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CAN CONDITIONAL CASH TRANSFER PROGRAMS IMPROVE COLLECTIVE ACTION? LAB-IN-THE-FIELD EVIDENCE ON COORDINATION AND SOCIAL NORMS

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CAN CONDITIONAL CASH TRANSFER PROGRAMS IMPROVE COLLECTIVE ACTION? LAB-IN-THE-FIELD EVIDENCE ON COORDINATION AND SOCIAL NORMS*

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ABSTRACT

This study tests an unintended benefit of a conditional cash transfer program in Colombia: the ability to overcome coordination failures. Participants interact with fellow beneficiaries, which gives rise to a coordination device. Beneficiaries participate in a minimum effort coordination game. Those enrolled in the program for over a year are exerting the highest level of effort. The improvement in coordination is not due to potential confounds such as willingness to cooperate or connectivity. A structural choice model illustrates that when beliefs about other's behavior are sufficiently high the Pareto-dominant equilibrium holds. The findings support nascent initiatives to influence beliefs through policy interventions.

RESUMEN

Este estudio evalúa un beneficio no deseado de un programa de transferencias condicionadas en Colombia: la habilidad de superar las fallas de coordinación. La interacción entre beneficiarios da lugar a un dispositivo de coordinación. Aquí, los beneficiarios participan en un juego de coordinación del mínimo esfuerzo. Los que llevan en el programa por más de un año ejercen el nivel de esfuerzo más alto. La mejora en la coordinación no se debe a posibles factores, como la disposición a cooperar o la conectividad. Un modelo de elección estructural ilustra que cuando las creencias sobre el comportamiento de los demás en el mayor nivel de esfuerzo son lo suficientemente altas, se mantiene el equilibrio Pareto-dominante. Estos hallazgos apoyan las iniciativas que buscan influir las creencias y formación de normas sociales a través de intervenciones de política.

I. Introduction

Social policies may improve economic outcomes through changes in the structures of social relationships. Public assistance programs are often designed to include a strong "social" component that may affect the social interactions in a community. Unintended benefits are thus a natural object of study within a policy intervention. A particular case is given by Conditional Cash Transfer (CCT) programs, currently one of the most popular interventions in developing countries. While a strong line of research shows that CCTs are successful in their baseline goals (i.e., nutrition, education and health of individuals), the potential benefits to a community, remain under-explored in the literature.

The ability to coordinate within a community is key to solving collective action problems and market failures. It brings economic development, builds efficient institutions, avoids conflicts (Bowles, 2004; Coleman, 1987; Hoff, 2000; Hoff and Stiglitz, 2001; Matsuyama, 1997; McAdams, 2008; Rousseau, 2000) and promotes entrepreneurship (Adler and Kwon, 2002). In developing countries, where weak institutions and a weak rule of law are prevalent, coordination can improve the efficiency of outcomes. Despite its importance for development and growth, the level of coordination in communities -and more importantly of what might influence it- remains largely unmeasured.

This study tests the presence of these benefits on the ability to overcome coordination failures within a community. The main contribution is an experimental measure of the effect of a policy intervention on a community's ability to coordinate. This study conducts a field experiment[1] based on the behavior in a coordination game[2] with social networks. It combines experimental and non-experimental data to investigate the effect of a CCT program on coordination in Colombia. CCT beneficiaries are exposed to interactions with local program officials and community leaders, but more importantly with other neighbor beneficiaries, which I argue creates a positive externality in the community's ability to coordinate.

In Cartagena, where the program was first implemented, the intervention was staggered across time and intervention populations. I take advantage of the phased roll-out design by randomly assigning individuals to the program. Participants from the pilot zone accessed to the program in 2005, while participants from another zone had access to the intervention in 2006. That way I can capture the effect of the program on coordination.

My first finding is that the length of exposure of the beneficiary to the program matters for coordination. Beneficiaries also have the choice to attend other group meetings that provide support to community-based initiatives, teamwork, group identity, and solidarity. Though this raises different possible channels, the analysis reveals that the improvement in

[1] An artefactual field experiment according to the taxonomy by Harrison and List (2004).

[2] Agents must coordinate on a common action with the group's success depending on the least favorable action of a team member. The minimum effort (ME) game is an adaptation of the stag hunt game (Holt, 2007) with multiple choices and subjects.

coordination is not due to potential confounding factors such as willingness to cooperate (measured with a public goods game), connectivity (measured with network data for each participant within a session) or socioeconomic characteristics.

My second finding is that a longer exposure to the program is positively correlated with choosing the Pareto-dominant equilibrium in the game. The social component of the CCT, namely the interactions and meetings, changed beliefs about others' behavior and established a social norm,[3] which allowed beneficiaries to overcome coordination failures. To support this claim I estimate a structural (quantal response) model from which I estimate the *responsiveness* or *precision* parameter that determines individual's expectations of others' decisions and their own expected payoffs. I provide evidence of a link between our measure of beliefs and length of exposure to the CCT program.

The use of lab in the field experiments as a method to study social attributes[4] within a community is not new.[5] Public good and trust games have been used in a variety of situations, both urban and rural, to measure cooperation, as I do as well to distinguish the role of beliefs (coordination) from that of social preferences (cooperation).

Most of the experimental literature on coordination games and achieving efficiency (i.e., learning, social networks, monetary incentives) relies on studies in the lab. In contrast, evidence of coordination in the field is almost nonexistent. My experimental design is a useful abstraction of the ability to coordinate in the field as most interactions are n-participants and usually within a broader set of options. Specifically, I examine how groups of more than two people coordinate and reach the most efficient outcome. I use an eight-player-three-choices coordination game with three ranked equilibria.[6] I will use the multiplicity of equilibria

[3] I take social norms as a coordination device, or in other words a signaling mechanism, to solve collective action problems (Ellickson, 1991; McAdams, 1997; Posner, 2002).

[4] Choice experiments, in contrast to survey measures, are incentivized, involve real behavior and eliminate sources of heterogeneity that may confound estimation of preferences from life choices. There is a debate on the validity of the survey measures and other qualitative measures to capture coordination in a community (Kawachi, Subramanian, and Kim, 2008; Narayan and Cassidy, 2001; Portes and Landolt, 2000; Putnam, 2001a,0)

[5] See Cardenas, Chong, Ñopo, Horowitz, and Lederman (2009); Carpenter (2002); Carpenter, Daniere, and Takahashi (2004); Fearon, Humphreys, and Weinstein (2009); Gaechter, Herrmann, and Thoni (2004); Gilligan, Pasquale, and Samii (2014); Karlan (2005); Voors, Turley, Kontoleon, Bulte, and List (2012).

[6] There are only two more studies that measure coordination in the field (Bhalotra, Clots-Figueras, Iyer, and Vecci, 2018; Brooks, Hoff, and Pandey, 2016). Bhalotra, Clots-Figueras, Iyer, and Vecci (2018) conduct a 4-people ME game and relate coordination with ethnic group composition. Brooks, Hoff, and Pandey (2016) conduct a (two-person) stag hunt game (2x2 coordination game) to examine the role of culture in the efficiency of coordination among men from different castes in India. For a very similar experimental design in India, see also Chakravarty, Fonseca, Ghosh, and Marjit (2016). Boschini, Dreber, von Essen, Muren, Ranehill, et al. (2014) examine gender-based focal points or conventions by using a battle of the sexes game on a random sample of Swedish citizens. Bosworth (2013) uses a stag hunt game in the lab as a measure of social capital, and find that traditional survey measures of trust are related to behavior in the experiment with 20 students. This positive relation is consistent with the findings of Anderson, Mellor, and Milyo (2004) and Thoni, Tyran, and Wengstrom (2012) on a public goods game, who use a student sample and a random sample from the Danish population, in the lab and on line, respectively.

to examine individual beliefs. Also, I exploit the role of social networks in coordination and disentangle their effect. In addition, our sample is larger compared to other studies on coordination in the field, heterogeneous in a wide range of socioeconomic variables and focused on the poorest of the poor.

The paper is organized as follows. Section II. offers a brief introduction to the institutional setting of the CCTs. Section III. describes the economic game and explains how this behavioral experiment is useful to capture a social norm. Section IV. describes the recruitment process, experimental procedures and descriptive statistics of our sample, subject to long and short exposure to the CCT.

Section V. quantifies the relation between the CCT and the ability to coordinate. Section VI. examines the role of other confounding factors such as willingness to cooperate, networks and other individual characteristics on coordination. Section VII. presents a structural estimation that captures the role of beliefs on effort choice and shows how exposure to the CCT implies an reduce in uncertainty and allows to overcome the coordination failure. The last section concludes.

II. The Cash Transfer program and identification

Familias en Acción (FA) is a Colombian CCT whose goal is to reduce extreme poverty in the medium term by providing resources to improve nutrition and health status and school enrollment of poor-household children.[7] Beneficiary households have access to the program's grants if they comply with some requirements. FA has three components: a nutritional and health component aimed at households with children younger than five, an education grant for children in primary school and an education grant for children in secondary school. Also, FA has a social component, articulated around periodic voluntary beneficiary meetings,[8] called Care Follow-up Meetings (EC) [*Encuentros de Cuidado*].[9] The health and nutrition grant, roughly equal to US$19 independent of family size, is conditioned on attending regularly growth and development check-ups for children, a vaccination program and some 'classes' on hygiene, diet, and contraception. The educational grants, aimed at households with children aged seven to seventeen, are conditional on enrollment and regular attendance in school. Each child in primary (secondary) school entitles the household to

[7]See Attanasio, Polanía-Reyes, and Pellerano (2015) for more details. The program has become the flagship of the Colombian government's social policy as it targets the poorest 20% of Colombian households. It started in 2002 in 627 small rural areas. In 2007, it expanded to all urban areas in order to include 1.5 million beneficiary households. This CCT is targeted to women, like every other CCT in Latin America.

[8]For evidence of success of FA on the target outcomes and other outcomes such as crime and voting behavior see a survey in Attanasio, Polanía-Reyes, and Pellerano (2015).

[9]In addition to the EC, the beneficiaries take part in the general assembly. The general assembly is a public meeting where beneficiaries discuss and decide about problems affecting beneficiaries in Cartagena. There are four annual assemblies, taking place on a date set by the local office.

about US$5 (US$10) per month. Households receive a total transfer which may oscillate between 5% and 16% of the minimum wage and between 10% and 30% of the average level income of the poor (DNP, 2010; MESEP, 2012).[10]

Although participation in the EC meetings is not compulsory to receive the transfer, most beneficiaries (80.11% in our sample) participate at ECs where, in addition to discussing hygiene, nutrition or other health-specific issues, they have the possibility to discuss a topic or simply chat. Beneficiaries are invited to attend some meetings that are presented as key for human capital investment. Conversations with program's officials and with beneficiary mothers indicate that these social aspects are indeed an important feature of the program: beneficiary mothers discuss community-related issues, and by doing so they reach a common ground to make decisions and take actions aimed at improving their life conditions. They start new activities, get to know each other better and improve their ability to act as a group.

Our CCT should change the ability to overcome coordination failures once the program begins to affect social interactions and their environment (Coleman, 1988). For example, FA creates networks and strengthens the current ones and improves the structure of social relationships among beneficiaries (Cassar, 2007; Charness, Feri, Meléndez-Jiménez, and Sutter, 2014; Goyal and Vega-Redondo, 2005; Jackson, 2008; Putnam, 1995). FA promotes leadership (Bass, 1991; Brandts, Cooper, and Fatas, 2007; Cartwright, Gillet, and Vugt, 2013; Foss, 2001; Latham and Saari, 1979) and gives mothers the opportunity to start working as a "social group" by perceiving a strong identification with the program (Akerlof and Kranton, 2000; Chen and Chen, 2011; Tajfel, 1982) and their power to "act together" (Sugden, 2000; Warren, 1998). This CCT may affect the beliefs about others' behavior in two ways. First, beneficiaries share the same paperwork load, health check-ups, payment logistics and the same interests. They may form a new group identity which would change the perception of the community traits. Second, beneficiaries repeatedly interact at the EC and beneficiaries' assemblies. This continued interaction among beneficiaries may change perceptions about others' behavior and thus create and enforce social norms.

Cartagena is the fifth largest city in Colombia, with 993,000 inhabitants in 2008. It is the third poorest city in the country, with 40.2% poor and 6.9% in extreme poverty in 2008 (MESEP, 2012). The zones Ciénaga and Pozón belong to the poorest locality (i.e., the lowest level of income, the lowest education coverage, the highest infant mortality rates and the worst living conditions in Cartagena. In 2009, Pozón was the densest zone with an area of 273 Ha and 45 thousand inhabitants, while Ciénaga has 463 Ha and 102 thousand inhabitants (see Figure A1)[11]. By 2006, Pozón and Ciénaga were considered by the local authorities as very similar, with a percentage of households with lower income of 56% and the same average time in school (6 years).

[10] In Colombia, most welfare programs use the so-called SISBEN score, a poverty indicator that is updated periodically. Based on this score, households are assigned to one of six categories. FA targets level 1 of SISBEN and displaced people.

[11] Appendices can be found in on-line supplementary material here.

In January 2005, the FA authorities decided to pilot the program in Pozón with 5,000 SISBEN 1 households. A new enrolment wave took place in March 2006 for 2,500 *displaced* households (i.e., households that were forced to leave their home because of the civil conflict). After that, displaced households have been allowed to enroll in the program at any time. Between 2005 and the first half of 2007, the program operated in Pozón but had not been implemented in other zones, despite there being other two zones (*Nelson Mandela* and *Ciénaga de la Virgen)* identified by the FA authorities as eligible to participate in the pilot. In late August 2007, a massive wave of enrollment to the program started in every municipality in the country, regardless of its population. The program was also rolled out in all the poorest zones of Cartagena, including Ciénaga. In total 35,500 households were enrolled in Cartagena, including new households from Pozón. In our data set 58 of 404 individuals who attended the follow-up (14.4% of Pozón sample) were enrolled in the program in 2007.[12]

In Cartagena, the implementation of the intervention was staggered across time and intervention populations. This analysis takes advantage of phased roll-out design by randomly assigning individuals to the program. Participants from the pilot zone had access to the program in 2005 and participants in Ciénaga had access to the intervention in 2006. Taking advantage of the comparability of beneficiaries across zones and the random allocation, I am able to capture the effect of the program on coordination after the program is implemented. For more resources on the CCT program and identification strategy see Attanasio, Pellerano, and Polanía-Reyes (2009); Attanasio, Polanía-Reyes, and Pellerano (2015).

III. The minimum effort coordination game

Collective action may facilitate coordination in a strategic environment with multiple Pareto-ranked equilibria (see, for example, Bryant (1983); Hirshleifer (1983)).[13] We use a well-known game to examine equilibrium selection in the presence of collective action. The ME coordination game introduces a conflict between payoff dominance and risk dominance.[14] An individual's payoff depends on her effort as well as on the minimum effort of the group. The higher the minimal effort, the higher every member's payoff is. In contrast to social dilemma games (pareto-dominant, public goods games), any common effort level chosen by all group

[12]The following enrollment waves after 2007 (for non-displaced households) took place in 2009 (32,000 households), in 2012 (22,000 households) and 2013 (7,000 households). Regarding the payment procedure of FA, the first payment in Pozón was in March 2005 followed by a bi-monthly payment. In 2007, the first payment in Ciénaga was in October 2007.

[13]Harsanyi and Selten (1988) present payoff dominance as based on collective rather than on individual rationality. However, most theoretical work on equilibrium selection in coordination games concerns 2x2 games (Anderson, Goeree, and Holt, 2001; Carlsson and Damme, 1993; Harsanyi and Selten, 1988; Kandori, Mailath, and Rob, 1993; Young, 1993).

[14]Notion introduced by Harsanyi and Selten (1988). This game is also called the weakest-link game. Many economic and organizational contexts feature situations where the worst component of a product or process determines its overall quality (Camerer and Knez, 1994; Foss, 2001).

members is an equilibrium, so it is in no one's interest to deviate upward or downward from the common effort. Hence choosing the most efficient (i.e., payoff-dominant) equilibrium is a problem of coordination, rather than one of cooperation.

The ME game is an adaptation of the stag hunt game[15] (Holt, 2007) with multiple choices and subjects. As an experimental design, consider an adaptation of Van Huyck, Battalio, and Beil (1990) with $n = 8$ players and $E = 3$ choices. Then the payoffs can be described by the matrix presented in Table I below. Players simultaneously determine their level of effort in order to maximize their expected payoff in the game, determined by the minimum level of effort in the group minus the cost of effort each player incurs

$$\pi_i^{ME} = \pi(e_i, e_{-i}) = 3 + 3\min(e_1, \ldots, e_n) - 2e_i \tag{1}$$

where e_{-i} are other players' levels of effort.

TABLE I. Coordination game. Payoffs table

Player's	Minimum effort by other players		
Effort	1	2	3
1	\$4	\$4	\$4
2	\$2	\$5	\$5
3	\$0	\$3	\$6

Note: Values are in thousands of COP

Any common level of effort $e_1 = \cdots = e_8$ is a Nash equilibrium. There are three Nash equilibria in this game. Equilibria are Pareto ranked (i.e., between any two equilibria there is a strict Pareto ordering). It is reasonable to assume that players would prefer the Pareto-dominant equilibrium.[16] However, choosing the highest level is risky because effort is costly; if for some reason one of the players deviates, others are left with the lowest possible payoff. Hence, if there is the uncertainty of the other player's action, deviation from the efficient outcome is unavoidable.

The only problem faced by the players is to coordinate on any of the three Nash equilibria. But only the belief about others choosing a certain level of effort will motivate the individual to exert that level of effort. This game shows the tension between payoff dominance and a secure but inefficient equilibrium. In the presence of strategic uncertainty one of two can prevail: either risk dominance, which yields an outcome that is safe but not efficient, or payoff dominance, which yields an efficient outcome.

This particular coordination game has been used extensively in the lab.[17] In fact, experimental evidence supports the prediction that a risk-dominant equilibrium will be favored

[15] The stag hunt game is a two-player, two-choice coordination game with a payoff-dominant equilibrium and a risk-dominant one.

[16] The Pareto-dominant equilibrium is also called the efficient equilibrium.

[17] See Cooper (1999); Devetag and Ortmann (2007) and Portes and Landolt (2000) for surveys on payoff-asymmetric coordination games in the lab.

over the Pareto-dominant equilibrium. This so-called coordination failure (Anderson, Goeree, and Holt, 2001; Camerer, 2003; Van Huyck, Battalio, and Beil, 1990) will happen unless there is a coordination device or institution that re-directs behavior (Bowles, 2004).[18]

Our equilibria are Pareto ranked, and the coordination device at hand should be stronger than a focal point or convention.[19] A social norm is a pattern of behavior such that individuals prefer to conform to it on the condition that they believe that most people in their reference network (i) conform to it (i.e., *empirical expectations*) and (ii) *think* they **ought to** conform to the norm (i.e., *normative expectations)* (Bicchieri, 2005,0).[20] We will consider a social norm as an equilibrium selection criterion (Horwitz, 1990; Kandori, Mailath, and Rob, 1993; Schelling, 1960). This game-theoretic approach to social norms introduces them as customary rules of behavior that coordinate our interactions with others. Once a particular way of doing things becomes established as a rule, it continues in force because we prefer to conform to the rule given the expectation that others are going to conform (Lewis, 1969; Schelling, 1960; Young, 2008).

Empirical expectations are key for social norms to evolve and they are mostly based on observations of what individuals in the reference group have done in the past (Bicchieri, 2014). Also, in repeated encounters, people have an opportunity to learn from each other's behavior, and to secure a pattern of reciprocity that minimizes the likelihood of misperception.[21] On the other hand, communication is key in making efficient coordination a focal point (Blume and Ortmann, 2007; Choi and Lee, 2014).[22] The CCT program may have allowed these observations to occur in the community, and time of exposure to the program provides the timeframe that beneficiaries need to coordinate.

Given that decisions are individual and private in the ME game, individual beliefs consist of empirical expectations when all players coincide in any equilibrium and also normative

[18]Among the determinants of achieving the payoff-dominant equilibrium there is evidence in the lab on: group size and cost of effort (Van Huyck, Battalio, and Beil, 1990,9); number of interactions (Berninghaus and Ehrhart, 1998; Knez and Camerer, 2000; Parkhurst, Shogren, and Bastian, 2004); randomness in matching (Goeree and Holt, 2005; Keser, Ehrhart, and Berninghaus, 1998; Schmidt, Shupp, Walker, and Ostrom, 2003); information about other players' actions (Berninghaus and Ehrhart, 2001; Weber, 2006); leadership (Brandts and Cooper, 2007; Brandts, Cooper, and Fatas, 2007; Cartwright, Gillet, and Vugt, 2013; Gillet, Cartwright, and Vugt, 2011); advice (Brandts and MacLeod, 1995; Kuang, Weber, and Dana, 2007); monetary incentives (Brandts and Cooper, 2006,0; Goeree and Holt, 2005); action set (Van Huyck, Battalio, and Rankin, 2007); non-monetary incentives (Blume and Ortmann, 2007; Bornstein, Gneezy, and Nagel, 2002; Cason, Sheremeta, and Zhang, 2012; Dugar, 2010; Rhodes and Wilson, 2008; Van Huyck, Battalio, and Rankin, 1997); subject-pool characteristics (Chen, Li, Liu, and Shih, 2014; Dufwenberg and Gneezy, 2005; Engelmann and Normann, 2010; Stoddard and Leibbrandt, 2014).

[19]Instead, conventions are measured with a coordination game with multiple equilibria that are equally efficient, pareto-dominant, such as the battle of the sexes game.

[20]These are conceptually equivalent to descriptive norm and injunctive norm in psychology (Cialdini and Trost, 1998; Fishbein and Ajzen, 2011).

[21]This is defined as common knowledge by the literature on team reasoning (Sugden, 2003).

[22]Although there is experimental evidence in the lab that shows otherwise (Burton, Loomes, and Sefton, 2005; Clark, Kay, and Sefton, 2001).

expectations when all players coincide in the equilibrium that is best for everyone in the group. The combined force of normative and empirical expectations makes norm compliance a superior choice and makes a deviation a bad choice, either because punishment may follow or just because one recognizes the legitimacy of others' expectations (Sugden, 2000).

Social norms emerge in small groups in which people have ongoing interactions with each other (Axelrod, 1986; Bicchieri, 1993; Hardin, 1982). For a social norm to exist, people collectively believe it exists, and also they believe that all people believe that everyone should obey that norm. Hence, a social norm that helps a group to overcome a coordination failure exists when individual beliefs coincide in the highest level of effort. If individuals choose the payoff-dominant strategy in a one-shot ME game in a group of more than two players, their decision is a belief that the others will choose that strategy, and hence that the group holds the same belief. A social norm differs from focal points or conventions[23] (Lewis, 1969; Schelling, 1960; Sugden, 1995; Young, 1993), which are a descriptive norm in which only empirical expectations are relevant -people do not expect others to respond if they stray from the convention.

Related literature in other social sciences undervalues the potential of coordination games to capture social norms (Bicchieri, 2014). However, our particular game and our quasi-experimental approach in measuring the effect of the exposure to the CCT allow us to indicate how the Pareto-dominant and risk-dominant equilibria are attained and how beliefs -which are built via the CCT- become self-fulfilling. The CCT program may have influenced normative expectations. In section VII., we present a structural choice model of the individual decision to coordinate that relates beliefs with exposure to the CCT program and the ability to select the most efficient equilibrium and overcome the coordination failure.

IV. Data and experimental procedures

IV.A Sampling, recruitment and allocation into sessions

We recruited the participants to the game with the help of the local office of FA (Enlace Municipal) in two zones -Pozón and Ciénaga- in the city of Cartagena, Colombia.[24] The program was already operating in both zones and we were able to contact beneficiaries directly. Invitations were sent to 500 randomly selected participants from the FA beneficiaries list in each zone. The FA office sent the invitations through a Madre Líder (ML)[25] to those specific households to attend any of the sessions held (over a span of four days). We assumed

[23] Lewis (1969) treats the Pareto-dominant equilibrium as the social contract that is not a convention.

[24] For more details on the CCT program and why we chose Cartagena, see Section 1 in the appendix.

[25] At their general assembly, the beneficiaries elect a representative called Mother Leader [*Madre Líder*] (ML) who is in charge of communication with the local office and is also in charge of organizing the social activities and educational meetings (such as the EC).

a response rate of 70% and expected to run 14 sessions with 350 attendees in each zone. The actual attendance rates for the new participants were 105.1% and 98.9% in Ciénaga and Pozón respectively. Our sample consisted of 714 participants, 710 of which had not participated in any game before.[26] This led to 29 sessions with people who had never played before (14 in Pozón and 15 in Ciénaga), the average size being 24.7 participants.

Conducting lab in the field experiments in large cities presents many challenges in terms of costs, time, recruitment and attendance (Candelo and Polanía-Reyes, 2008; Ñopo, Calonico, Candelo, Cardenas, Chong, and Polanía-Reyes, 2008). Since the sessions were scheduled at short notice (less than a week), we gave the beneficiaries as much freedom to choose the session that suited them best as we could. This could have led to relatives or neighbors choosing the same sessions, if they both happened to be invited. In fact, some invited beneficiaries arrived at the session in groups.[27] In both zones participants self-selected into sessions by responding to an invitation; hence the study does not use a random sample but a self-selected sample. The fact that individuals are not randomly allocated into sessions allowed us to explore the role of social networks on the effect of exposure to the program and social capital: We were able to obtain enough variation in terms of the density and quality of the network across sessions (See Table III).

IV.B Experimental procedures

Participants were invited to come to the local public school in their zone. After collecting their identification documents and checking their names on the recruitment lists, subjects in each session were given a random identification number and seated in a semi-circle in a classroom where the instructions of the games were read and explained. After the participants played the second round of the game described above, we collected a network questionnaire on the existing relationships among them while they had a snack. Controlling for network attributes allows me to better distinguish the effect of the program from the effect of pre-existing relationships (see section VI.).

Having collected the individual network data, we proceeded with the coordination game. An experimenter read and explained the instructions of the coordination game. After we

[26] In 2007, we only conducted a public goods game with 676 participants. In 2008, in addition to the sessions with new participants we also invited individuals who had participated in the public goods game in 2007. In 2008 we conducted a total of 53 sessions, 26 in Pozón and 27 in Ciénaga (24 of these sessions had only former participants). We followed the same protocol in the two years. These old participants had to attend sessions with only old participants. However, four people managed to stay in new sessions.

[27] For example, implementing sessions with 25 randomly allocated individuals was impractical and infeasible. The two zones are a two- hour drive apart; in order to minimize 'cross-talk' and its effects – participants talking about the experiment to future players who will participate in subsequent sessions, sessions were implemented in a four-day frame with four sessions each day in each zone. For example, during the first four days we conducted the experiments with participants in Pozón and the following four days with participants in Ciénaga.

had made sure the participants had understood the game, subjects formed three circles, back facing, in a different classroom. They proceeded with their decision, simultaneously and without communication. An experimenter announced the results to each group in private. Finally, the participants answered a questionnaire that gathered information on a wide range of socioeconomic features.

A session lasted on average two hours. Participants received their earnings based on the decisions in the experiments after the questionnaire.[28] On average each participant earned US$10.04 (COL$17,595), which just over the value of the daily minimum wage.[29]

IV.C Participants' characteristics

This section presents evidence to reassure on the comparability of samples in each zone, by testing for the presence of the difference in observable variables that could indicate different selection process. This is the logic used -in a different context- by Altonji, Elder, and Taber (2005,0) and Altonji, Conley, Elder, and Taber (2013): if one does not find significant differences in terms of observables it is plausible to assume that there are no unobserved selection biases. Table II reports results separately for participants corresponding to the two levels of program exposure as of 2008: short exposure means less than a year in the program, whereas long exposure means over one year in the program.[30] [31] Participants come from very poor families, with low levels of income and education. Table II shows the means of sample characteristics at the individual and household level, which are exogenous to the CCT program.

Participants with long exposure were more likely to have a partner, to own the house where they lived and to own durables. However, these household attributes are unlikely to be related to the CCT as it is a small transfer. Participants who have been enrolled in the program for less than a year are significantly more likely to be head of household, have been living in the zone for more years and have more years of education. In this case, there might be a reverse causation: later expansions of the CCT program might be explicitly targeting sectors that were previously not in. Whilst some of the effect of FA may be through its impact on socioeconomic outcomes, the relatively small size of differences and the presence of counterintuitive associations do not give strong support to conclude that all of its impact is through that channel.

[28] All recruited people received a show-up fee of US$1.1, to induce credibility and subsidize their transportation from and to their home or workplace.

[29] The daily minimum wage was COL$15,383 for 2008. Source: www.banrep.gov.co

[30] The analysis is constrained by data granularity on the time of exposure to the program. More granular data would allow for robustness checks along the time dimension.

[31] The samples coincide almost exactly with the limits of Pozón (long exposure) and Ciénaga (short exposure) apart from 41 observations from Pozón that were subject to short exposure. This is due to new households in Pozón that became beneficiaries in the 2007 urban expansion (see more information in the appendix).

TABLE II. Socioeconomic characteristics of the participants by time of exposure

	Exogenous Variable	All	Long Exposure	Short Exposure	Difference
General characteristics	Percentage of female participants	98	99	98	1
	Average age (years)	36.2	36.8	35.8	1.1
	Years living in the zone	18.5	14.9	21.2	-6.3***
	Percentage displaced	13	17	10	7**
	Percentage household head	33	24	40	-16***
	Percentage Single	11	10	12	-1
	Percentage married or civil partnership	72	78	68	10**
Education level (percentage)	None (level 0)	3	2	3	-0
	Primary incomplete (level 1)	21	22	20	2
	Primary complete (level 2)	14	16	13	3
	Secondary incomplete (level 3)	33	35	31	4
	Secondary complete (level 4)	20	16	23	-6*
	More than secondary complete (level 5)	9	8	10	-2
Income variables (percentage)	Unemployed	4	3	5	-2
	With access to credit	71	72	70	2
	With access to formal credit	22	24	22	2
	With food insecurity level (high)	9	7	10	-2
	Per capita monthly income (US$)	32.0	33.3	31.0	2.3
Dwelling characteristics	Household size	5.67	5.59	5.72	-0.13
	Number of people per room	2.98	3.21	2.81	0.4***
	Percentage dwelling with dirt floor	28	32	25	6*
	Percentage owning own house	59	69	52	17***
Assets (percentage)	Mobile phone	72	78	68	9**
	DVD player	33	37	31	6
	Sound player	31	37	27	10***
Observations		714	346	368	714

Note: Robust standard errors, clustered by session. * Significant at 10%; ** significant at 5%; *** significant at 1%. According to the official exchange rate at that date TRM: US$1=COL$1753.01 (monthly mean average for July 2008, http://www.oanda.com).

Table III presents the average number of friends, acquaintances and connections (the sum of relatives, friends and acquaintances) each participant reports in the session.[32] We also report features of the in-session network such as the friendship, acquaintanceship and connectivity densities (measured as the ratio of the total number of identified specific links in the session and the total possible number of specific links among connected people, i.e., those individuals that are identified as an acquaintance at least once by another player). In addition, we present a measure of leadership given by the percentage of players identified as an informal leader in each session (i.e., a person different to the ML), at least by one more player in the session. The fact that there are no statistical differences in terms of connectivity between levels of exposure indicates the recruitment process was successful.

TABLE III. Network characteristics at the session level

Variable	**All**	**Long Exposure**	**Short Exposure**	**Difference**
Average degree of relatives [a]	0.13	0.14	0.13	0.01
Average degree of friends	1.46	1.46	1.46	-0.00
Average degree of acquaintances	0.44	0.50	0.40	0.10
Average degree of trustworthy players	1.50	1.48	1.52	-0.05
Friendship density [b]	0.11	0.11	0.11	-0.00
Acquaintanceship density	0.03	0.04	0.03	0.01
Percentage of players identified as leader	0.18	0.20	0.16	0.04

Note: 714 observations. A player's degree is the number of edges or relationships the player declares to have within the session. Every player has a weighed measure of her degree of friends, degree of relatives and degree of trustworthy acquaintances. [a] Average degree for a network graph is the average number of edges that nodes in the network have. [b] Network density is the average degree divided by (N-1), where N is the number of nodes in the network. Robust standard errors of the difference clustered by session. For more details on the Network analysis see Advani and Malde (2018). *Significant at 10%; **significant at 5%; ***significant at 1%.

We conclude this discussion with a consideration about statistical inferences. Observations within our control group (beneficiaries with less than a year in the CCT) and our treatment group (beneficiaries with more than a year in the CCT) could be correlated because they share common characteristics besides the assignment into treatment and control. However, the intra-class correlation coefficient within exposure groups is relatively low at 0.18. Individuals within groups are no more similar than individuals between groups, and we effectively assigned 714 individuals to treatment or control. We can reject that we have only two independent observations.

Section V. analyzes individual behavior in the game using survey data we collected at the end of the experiment.

[32] The rate of reported leaders is significantly higher than the proportion of ML (participants who declared to have been elected FA beneficiary representatives) (5.2% and 5.1% respectively). We find that 46.2% among those identified as leaders in the session are MLs.

V. Exposure and coordination

First, we look at the differences between the frequencies of choosing the risk-dominant and the Pareto-dominant outcomes in terms of exposure to the program. In Table IV, we report the measures collected from the ME game. We present the results separately by length of exposure (short or long) to the program. In all relevant variables that indicate the ability to coordinate on the efficient outcome, players with long exposure show significantly higher measures with +28% participants choosing the highest level of effort and +25% groups actually achieving the Pareto-efficient equilibrium. The percentage of individuals choosing the safe option was 26% higher among those with short exposure. While +26% short-exposure participants choose the lowest level of effort and +35% short-exposure groups achieved the risk-dominant equilibrium. This is consistent with the hypothesis that the longer the exposure to the program the better a community will coordinate.

TABLE IV. Behavior in the coordination game

Variable	**All**	**Long Exposure**	**Short Exposure**	**Difference**
Average effort decision [b]	2.34	2.65	2.11	0.54***
	(0.11)	(0.12)	(0.13)	(0.17)
Percent of players that chose 1	24	10	35	-26***
	(0.5)	(0.4)	(0.7)	(0.8)
Percent of players that chose 3	59	75	46	28***
	(0.6)	(0.8)	(0.6)	(1.0)
Average Minimum effort in the group [b]	1.54	1.88	1.28	0.61***
	(0.13)	(0.21)	(0.10)	(0.21)
Percent of groups with a ME of 1	64	43	79	-35***
	(0.7)	(1.0)	(0.7)	(1.2)
Percent of groups with a ME of 3	17	31	6	25**
	(0.6)	(1.2)	(0.3)	(1.1)
1 if the player understood the best outcome	0.66	0.70	0.63	0.08**
is everyone choosing 3	(0.02)	(0.03)	(0.02)	(0.03)
Number of groups	87	42	45	87

Note: Robust Standard errors, clustered at the session level, in parenthesis. * Significant at 10%; **significant at 5%; ***significant at 1%. [b] The average of 1,2,3 units of effort.

Figure 1 reveals a significant difference by exposure length. Our first observation is that players with longer than a year exposure to the program coordinate more on the Pareto optimal equilibrium whereas players with a less than a year exposure coordinate more on the risk-dominant equilibrium.

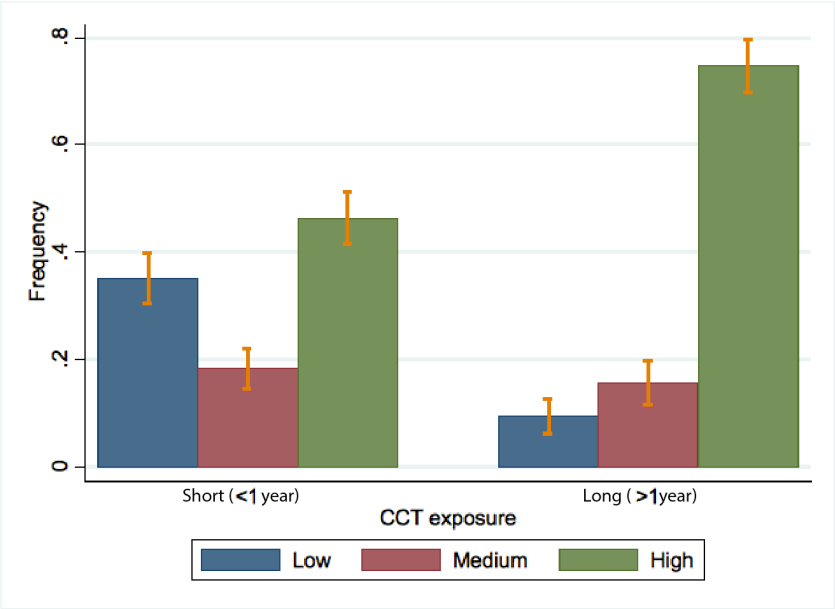


Figure 1. Exposure to the program and individual effort decision

Note: The whiskers depict the 95% confidence intervals. A non-parametric analysis confirms that the difference is statistically significant (Mann-Whitney test, p = 0.00).

The second observation is that earnings are higher for those who choose the higher level of effort and are beneficiaries longer than a year. Figure 2 shows average earnings for each level of effort and enrollment exposure. We observe players enrolled in the CCT program longer than a year have higher earnings than players enrolled for less than a year.

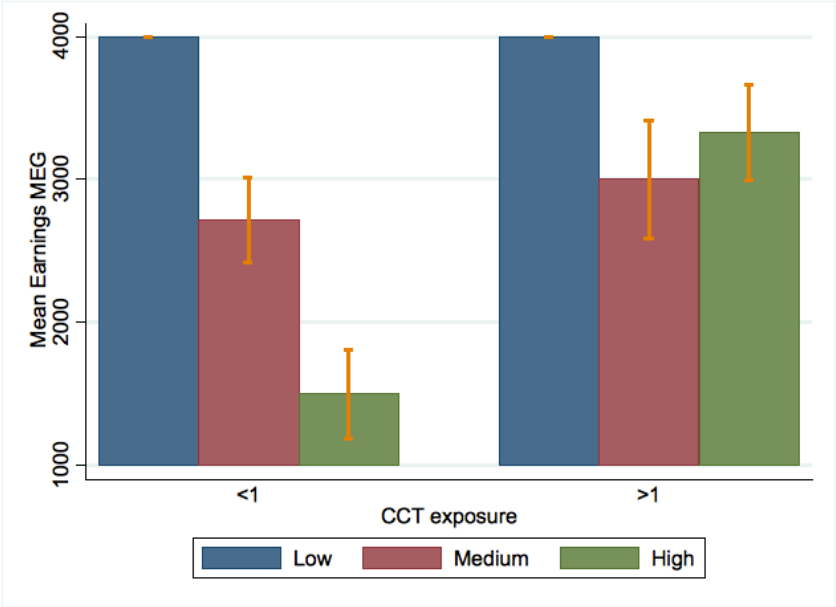


Figure 2. Exposure to the program and individual earnings

Note: The whiskers depict the 95% confidence intervals. A non-parametric analysis confirms that the difference is statistically significant (Mann-Whitney test, p = 0.00).

Now we use an ordinal choice model to test the hypothesis that exposure is relevant for the ability to coordinate on the most efficient outcome. Our empirical specification has as its unit of observation individual i of group g in session s. We estimate a partial proportional odds specification with three categories of the ordinal dependent variable, Y_i, the observed value of the unobserved individual effort decision, continuous latent variable Y_i^*. The continuous latent variable Y_i^* is equal to $Y_i^* = \alpha + \beta X_i + \delta N_{igs} + \lambda G_{gs} + \theta S_s + \nu_s + \varepsilon_{igs}$, where the disturbance terms ε_{igs} $i.i.d. \sim N(0,1)$ are independent from ν_s $iid \sim N(0, \sigma_\nu^2)$. N_{ig} includes number of friends, relatives and acquaintances in the group. G_{gs} includes session size, a dummy if that was the first session of the day, and a dummy for one of the experimenters who conducted the session, includes a dummy if there is a man in the group, the average equilibrium in the group from the previous two sessions and the presence of a ML in the group. The probability that Y_i will take on a particular value is

$$P(Y_i > j) = \frac{\exp(\alpha_j + X_{1i}\beta_1 + X_{2i}\beta_{2j})}{1 + \exp(\alpha_j + X_{1i}\beta_1 + X_{2i}\beta_{2j})}, \; j \in \{1, 2\} \tag{2}$$

where X_{ki} are individual observable characteristics (a dummy for being enrolled in the program for longer than a year). β_1 are the parameters that are constrained to be the same among levels of effort and β_{2j} are those that are set free to differ. Standard errors are clustered by session.

The three possible equilibria are ordered from the least to the most efficient equilibrium, so that the effort decision is an ordinal outcome. We start by applying Brant's test of parallel-regression/parallel-lines/proportional-odds assumption (see Fu (1998); Long and Freese (2006)). It is equivalent to a series of binary logistic regressions where categories of the dependent variable are combined, pareto-dominant, $e = 1$ is contrasted with $e \in \{2, 3\}$, and for $e = 2$ the contrast is with $e \in \{1, 3\}$. We confirm the assumption of parallel regressions is not met (we have a significant overall chi-square value):[33] one or more coefficients differ across values of j. However, if the assumption is violated only by one or a few of our independent variables, it is not necessary to relax the parallel-lines constraint for all variables, in particular for the exposure to the program. We choose a partial proportional odds model, where the parallel-lines constraint is relaxed only for those variables where it doesn't significantly hold.[34]

Table V presents the marginal effects for a partial proportional odds model for the decision to exert the low and high individual levels of effort. The dependent variable is the individual probability of choosing a low effort level (high effort level). Specifications (1) and (2) show the marginal effect of exposure to the program alone. The marginal effect is 32% to the likelihood of choosing the high level of effort. In contrast, the probability of choosing the lower level of effort by participants enrolled in the program longer than a year is 23% lower. The negative coefficient for exposure means that the likelihood of coordinating on the least efficient equilibrium decreases when enrollment into the program is longer than a year.

VI. Confounding factors

This section explores several confounds that may affect the relation between the ability to coordinate and the exposure to the program. The evidence below confirms the initial findings described in Table V, namely that the main driver of the decision to coordinate on the Pareto-dominant equilibrium is mainly associated to long exposure to the program, and not other potential confounds.

There are two features of social structures in particular that may facilitate coordination (Coleman, 1988): cooperation and networks. First, the ability to overcome free-riding incentives in real-world situations, especially salient among poor communities, share the same game-theoretic representation of a public goods game: cooperative outcomes are subject to "free-riding"[35] incentives (Coleman, 1994). To disentangle the role of other-regarding pref-

[33]The proportional odds assumption states that our model with 3 categories is equivalent to 2 binary regressions with the critical assumption that the slope coefficients are identical across each regression.

[34]We used a Wald test on each variable to see whether the variable meets the parallel-lines assumption. If the Wald test is statistically insignificant for one or more variables, the variable with the least significant value on the Wald test is constrained to have equal effects across equations. See Williams (2006).

[35]See Grossman and Hart (1980); Olson (2012); Ostrom (1997) and Samuelson (1954). Evidence on social program evaluations supports this claim (Adato, Hoddinott, and Haddad, 2005; Avdeenko and Gilligan,

TABLE V. Marginal effects of a partial proportional odds model for the lowest and highest individual level of effort (N=714). Dependent Variable: Level of effort

	Low (1)	**High** (2)	**Low** (3)	**High** (4)	**Low** (5)	**High** (6)
Beneficiary longer than a year (enrollment)	-0.23***	0.32***	-0.24***	0.33***	-0.24***	0.34***
	(0.09)	(0.11)	(0.09)	(0.12)	(0.09)	(0.12)
Cooperation decision round 1			-0.08*	0.11*	-0.08*	0.12*
			(0.05)	(0.07)	(0.05)	(0.07)
Degree of Player (friends)					-0.03*	0.05**
					(0.02)	(0.02)
Degree of Player (relatives)					0.04	-0.06
					(0.04)	(0.05)
Degree of Player (acquaintances)					-0.01	0.02
					(0.03)	(0.04)

Note: Robust Standard errors are clustered at the session level in parenthesis. * Significant at 10%; ** significant at 5%; *** significant at 1%. Change in the predicted probabilities of holding each attitude for an increase of one unit of each independent variable, while holding all other independent variables constant at their means.

erences we use a separate game (a public goods game) to measure cooperation. Second, both coordination and the social network determine the effectiveness of the social norms, as coordination reflects the ability to exploit Pareto-improving opportunities in the presence of uncertainty and the features of the social network provide the environment in which that ability is likely to emerge.

VI.A Other-regarding preferences

The decision to exert the highest level of effort may be mediated by other-regarding preferences. Altruism, trust, social distance from the other members, fairness, reciprocity, a sense of affiliation as a member of a common group, or sympathy toward others in the group determine social cohesion in a group and strengthen the ability of its members to cooperate and overcome collective action problems. We use behavior in a public goods game (PPG) as a proxy of willingness to cooperate.[36] The possibility of cooperation within a group is determined by multiple factors such as repetition, communication, punishments or rewards and inequality in the payments.[37] In our game, the incentives to invest in the group account are given by the specific features of the design, but also by the individual motivations concerning the group well-being (Attanasio, Pellerano, and Polanía-Reyes, 2009; Attanasio, Polanía-Reyes, and Pellerano, 2015).

2015; Fearon, Humphreys, and Weinstein, 2009).

[36]The literature has to a large extent focused on behavior in experimental trust games.(For an extensive review see Thoni, Tyran, and Wengstrom (2012). We think that a PPG is a more accurate design as it capture a social dilemma.

[37]See Attanasio, Polanía-Reyes, and Pellerano (2015) for a recent review.

Other studies employ a dichotomous voluntary contribution mechanism (VCM) game comparable to the one we use here: Attanasio, Barr, Cardenas, Genicot, and Meghir (2012) in 70 rural municipalities in Colombia, Cardenas, Chong, and Ñopo (2013) in 6 Latin American cities, Barr, Mugisha, Serneels, and Zeitlin (2012) in Uganda, Barr, Packard, and Serra (2014) in Albania and Alzua, Cardenas, and Djebbari (2014) in Mali.[38] The game captures the willingness to cooperate among the members of a group of 25 people by choosing simultaneously whether to allocate a token in the private account with a private benefit or to allocate the token in the group account, where the benefits of all members increase and the well-being of the entire group is improved.[39] There is no incentive to invest in the group account due to a higher individual payoff by investing in the private account. The dominant strategy is not to contribute at all, undermining the socially optimal outcome. However, if all in the group invest their token in the private account, the group will be worse off than if all the members invested in the group account, which is the social optimum. The situation constitutes a typical social dilemma.

Participants play the VCM twice. In the first round, each player has to decide where to invest her token. The second round is a repetition of the first, except that the players could talk for ten minutes before making simultaneously their private, anonymous decisions. Communication is completely unstructured, and during the discussion the players can talk about whatever they want but they cannot leave the room. No one, except the experimenter, knows the other players' contributions in the first round. We use behavior in the second round as a measure of how effective the opportunity to communicate could be in increasing willingness to cooperate and solving a social dilemma in the community.

Table VI reports behavior in the public goods game and experimental characteristics at the session level. It also reports differences across levels of exposure in these cooperation measures. First, though the unique Nash equilibrium of the game is for individuals to invest their token in the private account, many individuals deviate from the Nash equilibrium and contribute to the public good. Despite having a very low marginal propensity to contribute (MPC) and conducting the game in an urban context (characterized by low contributions), the overall level of cooperation in our sample is similar to that observed in similar labs in the field. However, the level of cooperation in the first round among the short-exposure sample is significantly higher than in the long-exposure one. In the second round, there is no significant difference in the cooperation variables. Finally, in the short-exposure sample, the percentage of participants who had a perfect understanding of the public goods game was significantly higher. It would be expected that cooperation should be higher in the long-exposure group than in the short-exposure one. Attanasio, Polanía-Reyes, and Pellerano (2015) examine these intriguing effects by using a difference in difference regression analysis

[38] Our public good game design has been used extensively in Colombia (Attanasio, Pellerano, and Polanía-Reyes, 2009; Attanasio, Polanía-Reyes, and Pellerano, 2015; Cardenas, Chong, and Ñopo, 2013) and in other countries (Barr, Packard, and Serra, 2014; Cardenas, Chong, and Ñopo, 2013). For more details on the experimental design see the appendix.

[39] The dichotomous VCM makes the game easily understood by subjects and also time effective.

with data from 2007 and 2008, which controls for possible unobservable variables. They find that there was indeed a positive effect of the program on first-round cooperation.

TABLE VI. Behavior in the public goods game

Level	Variable	All	Long Exposure	Short Exposure	Difference
Round 1	Average percentage of contributors	29	22	34	-12*
		(0.4)	(0.4)	(0.5)	(0.7)
	Percentage of sessions with no contribution	11	15	7	7
		(0.6)	(1.0)	(0.6)	(1.1)
	Median percentage of contributors	10	0.0	17	-17*
		(0.5)	(0.0)	(0.9)	(0.9)
	Maximum percentage of contributors	89	85	93	-7
		(0.6)	(1.0)	(0.6)	(1.1)
Round 2	Average percentage of contributors	27	26	29	-3
		(0.4)	(0.7)	(0.5)	(0.8)
	Percentage of sessions with no contribution	14	23	7	16
		(0.7)	(1.2)	(0.6)	(1.3)
	Median percentage of contributors	17	23	13	10
		(0.7)	(1.2)	(0.8)	(1.4)
	Maximum percentage of contributors	86	77	93	-16
		(0.7)	(1.2)	(0.6)	(1.3)
Session Level	Session size	24.65	24.74	24.58	0.16
		(0.14)	(0.16)	(0.21)	(0.26)
	1 if player understood the best for the group is contributing	0.20	0.13	0.25	-0.12***
		(0.02)	(0.03)	(0.02)	(0.04)
	1 if player declares she understood everything	0.67	0.67	0.68	-0.01
		(0.02)	(0.04)	(0.03)	(0.05)
Number of sessions		29	14	15	29

Note: Robust Standard errors are clustered at the session level in parenthesis. The standard errors for the median and maximum statistics are calculated at session level. * Significant at 10%; ** significant at 5%; *** significant at 1%

Table V shows the marginal effect of exposure to the program and dummies equal to one if the participant contributed to the public project in the first and second round.[40] Individuals who cooperated in the first round also present a higher probability (+11%) of choosing high level of effort and a lower probability of choosing the lower level of effort (-8%).

VI.B Network information

There are many advantages of social networks in community life, from exchange of goods and services to the transmission of information, values and norms (Jackson, 2008). Networks are

[40] Only behavior in the first round is included as it is a one-shot of willingness to cooperate while behavior in the second round is related to the effect of cheap talk and other unobserved variables. The results are robust when including cooperative behavior in the second round.

also important on effort individual decisions (Jackson (2010); List and Rasul (2011) and the references therein for studies that use field experiments in combination with social network data). For example, friends may conform to a social norm and status may be a determinant of individual behavior (Bernheim, 1994), and individuals may also be averse to inequality within the network (Charness and Rabin, 2002; Fehr and Schmidt, 1999).

Network structure becomes an important factor to take into consideration when overcoming collective action problems. The structure of the network, the position of individuals in it and their degree of participation determine, to a great extent, whether collective action is successful or not (Gould, 1993; Jackson, Rodriguez-Barraquer, and Tan, 2012; Jackson and Watts, 2002).[41] A common limitation of most models of collective action is that they neglect that people can choose with whom they interact, which is known that is not random. Generally, people prefer to interact with people who are similar to them, and collective action is no exception. Empirical work has demonstrated that individuals who participate in collective action have more links to other participants than individuals who do not participate (Opp, 1989).

There is a wealth of theoretical work supported by extensive evidence in the lab on the coordination problem of collective action on costly links and how information in the structure of the network affects individuals' decision to coordinate. However, there is no evidence from the field on how the network attributes of each individual (pareto-dominant, number of people known, family ties) explain individual effort decisions in situations where individuals do not have a single action that constitutes a dominant strategy. To our knowledge this is the first study that looks at the relationship between individuals' features and their decision to coordinate. This would shed light on the determinants of coordination in the field.

Table V shows that regardless of the density of the network (i.e., number of friends, relatives and trustworthy acquaintances in the session as identified by the player), players who had been enrolled into the program more than a year before chose the Pareto-efficient level of effort (difference is significant at 1%). While holding all other independent variables constant at their means, those players with an exposure of more than a year and having friends were 34% and 5% more likely to choose the highest effort level, respectively. In addition, those players with an exposure of more than a year and having friends were 24% and 3% less likely to choose the lowest effort level, respectively. This evidence on network features is consistent with the literature.

[41] For evidence of the structure of the social network and coordination games in the lab see Cassar (2007); Charness, Feri, Meléndez-Jiménez, and Sutter (2014); Choi and Lee (2014); Goyal and Vega-Redondo (2005); Jackson (2008).

VI.C Basic demographics and wealth

Table VII presents the marginal effects for a partial proportional odds model for the decision to exert the low and high individual levels of effort when controlling for socioeconomic variables at household and individual level, experimental variables and participant's variables related to the program. The dependent variable is the individual probability of choosing a low-effort level (high-effort level). Specifications (7) and (8) show the marginal effect of exposure to the program alone. The marginal effect is 27% for the likelihood of choosing the high level of effort. In contrast, the probability of choosing the lower level of effort by participants enrolled in the program longer than a year is 19% lower. Table A1 in the appendix reports the marginal effects of different socioeconomic dimensions (Glaeser, Laibson, and Sacerdote, 2002; Polanía-Reyes, 2005).[42]

TABLE VII. Marginal effects of a partial proportional odds model for the lowest and highest individual level of effort (N=712). Dependent Variable: Level of effort

	Low (7)	**High** (8)	**Low** (9)	**High** (10)	**Low** (11)	**High** (12)
Beneficiary longer than a year (enrolment)	-0.19***	0.27***	-0.29***	0.43***	-0.30***	0.45***
	(0.08)	(0.11)	(0.08)	(0.1)	(0.07)	(0.1)
Cooperation decision round 1					-0.06	0.09
					(0.04)	(0.06)
Degree of Player (friends)					-0.03**	0.05**
					(0.02)	(0.03)
Degree of Player (relatives)					0.03	-0.05
					(0.04)	(0.05)
Degree of Player (acquaintances)					0.00	0.00
					(0.03)	(0.04)
Basic characteristics	Yes		Yes		Yes	
Experimental variables	No		Yes		Yes	
CCT variables	No		No		Yes	

Note: Robust Standard errors are clustered at the session level in parenthesis. * Significant at 10%; ** significant at 5%; *** significant at 1%.

Table A2 in the appendix presents the results with session variables such as whether

[42]The variables included are gender, age, level of education, number of years living in the zone; whether the player is displaced, is the head of the household, has a partner or is beneficiary of another program different from FA; housing conditions such as the number of people per room, whether the housing is owned, whether the housing has electricity, water pipe access and sewage. Finally it reports wealth measured as assets (such as landlines, cellphone, sound-player and DVD player), household income and perception of wealth with respect to other households in the zone. The only characteristics with significant marginal effects at both levels of effort are having a landline and the individual perception of wealth. Having a landline will increase the probability to choose the lowest level of effort by 7% and decrease the probability of choosing the highest level of effort by 11%. This result would imply that having no landline would provide an incentive to strengthen their communication with others by more interactions or other means or the habit of effort with sometimes no reward by the player. In addition, an increasing perception of how rich is the household compared to others in the community will decrease the likelihood of the ability to coordinate.

there is a man in the session, whether the player understood perfectly the coordination game, a dummy of one of the experimenters and size of the session. In addition, there is the possibility of contamination among subjects of different sessions since participants in a session could talk to participants of the next session on their way in. Despite our effort in avoiding that kind of contamination effect in the field, we control for this possibility with the average level of effort over the previous two sessions and a dummy for whether that session was the first of the day.

VI.D Leadership

Social status is relevant in the creation and transmission of social norms (Richerson and Boyd, 2008). In a coordination setting, a leader may have a strong influence on the equilibrium selection (Bala and Goyal, 1998; Eckel and Wilson, 2000,0). From Table **??**, we find that only measures related to the CCT program such as number of EC meetings and the percentage of ML in the session are significantly related to the level of effort. When including these measures in the analysis in specification VI they don't affect the effort decision. For example, contrary to behavior from previous coordination games in the lab (Brandts, Cooper, and Weber, 2015; Foss, 2001; Gillet, Cartwright, and Vugt, 2011), we don't find a relation between being a ML, or the presence of a ML in the group, and the effort decision. This study contributes to the small but growing literature that conduct behavioral experiments with real-world leaders in a natural field setting (Attanasio, Polanía-Reyes, and Pellerano, 2015; Jack and Recalde, 2015; Kosfeld and Rustagi, 2015; Polanía-Reyes, 2016).

From January 2005, ECs were held quarterly in Pozón. However, a ML was allowed to organize EC with her beneficiaries whenever she considered. The number of ECs was determined by how proactive the ML was. There were differences in the EC in Pozón between the period 2005 to 2007 and from 2007 to 2008. As the MLs were trained, they felt empowered within their community, displacing other leaders. Although the national office does not make attendance to the assemblies a mandatory requirement, from 2005 to 2010 the local office made it so. The percentage of the zone population receiving the program was 79% in Pozón in 2006 and 22.4% in all of Cartagena in 2008.

VII. Beliefs about what others would do and certainty about those beliefs: A quantal response approach

One of our main points is that the tradeoff between risk dominance and payoff dominance is directly linked to beliefs, what a player thinks others will do, and certainty, the precision of those beliefs. In order to estimate the probabilities of choosing the most efficient effort level I estimate a Quantal Response Equilibrium (QRE) model (Goeree, Holt, and Palfrey, 2016;

McKelvey and Palfrey, 1995,9). As the QRE contains a random component, it is a statistical generalization of Nash equilibrium. It is a stochastic choice approach as best response functions are probabilistic. QRE has become an important tool for the statistical analysis of data from experimental games. It serves as a formal structural econometric framework to estimate behavioral parameters using laboratory and field data, and in this study it leads to insights into theoretical questions such as equilibrium selection and computation of equilibria:

> "Humans do not always optimize perfectly. The QRE relaxes the assumption that individual choice behavior is optimal given the expectations about the choice behavior of other players in the game, by allowing for players to make mistakes. That is, the expected payoffs calculated from players' expectations may be subject to noise elements which may lead players to choose suboptimal decisions. Players' expectation's about the possibility of errors by other players determines an equilibrium. (...) While better strategies are more likely to be played than worse strategies, there is no guarantee that the best responses are played with certainty. Importantly, this imperfect response behavior is understood by the players. Like Nash equilibrium this leads to a complicated equilibrium interplay of strategizing by the players (...) The fixed point of such a process is a QRE. The fixed point requires that the probability distributions representing players expectations match the distributions of players actual decisions, that is, the vector of equilibrium distributions gets mapped into itself. This equilibrium analysis can provide a limiting point of a learning process in which expectations evolve with observed distributions of others' decisions" (Goeree, Holt, and Palfrey (2016): 4).

This section provides a structural estimation of the level of certainty on what others would do (aka the precision parameter in the QRE, λ). For beneficiaries with long exposure to the program, their estimated parameter is 200. for beneficiaries with short exposure to the program, the estimated parameter is 0. The program affected the certainty of what others would do, so beneficiaries make fewer mistakes.[43]

In a symmetric QRE, each player uses a mixed strategy p, which itself induces a distribution p_{min} over the minimum effort of all opponents. The expected payoff from choosing $e_i \in \{1, 2, 3\}$ is thus given by

$$E[\pi(e_i, p_{min})] = 3 \sum_{k=1}^{3} p_{min}(k) \left(1 + \min(k, e_i) - \frac{2}{3} e_i\right) \tag{3}$$

The QRE condition relates the probability of playing a given strategy to the relative advantage of the expected payoff. In the conventional logit specification, the equilibrium is characterized by

$$p(e_i = j) = \frac{\exp(\lambda E[\pi(j, p_{min})])}{\sum_{k=1}^{3} \exp(\lambda E[\pi(k, p_{min})])} \tag{4}$$

[43]For future research, I will show that my QRE has two stable equilibria. Figure 3a is a plot of choice probabilities as a function of lambda and the belief about what others would do. In the presence of multiple equilibria, this last parameter will become relevant.

where $\lambda \in [0, \infty]$ captures the degree of payoff-maximizing behavior: a higher value of λ means more payoff responsiveness -less noise-. With $\lambda = 0$ the density function becomes uniform over its support and behavior becomes random.

Although I cannot give a closed-form solution for the QRE (due to the large number of players, see Anderson, Goeree, and Holt (2001)) we provide a numerical solution using a grid search. The QRE can be defined as the global minimum (for $p \in [0,1]^3$) the mean squared error function

$$\left|\left| p(j) - \frac{\exp(\lambda E[\pi(j, p_{min})])}{\sum_{k=1}^{3} \exp(\lambda E[\pi(k, p_{min})])} \right|\right|_2 \tag{5}$$

Figure A2 in the appendix presents the QRE along the dimension of p_3 as a function of λ. Although the limit point of the QRE as $\lambda \to \infty$ is the risk-dominant equilibrium $p = (1, 0, 0)$, given that the cost is greater than 1/8 we observe that there might be multiple equilibria in our model. We consider the minimum of the mean squared error (MSE) as a function of λ given by (5) in Figure 3. We argue that this is an adequate proxy for the formation of beliefs and hence of the social norm. This is in line with our thesis that reaching the Pareto-dominant equilibrium is a matter of social norms, captured by beliefs about other players' actions. If others are perceived to be very likely to play the Pareto-dominant equilibrium, such equilibrium is sustained.[44] Though the QRE path might converge to the risk-dominant equilibrium, we want to understand under what initial conditions a high value of (the outcome probability of choosing the highest level of effort) is sustained in an equilibrium. Figure 3a presents the responsiveness/certainty parameter λ for each probability of choosing high effort, p_3 according to individual beliefs about p_3. The Pareto-dominant equilibrium is sustained only with high levels of λ.

The main effect we want to understand is that of exposure to the CCT program. To do so we compute the QRE separately for the subsample with short exposure to the program from that with long exposure to it. We calibrate λ with the objective of minimizing the mean squared error (MSE) between the distribution of efforts observed within the sample and the one predicted from the QRE implied by λ. Figure 3 presents the MSE as a function of λ for the two subsamples of beneficiaries of the CCT. Table VIII presents the calibrated λ for the two possible scenarios (beliefs of low and high levels of p_3). Figure A3 in the appendix shows that having high beliefs on others choosing the highest level of effort is not enough if there isn't a $\lambda > 0.6$ in order to obtain convergence to the Pareto-dominant equilibrium. Only the long exposure group had such λ. The λ parameter that minimizes the MSE function for each sample is given in Table VIII. Beneficiaries with long exposure would have a very high

[44] This approach is consistent with the assumption by Mailath (1998) and De Paula (2013) on the equilibrium selection mechanism for the econometric analysis of incomplete-information games with possibly many equilibria. "If an equilibrium is established as a mode of behavior by past play, custom, or culture, this equilibrium becomes a focal point for those involved. When observed games are drawn from a population that is culturally or geographically close, sharing similar norms and conventions, one would expect this assumption to be adequate" (De Paula, 2013).

λ parameter, that is a knowledge that everyone in the group is less likely to make mistakes and would be more likely to select the Pareto-dominant equilibrium.

TABLE VIII. Calibrated sensitivity parameter $\hat{\lambda}$

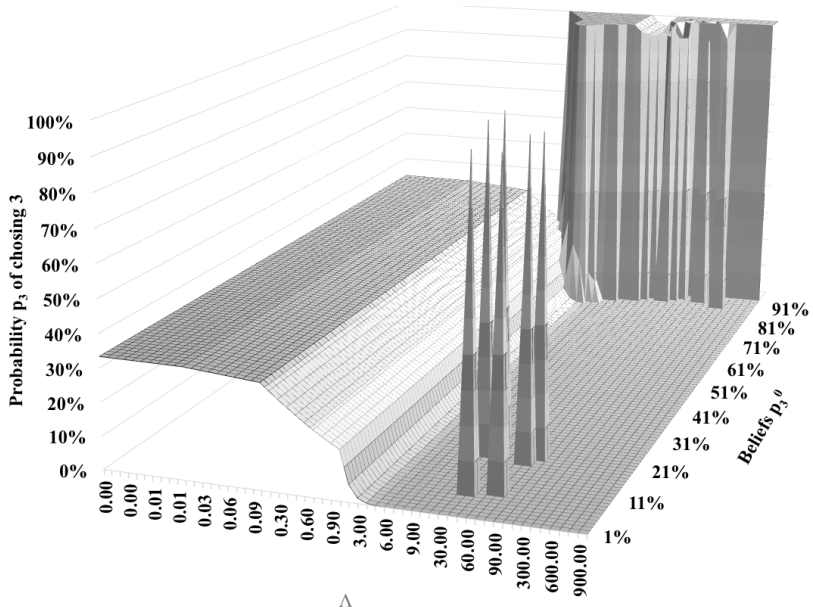
		Beliefs about p_3	
		Low	High
Beneficiary level	Short	0	0
of Exposure	Long	0	200

Figure 3 compares two equilibria: the one implied by a high initial belief (an initial condition $p_3^0 = 95\%$) and the one implied by a low initial belief (an initial condition $p_3^0 = 33.33\%$). The figure shows the model outcome for each of the two subsamples. In the panel 3c the predicted equilibrium for individuals with long exposure is similar to the observed data. For those beneficiaries with short exposure, the actual data is very similar to the theoretical prediction. As seen in the previous section, the program effect on coordination is notable, which is captured by the difference in observed distributions across the two figures. Again, low initial conditions cannot generate a prediction that accurately matches the real distribution: high initial conditions are needed to do so. This is reflected in Figure 4: low initial expectations cannot generate the observed frequency of high effort among the long exposure subsample.

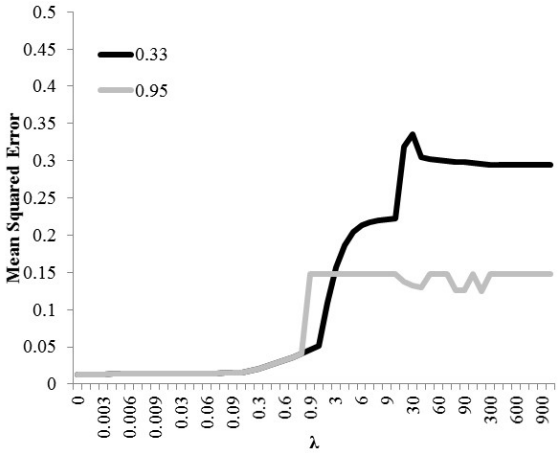
VIII. Concluding remarks

There is an increasing interest in measuring economic preferences using both choice experiments and surveys in order to identify relationships and causal effects of economic features related to prosocial behavior. However, the experimental literature in the field has focused entirely on the dimension of cooperation and trust, omitting coordination. The main contribution of this study is the use of a new experimental measure of beliefs in a coordination game with social networks, and to show the positive effect of a policy intervention, namely a CCT program, on fostering a coordination device.

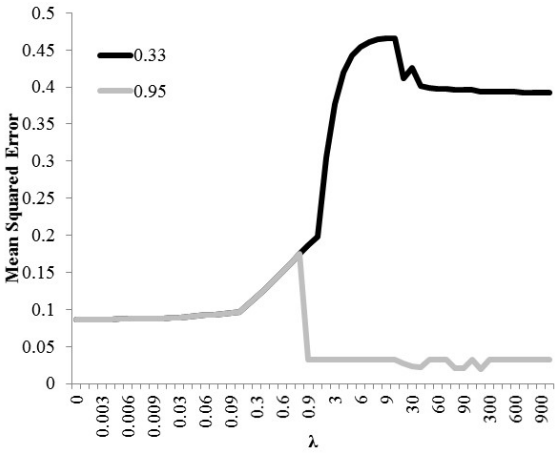
I test the hypothesis that coordination is strongly affected by a CCT program. There is a positive and significant relation between the individual effort decision and the exposure to a CCT program. Unfortunately our study is only a quasi-experiment, establishing the relation (but not the causation) between exposure to the program and ability to coordinate on the most efficient equilibrium. This relation is robust to controlling for potential confounding factors such as willingness to cooperate, wealth, and individuals' connections within the session. Also, the degree of friends in the network is key to the ability to coordinate on the Pareto-efficient equilibrium. Using a Quantal Response Equilibrium I elicit the positive



(a) Model prediction

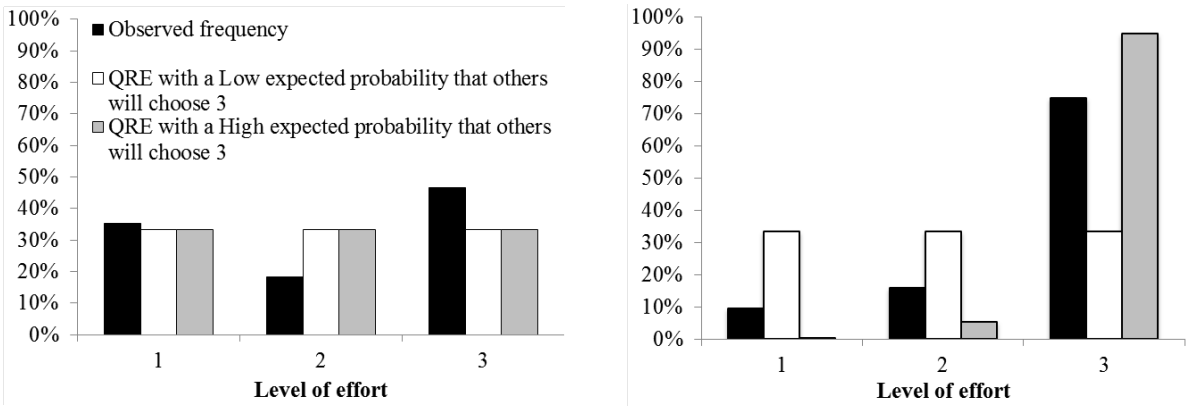


(b) Mean Squared Error - short exposure



(c) Mean Squared Error - long exposure

Figure 3. Levels of responsiveness parameter λ by beliefs about p_3



(a) Short exposure to the CCT

(b) Long exposure to the CCT

Figure 4. Predicted and realized effort distributions by exposure to the program

relationship between the CCT and beliefs about the behavior of others, which sheds light on the coordination device.

When investigating norms and economic policy, we are concerned about what system of beliefs supports and defines norms. Once we understand these beliefs, we can tell whether the behaviors that we observe are norm-driven or not, measure the consistency between beliefs and behavior under different conditions, and make predictions about future behaviors (Bicchieri, 2014). We find that the theoretical prediction for long-exposure beneficiaries is similar to the observed data. The results support policy interventions that have a social component, as they could provide mechanisms allowing for the solution of coordination failures within a community. More importantly, this study contributes to the current debate among policy makers on how to assess community attributes and their relevance for development (WB, 2015). We overcome the complexity of this assessment by using three different economic games that capture social communities' attributes: coordination, cooperation and networks. This empirical confirmation of previously anecdotal evidence on the unintended benefits of policy instruments will hopefully give rise to more such studies that will help intervention design.

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