Coordination as Unintended Benefit: Lab-in-the-Field Evidence from a Conditional Cash Transfer Program

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Abstract

This study tests an unintended benefit of a Conditional cash transfer program in Colombia: an improvement in coordination among its beneficiaries. A sample of 714 beneficiaries participate in a minimum effort coordination game. Those enrolled in the program for over a year are not just coordinating; they are more likely to exert the highest level of effort and reach higher earnings. Collected data is sufficiently rich to establish that improvement in coordination is not due to potential confounders such as willingness to cooperate, connectivity or socio-economic characteristics. A structural choice model of the individual decision to coordinate sheds light on the role of beliefs about others' behavior and suggests the presence of a coordination device to avoid the risk dominant equilibrium: the certainty in assessing what others do. Participants are required to interact with local program officials, community leaders and fellow beneficiaries. We argue that this social component of the CCT, changed beliefs about others' behavior and established a social norm, which allowed beneficiaries to overcome coordination failures. The findings support nascent initiatives to influence beliefs through policy interventions.

JEL classification: C92, D70, D78, Z13.

Keywords: field experiments, coordination, conditional cash transfer programs, cooperation

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1 Introduction

Social policies may improve economic outcomes through changes in the structures of social relationships. Conditional Cash Transfer (CCT) programs have become one of the most popular interventions in developing countries. It turns out such programs are often designed to include a strong 'social' component that may affect the social structure in a community. Unintended benefits are thus a natural object of study within a CCT intervention. While a strong line of research shows that CCTs are successful in their baseline goals (i.e. nutrition, education and health), the potential benefits to a community remain underexplored 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, and avoids conflicts (Bowles, 2004; Coleman, 1987; Hoff, 2000; Hoff & Stiglitz, 2001; Matsuyama, 1997; McAdams, 2008; Rousseau, 2000) as well as promotes entrepreneurship Adler & Kwon (2002). In many developing countries where weak institutions and a weak rule of law are prevalent, coordination allows the achievement of efficient outcomes, which improves well-being and is thus highly valuable to the community. 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 comunity. 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 must comply with health and education requirements. In the process, they are exposed to interactions with local program officials and community leaders, but more importantly with other neighbor beneficiaries. Our 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 coordination is not due to potential confounders such as willingness to cooperate (measured with a public goods game), connectivity (measured with network data for each participant within a session) or socio-economic characteristics.

[1] An artefactual field experiment according to the taxonomy by Harrison & 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 game is an adaptation of the stag hunt game (Holt, 2007) with multiple choices and subjects.

Our 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, which allowed beneficiaries to overcome coordination failures. To support this claim we estimate a structural (quantal response) model from which we estimate the *responsiveness* or *precision* parameter that determines individual's expectations of others' decisions and then own expected payoffs. We provide evidence of a link between our measure of beliefs and length of exposure to the CCT program.

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[3]. The use of 'lab in the field' experiments as a method to study social attributes within a community is not new[4]. Public good and trust games have been used in a variety of different situations, both urban and rural, which is not the case for coordination games. In fact we also ran a Public Goods (PG) game to measure social preferences (cooperation). Thanks to that this study is the first to distinguish the role of beliefs (coordination) from that of social preferences (cooperation). Most of the literature focuses on the structure of coordination games and achieving efficiency in the lab (i.e. learning, social networks, monetary incentives). Despite the extensive experimental literature on coordination in the lab, evidence of coordination in the field is almost nonexistent. Our paper contributes in several ways to a recent stream of research combining policy impact evaluation and experimental measures in the field.

Our 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, we examine how groups of more than two people coordinate and reach the most efficient outcome. We use an eight-player-three choices coordination game with three ranked equilibria.[5] The multiplicity of equilibria allows us to examine individual beliefs. Also, we exploit the role of social networks in coordination and disentangle their effect. In addition, our sample is

[3]There is a constant debate on the validity of the survey measures and other qualitative measures to capture coordination in a community (Kawachi et al., 2008; Narayan & Cassidy, 2001; Portes & Landolt, 2000; Putnam, 2001a,b).

[4]Cardenas et al. (2009); J. Carpenter et al. (2004); J. P. Carpenter (2002); Fearon et al. (2009); Gaechter et al. (2004); Gilligan et al. (2014); Karlan (2005); Voors et al. (2012).

[5]To the best of our knowledge, the only other study so far that studies coordination in the field is Brooks et al. (2016). They conducted 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 et al. (2016). Boschini et al. (2014) examined gender-based focal points or conventions by using a battle of the sexes game (i.e. a coordination game with multiple equilibria but the equally efficient and different allocations) and use a random sample of Swedish citizens. Bosworth (2013) also uses a Stag Hunt game in the lab as a measure of social capital, and find that traditional survey measures of trust is related to behavior in the experiment with 20 students. This positive relation is consistent with the findings of L. Anderson et al. (2004) and Thoni et al. (2012) on a Public Goods game, who use a student sample and a random sample from the Danish population, in the lab and online, respectively.

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 2 offers a brief introduction to the institutional setting of the CCTs. Section 3 describes the economic game and explains how this behavioral experiment is useful to capture a social norm. Section 4 describes the data and experimental setup, and characterizes the samples subject to long and short exposure to the CCT. Section 5 quantifies the relation between the CCT and the ability to coordinate. Section 6 examines the role of other confounding factors such as willingness to cooperate, networks and other individual characteristics on coordination. The last section concludes.

2 The Cash Transfer program: *Familias en Acción*

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 enrolment of poor household children[6]. 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 less 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 beneficiary meetings[7], called Care Follow-up Meetings (EC) [*Encuentros de Cuidado*].[8] 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 enrolment and regular attendance in school. Each child in primary (secondary) school entitles the household to 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).[9]

Although participation in the EC meetings is not compulsory to receive the transfer,

[6]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.

[7]For evidence of success of FA on the target outcomes and other outcomes such as crime and voting behavior see a survey in Attanasio et al. (2015).

[8]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.

[9]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.

almost all beneficiaries (95.94% 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.

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). The ML's often assume a prominent and visible role in the community.

Our CCT would change the ability to overcome coordination failutes once the program affects 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 et al., 2014; Goyal & Vega-Redondo, 2005; Jackson, 2008; Putnam, 1995). FA promotes leadership (Bass, 1991; Brandts et al., 2007; Cartwright et al., 2013; Foss, 2001; Latham & Saari, 1979) and gives mothers the opportunity to start working as a "social group" by perceiving a strong identification with the program (Akerlof & Kranton, 2000; R. Chen & 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.

3 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)).[10] We use a well-known game to examine equilibrium selection in the presence of collective action. The minimum effort coordination game introduces a conflict between payoff dominance and risk

[10] Harsanyi & 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 (J. K. Anderson L.R. Goeree & Holt, 2001; Carlsson & Damme, 1993; Harsanyi & Selten, 1988; Kandori et al., 1993; Young, 1993).

dominance.[11] 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 (e.g., Public Goods games), any common effort level chosen by all group 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 minimum effort game is an adaptation of the stag hunt game[12] (Holt, 2007) with multiple choices and subjects. As an experimental design, consider an adaptation of Huyck et al. (1990) with $n = 8$ players and $E = 3$ choices. Then the payoffs can be described by the matrix presented in Table 1 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 he 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.

		Minimum Effort Level		
		3	**2**	**1**
My	**3**	\$6	\$3	\$0
decision	**2**		\$5	\$2
(effort level)	**1**			\$4

Note:Values are in thousands of Colombian pesos

Table 1: Coordination game. Payoffs table.

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[13]. 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

[11] Notion introduced by Harsanyi & 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 & Knez, 1994; Foss, 2001).

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

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

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.[14] In fact, experimental evidence supports the prediction that a risk-dominant equilibrium will be favored over the Pareto-dominant equilibrium. This so-called coordination failure (J. K. Anderson L.R. Goeree & Holt, 2001; Camerer, 2003; Huyck et al., 1990) will happen unless there is a coordination device or institution that re-directs behavior (Bowles, 2004).[15]

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.[16] On the other hand, communication is key in making efficient coordination a focal point (Blume & Ortmann, 2007; Choi & Lee, 2014).[17] 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.

An example of a convention would be to stop at a red light and drive on a green: as long as we all agree, which color is picked for which action has little consequence. Conventions could be measured with a coordination game with multiple equilibria that are equally efficient, e.g. a battle of the sexes game.

Our equilibria are instead Pareto ranked, and so we argue that the coordination device at hand is stronger than a focal point or convention. A social norm[18] is a pattern of behavior such that individuals prefer to conform to it on the condition that they believe that most

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

[15] Among the determinants of achieving the payoff-dominant equilibrium there is evidence in the lab on: group size and cost of effort (Huyck et al., 1990, 1991); number of interactions (Berninghaus & Ehrhart, 1998; Knez & Camerer, 2000; Parkhurst et al., 2004); randomness in matching (Goeree & Holt, 2005; Keser et al., 1998; Schmidt et al., 2003); information about other player's actions (Berninghaus & Ehrhart, 2001; Weber, 2006); leadership (Brandts & Cooper, 2007; Brandts et al., 2007; Cartwright et al., 2013; Gillet et al., 2011); advice (Brandts & MacLeod, 1995; Kuang et al., 2007); monetary incentives (Brandts & Cooper, 2006, 2007; Goeree & Holt, 2005); action set (Huyck et al., 2007), non-monetary incentives (Blume & Ortmann, 2007; Bornstein et al., 2002; Cason et al., 2012; Dugar, 2010; Huyck et al., 1997; Rhodes & Wilson, 2008); subject-pool characteristics (Y. Chen et al., 2014; Dufwenberg & Gneezy, 2005; Engelmann & Normann, 2010; Stoddard & Leibbrandt, 2014).

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

[17] Although there is experimental evidence that shows otherwise (Burton et al., 2005; Clark et al., 2001).

[18] A social norm is an equilibrium selection criterion (Horwitz, 1990; Kandori et al., 1993; Schelling, 1960). This game-theoretic approach of 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). Social norms are now proposed by the theory of law as a coordination device and an efficient alternative to solve collective action problems as it provides a signaling mechanism (Ellickson, 1991; McAdams, 1997; Posner, 2002).

people in their reference network (i) conform to it (i.e. *empirical expectations*)[19] and (ii) *think* they **ought to** conform to the norm (i.e. *normative expectations)* (Bicchieri, 2005, 2014).[20] 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 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 other's 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 minimum effort 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[21] (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 7, 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.

[19] The definition of the coordinative role of institutions and practices of society is similar to that in Gauthier (1986): "An institution or practice is coordinative if each person prefers to conform to it provided (most) others do, but prefers not to conform to it provided (most) others do not" (in Jeske & Fumerton (2011).

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

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

4 Data and experimental procedures

4.1 Identification strategy

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). *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 neighborhood with an area of 273 Ha and 45 thousand inhabitants while Ciénaga has 463 Ha and 102 thousand inhabitants (see Figure A1). 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).[22]

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 neighborhoods, despite there being other two neighborhoods (*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 enrolment to the program started in every municipality in the country, regardless of its population. The program was also rolled out in all the poorest neighborhoods 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.[23]

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 neighborhood accessed to the program in 2005 and participants in Cienaga had access to the intervention in 2006. We are able to capture the effect of the program on coordination after the program is implemented.

In what follows we describe the recruitment process, experimental procedures and descriptive statistics of our sample.

[22]For more resources see Attanasio et al. (2015).

[23]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.

4.2 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 neighborhoods -*Pozón* and *Ciénaga*- in the city of Cartagena, Colombia.[24] The program was already operating in both neighborhoods and we were able to contact beneficiaries directly. Invitations were sent to 500 randomly selected participants from the FA beneficiaries list in each neighborhood. The FA office sent the invitations through the ML to those specific households in order to attend to any of the sessions held (a span of four days). We assumed a response rate of 70% and expected to run 14 sessions with 350 attendees in each neighborhood. 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.[25] This led to 29 sessionswith 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 & Polania-Reyes, 2008; Ñopo et al., 2008). Since the sessions were scheduled on a 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 to the session in groups.[26] In both neighborhoods 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 5).

4.3 Experimental procedures

Participants were invited to come to the local public school in their neighborhood. After collecting their identification documents and checking their names on the recruitment lists,

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

[25]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 to sessions with only old participants. However, four people managed to stay in new sessions.

[26]For example, implementing sessions with 25 randomly allocated individuals was impractical and infeasible. The two neighborhoods 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 neighborhood. For example, during the first four days we conducted the experiments with participants in *Pozón* and the following four days with participants in Ciénaga.

subjects in each session were given a random identification number and seated in 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.

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

A session lasted on average two hours. Participants received their earnings[27] based on the decisions in the experiments after the questionnaire. On average each participant earned US$10.04 (COL$17595), which just over the value of the daily minimum wage.[28]

4.4 Participants Characteristics

This section presents evidence to reassure on the comparability of samples in each neighborhood, 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 et al. (2005, 2008) and Altonji et al. (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 2 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).[29] Participants come from very poor families, with low levels of income and education. In Table 2 we also report the means by the main characteristics of the sample of a set of individual and household level characteristics, that are exogenous to the program, household socio-economic characteristics.

Participants with long exposure were more likely to have a partner, 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 neighborhood for more years and have more years of education. In this

[27] 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.

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

[29] 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).

	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 neighborhood	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 of civil partnership	72	78	68	10**
Educatio 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
	Percentage with access to credit	71	72	70	2
	Percentage with access to formal credit	22	24	22	2
	Per. 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 (perc.)	Mobile phone	72	78	68	9**
	DVD player	33	37	31	6
	Sound player	31	37	27	10***
Observations		714	346	368	714

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 2: Socio-economic characteristics of the participants by time of exposure

case, there might be a reverse causation: latter 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 socio economic 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.

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

5 CCT exposure and behavior in the coordination game

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 3, we report the measures collected from the Minimum Effort 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.

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.

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 is everyone choosing 3	0.66	0.70	0.63	0.08**
	(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.

Table 3: Behavior in the Coordination game

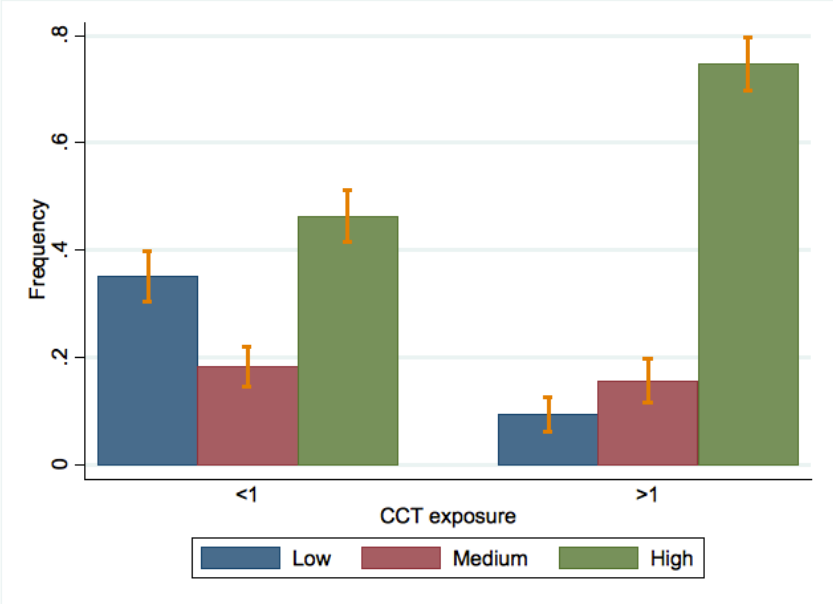


Figure 1: Exposure to the program and individual effort decision

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.

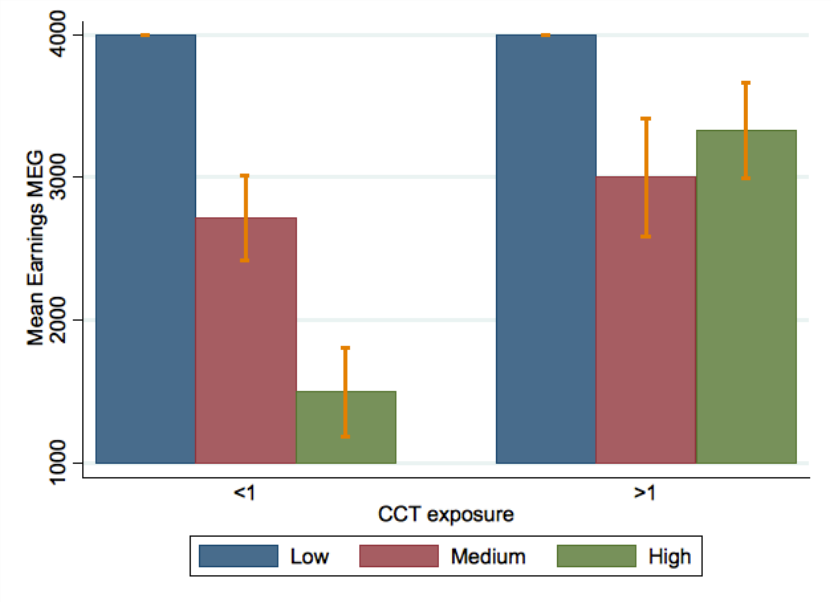


Figure 2: Exposure to the program and individual earnings

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 & Freese (2006)). It is equivalent to a series of binary logistic regressions where categories of the dependent variable are combined, e.g. $e = 1$ 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)[30]: one or more coefficients differ across values of j. However, 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.[31]

Table 6 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). Specification I shows 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 enrolment into the program is longer than a year. On average, beneficiaries in the CCT longer than a year are 23% less likely to choose a low level of effort.

6 Confounding factors

This section explores several confounders that may affect the relation between the ability to coordinate and the exposure to the program.

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

[30] 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.

[31] 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).

"free-riding"[32] incentives (Coleman, 1994). 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.

6.1 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 the Public Goods Game (PPG) as a proxy of willingness to cooperate[33] The possibility of cooperation within a group is determined by multiple factors such as repetition, communication, punishments or rewards and inequality in the payments.[34] 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 et al., 2009, 2015).

Other studies employ a dichotomous Voluntary Contribution Mechanism (VCM) game comparable to the one we use here: Attanasio et al. (2012) in 70 rural municipalities in Colombia, Cardenas et al. (2013) in 6 Latin American cities, Barr et al. (2012) in Uganda, Barr et al. (2014) in Albania and Alzua et al. (2014) in Mali.[35] 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.[36] 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

[32] See Grossman & Hart (1980); Ostrom (1997); Samuelson (1954) and Olson (2009). Evidence on social program evaluations supports this claim (Adato et al., 2005; Avdeenko & Gilligan, 2014; Fearon et al., 2009).

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

[34] See Attanasio et al. (2015) for a recent review.

[35] Our Public Good game design has been used extensively in Colombia (Attanasio et al., 2009, 2015; Cardenas et al., 2013) and in other countries (Barr et al., 2014; Cardenas et al., 2013). For more details on the experimental design see Section 1 in the appendix.

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

could talk for ten minutes before making simultaneously their private, anonymous decision. 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.

In Table 4 we report behavior in the Public Goods game and experimental characteristics at the session level. We also report 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 we observe 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, we observe that in the short exposure sample, the percentage of participants who had a perfect understanding of the Public Goods game was significantly higher. We would expect that cooperation should be higher in the Long exposure group than in the short exposure one. Attanasio et al. (2015) examine these intriguing effects by using a difference in difference regression analysis 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.

Specification II in Table 6 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.[37] The marginal effect of the exposure to the program is 33% higher 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 24% lower. Individuals who cooperated in the first round also present a higher probability of choosing high level of effort and a lower probability of choosing the lower level of effort.

6.2 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 also important on effort individual decisions (Jackson, 2010; List & 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

[37] We only include behavior in the first round 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.

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)
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

Robust Standard errors that 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 4: Behavior in the Public Goods game

of individual behavior (Bernheim, 1994), individuals may also be averse to inequality within the network (Charness & Rabin, 2002; Fehr & 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 and their degree it determine, to a great extent, if collective action is successful or not (Gould, 1993; Jackson et al., 2012; Jackson & Watts, 2002).[38] 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 that lab on the coordination problem of collective action on costly links and how information in the structure of the network affects individual's decision to coordinate. However, there is no evidence from the field on how the network attributes of each individual (e.g. number of people known, family ties) explains 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

[38]For evidence of the structure of the social network and coordination games in the lab see Cassar (2007); Charness et al. (2014); Choi & Lee (2014); Goyal & Vega-Redondo (2005); Jackson (2008).

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.

In Table 5 we present the average number of friends, acquaintances and connections (the sum of relatives, friends and acquaintances) each participant reports in the session.[39] 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.

	Variable	**All**	**Long Exposure**	**Short Exposure**	**Difference**
Session level (714 obs.)	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
	Score	5.38	5.45	5.32	0.13

Note: 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 & Malde (2014). * Significant at 10%; ** significant at 5%; *** significant at 1%.

Table 5: Network characteristics across sessions

Specifications II and III in Table 6 show that willingness to cooperate is positively (negatively) related -although slightly significant- with a high (low) individual level of effort. Table 4 presents our results with eight different specifications. In the first 4 specifications (I to IIIb) we relate the effort decision to other experimental variables with the network information we used for the algorithm that allocated individuals into groups and the traditional measures of social capital that seemed to have an impact on the effort decision.

[39]Interestingly, 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.

In Table ?? specifications IIIa-IIIb the role of network information in the effort decision with and without cooperation. Regardless of the density of the network (i.e. number of friends, relatives and trustworthy acquaintances in the session are identified by the player), players who were 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 35% 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 25% and 3% less likely to choose the lowest effort level, respectively. This evidence on netwrok features is consistent with the literature.

Once we control for network features (specification IIIb), the decision to cooperate is also positive (negative) and significant for those who choose the high (low) level of effort, respectively.

Specification	**I**		**II**		**III**
Independent Variable	**Low**	**High**	**Low**	**High**	**Low**
Beneficiary longer than a year (enrolment)	-0.23***	0.32***	-0.24***	0.33***	-0.24***
	(0.09)	(0.11)	(0.09)	(0.12)	(0.09)
Cooperation decision round 1			-0.08*	0.11*	-0.08*
			(0.05)	(0.07)	(0.05)
Degree of Player (friends)					-0.03*
					(0.02)
Degree of Player (relatives)					0.04
					(0.04)
Degree of Player (acquaintances)					-0.01
					(0.03)

Robust Standard errors that 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.

Table 6: Marginal effects of a partial proportional odds model for the lowest and highest individual level of effort (N=714)

6.3 Basic demographics and wealth

We also consider the economic approach to social capital (Glaeser et al., 2002; Polania-Reyes, 2005) and examine the role of socio-economic characteristics at household and individual level in the individual effort decision. Table 9 reports the effect of the exposure to the program on the effort decision, when controlling for these individual characteristics. Overall, the effect is consistent with our previous specifications.

Table 9 presents three specifications in which we control for participants' basic socio-economic characteristics, experimental variables at the session, group and individual level, and the factors we considered in Table ??. Specifications V-VII in Table10 a report the marginal effects of different socio-economic dimensions. First it reports individual demographic characteristics such as being a woman, age, level of education, number of years living in the neighborhood, whether the player is displaced, is the head of the household, has a partner or is beneficiary of another program different from FA. Then it reports housing conditions such as the number of people per room, if the housing is owned, if the housing does have electricity, water pipe access and sewage. Finally it reports wealth measured as assets[40], household income and household perception of wealth with respect to other households in the neighborhood.

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 land line 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.

6.4 Experimental session variables

Specifications VI in Table 6.2 and Table 6.4 include session variables such as whether there is a man in the session, whether the player understood perfectly the coordination game, a dummy of one of the experimenters and the size of the session. In addition, given 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 effects 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.

6.5 Leadership

This study contributes to the small but growing literature that conduct behavioral experiments with real-world leaders in a natural field setting (Attanasio et al., 2015; Jack & Recalde, 2015; Kosfeld & Rustagi, 2015; Polania-Reyes, 2016).

Social status is relevant in the creation and transmission of social norms (Richerson

[40]The assets are landline, cellphone, sound-player and DVD player.

& Boyd, 2008). In a coordination setting, a leader may have a strong influence on the equilibrium selection (Bala & Goyal, 1998; Eckel & Wilson, 2000, 2007). From Table 9, we find that only social capital measures related to the CCT program such as number of EC meetings and the percentage of ML in the session is significantly related to the level of effort. When including these measures in the analysis in specification VII (See Table 10 b) they don't affect the effort decision. For example, contrary to behavior from previous coordination games in the lab (Brandts et al., 2015; Foss, 2001; Gillet et al., 2011) we don't find a relation between being a ML, or the presence of a ML in the group, and the effort decision.

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 proactivity the ML was. There were differences in the EC in Pozón between the period 2005 to 2007 and from 2007 to 2008. As the ML were trained, they felt empowered within their community, displacing other community 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 neighborhood population receiving the program was 79% in Pozón in 2006 and 22.4% in all of Cartagena in 2008.

Dependent Variable:	**IV**		**V**		**VI**	
Level of effort	**Low**	**High**	**Low**	**High**	**Low**	**High**
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	

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

Table 7: Marginal effects of a partial proportional odds model for the lowest and highest individual level of effort(N=712)

Dependent Variable:	**IV**		**V**		**VI**	
Level of effort	**Low**	**High**	**Low**	**High**	**Low**	**High**
1 if the player is a woman	-0.15	0.22	-0.07	0.1	-0.04	0.6
	(0.15)	(0.21)	(0.1)	(0.15)	(0.11)	(0.16)
Age	0.00	0.00	0.00	0.00	0.00	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Level of education (0 to 5)	0.01	-0.02	0.02*	-0.02*	0.02	-0.03
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.02)
Number of years living in the neighborhood	0.00	0.00	0.00	0.00	0.00	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
1 if the player is displaced (self-declared)	0.01	-0.02	0.02	-0.02	0.01	-0.02
	(0.05)	(0.07)	(0.05)	(0.07)	(0.05)	(0.08)
1 if the player is the head of household	0.00	0.00	0.02	-0.03	0.01	-0.02
	(0.03)	(0.04)	(0.03)	(0.04)	(0.03)	(0.05)
1 if the player has a partner	-0.03	0.05	-0.02	0.02	-0.02	0.03
	(0.04)	(0.05)	(0.04)	(0.06)	(0.04)	(0.06)
Number of people per room	-0.01	0.01	-0.01	0.01	0.00	0.01
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
1 if the player has her own housing	-0.02	0.03	-0.02	0.03	-0.01	0.02
	(0.03)	(0.04)	(0.02)	(0.04)	(0.03)	(0.04)
1 if the player's home has no electricity	-0.01	0.01	0.02	-0.02	0.03	-0.04
	(0.07)	(0.1)	(0.07)	(0.11)	(0.06)	(0.09)
1 if the player has a landline	0.06**	-0.09**	0.07**	-0.11**	0.07**	-0.11**
	(0.03)	(0.04)	(0.03)	(0.05)	(0.03)	(0.05)
1 if the player has a cellphone	-0.01	0.01	0.01	-0.02	0.00	-0.01
	(0.03)	(0.04)	(0.03)	(0.05)	(0.03)	(0.05)
1 if the player's home has water pipe access	-0.07**	0.11**	-0.05	0.08	-0.06	0.09
	(0.04)	(0.05)	(0.03)	(0.05)	(0.04)	(0.06)
1 if the player's home has sewage	0.02	-0.03	-0.01	0.01	-0.01	0.02
	(0.03)	(0.04)	(0.03)	(0.05)	(0.03)	(0.05)
1 if receiving any other government aid	-0.02	0.03	-0.04	0.06	-0.03	0.04
	(0.02)	(0.03)	(0.03)	(0.04)	(0.03)	(0.04)
1 if perceiving HH income is the highest	-0.33***	0.1	-0.25***	0.01	-0.06	0.09
	(0.1)	(0.12)	(0.07)	(0.1)	(0.07)	(0.1)
1 if Perceiving HH income is above average	-0.04	0.06	-0.01	0.02	-0.01	0.02
	(0.06)	(0.08)	(0.05)	(0.08)	(0.05)	(0.08)
1 if the HH has a sound player	0.00	0.00	-0.01	0.01	0.00	0.00
	(0.03)	(0.04)	(0.03)	(0.04)	(0.03)	(0.04)
HH income per capita	0.00	0.00	0.00	0.00	0.00	0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
1 if the HH has a DVD player	0.01	-0.01	0.01	-0.01	0.01	-0.01
	(0.03)	(0.05)	(0.03)	(0.04)	(0.03)	(0.04)
Basic characteristics	Yes		Yes		Yes	
Experimental variables	No		Yes		Yes	
CCT variables	No		No		Yes	

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

Table 8: Control variables in Table 7 Marginal effects of a partial proportional odds model for the lowest and highest level of effort - Basic Characteristics

	V		VI	
Independent Variable	**Low**	**High**	**Low**	**High**
1 if there is at least one man in the group	0.09	-0.14	0.12	-0.18
	(0.09)	(0.13)	(0.09)	(0.14)
1 if the player understood the activity perfectly	-0.02	0.02	-0.02	0.02
	(0.02)	(0.04)	(0.03)	(0.04)
1 if Experimenter No2 (female) in 2008	-0.18**	0.26**	-0.17**	0.26**
	(0.09)	(0.13)	(0.09)	(0.13)
Number of players in session	0.09**	-0.13***	0.08**	-0.13***
	(0.04)	(0.05)	(0.04)	(0.05)
1 if First session in the day	-0.03	0.05	-0.02	0.03
	(0.08)	(0.13)	(0.08)	(0.12)
Average level of effort in the last two sessions [a]	-0.1	0.14	-0.11	0.16
	(0.11)	(0.16)	(0.11)	(0.16)
1 if player is chosen as leader by anyone in the group			0.03	-0.05
			(0.05)	(0.08)
1 if player is a ML (self-declared)			-0.02	0.02
			(0.06)	(0.09)
1 if there is at least 1 ML in the group			-0.02	0.03
			(0.04)	(0.07)
Basic characteristics	Yes		Yes	
Experimental variables	Yes		Yes	
CCT measures of social capital	No		Yes	

Robust Standard errors that are clustered at the session level in parenthesis. [a] Average deviation from the neighborhood mean of the average effort in the previous 2 sessions * Significant at 10%;** significant at 5%; *** significant at 1%.

Table 9: Control variables in Table 7 Marginal effects of a partial proportional odds model for the lowest and highest level of effort -Experimental variables and CCT measures

7 Capturing 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. In order to estimate the probabilities of choosing the most efficient effort level we estimate a Quantal Response Equilibrium (QRE) model (Goeree et al., 2016; McKelvey & Palfrey, 1995, 1998).[41]

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

[41] The QRE model allows agents to make mistakes and assumes that agents take into account the possibility that others are making mistakes when drawing inferences from their actions. Since the ME game has three equally possible equilibria, we use this approach due to the different predictions it offers.

$e_i \in \{1, 2, 3\}$ 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

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

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).

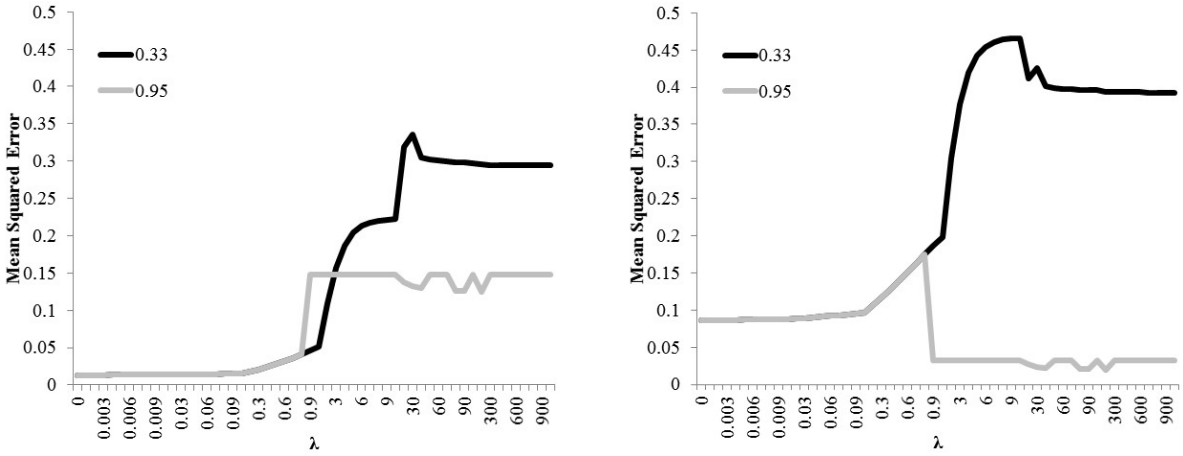
Although we cannot give a closed-form solution for the QRE (due to the large number of players, see J. K. Anderson L.R. Goeree & Holt (2001)) we provide a numerical solution using a grid search. The QRE can be defined as the global minimum (for $p \in [0, 1]^3$) the mean squared error function

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

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 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.[42] 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.

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

[42]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).



(a) Short exposure to the CCT

(b) Long exposure to the CCT

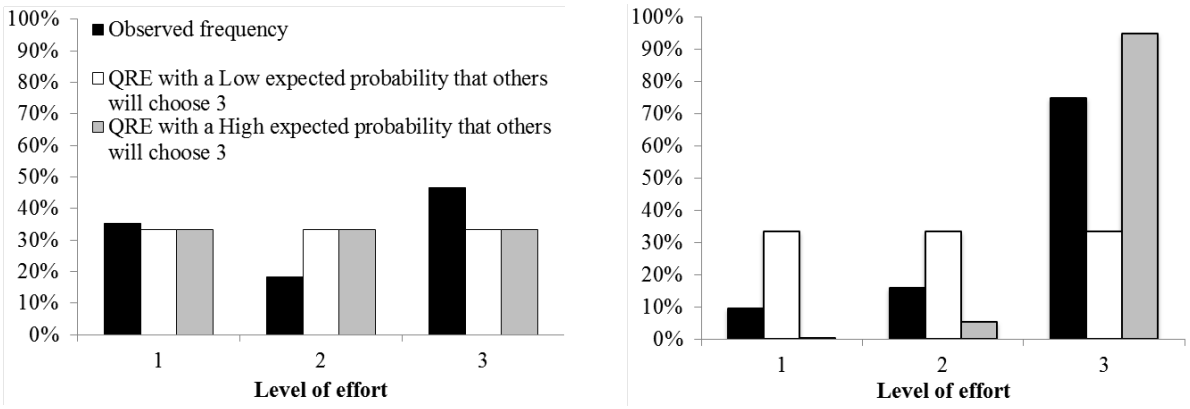
Figure 3: Mean Square Error - beliefs about high and low p_3

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. In Table 10 we present 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 10. Beneficiaries with long exposure would have a very high λ parameter, that is a knowledge that everyone in the group is less likely to make mistakes and would be select the Pareto dominant equilibrium.

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

Table 10: Calibrated sensitivity parameter $\hat{\lambda}$

Figure 3 compares two pseudo-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 $p_3^0 = 33.33\%$). We plot the model outcome for each of the two subsamples. In the panel 3b. we observe that 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



(a) Short exposure to the CCT

(b) Long exposure to the CCT

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

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.

8 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.

We test the hypothesis is that coordination is strongly affected by a CCT program. We find 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. We do find the relation to be robust to controlling for potential confounding factors such as willingness to cooperate, wealth, and individuals' connections within the session. We also find that the degree of friends in the network is key to the ability to coordinate on the Pareto-efficient equilibrium. Using a Quantal Response Equilibrium we elicit the positive relationship between the CCT and beliefs about the behavior of others, which sheds light on the coordination device.

When investigation norms and economic policy, we are concern on 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 among 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 (Bank, 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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