogo weak ID test critical values: | | | | |
| 10% maximal IV size | | | 7.03 | |
| 15% maximal IV size | | | 4.58 | |
| 20% maximal IV size | | | 3.95 | |
| 25% maximal IV size | | | 3.63 | |

* p < 0.1, ** p < 0.05, *** p < 0.01. Standard errors in parentheses.

*Note:* Figures (coefficients, marginal effects and standard errors) have been multiplied by 100 for clarity. Timespan has been restricted to the 2007–2013 period. The weak identification test rejects the null hypothesis of weak instruments.

importance, as it enables better targeting of policy towards those in most need of them. Exploring the impact of cooperative membership on subpopulations and trying to identify the mechanisms at play is part of my future research agenda.

Preliminary results of membership's differential effects depending on their type and business are displayed in table 7. The results show that the effect of membership is always higher than the baseline specification. While not straightforward to interpret, we observe that financial institutions usually display higher average marginal effects. This is contrary to my hypothesis that financial cooperative produce less social capital because of lower presence in rural areas, and hence should have a lower impact on displacement. However, this apparent higher impact might be caused by features of the data. Such estimations should receive more attention in subsequent research, and I plan to disentangle these relationships in the future.

# 7 Conclusion

Building upon cooperative literature on social capital, this study aimed to examine the large-scale effects of cooperative forms of organizations on displacement in Colombian between 2003 and 2013. It set out to test the hypotheses that (1) cooperatives, by enhancing communities' social capital, provide resilience in conflict context, reducing the rate of forcibly displacement persons, and

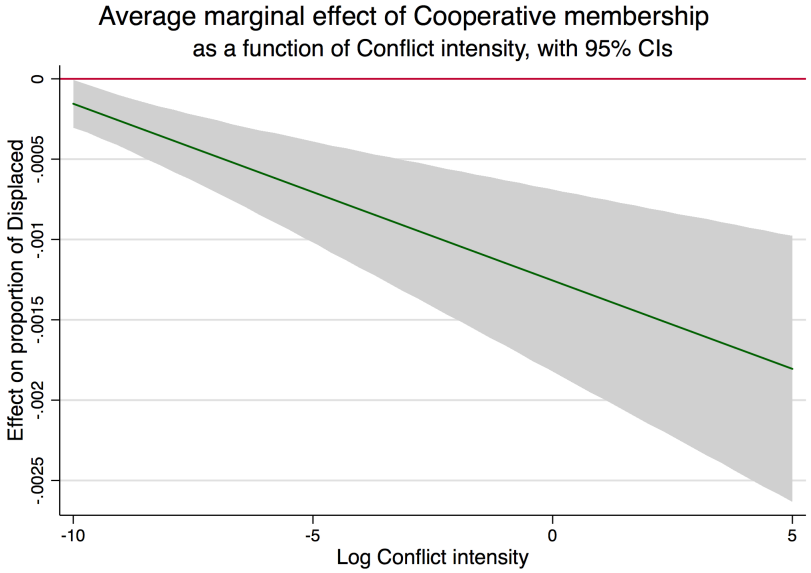



FIGURE 7: Instrumental variable model — Marginal effects of cooperative membership on displacement as a function of conflict intensity

(2) that the importance of cooperatives as resilience factor increases as conflict intensifies. Linear, zero-inflated beta and instrumental variable specification were used to estimate and check these assumptions. With various magnitudes of effects, all three estimations approaches confirmed the two hypotheses, suggesting that cooperatives indeed play a significant role in preventing displacement in conflict-burdened areas. The most conservative estimates (using a zero-inflated beta model and controlling for correlated random effects) indicate a 0.000134 percentage point or 6.5% decrease in displacement rate for a one standard deviation increase in cooperative membership.

Improved distinction and categorization of cooperatives would allow to better distinguish the real drivers of resilience and help identify the precise mechanisms at work. Better data on local cooperative membership would also enable more precise definition of effects, a large proportion of cooperatives being active outside their headquarters' municipalities. Enhanced control for endogeneity in cooperative membership (by means of a control function approach) would be an important next step in this research agenda.

Adding to the social and solidarity economy literature, this paper is the first to quantitatively estimate the effects of cooperatives on conflict outcomes on a country-wide scale, using municipal-level data on a ten-year period. Its results have important policy implications, as they suggest that cooperatives are strong resilience providers for communities under external pressure. Community-empowering policies in the form of cooperative-creation encouragement could help diminish the sufferings of a multitude of rural populations in conflict areas, in addition to the already demonstrated positive developmental impacts of cooperatives in terms of poverty alleviation, for example. Local, national and international efforts should coordinate in order to effectively encourage self-empowerment of stakeholder through cooperative forms of organizations.

Table 5: Zero-inflated beta estimations — Gender and age subpopulations, average marginal effects

| *Figures multiplied by 100* | (1) Baseline | (2) Women | (3) Men | (4) Children | (5) Adults | (6) Seniors |
|---|---|---|---|---|---|---|
| L.Log Coop. members | -0.0187*** | -0.00922*** | -0.00898*** | -0.00607*** | -0.0104*** | -0.00158*** |
| | (0.00401) | (0.00203) | (0.00193) | (0.00141) | (0.00225) | (0.0321) |
| L.Log Conflict intensity | 0.114*** | 0.0577*** | 0.0546*** | 0.0397*** | 0.0638*** | 0.00806*** |
| | (0.0105) | (0.00475) | (0.00460) | (0.00303) | (0.00521) | (0.000515) |
| Year fixed effects | Yes | Yes | Yes | Yes | Yes | Yes |
| TIMC | Yes | Yes | Yes | Yes | Yes | Yes |
| Coop × Violence inter. | Yes | Yes | Yes | Yes | Yes | Yes |
| Correlated RE | No | No | No | No | No | No |
| Observations | 10580 | 10580 | 10580 | 10580 | 10580 | 10580 |

* p < 0.1, ** p < 0.05, *** p < 0.01. Standard errors in parentheses.

*Note:* Figures (coefficients, marginal effects and standard errors) have been multiplied by 100 for clarity. Only average marginal effects are reported. The dependent variables for columns (2) to (6) are the rates of displaced corresponding to the subpopulation in the models' titles. For instance, column (2)'s dependent variable is the rate of displaced women.

Table 6: Zero-inflated beta estimations — Ethnicity and disability subpopulations, average marginal effects

| *Figures multiplied by 100* | (1) Baseline | (2) European | (3) African | (4) Indigenous | (5) w/o disab. | (6) with disab. |
|---|---|---|---|---|---|---|
| L.Log Coop. members | -0.0187*** | -0.0157*** | -0.0000857 | -0.000445* | -0.0180*** | -0.000595*** |
| | (0.00401) | (0.00360) | (0.000448) | (0.000268) | (0.00389) | (0.000139) |
| L.Log Conflict intensity | 0.114*** | 0.0982*** | 0.00831*** | 0.00447*** | 0.111*** | 0.00350*** |
| | (0.0105) | (0.00941) | (0.00108) | (0.000609) | (0.0104) | (0.000212) |
| Year fixed effects | Yes | Yes | Yes | Yes | Yes | Yes |
| TIMC | Yes | Yes | Yes | Yes | Yes | Yes |
| Coop × Violence inter. | Yes | Yes | Yes | Yes | Yes | Yes |
| Correlated RE | No | No | No | No | No | No |
| Observations | 10580 | 10580 | 10580 | 10580 | 10580 | 10580 |

* p < 0.1, ** p < 0.05, *** p < 0.01. Standard errors in parentheses.

*Note:* Figures (coefficients, marginal effects and standard errors) have been multiplied by 100 for clarity. Only average marginal effects are reported. The dependent variables for columns (2) to (6) are the rates of displaced corresponding to the subpopulation in the models' titles. For instance, column (2)'s dependent variable is the rate of displaced from European ethnic origin.

TABLE 7: Zero-inflated beta estimations — Types of cooperatives, average marginal effects

| *Coefficients multiplied by 100* | (1) Baseline | (2) Non-fin. Coop (type coop.) | (3) Fin. Coop (type coop.) | (4) Non-fin. Coop (econ. act.) | (5) Fin. Coop (econ. act.) | (6) Prod. Coop |
|---|---|---|---|---|---|---|
| L.Log Coop. members | -0.0134*** | | | | | |
| | (0.00398) | | | | | |
| L.Log Non-fin Coop. member (type coop.) | | -0.0219*** | | | | |
| | | (0.00538) | | | | |
| L.Log Fin Coop. member (type coop.) | | | -0.0330*** | | | |
| | | | (0.00585) | | | |
| L.Log Non-fin Coop. member (econ. act.) | | | | -0.0227*** | | |
| | | | | (0.00524) | | |
| L.Log Fin Coop. member (econ. act.) | | | | | -0.0362*** | |
| | | | | | (0.00578) | |
| L.Log Prod. Coop. member | | | | | | -0.0286*** |
| | | | | | | (0.00636) |
| L.Log Conflict intensity | 0.0212*** | 0.0210*** | 0.0214*** | 0.0212*** | 0.0215*** | 0.0207*** |
| | (0.00346) | (0.00343) | (0.00342) | (0.00346) | (0.00344) | (0.00337) |
| Year fixed effects | Yes | Yes | Yes | Yes | Yes | Yes |
| TIMC | Yes | Yes | Yes | Yes | Yes | Yes |
| Coop × Conflict inter. | Yes | Yes | Yes | Yes | Yes | Yes |
| Correlated RE | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 10580 | 10580 | 10580 | 10580 | 10580 | 10580 |

* p < 0.1, ** p < 0.05, *** p < 0.01. Standard errors in parentheses.

*Note:* Figures (coefficients, marginal effects and standard errors) have been multiplied by 100 for clarity. Only average marginal effects are reported. Cooperative membership variables correspond to the share of the population member of one of the type of cooperatives. For instance in column (2), the rate of members of non-financial cooperatives as defined by cooperative type is used to estimate the effect of membership on displacement.

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# Appendices

## A Detailed descriptive statistics

Table A.1 describes the definitions and main features of the time-invariant-municipal controls provided by the CEDE dataset (see section 4 for more details).

Table A.1: Time-invariant-municipal controls descriptive statistics

| | Definition | Mean | SD | Min | Max |
|---|---|---|---|---|---|
| Dist. to dept. cap. | Linear distance to department capital, kilometers | 81.46 | 60.54 | 0 | 493.1 |
| Dist. to regi. market | Linear distance to the main wholesale food market, kilometers | 130.0 | 111.5 | 0 | 926.5 |
| Year of creation | Year of municipality's foundation | 1870.3 | 110.3 | 1525 | 2007 |
| Area ($km^2$) | Municipality's area, square kilometers | 1017.4 | 3199.9 | 15 | 65674 |
| Altitude | Municipality's altitude, meters | 1140.6 | 1155.0 | 2 | 25221 |
| Land aptitude | Index of land aptitude established by IGAC, indicating the ability to cultivate in the municipality. Low values represent low aptitude, high values denote high cultivation potential. | 2.669 | 1.226 | 0 | 8 |
| Observations | | 15707 | | | |

*Note:* *IGAC* stands for Instituto Geográfico Agustín Codazzi, the Colombian National Geographic Institute.

Table A.2 and A.3 report the correlation matrix and coefficients' significance. It includes the instrument cooperative presence ratio in 2002 and cooperative presence dummy in 2002.

Table A.2: Correlation matrix

| | Coop. pres. ratio 2002 | Proportion displaced | Coop. members | Violence |
|---|---|---|---|---|
| Coop. pres. ratio 2002 | 1 | | | |
| Proportion displaced | -0.0654*** | 1 | | |
| Coop. members | 0.732*** | -0.0672*** | 1 | |
| Violence | 0.111*** | 0.298*** | 0.132*** | 1 |
| Dist. to dept. cap. | -0.132*** | 0.103*** | -0.117*** | -0.0407*** |
| Dist. to regi. market | -0.181*** | 0.0509*** | -0.143*** | 0.00266 |
| Year of creation | -0.193*** | 0.162*** | -0.187*** | 0.0556*** |
| Area ($km^2$) | -0.0615*** | 0.101*** | -0.0437*** | 0.119*** |
| Altitude | 0.0586*** | -0.126*** | 0.0681*** | -0.0433*** |
| Land aptitude | 0.0336*** | -0.0389*** | 0.0493*** | 0.00701 |

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table A.3: Correlation matrix, continued

| | Dist. to dept. cap. | Dist. to regi. market | Year of creation | Area (km$^2$) | Altitude | Land aptitude |
|---|---|---|---|---|---|---|
| Dist. to dept. cap. | 1 | | | | | |
| Dist. to regi. market | 0.305*** | 1 | | | | |
| Year of creation | 0.171*** | 0.264*** | 1 | | | |
| Area (km$^2$) | 0.235*** | 0.458*** | 0.181*** | 1 | | |
| Altitude | -0.182*** | -0.194*** | -0.289*** | -0.150*** | 1 | |
| Land aptitude | -0.00501 | -0.0285** | 0.0138 | -0.0175* | -0.224*** | 1 |
| Observations | 15707 | | | | | |

* p < 0.1, ** p < 0.05, *** p < 0.01.

# B Details on data

Substantial work was needed in order to gather data from various sources and merge it correctly. In this section, I summarize the steps taken in order to perform this task.

## B.1 Displacement

Data from displacement was retrieved from the RUV, a branch of the Colombian Ministry of Interior responsible for victim relief programs. This data is put together thanks to governmental and non-profit organizations active in conflict victims programs. Even if the combats are officially over, datasets are updated regularly in order to account for victims declaring themselves only recently.

Displacement data is originally organized as follows: for each year, every municipality affected by displacement is entered in the database. For each year, the municipality is divided in several rows depending on different categories of persons affected. Displacement information is disaggregated into gender (3 categories), age group (6 categories), disability (2 categories) and ethnic origin (6 categories), of which age and gender could also be coded as "unknown". Each row in the original dataset represents a unique combination of these categories. Thus, for each municipality and each year, there would be one row for females, between 16 and 21 years old, without disability and from indigenous origin if victims with these characteristics existed that year, with the total number of people belonging to this category having been displaced. In order to clarify, let me give an example: in 2007, the municipality of La Union in the department of Antioquia had eleven women between the age of 6 and 11 without disability and of no particular ethnic origin displaced. This is coded in a single row, La Union comprising a total of 51 rows for 2005. In theory, if all combinations of categories were represented (and including an "unknown" option for gender and age categories), a municipality could have as much as $4 \times 7 \times 2 \times 6 = 336$ rows. An example is given below.

| | A | B | C | D | E | F | G | H | I | J | K |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | TIPO DE VICTIMA | ANIO OC | DANE OCURREN | DEPARTAMENTO OCUR | MUNICI | HECHO VICTIMIZAN | DISCAPACIDA | GENERO | CICLO VITAL | PERTENENCIA ETN | TOTAL |
| 521357 | Victimas de conflicto armado | 2004 | 13580 | BOLIVAR | REGIDOR | Amenaza | Con discapacidad | Mujer | entre 29 y 60 | Negro(a) o Afrocolom | 1 |
| 521358 | Victimas de conflicto armado | 2004 | 13580 | BOLIVAR | REGIDOR | Delitos contra la integ | Con discapacidad | Mujer | entre 29 y 60 | Negro(a) o Afrocolom | 1 |
| 521359 | Victimas de conflicto armado | 2004 | 13580 | BOLIVAR | REGIDOR | Delitos contra la integ | Sin discapacidad | Mujer | entre 29 y 60 | Ninguna | 2 |
| 521360 | Victimas de conflicto armado | 2004 | 13580 | BOLIVAR | REGIDOR | Desplazamiento | Con discapacidad | Mujer | entre 29 y 60 | Negro(a) o Afrocolom | 1 |
| 521361 | Victimas de conflicto armado | 2004 | 13580 | BOLIVAR | REGIDOR | Desplazamiento | Con discapacidad | Mujer | entre 61 y 100 | Ninguna | 2 |
| 521362 | Victimas de conflicto armado | 2004 | 13580 | BOLIVAR | REGIDOR | Desplazamiento | Con discapacidad | Mujer | entre 61 y 100 | Negro(a) o Afrocolom | 1 |
| 521363 | Victimas de conflicto armado | 2004 | 13580 | BOLIVAR | REGIDOR | Desplazamiento | Sin discapacidad | Mujer | ND | Negro(a) o Afrocolom | 9 |
| 521364 | Victimas de conflicto armado | 2004 | 13580 | BOLIVAR | REGIDOR | Desplazamiento | Sin discapacidad | Mujer | entre 0 y 5 | Ninguna | 2 |
| 521365 | Victimas de conflicto armado | 2004 | 13580 | BOLIVAR | REGIDOR | Desplazamiento | Sin discapacidad | Mujer | entre 6 y 11 | Ninguna | 9 |
| 521366 | Victimas de conflicto armado | 2004 | 13580 | BOLIVAR | REGIDOR | Desplazamiento | Sin discapacidad | Mujer | entre 6 y 11 | Negro(a) o Afrocolom | 1 |
| 521367 | Victimas de conflicto armado | 2004 | 13580 | BOLIVAR | REGIDOR | Desplazamiento | Sin discapacidad | Mujer | entre 12 y 17 | Ninguna | 4 |
| 521368 | Victimas de conflicto armado | 2004 | 13580 | BOLIVAR | REGIDOR | Desplazamiento | Sin discapacidad | Mujer | entre 12 y 17 | Indigena | 1 |
| 521369 | Victimas de conflicto armado | 2004 | 13580 | BOLIVAR | REGIDOR | Desplazamiento | Sin discapacidad | Mujer | entre 12 y 17 | Negro(a) o Afrocolom | 13 |
| 521370 | Victimas de conflicto armado | 2004 | 13580 | BOLIVAR | REGIDOR | Desplazamiento | Sin discapacidad | Mujer | entre 12 y 17 | Raizal del Archipielag | 1 |

FIGURE B.1: A screenshot of the original RUV database

I imported this dataset summing the victims for different categories I considered important and collapsing per municipality and year. In the end, my dataset has one row for each municipality-year, and variables for each category of victims. I did not keep any "interacted" categories, as it would have created a very large number of variables while the focus of this study was primarily on aggregated numbers of displaced. In clear, for each municipality-year, I have the main variable of interest, total displaced, a variable with the total number of women displaced (regardless of their other characteristics), and variable with the total number of disabled people displaced (regardless of there characteristics), etc, for each category. If summed, categorical variables do not add up to the total number of displaced: the sum would be much higher, since my variable overlaps between

categories. Finally, I constructed higher level aggregations of categories for age groups (from 6 original categories to 3) and ethnic origin (also from 6 to 3). Interactions between characteristics could prove important in further research looking into disentangling displacement determinants for specific populations.

## B.2 Cooperatives

Data for cooperatives in Colombia was found at Supersolidaria, a branch of the Colombian Ministry of Finance responsible for controlling and supervising the Colombian SSE. Every year, the organism records all cooperatives in Colombia subject to its supervision and some essential characteristics such as address and contact information, and notably number of employees and members, as well as various financial figures. The records go back to 2002.

A major issue was that postal codes were not included in the original files. This made matching with displacement data and controls rather cumbersome. Hence, I had to match each cooperative with its corresponding postal code. This was done by downloading the official Colombian municipality register from the National Administrative Department of Statistics (*Departamento Administrativo Nacional de Estadística*, or DANE) and then matching the register with municipality names, while previously normalizing the string variables to get rid of accents and punctuation which could interfere with the matching process. Unfortunately, the cooperative dataset did not follow the same naming conventions (shortening names, mostly), and close to 28 municipalities had to be manually matched with t official name, using the department to confirm it was the correct municipality. However, one last issue due to the matching remained: because the municipality postal code dataset was allowed to match multiple cooperatives, some were assigned to homonym municipalities in other department.

After clearing this last issue and several checks, I created a few categorical variables based on the type of cooperative (notably a "financial cooperative dummy", see below) before collapsing by municipality and year, yielding a dataset with one row per municipality-year.

Supersolidaria distinguishes between different types of cooperatives in two different dimensions. The first one is labelled "type of entity" (*tipo de entitad*) and takes one of the 18 values shown in table B.1.

These categories refer to legal differences, mainly on how the cooperatives are controlled by Supersolidaria. In order to leave room for refining the analysis later, I assigned a financial cooperative dummy for cooperatives which practice some type of financial activity, be it their main business or not (column "Financial activity" in table B.1).

These categories do not inform much on the cooperatives' core business. This information is instead provided by the variable "type of economic activity" (*tipo de actividad economica*) in the original Supersolidaria database. Unfortunately, this variable takes 526 different values, and most of the cooperatives are listed under "other type of economic activity", which is not very informative and prevents from meaningfully distinguishing cooperatives. I however construct cooperatives' economic activity type based on keywords: any cooperative in which words coffee, cultivation, production, breeding, elaboration and fabrication appear in their economic activity variable was coded as "productive", and represent 7% of all cooperatives. Using type of economic activity, I also construct an alternative financial cooperative measure, based on the keywords financial, savings and

Table B.1: Types of cooperatives

| Original name | English translation | Financial activity | % of coops |
|---|---|---|---|
| Cooperativas de Trabajo Asociado | Associated Work Cooperatives | | 29.55 |
| Fondos de Empleados | Employee Funds | Yes | 27.55 |
| Multiactiva sin Seccion de Ahorro | Multi-active without Savings Section | | 22.00 |
| Especializada sin Seccion de Ahorro | Specialized without Savings Section | | 8.99 |
| Asociaciones Mutuales | Mutual Associations | | 2.97 |
| Especializada de Ahorro Y Credito | Specialized in Savings and Loans | Yes | 2.58 |
| Integral sin Seccion de Ahorro | Integral without Savings Section | | 2.43 |
| Instituciones Auxiliares Especializadas | Specialized Auxiliary Institutions | | 0.98 |
| Multiactiva con Ahorro y Credito | Multi-active with Savings and Credit | Yes | 0.92 |
| Organismo de Representacion | Representative Body | | 0.77 |
| Administraciones Publicas Cooperativas | Cooperative Public Administrations | | 0.45 |
| Organismo de Caracter Economico | Economic Organization | | 0.21 |
| Aportes y Credito | Contributions and Credit | Yes | 0.16 |
| Precooperativas | Pre-cooperatives | | 0.11 |
| Innominados | Unnamed | | 0.09 |
| Otras Organizaciones | Other Organizations | | 0.09 |
| Integral con Ahorro y Credito | Integral with Savings and Credit | Yes | 0.08 |
| - | *No economic activity reported* | | 0.07 |

credit. This categorization encompasses a slightly higher number of financial cooperative (33%) compared to the differentiation from type of cooperative (table B.1, 31%).

# C Zero-inflated beta details

In this appendix, I report the full output of the zero-inflated beta estimations from table 3, including and excluding CRE. I then distinguish average marginal effects for zero values and positive values.

Table C.1: Zero-inflated beta model — Full estimation results for column (3) and (4) in table 3

| *Coefficients multiplied by 100* | No CRE | CRE included |
|---|---|---|
| *Proportion* | | |
| L.Log Coop. members | -2.695*** | -2.342*** |
| | (0.439) | (0.447) |
| L.Log Conflict intensity | 5.745*** | 0.126 |
| | (0.334) | (0.322) |
| L.Log Coop. members | | |
| × L.Log Conflict intensity | -0.196*** | -0.269*** |
| | (0.0440) | (0.0474) |
| Log Coop membership panel avg. | | -2.137*** |
| | | (0.412) |
| Log Conflict intensity panel avg. | | 11.26*** |
| | | (0.616) |
| Constant | -720.8*** | -663.4*** |
| | (37.8) | (39.0) |
| *Zeroinflate* | | |
| L.Log Coop. members | -17.84 | -6.262 |
| | (17.5) | (5.69) |
| L.Log Conflict intensity | -33.90* | -5.411 |
| | (19.4) | (5.04) |
| L.Log Coop. members | | |
| × L.Log Conflict intensity | -1.400 | -0.808 |
| | (1.72) | (0.554) |
| Log Coop membership panel avg. | | -5.775*** |
| | | (1.86) |
| Log Conflict intensity panel avg. | | -108.4*** |
| | | (10.8) |
| Constant | 66.04 | -768.3*** |
| | (170.5) | (203.2) |
| $ln\phi$ | | |
| Constant | 392.0*** | 406.7*** |
| | (6.04) | (6.68) |
| Year fixed effects | Yes | Yes |
| TIMC | Yes | Yes |
| Coop × Conflict inter. | Yes | Yes |
| Correlated RE | No | Yes |
| Observations | 10580 | 10580 |

* p < 0.1, ** p < 0.05, *** p < 0.01. Standard errors in parentheses.

*Note:* Figures (coefficients, marginal effects and standard errors) have been multiplied by 100 for clarity. Log Conflict intensity panel avg. and Log Coop membership panel avg. refers to the average value of conflict intensity, respectively, for each panel over time.

TABLE C.2: Zero-inflated beta model — Distinguishing average marginal effects for column (3) and (4) in table 3

| *Figures multiplied by 100* | No CRE | | CRE included | |
|---|---|---|---|---|
| | (1)<br>Pr=0 | (2)<br>0>Pr>1 | (3)<br>Pr=0 | (4)<br>0>Pr>1 |
| *Proportion* | | | | |
| L.Log Coop. members | -2.695***<br>(0.439) | -2.695***<br>(0.439) | -2.342***<br>(0.447) | -2.342***<br>(0.447) |
| L.Log Conflict intensity | 5.745***<br>(0.334) | 5.745***<br>(0.334) | 0.126<br>(0.322) | 0.126<br>(0.322) |
| L.Log Coop. members<br>× L.Log Conflict intensity | -0.196***<br>(0.0440) | -0.196***<br>(0.0440) | -0.269***<br>(0.0474) | -0.269***<br>(0.0474) |
| Log Coop membership panel avg. | | | -2.137***<br>(0.412) | -2.137***<br>(0.412) |
| Log Conflict intensity panel avg. | | | 11.26***<br>(0.616) | 11.26***<br>(0.616) |
| Constant | -720.8***<br>(37.8) | -720.8***<br>(37.8) | -663.4***<br>(39.0) | -663.4***<br>(39.0) |
| *Zeroinflate* | | | | |
| L.Log Coop. members | -17.84<br>(17.5) | -17.84<br>(17.5) | -6.262<br>(5.69) | -6.262<br>(5.69) |
| L.Log Conflict intensity | -33.90*<br>(19.4) | -33.90*<br>(19.4) | -5.411<br>(5.04) | -5.411<br>(5.04) |
| L.Log Coop. members<br>× L.Log Conflict intensity | -1.400<br>(1.72) | -1.400<br>(1.72) | -0.808<br>(0.554) | -0.808<br>(0.554) |
| Log Coop membership panel avg. | | | -5.775***<br>(1.86) | -5.775***<br>(1.86) |
| Log Conflict intensity panel avg. | | | -108.4***<br>(1.08) | -108.4***<br>(1.08) |
| Constant | 66.04<br>(170.5) | 66.04<br>(170.5) | -768.3***<br>(203.2) | -768.3***<br>(203.2) |
| ln_phi | | | | |
| Constant | 392.0***<br>(6.04) | 392.0***<br>(6.04) | 406.7***<br>(6.68) | 406.7***<br>(6.68) |
| Year fixed effects | | | | |
| TIMC | | | | |
| Coop × Conflict inter. | | | | |
| Correlated RE | | | | |
| Observations | 10580 | 10580 | 10580 | 10580 |

* p < 0.1, ** p < 0.05, *** p < 0.01. Standard errors in parentheses.

*Note:* Figures (coefficients, marginal effects and standard errors) have been multiplied by 100 for clarity. Log Conflict intensity panel avg. and Log Coop membership panel avg. refers to the average value of conflict intensity, respectively, for each panel over time.

# D Robustness checks

## D.1 Alternative measure of conflict

I substitute my preferred measure of conflict for a population-based measure, drawn from the CEDE database. The estimation is performed for the linear an zero-inflated beta models.

Table D.1: Linear models, coefficients and average marginal effects — Alternative measure of violence

| *Figures multiplied by 100* | Pooled | | Random effects | |
|---|---|---|---|---|
| | (1) Coeff. | (2) Avg. ME | (3) Coeff. | (4) Avg. ME |
| L.Log Coop. presence | -0.135*** | -0.0362*** | -0.0775*** | -0.0148 |
| | (0.0295) | (0.00657) | (0.0258) | (0.0116) |
| L.Log Conflict intensity | 0.185*** | 0.231*** | 0.0514*** | 0.0808*** |
| | (0.0149) | (0.0167) | (0.0118) | (0.0126) |
| L.Log Coop. presence × L.Log Conflict intensity | -0.00963*** | | -0.00612*** | |
| | (0.00241) | | (0.00189) | |
| Constant | -3.089*** | | 0.779 | |
| | (0.797) | | (0.670) | |
| Year fixed effects | Yes | Yes | Yes | Yes |
| TIMC | Yes | Yes | Yes | Yes |
| Members × Conflict inter. | Yes | Yes | Yes | Yes |
| Correlated RE | No | No | Yes | Yes |
| Observations | 10580 | 10580 | 10580 | 10580 |

* p < 0.1, ** p < 0.05, *** p < 0.01. Standard errors in parentheses.

*Note:* Figures (coefficients, marginal effects and standard errors) have been multiplied by 100 for clarity.

Table D.2: Zero-inflated beta models, average marginal effects — Alternative measure of violence

| *Figures multiplied by 100* | (1) | (2) |
|---|---|---|
| L.Log Coop. members | -0.0177*** | -0.00852* |
| | (0.00407) | (0.00445) |
| L.Log Conflict intensity | 0.130*** | 0.0311*** |
| | (0.00804) | (0.00366) |
| Year fixed effects | Yes | Yes |
| TIMC | Yes | Yes |
| Coop × Conflict inter. | Yes | Yes |
| Correlated RE | No | Yes |
| Observations | 10580 | 10580 |

* p < 0.1, ** p < 0.05, *** p < 0.01. Standard errors in parentheses.

*Note:* Figures (coefficients, marginal effects and standard errors) have been multiplied by 100 for clarity.

## D.2 Removing potential municipality outliers

In this appendix, I remove five sets of municipalities, on the grounds that they represent very large shares of variables' observations. I perform my preferred regression — zero-inflated beta model, cooperatives and violence interacted, years fixed effects and time-invariant-municipal controls — and report them against the baseline estimation (i.e., all municipalities included) in table D.4. Overall, effects remain negative and significant, with similar magnitudes.

Table D.3 summarizes the municipalities excluded, on which criteria (variable and period) and the share that these municipalities represent in the total amount of their respective variables.

Table D.3: Summary of potential outliers

| Name | Definition | Variable | Timespan | Municipalities excluded | Share |
|---|---|---|---|---|---|
| Displ. | Top five municipalities which generated the most displaced | Total displaced | 2002-2015 | • Buenaventura<br>• San Andres de Tumaco<br>• Medellín<br>• Santa Marta<br>• Valledupar | 10% |
| Membership | Top five municipalities which have the most cooperative members | Cooperative members | 2013 | • Bogotá<br>• Medellín<br>• Cali<br>• Bucaramanga<br>• Neiva | 68% |
| Top 5 pop. | Top five most populated municipalities | Total population | 2013 | • Bogotá<br>• Medellín<br>• Cali<br>• Barranquilla<br>• Cartagena | 30% |
| Top 10 pop. | Top 10 most populated municipalities | Total population | 2013 | Same as above, adding<br>• Cúcuta<br>• Soledad<br>• Ibagué<br>• Bucaramanga<br>• Soacha | 36% |
| Department cap. | The 32 department capitals and the capital district (Bogotá) | Total population | 2013 | *33 municipalities, see note* | 46% |

*Note: Variable* denotes the variable on which the municipalities where excluded. *Timespan* indicates the time period under which the selection was made. *Share* represents the share that the excluded municipalities represent with respect to the sum of the variable — total displaced persons, total cooperative members and total population, respectively. Regarding *Department cap.*'s excluded municipalities: the list of all departmental capitals can easily be found in any good encyclopedia or online.

## D.3 Excluding zero displacement

In this appendix, I exclude zero displacement municipalities, first only from the department of Boyacá if they did not record displacement reception during the preceding or following year. Next, I exclude all the zero displacement municipalities.

Table D.4: Zero-inflated beta model, average marginal effects — Excluding potential outliers

| *Coefficients multiplied by 100* | (1) Baseline | (2) Displ. | (3) Membership | (4) Top 5 pop. | (5) Top 10 pop. | (6) Department cap. |
|---|---|---|---|---|---|---|
| L.Log Coop. members | -0.0134*** | -0.0130*** | -0.0129*** | -0.0130*** | -0.0130*** | -0.0128*** |
| | (0.00398) | (0.00396) | (0.00401) | (0.00400) | (0.00401) | (0.00400) |
| L.Log Conflict intensity | 0.0212*** | 0.0209*** | 0.0210*** | 0.0212*** | 0.0214*** | 0.0223*** |
| | (0.00346) | (0.00347) | (0.00346) | (0.00347) | (0.00349) | (0.00358) |
| Year fixed effects | Yes | Yes | Yes | Yes | Yes | Yes |
| TIMC | Yes | Yes | Yes | Yes | Yes | Yes |
| Coop × Conflict inter. | Yes | Yes | Yes | Yes | Yes | Yes |
| Correlated RE | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 10580 | 10530 | 10530 | 10530 | 10490 | 10260 |

* p < 0.1, ** p < 0.05, *** p < 0.01. Standard errors in parentheses.

*Note:* Figures (coefficients, marginal effects and standard errors) have been multiplied by 100 for clarity.

Table D.5: Zero-inflated beta model, marginal effects — Excluding Boyacá potential measurement errors and excluding all zeros

| *Figures multiplied by 100* | Zero-inflated beta | | Pooled | |
|---|---|---|---|---|
| | (1) Baseline | (2) Boyacá excl. | (3) Baseline | (4) All zeros excl. |
| L.Log Coop. members | -0.0134*** | -0.0141*** | -0.0354*** | -0.0427*** |
| | (0.00398) | (0.00411) | (0.00652) | (0.00731) |
| L.Log Conflict intensity | 0.0212*** | 0.0213*** | 0.191*** | 0.187*** |
| | (0.00346) | (0.00350) | (0.0136) | (0.0136) |
| Year fixed effects | Yes | Yes | Yes | Yes |
| TIMC | Yes | Yes | Yes | Yes |
| Coop × Conflict inter. | Yes | Yes | Yes | Yes |
| Correlated RE | Yes | Yes | No | No |
| Observations | 10580 | 10261 | 10580 | 9373 |

* p < 0.1, ** p < 0.05, *** p < 0.01. Standard errors in parentheses.

*Note:* Figures (coefficients, marginal effects and standard errors) have been multiplied by 100 for clarity.