

2009

Conditional cash transfers and social capital

THE CARTAGENA CASE



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ABSTRACT¹

In July 2007, we conducted a public goods game in Cartagena, Colombia, to examine the difference between individual decisions two neighborhoods: *El Pozón* neighborhood had been targeted for over two years by a conditional cash transfer program, *Familias en Acción* that has an important social component and the control neighborhood, *Ciénaga*. In 2008, with the program being implemented in *Ciénaga*, we could make a follow up to the public goods game in both neighborhoods and conducted a coordination game. This is the one of the pioneered studies in applying games to measure the effect of the CCT in social capital in two stages.

In 2007, the level of cooperation we observe in the ‘treatment’ community is considerably higher than in the ‘control’ community. The two neighborhoods, however, although similar in many dimensions, turned out to be significantly different in other observable variables. The result we obtained in terms of cooperation, however, was robust to controls for these observable differences. In 2008, the results are unexpected but lead us to a deeper understanding of the mechanisms social capital develops and crucial policy lessons to improve social capital within a community.

Additionally, we present a comparison of our measures of social capital with other more traditional measures that have been used in the literature.

Keywords: Cash transfer programs, Social capital, social networks, collective action, cooperation, VCM, experiments, public goods provision

JEL Classification: Z13, D70, C93, H41, D85

¹ We thank Lilian Puello, the Enlace Municipal of *Familias en Acción* in Cartagena and Hernando Sánchez of the national office of *Familias en Acción*. Without the logistic support of the program officials at all levels this exercise would not have been possible. We also thank to Syngjoo Choi, Patricia Padilla, Vivian Rodriguez, and the team of coordinators who run the experiments. The experiments reported here were sponsored by the Corporación Andina de Fomento –CAF-, the European Commission and Institute for Fiscal Studies, EDePo.

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CONTENTS

1. Introduction and Motivation
2. The effects of a conditional cash transfer on social capital
3. Measuring social capital
 - 3.1. The Cartagena Case
 - 3.2. The VCM
 - 3.3. The Participants
4. Results: do CCTs build social capital?
 - 4.1. Findings
 - 4.2. Traditional measures vs VCM outcomes
5. Conclusions

References

Appendix A. Experimental Design and procedure

1. Experimental set up
2. Experimental Design: the VCM
3. Post- experimental data

Appendix B. Research Instruments

1. Instructions
2. Post- experiment survey
3. Decisions sheet
4. Networks sheet
5. Invitation (Recruitment) letter
6. Log sessions

Appendix C. Descriptive Statistics

1. Introduction and Motivation

Conditional Cash Transfer programs have recently become very popular. International financial organizations, aid workers and policy makers have been promoting them as an effective way of simultaneously reducing short run poverty and break the intergenerational transmission of poverty by providing incentives to the accumulation of human capital.

A distinctive feature of most CCT, in addition to the fact that grants typically target women, is the fact that the conditions imposed on the beneficiaries often involve social activities, such as participating to meetings and courses or simply visiting a health centre. It has been claimed that these activities could improve trust and social relations within the community. For many women, especially in rural areas, these conditions represent an opportunity to interact on a regular basis with women in within their community.

On the other hand, it is well known that differences in the structures of social relationships and their forms of organization can acquire relevance in improving economic outcomes. In fact, specially in poor communities social relationships between family members, friends, partners or peers constitute an important asset that can be resorted to in moments of crisis, to be enjoyed like an aim and to be used to obtain material gains (Woolcock and Narayan, 2000).

Empirical evidence reveals that social capital accumulation improves household welfare. For example, studies in Tanzania (Narayan and Pritchett, 1999); Bolivia, Burkina Faso, Indonesia (Grootaert and Oh and A. Swamy, 1999; Grootaert and Narayan, 2000; Grootaert, 2001) and South Africa (Haddad and Maluccio, 2000) have demonstrated that household social capital improves well-being levels. Most of these studies defines social capital as norms and social networks that facilitate collective action to reach common objectives (Coleman, 1990; Putnam, 1993).

Social capital improves well-being mainly through mechanisms such as cooperative action, diffusion of technology and information, a reduction in transaction costs, and an increase of security and protection of common pool resources. In many cases, government policies may trigger these mechanisms in order to enhance social capital accumulation. However, there are no studies that examine the role of a government's economic or social policy (i.e. a CCT) in social capital outcomes.

The impacts that CCT have had on schooling, nutritional status and a variety of other outcomes have been well documented. However, whether they have had an effect on social capital remains rigorously unexplored. This study uses a quantitative approach to examine this effect by conducting experiments in the field and combining them with survey data.

Familias en Acción is a conditional cash program that has become the flagship of the Colombian government's social policy. Started in 2002 in small rural areas, it is now being expanded to large metropolitan areas. The program has an educational component, conditional on school attendance, and a nutritional component, conditional on health centre visits as well as participation in meetings on the part of the mothers. The rural version of the program has been evaluated (see (Attanasio, et al., 2005)) and been found to have effects similar to those found in the case of PROGRESA and other CCT in rural areas. In particular, *Familias en Acción* seems to have a positive effect on some nutritional and health outcomes for young children living in rural areas and to have some considerable effects on enrolment in secondary school in rural areas.

Initially, we carried out in July 2007, the first stage of this study. By applying our quantitative measures of social capital to two different neighborhoods, one in which the program had operated for about two years (*El Pozón*) and one in which the program had not yet started (*Ciénaga*), we could test the hypothesis that the program, where it was implemented, had improved social capital. Unfortunately, these two situations could not be perfectly comparable and it was not assumed that the context in which the program did not operate could be used as a counterfactual for the context in which the program did operate.

In 2008, the CCT was implemented in *Ciénaga*. By applying our measures again we can examine properly the effect of FeA in social capital. Additionally, we relate our measures of social capital to other variables that we observe in our sample and that have been used in the literature as traditional measures of social capital.

This document is divided into six sections. In the next section, we give some background information on the *Familias en Acción (FeA)* program. Section 3 outlines our methodology, which includes a proposal for the measurement of social capital and our attempt to estimate the effect of a CCT program on it. Section 4 presents our results on the effect of FA on social capital. In section 5, we discuss alternative measures of social capital. The last Section concludes.

2. The effect of a conditional cash transfer on social capital

Since its inception in 2002 *Familias en Acción*, a conditional cash transfer inspired by the Mexican PROGRESA, has become the flagship program of the Colombian government's social policy. The program, the goal of the program is to help reduce extreme poverty in the medium term. The objective is to temporarily increase consumption, nutritional status, and schooling for the younger members of low-income families. In August, 2007, the FeA program which targets the poorest 20% of Colombian households,² expanded to 1.5 million beneficiaries.

The program FeA has three components: a nutritional and health component aiming at households with children less than 5 to attend to growth and development check-ups for children, a vaccination program and some 'classes' on hygiene, diet and contraception; educational component aiming at households with children aged 7 to 17, to enroll them at and regularly attend primary and secondary school; and a social one, attendance to the social meetings, called *Encuentros de Cuidado*³.

Most of beneficiary mothers (97 percent) participate in the *Encuentros de Cuidado* where, in addition to discussing hygiene, nutrition or other health-specific issues, they have the possibility to talk about different topics or even simply chat together. Conversations with program's officials and with beneficiary mothers indicate that these social aspects are indeed an important feature of the program: beneficiary mothers start new activities, get to know each other better and improve their ability to act as a group. This means that FeA may create networks and improve trust among beneficiaries, promote leadership and give mothers the opportunity to start working as a "social group" by perceiving a strong identification with the program, facilitating group decision making and finally, overcoming social dilemma.

² In Colombia, most welfare programs are targeted using the so called Sisben score, a poverty indicator that is updated periodically. On the basis of this score, households are assigned to one of six categories. *Familias en Acción* targets the level 1 of Sisben.

³ The nutritional grant, roughly equal to 25 US\$, targets households with at least a child less than 7 and is independent of the number of children in the household. The educational grant is available to households with school-aged children and is conditional on attendance. Each child in primary entitles the household to about 8 US \$ per month, while each child in secondary school entitles the household to twice as much.

Additionally, there is also a *Madre líder*, who is in charge of coordination with the municipality office and has a group of *Madres titulares* or beneficiaries on her own to organize social activities and educative meetings.

3. Measuring social capital

There is now a large literature, covering several disciplines, that discusses social capital (see for instance (Durlauf and Fafchamps, 2005) and the positive effect of social capital on economic development (Woolcock and Narayan, 2000; Grootaert, 2001; Woolcock, 2002). In this study we propose a measure of social capital based on the behaviour in a public goods game and a coordination game. Field experiments as an alternative method to study social preferences within a community and to measure social capital is not new (Carpenter, 2002; Carpenter, Daniere and Takahashi, 2004; Karlan, 2005). However, this study is one of the first to use a public goods game and a coordination game for such a purpose.

Being aware of the difficulty of measuring social capital, there have been identified useful proxies for social capital, using different types and combinations of qualitative, comparative and quantitative research methodologies (Woolcock and Narayan, 2000). However, these measures are not able to consider social preferences such as trust, attitudes to cooperate and group behavior attributes, such as ability to coordinate and overcome social dilemmas. This dimension of social capital has been almost unexplored in CCT's impact evaluation studies.

We used two different measures of social capital based on the behaviour in a public goods game and a coordination game. The former game was design to examine how social preferences such as trust and attitude to cooperate have been determined by the presence of a CCT and measure the dimension of trust among the members of a group. The latter game was designed to measure the ability to coordinate and reach a high equilibrium among the beneficiaries. We develop these methodologies in the appendix.

3.1. The Cartagena Case

After its initial expansion in rural areas the government decided to expand the program to urban areas. When this decision was taken, *Familias en Acción* identified *El Pozón*, a neighborhood in Cartagena to pilot the program in 2005. The program administration was undecided among three different neighborhoods of Cartagena, *El Pozón*, and another two called *Nelson Mandela* and *Ciénaga de la Virgen*. In the end, *El Pozón* was chosen because of contingent events. Since then the program had been developed in *El Pozón* but it had not been implemented in the other neighborhoods, we base our evaluation strategy on a comparison between *el Pozón* and *Ciénaga de la Virgen*⁴.

In September 2007, a new wave of massive inscriptions to the program started in every municipality of the country, regardless of its population size. In this context, the program was also being rolled out in the poorest neighborhoods of Cartagena, including *Ciénaga*. After conversations with the program administrator it was felt that, ex-ante, *El Pozón* and *Ciénaga de la Virgen* were very similar. The data collection strategy was designed in such a way that in the games conducted in 2007, included *potential* beneficiaries from *Ciénaga*, the control neighborhood in the first stage. In the second stage (Follow-up), in July 2008, we could run the same experiment again in both neighborhoods and collect data to control for fixed unobservable effects.

⁴ More information see (Attanasio, Pellerano and Polania, 2008b)

By the time we run the base line field experiments in 2007, El Pozón had been targeted for over two years. In the follow up in 2008, Ciénaga had been already targeted for over 7 months⁵.

3.2. The Voluntary Contribution Mechanism ⁶

The Voluntary Contribution Mechanism (VCM) is an adapted public goods game which has been applied in a variety of different situations, both urban and rural, in Colombia (Cárdenas and Jaramillo, 2007; Márquez, et al., 2007) and is one of the experimental methods that have been often used in the literature to examine behavioral motivations such as trust and cooperation in groups.

The VCM game captures trust and the willingness to cooperate among the members of a specific group by choosing whether to invest a token in a private account with private benefits or to invest the token in a group account (the public good) where the benefits of all members increases and the well-being of the entire group is improved. The general design is given in such a way that 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 social outcome. If all in the group invest the token in the private account, the group will be worse-off than if all the members invest in the public account and the benefits for investing in the group account increase with the number of contributors.

The situation just described constitutes a typical social dilemma. The experimental literature has extensively documented that, typically, the Nash equilibrium is not observed, either in the lab or in the field. Groups of individuals seem to be able to partly internalize at least in part the externality built in the game. In general, contributions to the public good are in a range of forty to sixty percent of the group optimum (Ledyard, 1995; Croson, 1996; Camerer and Fehr, 2004; Cardenas and Carpenter, 2008). At the same time, there seems to be considerable amounts of heterogeneity in the ability different groups have to solve this kind of problems. For this reason, this set up seems particularly attractive in devising a measure of ‘social capital’. The possibility of cooperation within a group is determined by multiple factors such as repetition, communication, punishments or rewards, inequality in the payments.

The incentives to invest in the group account are given by characteristics of the design, but overall, by the individual motivations concerning the group well-being. Individual attributes such as altruism, trust, social distance from the other members (Cardenas, 2003), fairness (Rabin, 1993), reciprocity (Andreoni, 1988, 1995; Bowles and Gintis, 2004), a sense of affiliation as a member of a common group, or sympathy toward others in the group (Kurzban, McCabe, Smith, and Wilson, 2001) determine social cohesion in a group and strengthen the ability of its members to cooperate and overcome collective action problems. In addition, group attributes such as social norms and institutions, informal enforcement mechanisms (Carpenter and Cárdenas, 2006), concerns for social reputation, social reciprocity (Bowles and Gintis, 2004); and group identification enforce the group interests over the individual and lead to overcome the dilemma and to attain a higher level of contribution.

We use two different measures of social capital. The first is simply the proportion of players in each session that contributes to the public project in the first round. The second is the change in this proportion between the two rounds. This second measure aims at capturing the effects of communication on social outcomes. Notice that while the literature, on average, reports an

⁵ Additionally, the local program coordinator (Enlace municipal) is very active and has promoted a number of initiatives around the program.

⁶ The experimental design of the VCM was developed by Juan Camilo Cárdenas, Maria Claudia Lopez, Natalia Candelo and Sandra Polania

improvement between the two rounds, in principle the proportion of individuals contributing to the public good could decline as well as increase. If, for instance, in the talks it emerges that in the first round a big majority has played ‘private’ those who played public might realize that this is not an optimal strategy. On the other hand, communication is a mechanism which gives group members the chance to make explicit commitments and promises about what they will do; it offers an opportunity for suasion among the members of the group about what is right or what should be done to obtain the highest benefit for all (Messick and Brewer, 1983). Finally, we have to take into account that communication can be a useful instrument to achieve the maximum social outcome if individuals are involved in an ongoing relationship, are able to identify each other and have information about past behavior from others in the group.

3.3. The participants

In the base line, we conducted 28 sessions, 14 in each neighborhood. In the follow up, we conducted 53 sessions, 26 in El Pozón and 27 in Ciénaga. The data for the entire set of experimental and survey data contains information on a sample of 642 and 1034 participants in the base line and the follow up, respectively. As we mentioned above, it had been ten months since the CCT was implemented in both neighborhoods due to the FA’s urban expansion policy and five months since beneficiaries in Ciénaga received their first payment.

The data we obtained let us to apply two strategies of analysis, shown in table 1. First, a base line section with 676 individuals distributed in 28 sessions in July, 2007. Second, an independent cross section of 619 individuals distributed in 25 sessions in July, 2008. Third, a panel with 444 participants who participated twice in both years and were distributed in 18 sessions in July, 2008. Additionally, we obtained 10 mixed sessions including 240 old (2007) and new (2008) participants. Overall we obtained a sample with 1,453 different subjects who participated in 71 sessions with an average size of 24.5 people and 98.8 percent were women (see table 1 and table 2).

Table 1. Number of Players (number of sessions)

	Base Line	Follow-up		
		Independent Cross section ^a	Panel ^b	Mixed ^c
El Pozón	342 (14)	299 (12)	173 (7)	169 (7)
Ciénaga	334 (14)	320 (13)	271 (11)	71 (3)
Total	676 (28)	619 (25)	444 (18)	249 (10)

^aSessions with 95% or more participants who were playing the game for the first time. ^bSessions with 95% or more participants who were playing the game for the second time. ^cSessions with 94% or fewer participants who were playing the game for the first and the second time.

4. Results: do CCTs build social capital?

Summarizing, we got several social capital measures: First, we obtain from the game the percentage of contribution to the public good in the first round and the difference in contribution between the first and second round are measures of attitudes to cooperate and trust in a group. Second, we obtained from the survey the traditional measures of trust (i.e. World Values Survey), membership in organizations and participation in political and social processes within the community. Finally, we got form the networks questionnaire a measure of how well-connected were the participants within the group, that is, the amount of acquaintances, relatives and friends a participant had in her session, if she was considered a leader and a trustable person by others in the group.

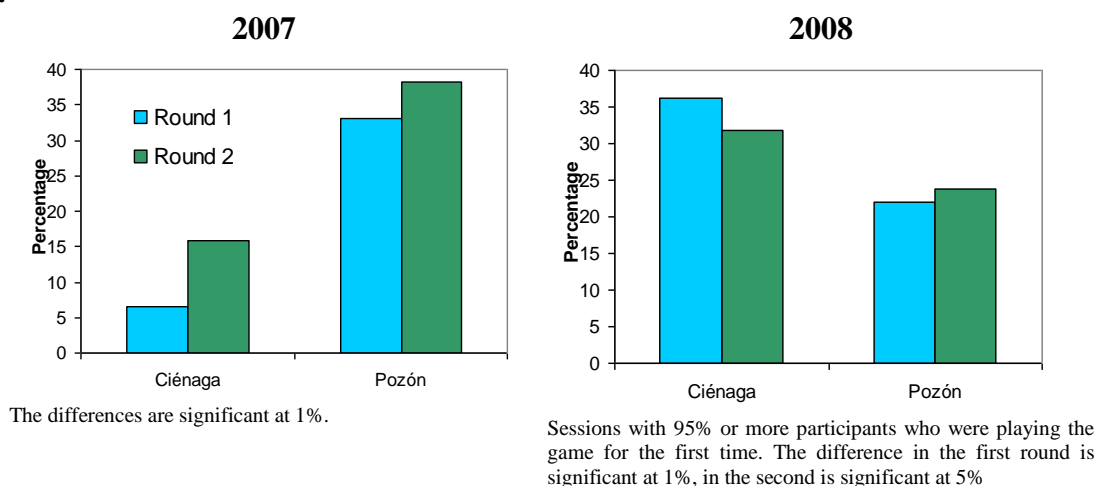
4.1. Findings

In an attempt to identify the effects of *Familias en Acción* on our measures of social capital, we start by comparing contribution rates to the public project in the two neighborhoods. The results that follow describe the most relevant and robust findings that emerged from the group-level and individual data of the independent cross section only. That is participants' behavior in July 2007 and new participants' behavior in July 2008.

Finding 1: *There is cooperation*

The patterns on cooperative behavior were replicated in this study (Cardenas and Carpenter, 2008). The results are summarized in Table 2 and Figure 1. The game theoretical prediction that people should not contribute her token to the group account is rejected. In the first round, only 12% of the sessions did not contribute at all. However, the overall level of cooperation we observe in our sample is very low if we compare our results with those in the existing literature playing similar games in the field⁷ (Cardenas and Carpenter, 2008). In Colombia, an almost identical VCM game was played in 2006 within the evaluation sample of the rural component of *Familias en Acción* in 70 municipalities, some of which were exposed to the program. The results, analyzed in (Attanasio, et al., 2008a), indicate a contribution rate of around 35%, not too different from that observed in *El Pozón* in 2007 (33%) or in *Ciénaga* in 2008 (36.3%). Accordingly, for the first round, the overall contribution rate in 2008 is quite low at 29.4% but significantly higher than in 2007, 20%. This means that on average only 7 players per session contributed to the public good. At this level, the contributors to the public good obtained about \$2.8 instead of the \$5 they could have obtained playing private even in the event of nobody contributing to the public good.

Figure 1. Percentage of contribution to the group account in round 1 and 2, by session and sample.



Finding 2: *Although people from El Pozón cooperated more than Ciénaga in 2007, people from Ciénaga cooperated more in 2008.*

Additionally, there is a surprising difference between the two neighborhoods with respect to last years' results: while only 6.6% of the participants in *Ciénaga* contributed to the public project in the first round of the game in 2007, 36.25% did in 2008 and in *El Pozón* the contribution rate in the

⁷ 37% of endowment in the United States (List, 2004), 53% of endowment in Zimbabwe (Barr and Kinsey, 2002); 58% of endowment in Kenya (Ensminger, 2000); Russia 52% of endowment (Herrmann, Gaechter and Thoni, 2008) and 23% of endowment in Peru (Henrich and Smith, 2004). It should be noted, however, that, unlike in our game, in most of the VCM played in the field the endowment could be split between the public and private project. We impose a nothing or all choice so that our percentages are not strictly comparable to those in the literature.

first round was 33% in 2007, it was significantly lower, 22.1%, in 2008. In the second round, the contribution in Ciénaga in 2008 (31.9%) was higher than Ciénaga in 2007 (15.9%), although this difference is not significant.

Social efficiency is maximized when all players contribute to the group account. In the first round, the average level of efficiency in 2008 in Ciénaga is higher than the efficiency level in El Pozón and higher earnings for Ciénaga are also observed in both rounds. Additionally, the increase in efficiency in *Ciénaga* for both rounds with respect to 2007 is significant, as it is the decline in *El Pozón*. Finally, there were more sessions with null cooperation in El Pozón than in Ciénaga (See the legend) difference is significant at less than 1%⁸.

At this point, we are not sure what happened in 2008. Taken literally, the results imply that the program, if that is the only difference between the two neighborhoods being considered, has a very strong effect on cooperation in El Pozón in 2007 and in *Ciénaga* in 2008, since the participants in *Ciénaga* already belong to the program. Below we extensively discuss the robustness of this result and its interpretation. However, we cannot explain why cooperation in *El Pozón* is lower. A possible interpretation of the point estimate difference is that in *El Pozón*, the information about the games spread easily in 2007 and people had already a pre-disposition to keep their token in the private account while in *Ciénaga* it was not the case.

Table 2. Basic Results

	Difference Significance	Baseline		Follow up		Total	
		El Pozón	Ciénaga	El Pozón	Ciénaga	Baseline	Follow-up
Sessions							
Number of Participants		342	334	299	320	676	619
Number of Sessions		14	14	12	13	28	25
Size of the group for the smallest session		22	21	24	22	21	22
Size of the group for the largest session		28	25	25	25	28	25
Average Size per session		25	24	25	25	24	25
Total Earnings without show up fee (US\$)***	° xxx	7.4	5.3	6.8	7.4	6.7	7.3
First Round							
Average % of contributors per session	*** + ° xxx	33.0	6.6	22.1	36.3	20.0	29.4
% of sessions with no contribution	** xxx	0.0	30.0	16.7	7.8	14.8	12.1
Median % of contributors per session		31.6	4.3	24.0	36.0	16.0	25.0
Maximum % of contributors per session		66.7	24.0	84.0	48.0	66.7	84.0
Earnings (US\$)	*** + ° xxx	3.7	2.9	3.4	3.7	3.3	3.6
% Efficiency ^a	*** + °° xxx	67.2	55.5	60.8	68.4	61.4	64.8
Second Round							
Average % of contributors per session	*** xx	38.3	15.9	23.8	31.9	27.2	28.0
% of sessions with no contribution	* °°	0.0	21.3	25.1	7.8	10.5	16.2
Median % of contributors per session		33.3	17.4	12.0	28.0	24.0	27.3
Maximum % of contributors per session		87.0	48.0	72.0	80.0	87.0	80.0
Earnings (US\$)	*** ° xx	3.8	3.2	3.4	3.6	3.5	3.6
% Efficiency ^a	*** ° x	69.7	60.0	61.4	66.5	64.9	64.0

* Differences between treated and control in 2007: * significant at 10%; ** sig. at 5%; *** sig. at 1%

+ Differences between treated and control in 2008: + significant at 10%; ++ sig. at 5%; +++ sig. at 1%

° Differences between 2007 and 2008 in the treated (El Pozón): ° significant at 10%; °° sig. at 5%; °°° sig. at 1%

x Differences between 2007 and 2008 in the control (Ciénaga): x significant at 10%; xx sig. at 5%; xxx sig. at 1%

All inferences are performed computing standard errors that are clustered at the session level. Median and Maximum % of contributors per session were not tested.

a The Efficiency index is calculated to each group as the sum of the earnings of people who decided P and earnings of people who decided to contribute (G) over the gains in the group if everyone in the session contributes, in other words, the real size of the cake over the size of the cake if everyone would have contributed.

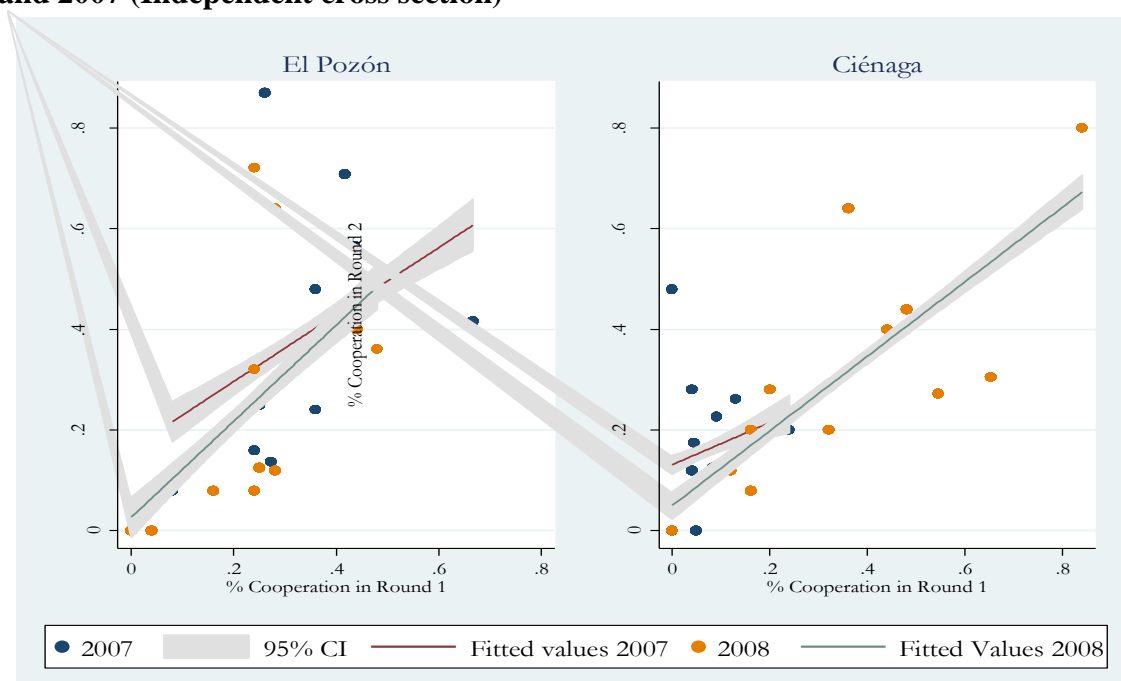
The result on the *change* between the two rounds, besides being statistically different between the two neighborhoods, is of difficult interpretation. *Ciénaga* diminished its cooperation levels

⁸ All inferences are performed computing standard errors that are clustered at the session level.

between the first and the second round whereas *El Pozón* increased it. As we mentioned above, both from a theoretical point of view and from the available evidence, communication can have different effects on the level of cooperation.

The average cooperative behavior in Round 1 and Round 2 are very correlated (see Figure 2). In the second round, in only *El Pozón*, there is a movement towards the social optimum: contribution rates move by 1.7% in *El Pozón* and by -4.3% in *Ciénaga de la Virgen*. The improvement (decline) is statistically significant in *El Pozón* (*Ciénaga*) at 10% (1%) at the session level. The point estimate, therefore, indicates that communication may more effective *El Pozón* than in *Ciénaga*. On the other hand, it is possible to observe in Figure 2 how the spam of cooperation in *Ciénaga* expanded from 2007 to 2008. In 2008, we observe a higher correlation between rounds and higher levels of contribution at the session level than in 2007. *El Pozón* also shows a higher slope but the change in the slope is lower than in *Ciénaga*.

Figure 2. Contribution rates in the group account in rounds 1 and 2 for each neighborhood, 2008 and 2007 (Independent cross section)



The fact that the allocation of the program was not random and the fact that we are only considering two neighborhoods present, of course, the possibility that the observed differences in contribution rates could be driven by pre-existing differences between the two areas rather than being a consequence of the program. To check on this possibility we now turn to the analysis of data from the post-game survey.

In Table 3, we report the means of several variables we observe for the participants as well as tests of significance for the difference between the two neighborhoods. Important differences between the two neighborhoods emerge quite clearly. In particular for 2008, players from *El Pozón* are significantly (see legend) less likely to be head of household and having their own housing, further to the nearest health center but better access to public services. Moreover they are more likely more educated. In addition, the players in *El Pozón* seem considerably less poor than those in *Ciénaga*. They are more likely to own the house where they live, to be connected to piped water, to own several durables and other assets and less likely to have a dirt floor in the house. They are also much less likely to be unemployed.

Some of the differences observed in Table 3 could have been induced by the program and, given the nature of the data; it is hard to disentangle the effect that FA may have had on many of the socio economic outcomes in both neighborhoods. For instance asset tenure and monthly income may be clearly affected by receiving the benefits from FA in *El Pozón*. We will show how our evidence suggests in the next section.

Finding 3: *The Familias en Acción program enhances cooperation*

Provided that the aim of this study is to test the link between participating in FeA and social capital, first, we use our individual experimental outcomes as dependent variables and a key variable of the participation in the program. Our specification consists in dummy variables taking the value of 1 if the participant made a voluntary contribution to her group in the first round and zero otherwise, the difference between her decision in the first and second round and a measure of participant's attitudes with respect to trust and civil and voluntary work in the community, respectively.

Table 3. Demographic Characteristics of the Participants in the Experiments

Descriptive statistics	Difference Significance		Baseline		Follow up	
			El Pozón	Ciénaga	El Pozón	Ciénaga
General Characteristics						
Percentage of female population	**	°	100	97.9	98.7	97.8
Average age (years)	***	°° xxx	38.0	33.6	36.1	36.3
Number of Years living in the neighborhood	***	+++	14.5	22.4	14.6	22.6
% Displaced	***	+	19.1	8.2	16.4	11.3
% Household head	***	+++ xxx	21.3	30.5	24.1	42.8
<i>Marital status (percentage)</i>						
Formal or Informal Union	***	+	76.9	62.9	77.9	66.6
Single	***	°°	5.6	11.7	10.4	11.9
Educational level (percentage)						
None			2.1	4.2	2.3	2.8
Primary Incomplete			18.1	18.6	22.4	21.6
Primary Complete			13.5	13.8	15.4	14.7
Secondary Incomplete	*		37.4	30.2	33.1	29.4
Secondary Complete		°°°	24.0	25.5	17.7	21.2
More than secondary complete	***		5.0	7.8	9.0	10.3
Dwelling characteristics						
Household size			5.6	5.8	5.6	5.8
Number of people per room	**	°° xxx	3.2	2.9	3.6	3.4
% Floor material (ground)	***	°° xxx	24.3	41.0	30.8	25.9
% Own housing	***	+++ °°°	82.7	58.7	68.2	52.5
Time to the nearest health center (minutes)		+++ xxx	28.1	32.3	25.3	18.3
Public services (percentage)						
Aqueduct	***	++	94.7	76.9	92.0	83.4
Sewer System	***	+++ xxx	64.3	12.6	69.2	27.5
Phone	***	+++	9.6	26.6	8.0	24.4
Assets (percentage)						
Cell Phone	***	+ °°°	86.3	67.1	76.9	69.0
Bicycle	**		21.9	14.4	20.4	15.3
Tvcolor	*	°°° xxx	80.7	74.6	84.9	84.1
Washing machine	***	xxx	23.7	13.8	28.8	25.9
Sound Player	***	+++	39.8	25.1	35.8	25.3
Income variables						
% Unemployed	***	xx	2.9	10.8	4.3	5.0
% Access to credit			67.8	66.8	71.6	69.4
% Access to formal credit			21.1	22.2	24.1	21.9
Food unsafety level (high)			9.6	9.9	7.0	9.7
Per capita Monthly Income (US\$)	***	°°° xxx	27.4	24.2	33.9	29.0
Participation in Familias en Acción						
%Madre_líder		°°°	16.7	-	5.7	7.3
Participation in <i>Encuentros de Cuidado</i>	NA	+++ °°° NA	97.1	-	94.0	67.8

* Differences between treated and control in 2007: * significant at 10%; ** sig. at 5%; *** sig. at 1%

+ Differences between treated and control in 2008: + significant at 10%; ++ sig. at 5%; +++ sig. at 1%
 ° Differences between 2007 and 2008 in the treated (El Pozón): ° significant at 10%; °° sig. at 5%; °°° sig. at 1%
 x Differences between 2007 and 2008 in the control (Ciénaga): x significant at 10%; xx sig. at 5%; xxx sig. at 1%
 All inferences are performed computing standard errors that are clustered at the session level.

In Table 4, we report results of a probit regression where we model the probability that an individual contributes to the group account in the VCM game as a function of several observables and the effect of *Familias en Acción*, an interaction between being from Ciénaga and having made the decision in 2007, a dummy of time and a dummy that indicates that the player is from the ‘new treated’ neighborhood, *Ciénaga*. The latter is our variable of interest among the explanatory variables. It represents how much the decision to cooperate has improved in Ciénaga with respect to its behavior in 2007. The reported specifications differ in the type of variables we control for and all of them have robust standard errors that are computed clustered at the session level. We used individual characteristics that include age, schooling, gender, and socio-economic level. experimental controls, such as a we control for session characteristics such as the percentage of men, the percentage of participants with less than secondary and the number of players.

The first thing to notice is the fact that, across specifications, the effect is sizeable and significant. Indeed, in the first two specifications, where we control for individual characteristics, as well as experiment and session correlation controls the effect does not change. In specification I, for example, the probability of contributing in the public account in the first round is 31.9 percent lower if the participant dwelled in Ciénaga in 2007, which where the program still had not been implemented. While in specification II we only control for individual and household characteristics, in the third specification we decided to control for session characteristics. An issue that worried us considerably on the field was the possibility that individuals who played in early sessions would ‘contaminate’ other individuals that were about to enter subsequent session by talking to them and commenting on the game. While we tried to avoid these contacts as much as possible and instructed the subjects not to talk to subsequent players, some contacts were unavoidable. For this reason we control for the sequence order in which a particular session is played in a day and also for results in previous sessions.⁹ While we do find these effects to be significant, we would not have expected they would affect much the size of the coefficient on the treatment, partly because they are present in both treatment and control sessions. These results are shown in Table 5.

Table 4. Program's Impact on the Cooperative Decision (First Round)

<i>Dependent variable: 1 if player contributed to the group account in the first round</i>				
Independent Variables	I	II	III	IV
Dummy <i>Ciénaga</i>	0.123* [0.067]	0.097 [0.064]	-0.044 [0.073]	-0.079 [0.080]
TIME	-0.097* [0.053]	-0.095* [0.052]	-0.119* [0.063]	-0.099* [0.053]
DIFF	-0.319*** [0.048]	-0.305*** [0.049]	-0.189** [0.076]	-0.175*** [0.050]
<i>Basic Controls - Participant's characteristics</i>		YES	YES	YES
<i>Session Characteristics</i>			YES	YES
<i>Session composition (info within session)</i>				YES
Observations	1295	1282	1282	1282

Marginal Probit. Cluster at the Session level. * significant at 10%; ** significant at 5%; *** significant at 1%

Finally, in specification IV we control for some indicators of session heterogeneity with variables such as the standard deviation of years of education, age level and years dwelling in the neighborhood. Controlling for these variables decreases the point estimates of the treatment effect

⁹ Particularly, in order to control for contiguous sessions correlation, we include in specification (III): a) a dummy for the first session each day; b) a variable capturing the deviation from the neighborhood mean of the average contribution to the public account in the previous 2 sessions.

substantially (to -13.4%) although it is still statistically significant at 5%.

We now discuss in detail the coefficients on the variables we control for in the first round and try to give them an interpretation. In table 5, we can observe that five structural socio economic controls that we include in the specification are significant. We find some evidence that players with a large household size tend to cooperate more. In 2008, not only women participated and women tend to cooperate more than men. Older participants also contributed more. The decision to contribute is strongly associated with how well the subject understood the exercise. People who declared that understood the game tended to keep their token.

Table 5. Controls for the decision to contribute in the group account in the first round.

<i>Dependent variable: 1 if player contributed to the group account in the first round</i>			
Independent Variables	II	III	IV
<i>Basic Controls - Participant's characteristics</i>			
1 if the player is a woman	0.120** [0.056]	0.155*** [0.033]	0.152*** [0.028]
Age	0.005*** [0.001]	0.005*** [0.001]	0.006*** [0.001]
Level of Education (0 to 5)	0.003 [0.010]	-0.001 [0.009]	0.002 [0.009]
1 if the player has her Own Housing	-0.032 [0.028]	-0.034 [0.026]	-0.049* [0.025]
Household size	0.016*** [0.006]	0.016** [0.006]	0.013** [0.006]
Ground Floor (house)	-0.045* [0.026]	-0.041* [0.024]	-0.033 [0.024]
Sewage	-0.051* [0.029]	-0.043 [0.027]	-0.029 [0.027]
No Electricity	0.137* [0.077]	0.087 [0.079]	0.11 [0.080]
1 if player belongs to the fifth quintile per capita income	0.045 [0.033]	0.05 [0.033]	0.048 [0.032]
How much the player is Player understood the instructions (1 nothing, 2, 3, 4 Everything)	-0.040** [0.020]	-0.035* [0.020]	-0.041** [0.020]
1 if the household receives other support from another institution	-0.054* [0.032]	-0.046 [0.030]	-0.038 [0.030]
<i>Session Characteristics</i>			
Number of players in session		-0.040*** [0.011]	-0.049*** [0.010]
1 if there is at least one Man in the session		0.154** [0.063]	0.151*** [0.052]
Experimenter n°2 (female) in 2007		-0.035 [0.072]	-0.041 [0.048]
Experimenter n°3 (male) in 2007		0.095 [0.063]	0.127** [0.052]
Experimenter n°2 (female) in 2008		0.151* [0.083]	0.121* [0.072]
First Session in the Day		0.171*** [0.058]	0.225*** [0.042]
Behavior in the 1st round of the last two sessions ^a		0.199 [0.232]	0.322** [0.150]
<i>Session composition (info within session)</i>			
Std Dev of Age			-0.006 [0.009]
Std Dev of Years living in the Neighbourhood			-0.046*** [0.010]
Average of Years living in the Neighbourhood			0.026*** [0.008]
Std Dev of level of education			-0.237* [0.137]
Percentage of people with less than secondary complete			0.347** [0.166]
Observations	1282	1282	1282

Marginal Probit. Cluster at the Session level. Marginal effects reported. Robust standard errors, clustered by session, in brackets after probit estimation. * significant at 10%; ** significant at 5%; *** significant at 1%

^a It is calculated as the Mean of previous 2 Sessions' Deviation from the average contribution in the neighborhood

Other controls that are statistically significant at conventional levels are the size of the session, a dummy of the presence of at least one man in the session, a dummy of the session as being the first one of the day and the behavior in the previous sessions. This means that people in large groups contributed less, thus cooperation is easier in relatively smaller groups, and a cooperative behavior in the previous session increased the probability to cooperate. We observe that in those sessions where at least one man was playing cooperation rates are 15.1% higher. On the other hand, the controls on potential session correlation confirm that a certain correlation, probably induced by contamination, is indeed observed between contiguous sessions: the average cooperation rates are higher in the first sessions of every day and positively associated with the deviation from the mean of previous 2 sessions in every neighborhood.

Finding 4: *Composition affects cooperation*

Finally, we find that group conformation is extremely significant in determining individual cooperative decisions, even in the first round of the VCM game when communication between players is not allowed. First, the higher the participation rates of people with less than secondary school the higher the cooperation rates. Second, the results show strong evidence that group heterogeneity reduces incentives to individual cooperatives behavior.¹⁰ The longer the participant has been living in the neighborhood and the more homogenous is the session in terms of dwelling in the neighborhood and the level of education, players' education, age and time of residence in the neighborhoods are less disperse, the higher the probability that this person is going to make a contribution to the group account. These results may indicate that players tend to cooperate more easily with peers, i.e. with players that they already know or whose observable characteristics suggest a certain degree of affinity.

Finding 5: *Leaders are important*

An important feature of the FeA program is the importance that the role of the *madres lideres* has acquired in the community activities. It is not difficult to expect that being a *madre líder* can be a determinant of the attitudes to cooperate, not only for the beneficiary that was elected as a *madre líder* by her community, but also for the beneficiaries that are under her supervision and coordination. Table 6 presents the results of including variables regarding this attribute of the program, taking into account only participants who are beneficiaries, that is subjects from *El Pozón* in 2007 and 2008 and from *Ciénaga* in 2008.

All the previous observations about the significance of our controls kept their sign and relevance in determining the decision to contribute to the group account in the first round, but our key variable about the effect on the program on that decision. Cooperation is positively associated with the presence of at least one *madre líder* in the session by a 23.9 percent. However, the probability that a *madre líder* contribute to the group account was significantly lower. By including these two variables, the dummy of the year of the session loses its significance.

Table 6. Role of *Madres Lideres* (First Round, treatment only)

¹⁰ We calculate group heterogeneity as the standard deviations of selected characteristics in each session. In addition to these variables that reflect heterogeneity, we also control for the average level of education in the session.

<i>Dependent variable: 1 if player contributed to the group account in the first round</i>				
Independent Variables	V	VI	VII	VIII
Dummy <i>Ciénaga</i>	0.127*	0.089	-0.128**	-0.093
	[0.076]	[0.071]	[0.064]	[0.090]
TIME	-0.07	-0.074	-0.139*	-0.117*
	[0.066]	[0.064]	[0.079]	[0.070]
1 if the participant is a <i>madre_lider</i>	-0.075*	-0.078*	-0.079*	-0.088*
	[0.043]	[0.045]	[0.045]	[0.046]
1 if there is at least a <i>madre lider</i> in the session	0.217***	0.227***	0.259***	0.239***
	[0.062]	[0.054]	[0.035]	[0.032]
<i>Basic Controls - Participant's characteristics</i>		YES	YES	YES
<i>Session Characteristics</i>			YES	YES
<i>Session composition (info within session)</i>				YES
Observations	961	958	958	958

As we mentioned in the introduction, the use of the results of an experimental game to measure social capital is relatively novel. It is therefore useful to relate our measures to more conventional measures of participation that have been used in the literature. Before doing so, however, we look at some additional information we have available in our data set on the existence of networks among the game participants and on leadership. As we mentioned below, our database includes information about the knowledge that each individual has of the other individuals in the session, on leadership within the group and on other variables that are sometimes used as measures of social capital. In this section we analyze this information both to compare possible measures of social capital, some of which have been used in the literature and to check whether the program shows effects on some of them.

For every session we can construct a relationship matrix that describes the shape of existing networks among players. One-to-one relationships are characterized according to four possible categories: relatives, friends, acquaintances and strangers. This information allows us to calculate a set of variables on session connectivity and eventually control for the strength of relationships in each group. The simplest measure of the “social integration” of each player within the session is given by the percentage of players that she reports as being relatives, friends or acquaintance in the group. These measures are shown in Table 7.

We can observe that the sampling and recruitment process may have had a better performance in 2008 compared to 2007, since there is no significant difference of these measures between El Pozón and *Ciénaga*.

Finding 6: *Connectivity inside the group does not affect cooperation*

We may obtain additional information about the relationship between our measure of social capital and the effect of the program by looking at the existence of networks among the game participants and on leadership. As we mentioned below, our database includes information about the knowledge that each individual has of the other individuals in the session, on leadership within the group and on other variables that are sometimes used as measures of social capital.

For every session we can construct a relationship matrix that describes the shape of existing networks among players. One-to-one relationships are characterized according to four possible categories: relatives, friends, acquaintances and strangers. This information allows us to calculate a set of variables on session connectivity and eventually control for the strength of relationships in each group. The simplest measure of the “social integration” of each player within the session is given by the percentage of players that she reports as being relatives, friends or acquaintance in the group.

Table 7 reports the average levels for the various connectivity indexes in the two

neighborhoods as well as a test of whether they are significant different. The table shows that social networks are not statistically different in our 2008 sample but they are generally less strong in *El Pozón* and in *Ciénaga* in 2008 with respect to 2007. When we use an overall measure of connectivity, which subsumes the three possible categories of relationship, we find that on average in *El Pozón* each player declares to “know” 14.7% of the other players in the session, similar to 14.6% in *Ciénaga*. Intuitively, this might be partly due to the quality of the random sampling in 2008 and the game recruitment process did not exploited existing networks.

The same information on networks also allows us to calculate three interesting measures of leadership, respectively a) the proportion of players that are referred to as leaders in each session b) the proportion of players that indicate at least one leader in the session and c) the proportion of players supporting each one of the leaders in the session (leader popularity). We find that leadership mechanisms are stronger in *El Pozón* in 2008 as it was in 2007, possibly in association with the social dynamics fostered by FeA. For example, 31.4% of players in *El Pozón* is able to indicate at least one leader in the group, whereas this happens, not significantly, for just 24.7% of the players in *Ciénaga*. Interestingly, in *El Pozón* the rate of reported leaders is significantly higher than the proportion of *Madres Líderes* (elected FA beneficiary representatives) in the sample (5.7%, see table 4).¹¹

The popularity of leaders (that we calculate as the proportion of players reporting each one of the leaders in the session) is low in both neighborhoods, suggesting that a certain fragmentation affects the patterns of leadership consolidation in the social context of the study. It is interesting to note that the popularity of *Madres Líderes* is higher than the average (it reaches 32%).

Another interesting finding is that when controlling these networks measures the only variables that explains significantly the decision to contribute is the dummy of leader (if the participant was considered a leader in the group by the other members) and has a negative effect in the same way the dummy of *madre líder* has (Results are not presented but are available upon request.)

4.2. Traditional measures vs VCM outcomes

As we mentioned above, the post game survey included traditional questions regarding trust and cooperative attitudes. For instance, we ask whether individuals participate into some social activities (like voting) and whether they ‘trust’ their neighbors. We also include a set of questions on membership in social groups and organizations. These variables have been widely used as a proxy for social capital in the non experimental literature. In Table 7, we also present some descriptive evidence of players’ characteristics in terms of civic participation and membership in social groups and organizations, which is one of the most common proxies for social capital. The participants in the both neighborhoods reported high levels of participation in organized groups than other citizens (see Table 7) (Latorre López, 2004; Polania, 2005). However, it is surprising how social capital, measured with the traditional indicators about membership in organizations and attitudes towards civic activities within the community are significantly higher in *Ciénaga* in 2008 with respect to the same neighborhood in 2007, in spite of the overall low levels. This is remarkable especially in the measures we obtain in the post game survey about session connectivity and leadership within the participants in each session. The latter feature is related with the difference in the sampling and recruitment procedures. In 2008, we aimed to apply a random sampling to recruit the participants in both neighborhoods.

On the other hand, while the differences between membership in associations in *El Pozón* and *Ciénaga* are not always significant Voluntary organizations accounted for the group participation of

¹¹ We find that 59.5% of *Madres Líderes* are reported as being leaders in the session.

the largest number of participants, followed by religious groups; about two out of five individuals reported participating in one of these. In addition, Ciénaga presents a decline in the participation rate of neighborhood committees (*Juntas de Acción Comunal*), which are probably the most institutionalized spaces for civic participation in Colombia and is consistent with our hypothesis in previous studies ((Attanasio, et al., 2008b)).¹²

Our review of possible alternative measures of social capital concludes with the analysis of another proxy, electoral participation, which has been widely used in literature, and a set of direct question on trust and social preferences similar to those commonly included in questionnaires aimed at ‘measuring’ social capital. Electoral participation was significantly higher in *El Pozón* than in *Ciénaga* in 2007¹³. In 2008, It is not any more this case and we can also observe a significant improvement on political participation and perception of trust in the community by the participants in *Ciénaga*.

Directs measures of trust yield particularly low estimates of ‘social capital’, with just 6% of the players manifesting to trust the majority of their neighbors. When calculated with a trust index (which goes from 2 to 0 respectively if the player claims to trust the majority, a few or none of its neighbors) players in *El Pozón* show still higher pro-social attitudes, compared to 2007¹⁴. Moreover, they report a different perception of other’s social preferences (such as altruism and reciprocity) in the community, for example when asked if “most of the people try to help in the community”. The use of direct survey questions on trust has been strongly questioned as a poor indicator of social capital in comparison with experimental outcomes.

The probabilities that players participate in at least one civic group, meetings and decision making processes in the community are still higher in *El Pozón* by a 5% and 7%, respectively. Finally, with respect to participation in decisions concerning neighborhood life and involvement in voluntary work in their neighborhood (especially physical infrastructure improvement), players in *El Pozón* showed still higher rates of 30.4% and 29.4% in civic participation.

We also show some additional evidence concerning the quality of players’ membership in the civic groups and associations reported in Table 7. All indicators show that civic membership is still more intense in *El Pozón*. Players in the treated neighborhood are likely to spend more time in the respective organizations (both in terms of attendance to meetings and of frequency), although there is a significant increase in *Ciénaga*. Also, they are more likely to be involved in responsibility roles within the organizations and to contribute with money or voluntary work¹⁵.

Table 7. Social Capital Measures

¹² This results may confirm previous analysis suggesting that FA may be stimulating some mechanism of substitution of the traditional forms of civic participation with new ones (see Pellerano, 2004)

¹³ We asked for the last local elections in Cartagena (Gobernador, mayor, members of the *Asambleas Departamentales*, *Concejos Municipales* and *Juntas administradoras locales*). They were held seven months after the inscription in the program and four months before the beginning of the program in *El Pozón*. Presidential elections were held eleven months after the beginning of the program.

¹⁴ We ask to the subjects: “In general, do you think that in your community...? The options are: It is possible to trust in few people, it is not possible to trust in anyone, it is possible to trust in most of the people.

¹⁵ For these indicators we ask to the subjects: Do you attend the meetings?, do you participate in the decision processes?, are you one of the leaders in the group?, do you support the group with money or voluntary work? And usually, how many hours per month you spend by attending to this group? See Appendix.

(Percentage)	Difference Significance		Baseline		Follow up		Total			
			El Pozón	Ciénaga	El Pozón	Ciénaga	Baseline	Follow-up		
<i>A Measure of session connectivity: Individual Social Integration</i>										
Relatives within the session	***	°°°	xxx	0.1	1.1	0.6	0.5	0.6	0.6	
Friends within the session	*		xx	5.9	2.9	5.8	5.9	4.4	5.9	
Acquaintances within the session	**	°°°	xxx	38.7	27.4	8.3	8.1	33.1	8.2	
Connected (relatives, friends or acquaintances) within the session	***	°°°	xxx	44.7	31.4	14.7	14.6	38.2	14.6	
<i>Leadership Measures</i>										
Players reporting at least one leader in the session	***	°°°	x	90.1	35.3	31.4	24.7	63.0	27.9	
Players reported as leader in the session	***	°°°	x	43.9	22.8	18.7	16.6	33.4	17.6	
Leader popularity in the session ^a	***	°°°	x	3.7	1.5	1.3	1	2.6	1.1	
<i>Civic Participation by neighbourhood</i>										
Membership in at least one organization	**	++	xxx	43.6	33.5	34.4	20.9	38.6	27.5	
Religious	**	+	°°°	xxx	36.2	24.1	11.7	6.9	31.0	9.2
Educational	***	++	°	xxx	19.5	33.9	12	4.7	25.7	8.2
Accion Comunal	***		°°°	xxx	16.1	29.5	5.7	5	21.8	5.3
Environmental management		+	°°	xxx	14.8	8.9	2.7	0.3	12.3	1.5
Charity (other than as beneficiary)			°	x	6.7	5.4	2.7	1.6	6.1	2.1
Cultural or athletic				x	4.7	7.1	3	1.9	5.7	2.4
Voluntary	***	+++	°°°	xxx	53.7	22.3	15.1	6.6	40.2	10.7
Surveillance association			°°	x	2.7	4.5	0.3	0	3.4	0.2
Labor union or sector association				x	3.4	1.8	0.7	0	2.7	0.3
Political movement or party			xx	1.3	3.6	0.3	0	2.3	0.2	
<i>Quality of Civic Membership by neighbourhood</i>										
Participation in neighborhood decisions	***	°°°		68.4	39.8	43.8	37.2	54.3	40.4	
Participation in the neighborhood meetings	***	+	°°°	xx	71.8	51.4	51.5	44.4	61.8	47.8
Attendance to the meetings (of any civic association)	**	++	°	xxx	43.6	33.2	33.4	20.9	38.5	27
Decision-Maker (of any civic association)	***	++	°	xx	39.8	27.3	30.4	18.8	33.6	24.4
Leader (of any civic association)	***		°°°		26.0	10.8	11.4	9.1	18.5	10.2
Supports with money or voluntary work (of any civic association)	***	++	°°	xxx	41.2	29.9	29.4	18.4	35.7	23.7
Frequency (Number of hours) (of any civic association)	***	+	°°°	xx	12.5	5.2	475.6	260	8.9	364.1
<i>Alternative Social Capital Measures</i>										
Vote Local Elections	***	°°°	xxx	60.2	44.3	72.2	72.5	52.4	72.4	
Vote Presidential Elections	***	+++	xxx	84.2	49.4	86.6	70.6	67.0	78.4	
Trust (1-4)	***		xxx	1.7	2.0	1.7	1.8	1.8	1.8	
Trust (index 0-2)	***		xxx	0.8	0.6	0.8	0.7	0.7	0.8	
Perception of cooperation in the community	***		xxx	28.1	20.4	32.1	32.5	24.3	32.3	

* Differences between treated and control in 2007: * significant at 10%; ** sig. at 5%; *** sig. at 1%

+ Differences between treated and control in 2008: + significant at 10%; ++ sig. at 5%; +++ sig. at 1%

° Differences between 2007 and 2008 in the treated (El Pozón): ° significant at 10%; °° sig. at 5%; °°° sig. at 1%

x Differences between 2007 and 2008 in the control (Ciénaga): x significant at 10%; xx sig. at 5%; xxx sig. at 1%

All inferences are performed computing standard errors that are clustered at the session level. Note: The table reports the percentage of respondents who participate in certain groups or organizations. Respondents can report participation in more than one of the organizations listed.

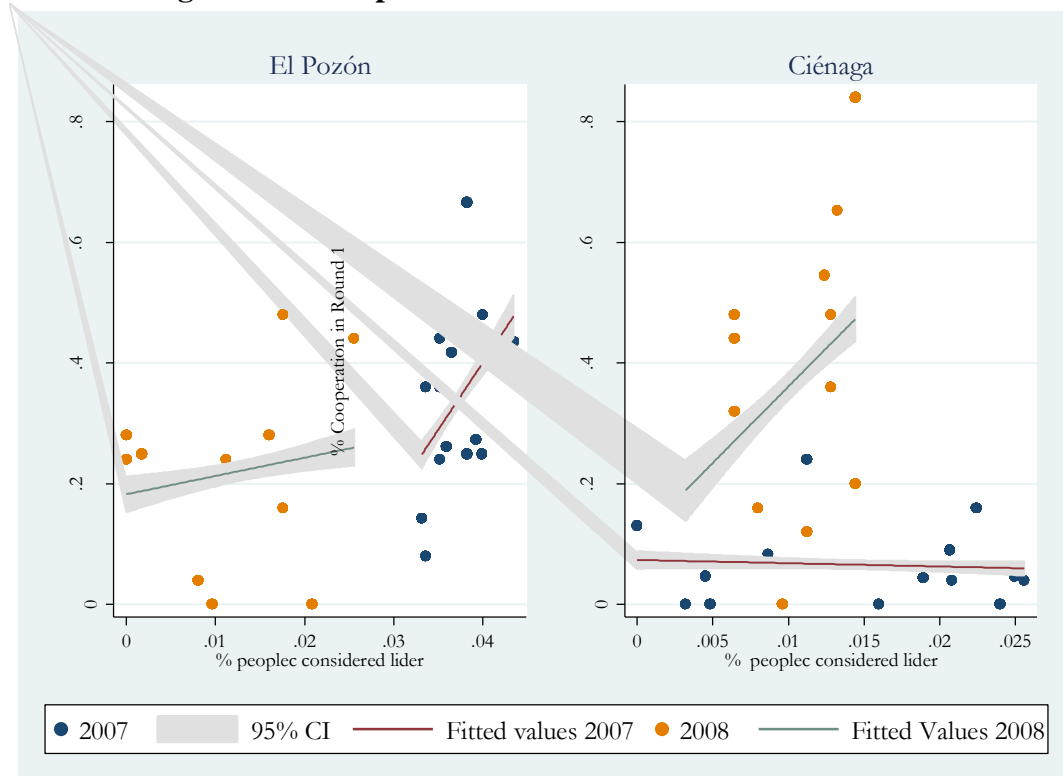
^a Average of % people who reported the same leader in the session.

In order to check the robustness of the results about the association between cooperative behaviour in the VCM game and the FeA program, we use the alternative measures described above.

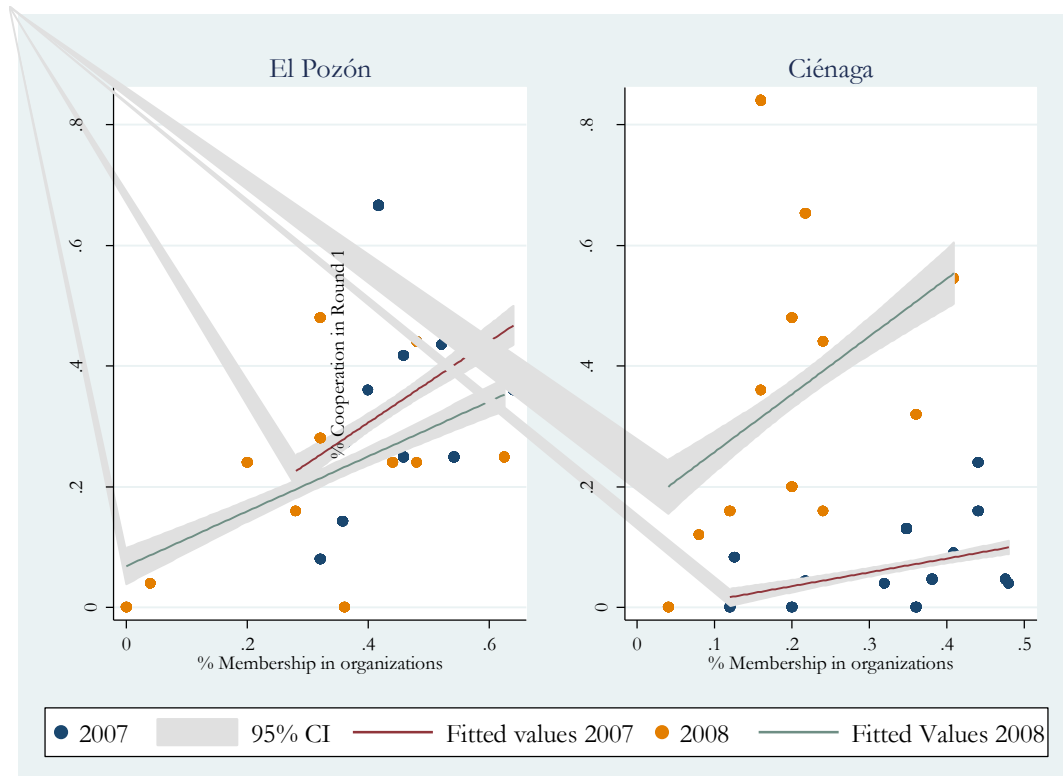
We have now presented descriptive evidence on several possible measures of social capital. Some of these measures have been widely used in the literature. We have also shown suggestive evidence on whether the FA program has had an effect on these measures and found that, for some of them, like with our measure based on behaviour in a public good game, the program seems to have had an effect. We now relate directly our measure with the more traditional ones. We start, in Figure 4, by presenting some simple scatter diagrams relating average cooperation in the VCM and four alternative measures of social capital averaged at the session level.

Figure 4. Social Capital measures and cooperation in the first round

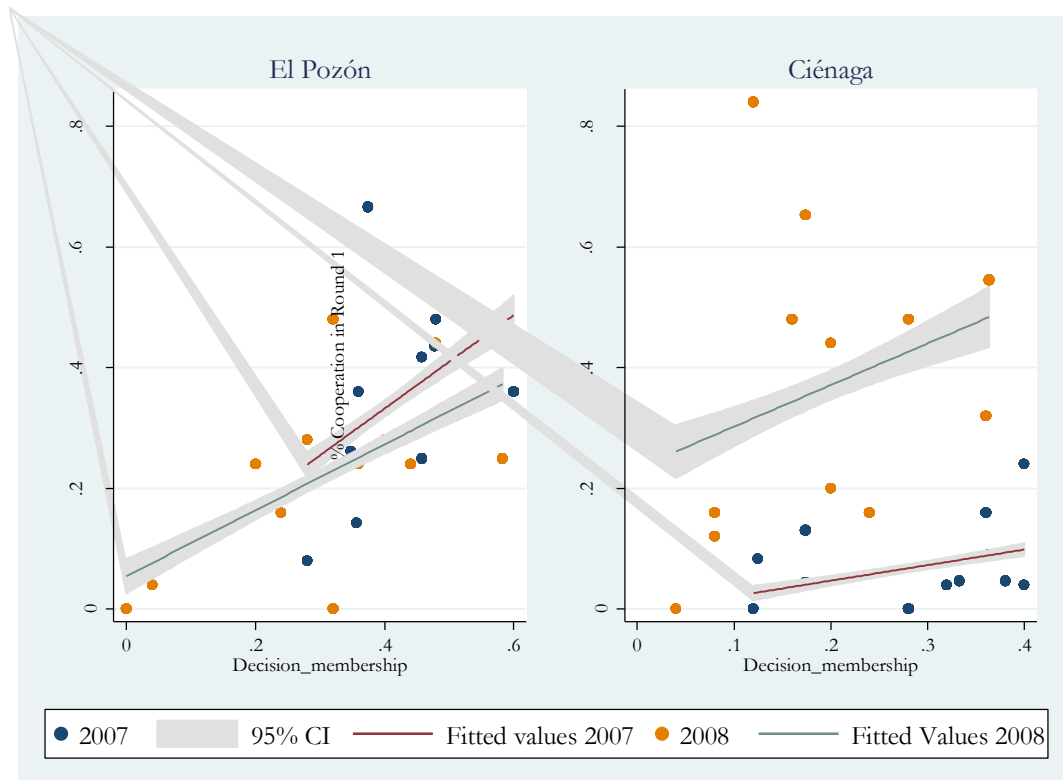
4a. Percentage of leadership in the session



4b. Attendance to the meetings of any civic organization



4.c Participation in decision making processes



Overall, our measure of social capital seems to co-vary remarkably well across sessions with the four more traditional measures we have considered in Figure 4: the percentage of people who are members of civic groups and associations, and the percentage of volunteers. We find that participation in volunteer work in the community is highly correlated with the decision to contribute to the group account in the VCM experimental setting.

In Table 5, we report the simple correlation coefficients between VCM cooperation and some of the alternative social capital measures, both averaged out at the session level.

Also, voting behaviour in presidential elections and membership in civic groups are associated with cooperation but respectively only for the first and the second rounds. This is consistent with the hypothesis that voting behavior may reflect pre-game values and preferences whereas volunteering may be associated with communication skills and social interaction abilities which are crucial for determining individual behaviour in round 2. Interestingly, the correlation with the self reported trust measure is the lowest. Voting in the local election and perception of cooperation in the community also show low correlation with the level of cooperation.

In Table 5, we explore the association between individual (rather than session aggregate) cooperative behaviour in the VCM game and other possible measures of social capital at the individual and session level, while conditioning on various observable variables. The table reports the coefficient on a given social capital measure in a probit regression where the individual behaviour in the VCM game is explained by several controls and that particular ‘social capital’ variable. The first column refers to the decision to contribute to the group account in Round 1, while column 2 refers to the behaviour in Round 2. The same controls as those in the fourth column of Table 5 and in the third column of Table 8 are used, respectively for Round 1 and 2.

We find that only few of these alternative social capital measures (membership of organization and participation in common work in the neighborhood) are good predictors of individual cooperation. Almost all of them seem to explain individual cooperation in the game much better when averaged out at the session level. For instance, the percentage of players being member of social organizations in the session is a more informative predictor of the individual choice of cooperating in Round 1 than whether the player himself is or not a member of a social organization.

These findings are consistent with our previous analysis suggesting that group conformation is relevant in determining the individual behaviour in the VCM game, apparently even more than individual characteristics. Effectively, the experiment is designed in such a way that, independently of a player's social preferences, individual payoffs of cooperation are fully defined by the social preferences of the other players in the group. Under these circumstances, the fact that other players show visible characteristics, such as being member of an organization or being a volunteer in the community, may be perceived as these players have pro-social concerns, and that is a strong incentive for individual cooperation. Also, especially for Round 2, these results may also suggest that, in order to enforce collective agreements towards cooperation, a certain "critical mass" is required in the group which guarantees that a number of players commits to the social optimum.

In addition to standard measures of social capital we also check the correlation between our VCM social capital measure and the connectivity indexes we presented in Table 12. The results are reported in Table 19.

We find that individual social connectivity measures are not associated with individual cooperative behaviour. On the contrary, again, when we calculate a group average measure of connectivity we find high correlation with individual cooperative behaviour. The average connectivity index is a measure of how "filled" the network matrix in the session is. If every player knew every other player in the group (i.e. there is no empty cell in the network matrix) the index would have been 1.¹⁶ Our analysis shows that a 0.1 increase in the group average connectivity index would be associated with a 9.3 percentage points increase the individual probability of cooperation in the Second Round. It is interesting that the correlation between this average group connectivity index and individual cooperative behaviour in the VCM is higher for Round 2, when communication between players is allowed, showing that in relatively more "connected" groups it is easier to reach agreements towards the "common good". Figure 5 shows that a positive and clear relation exists between Group Connectivity Index and average group contribution in Round 2.

Finally, Figure 6 shows that the average connectivity index is significantly higher for the 14 groups that participated in the experiment in *El Pozón* (where the network matrix is "filled" on average at 45%) than for the 14 sessions played in *Ciénaga* (where the network matrix is "filled" on average at 31%). According to our analysis, this might be a suggestive explanation of the high cooperation rates observed in *El Pozón*. The positive effect of FA on social capital might be strictly associated to its capacity to promote the creation of networks amongst beneficiary women.

¹⁶ On average the index has a value of .38, which means that 38% of the one-to-one relationships in the group happen between relatives, friends or acquaintances.

5. Conclusions

Our main purpose is to examine, by combining survey and experimental methods, the effect of a social intervention on individual and group behaviour and their ability to obtain better social and economic outcomes. There are two main difficulties in testing rigorously the hypothesis that CCT increase social capital. The first lies in the difficulty in obtaining a quantitative measure of social capital. The second is the standard evaluation problem of observing the counterfactual to a given intervention.

The level of cooperation we observe in the ‘treatment’ community is considerably higher than in the ‘control’ community. The two neighborhoods, however, although similar in many dimensions, turn out to be significantly different in other observable variables. The result we obtain in terms of cooperation, however, is robust to controls for these observable differences. In the last part of the paper we also compare our measure of social capital with other more traditional measures that have been used in the literature.

It is worthwhile to consider participants’ answers to the questions on attitudes, beliefs, and preferences towards trust and collective action when trying to measure in a more rigorous way the effect of a CCT on beneficiaries’ socio economic performance.

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Appendix A. Experimental Design and procedure

1. Experimental set up

The participants were invited to come to the local public high school. Upon arrival, the subjects were given an identification number randomly and seated in semi-circle in a classroom. As detailed below, the VCM game we use is played in two rounds. The subjects first play the game individually and privately, without having the possibility of communicating with other players. After the first round (but before its results are revealed), they are given the possibility of talking and discussing strategies for the second round. Finally the second round is played, again individually and privately, before the results of the first round are announced.

All recruited people were given US\$1.2 as part of their show-up fee in order to induce credibility and to subsidize the transportation cost from their homes or workplace to the school we assigned for the experiments stage. Once the session ended participants were paid their earnings based on the decisions in the experiments. On average each participant earned US\$9.6 (COL\$16866.46).

2. Experimental Design: the VCM

Each player receives an endowment of one token that could be invested either in a private or a group account. The private decision is made simultaneously, and without discussion with anyone in the group. The earnings are calculated in the following way: if the player chooses to invest in the private account, the token is converted in \$5¹⁷ and will be given entirely to her. In addition each player receives, regardless of how she has invested her own her token, \$0.40 for each token invested in the group account by any other member in the group of 25 players. Therefore, her total earnings at the end of this round are $(\$5) + (\$0.40 \times \text{Sum of Tokens invested by the group})$. If the player chooses to invest her token in the group account, she will receive 0.4 for each token invested in the group account by her and in the rest of the group. In this case her total earnings at the end of the round will be $(\$0) + (\$0.40 \times \text{Sum of Tokens invested by the group})$. Each player makes her private decision by selecting a card which says if she is going to invest her money in the group account or to keep it for herself (i.e. private account). The experimenter then collects the “decisions cards,” totals them up, multiplies by \$0.40 the amount and credits the relevant amounts to each player. The relevant amounts, however, are only revealed and paid at the end of the session and after a second round of the same game.

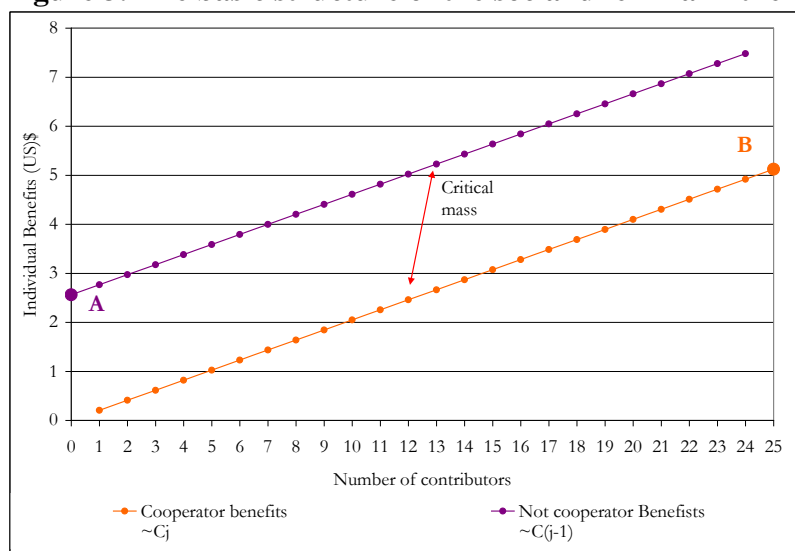
In the first round, each player has to decide where to invest her token. The second round is a repetition of the first, except that the players are allowed to discuss for ten minutes before making simultaneously their private, anonymous decision. During the discussion, the players can talk about whatever they wanted but they could not leave the room. No one, except the experimenter, knows for certain the other players' contributions in the first round. The players do not even know their own payout in the first round when they discuss with the other players or when they play the second round. At the end of the session, however, the totals but not the individual strategies are announced. The players are paid in cash privately at the end of the session after taking a snack. The payoff resulting from both rounds are paid together with a show-up fee of \$2 to cover the transportation costs of each participant.

This experiment has been designed to set up a situation for 25 people where there is a social

¹⁷ Units in thousands; thus, \$5 means COL\$5.000 (US\$ 2.86, according to the official exchange rate at that date TRM: 1US\$=COL\$1750 (Monthly mean average for July 2008. <http://www.banrep.gov.co>)).

dilemma, illustrated in Figure 3. This figure shows the two possible individual outcomes (playing public or private) as a function of the number of individuals that contribute to the group account. Clearly, the dominant strategy for the $j-1$ player is to choose not to invest the token in the group account because each token contributed yields only \$0.40 to its contributor, no matter what the others do. Therefore, each player would want to “free ride” on the others the benefits of the group account and the Nash equilibrium is that everyone invests in the private account (point A). In this case, the group earnings would be \$25 (players) x \$5 (private account return) = \$125. The social optimal where the group would be best off is that everyone contributes (point B) and each token contributed yields \$10 (25 (players)*0.4 (group account return) to the others at no cost to them. In this case, the group earnings would be 25 (players) x \$10 (individual benefits of the group account) = \$250. Notice that it is necessary that at least 12 players contribute to the public account for a contributor to this account to earn the same as in the Nash equilibrium where everybody invests her token to the private account. When size of the group is smaller than 25 players, the critical mass would be more difficult to achieve.

Figure 3. The basic structure of the social dilemma in the VCM



4. Post experimental data

In addition to our quantitative measure we also collect a survey from the participants to the game. In this survey, among other things, we ask questions that have been suggested as possible measures of social capital such as membership in organizations and trust. This survey yields some insights into the individual characteristics that could affect the decision of contribution (i.e. volunteerism, participation in community activities, leadership and attendance to their meetings) and gives also information to examine the external validity of our results.

The survey is completed by a module that aims at filling in a ‘networks map’ for each session, asking the subjects questions about their relationship to other participants. In particular, in the networks questionnaire, we asked to each participant her relationship with each other player in the group (“how do you consider person Y?”) in three categories: relatives, friends and acquaintances. The network information allows us to measure the degree of connectivity among the players in each session¹⁸. We also asked if the player considered any other player as a leader in the group. It was

¹⁸ We are aware that asking the subjects about their acquaintance’s trustworthiness would have given us a more accurate measure of social capital. There were two reasons we got only a measure for connectivity. First, we replicated the same experimental and survey design which was conducted in

possible to mention only one person. This variable provides us with information about the presence of leaders and is useful to determine their potential role in the game outcome.

The social networks' structure determines the degree of social cohesion in a group and the ability to overcome the costs of collective action and obtain benefits related with cost of transaction, information, and risk management. In the VCM experiment, the structure affects the player's willingness to communicate with others and the ability to do so in an effective and organized way to obtain the maximum social outcome. In addition, the structure of the social network can determine individual perception of group's characteristics and network's quality (Cárdenas and Jaramillo, 2007); if there is not even a social network (i.e. all participants are unknown to each other) the cost of effective communication could be higher.