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Community-Driven Development and Collective Action: Overcoming Clientelism, Elite Capture, and Free Riding

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Abstract

This paper presents a case study of a World Bank community-driven development (CDD) project implemented on agrarian reform settlements in Northeastern Brazil in partnership with the Landless Workers' Movement (MST). Critiques of community-driven development often focus on whether it is truly participatory and on common causes of project failure, such as elite capture, clientelism, and free riding. The paper uses a mixed methods approach, combining case studies of eight community-driven development subprojects, interviews with project beneficiaries, technicians, academics, and social movement leaders, and a census survey of six of the subproject-receiving communities. The paper finds that, although success in these subprojects was limited, agrarian settlement institutions and partnership with the Landless Workers' Movement were essential for avoiding these common causes of project failure, making the project both more participatory and more effective. My findings imply a key element of community-driven development project success lies in building institutions that provide an avenue for addressing project problems and which limit the ability of elites to intervene.

Keywords: Participatory Development, Community-driven Development, Clientelism, Elite Capture, Free Riding, Landless Workers' Movement (MST), Agrarian Reform Settlements, Brazil, Rural Agricultural Workers

JEL Classification Codes: O12, O22, Q15, Q18.

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1 Introduction

The enthusiasm with participatory development approaches grew over the 1990s and 2000s, and in response so did criticism. Development institutions, such as the World Bank (WB), adopted participatory development as a method that could fit their needs, as having the characteristics of being both decentralized and, following the backlash to the neoliberal policies of the 1980s and 1990s, morally palatable to the public. Partly, this came about due to the World Bank's distrust of the State and fatigue with neoliberal policies (Arcand and Wagner, 2016). For example in 1998, James Wolfensohn said regarding participation, "We must never stop reminding ourselves that it is up to the government and its people to decide what their priorities should be. We must never stop reminding ourselves that we cannot and should not impose development by fiat from above - or from abroad" (Wolfensohn, 1998).

Participatory development can be defined as the active involvement of participants in the development process. More specifically, participatory development stresses bottom-up rather than top-down approaches, prioritizes the goal of empowerment, and gives priority to local or indigenous knowledge (Henkel and Stirrat, 2001). Participatory approaches have been adopted by a variety of institutions in addition to the World Bank, such as by national governments, by international non-governmental organizations, and by other international development institutions (Brett, 2003). The World Bank's current approach to participatory development is called community-driven development (CDD); it posits that community control of development projects and funds creates efficient outcomes and empowered communities, while reducing corruption (Coirolo and Lammert, 2009; Chambers, 1983; Craig and Mayo, 1995; World Bank Operations Evaluation Department, 2005).

While the model of CDD may be attractive, its application has encountered serious obstacles (Cooke, 2001). The success of community-driven development depends on the ability of participants to organize around a specific goal, to access and receive subproject funds, to decide on a particular subproject, and to work and maintain the subproject collaboratively. Thus, criticisms of CDD tend to center on some typical causes of failure: clientelism (when politicians exchange subprojects for votes), elite capture of funds (when an elite within a community controlled the subproject funds), and free-riding by members in the community.

My study explores how the goal of community involvement, input, and control over a local-level development process played out in the specific institutional context of a World Bank CDD project, called São José Agrário (SJA). It provided grants for small-scale infrastructure and productive subprojects in agrarian settlements in North-Eastern Brazil.[1] São José Agrário was a somewhat unique experiment in CDD. It combined what many critics of community-driven development deem a top-down approach to participatory development with what most critics would agree to be a bottom-up approach. In fact, it accomplished one of the stated goals of CDD: a real partnership with a civil society group in the CDD process. This occurred because a social movement (the Landless Workers' Movement, MST) organized and demanded access to State/World Bank development funds (called São José II)and partnership in administrating the subprojects. Additionally, the project was implemented in agrarian reform settlements which had previously organized around gaining

[1]Project refers to state-level projects. Subprojects refers to community-level projects. Examples of subprojects included irrigation, mechanization, bee-keeping, reservoirs, and fences.

access to land. These settlements already had established institutions for a common project — that of creating a settlement.

Critics of the CDD approach begin at the fundamental level of questioning if the approach is truly a participatory bottom-up approach. Some criticize development programs' use of a participatory approach for co-opting the meaning of participatory development. For example, Parfitt writes that participation has been reduced to "a managerial exercise based on 'toolboxes' of procedures and techniques; it has ignored critical engagement and class, and while playing lip-service to empowerment mainly devotes itself to efficiency" (Parfitt, 2004, 22). These criticisms highlight a theoretical divide identifying two categories from the perspective of bottom-up versus top-down approaches to participatory development based on the goals of the actors advocating for participatory development. I call these the radical approach and the project-based approach.[2]

The radical approach to participatory development highlights the use of participation to confront power, knowledge, and income inequalities. This approach emphasizes explicitly political collective action to increase the power of the participants. The radical approach envisions a process in which those with less power actively confront those with more power to shift the balance of power. In this way, the less powerful can gain the power necessary to change the conditions of their existence (Rahman, 1995; Freire, 1970).

The project-based approach to participatory development posits that community control of development projects and funds will make these projects more effective by creating efficient outcomes, empowering communities, and reducing corruption (Mansuri and Rao, 2012). The project-based approach relies not only on the peoples' participation but also the importance of incorporating peoples' knowledge or indigenous knowledge (Rapley, 2007). Efficient outcomes are expected to stem from two sources. First, the community's practical knowledge of what they need and the local conditions will result in the direction of funds toward the community's highest priority in each case (Chambers, 1983; Banerjee and Duflo, 2011). In addition, local knowledge is expected to facilitate the targeting of the project to the poorest in the most cost-effective way, not only because these projects are efficient, but also because the participants bear a portion of the cost of the project in terms of both labor and monetary contributions (Paul, 1987; Mayo and Craig, 1995). Second, this approach assumes empowerment will result by putting the community in charge of defining their needs and priorities and acting upon them through received funds, increasing members' capabilities, political voice, and control over the development project. Lastly, corruption is expected to be reduced as the subproject funds are directed through local-level governments with greater civil society participation (Mansuri and Rao, 2012).

My particular division of radical versus project-based approaches to participatory development is not unique. Several other authors have followed a similar line of logic. For example, Tufte and Mefalopulos divide approaches into the social movement perspective and the project-based or institutional perspective (Tufte and Mefalopulos, 2009). Mansuri and Rao divide participatory development between organic participation and induced participation (Mansuri and Rao, 2012). Oakley defines participation based on whether it is a means or an ends (Oakley, 1991).

All of these divisions share commonalities. The social movement perspective, organic participation, and end process are all focused on changing power relations. For example

[2]I borrowed the name project-based for the lack of a better term from Tufte and Mefalopulos (Tufte and Mefalopulos, 2009).

Tufte and Metafalopulos describing the social movement perspective write, "Some stakeholders define participation as the mobilization of people to eliminate unjust hierarchies of knowledge, power, and economic distribution" (Tufte and Mefalopulos, 2009, 4). Mansuri and Rao explain that organic participation covers social movements and other forms of civic action and is intrinsically motivated. Oakley writes that participation as an end is a process and has the goal of fomenting and reinforcing the capabilities of rural peoples, and may not be measurable (Oakley, 1991). Participation as an ends is expected to change power relations between the community and the development agency, in which the community gains greater power increasing equality between the two and is thereby empowered (Parfitt, 2004).

On the other hand, the project-based (or institutional) perspective, induced participation, or means process are all focused on using participation to achieve a development policy goal generally promoted by an outside group or institution, and as such are less likely to challenge power hierarchies (Parfitt, 2004). Tufte and Metafolopulos define the project-based or institutional perspective as "...the reach and inclusion of inputs by relevant groups in the design and implementation of a development project" (Tufte and Mefalopulos, 2009, 4). Mansuri and Rao define induced participation as participation which requires the intervention of "powerful" institutions that provide extrinsic motivation. In the case of organic participation, participants are assumed to be intrinsically motivated (Mansuri and Rao, 2012). Such participation is "promoted through policy actions of the state and implemented by bureaucracies (the "state" can include external governments working through bilateral and multilateral agencies, which usually operate with the consent of the sovereign state)" (Mansuri and Rao, 2012, 32). Oakley explains that participation as a means is based on reaching a predetermined objective, reaching the said objective is more important than the participation itself (Oakley, 1991). Parfitt writes, "... participation as a means is politically neutral insofar as it does not address such power differentials..." (Parfitt, 2004, 539). Project-based approaches, while not addressing power, do often have the goal of empowerment by way of increasing social capital and capabilities. Research by McCaARTHY et al. analyzed the effectiveness of the CDD approach at reaching these goals and found it to be inconclusive McCARTHY et al. (2017).

This article analyzes a sample of those SJA subprojects to contribute to understanding what institutions can assist in overcoming common problems faced by CDD projects cited in the literature — those of clientelism, elite capture, and free riding. This is contextualized within the theoretical question of what constitutes participatory development by analyzing a unique case study that has elements of both a project-based and a radical participatory development project. I argue the partnership between the MST and the State is a hybrid of the radical and project-based approaches, and that this partnership, as well as the implementation of the subprojects in communities with institutions of collective action, provided the communities with the tools to overcome clientelism, elite capture, and free riding.

The article is organized as follows; section 2 provides the case study background, section 3 describes the methodology, section 4, 5, and 6 address how the settlers dealt with clientelism, elite capture, and free riding respectively, and section 7 concludes.

2 Background

The community-driven development approach was first implemented in the Brazilian state of Ceará during the 1980s (Coirolo and Lammert, 2009). Deemed a success, the World Bank reformulated their projects in Ceará around this approach in 1993. In 2001, the Rural Poverty Reduction Project was implemented by the World Bank, locally named São José II (SJII) by the State of Ceará.[3] SJII was funded via a WB loan of US$70 million and State counterpart funding of US$38.6 million and continued until 2009 (The World Bank, 2009). In Ceará, the implementing agency is the Department for Agrarian Development (SDA - *Secretaria de Desenvolvimento Agrário*).

In 2007, soon after the additional financing loan for SJII was approved, the MST (Landless Workers Movement) occupied the SDA. This was an example of what Funder writes of as "the particular role of local community members in co-shaping and/or subverting the practices and power relations of participation as they develop on the ground" (Funder, 2010, 1710). The MST demanded and gained around US$15 million in project funds for agrarian reform settlements.[4] The SDA called this subcomponent of the SJII project São José Agrário (SJA). São José Agrário was originally set to fund 180 subprojects on agrarian settlements; in the end, they were able to disburse funds to 163 settlements (Sao Jose Agrario Technician B, 2013).

Although São José Agrário followed roughly the same guidelines as the larger SJII project, important differences resulted from collaboration with the MST. The MST played an active role accompanying the projects from start to finish and dialoguing with the SDA. First and foremost the MST chose which settlements would receive projects based on their participation in the occupation of the SDA to gain SJII funds and the settlements' desire to carry out a project. The state did not intervene in the MST's selection process unless associations or subprojects did not meet eligibility criteria. The MST and the state technicians also assisted settlements in project choice.

In comparison, the SJII project began by attempting to disseminate the project to the public. Individuals or groups who wanted to apply for funds formed legally recognized community associations with a bank account specific to the project. The community association would then prepare a subproject proposal and submit it to the state technical unit housed in the Department of Agrarian Development (SDA). Groups choose projects from a menu given by the WB and the State agency.

The SJA process was further simplified by the fact that the settlements already had legally recognized community associations, as an association is a requirement of settlement creation. In both the SJA and SJII projects, once the community's selected project was approved, the communities acted collectively to implement, operate, and maintain the

[3]The World Bank and the state of Ceará had different names for the same projects. The State of Ceará used São José to refer to many of the projects co-funded by the WB and the State of Ceará. Each new project was given a number, thus São José I, São José II, São José III.

[4]At the national level expropriation-based land reform emerged out of the 1988 Brazilian Constitution administered by the National Institute of Colonization and Agrarian Reform (INCRA, *Instituto Nacional de Colonização e Reforma Agrária*). In the late 1990s, the WB implemented a market-based land reform program (Pereira, 2004). Although the Landless Workers Movement is most closely linked to expropriation-based land reform, in this case they were working with both types of land reform settlements. Five of my study settlements were national appropriation-based land reform settlements and three were market-based land reform settlements.

project. The association had to provide at least 10% of the project's cost in labor, cash, or kind.

3 Methodology

My study is based on 14 months of fieldwork: July and August of 2011, and July 2012 through June 2013. I used a mixed methods approach combining in-depth interviews, a survey, and participant observation. I conducted interviews with over 60 government officials, project technicians, academics, social movement leaders, labor union leaders, and CDD participants. In addition, I conducted 8 case studies of agrarian settlements which have received the SJA subprojects (of 163 total subprojects).

I chose two municipalities, Canindé and Quixeramobim, that had a large number of subprojects with a similar micro-climate — the *sertão*, a semi-arid region in northeastern Brazil. I then choose only settlements that had been established between 1998 and 2002. This allowed me to evaluate settlements that were constructed under similar agrarian reform programs, both market-based and national land reform settlements. All settlements had been functioning for at least 10 years, giving them time to experiment with and establish institutions. Lastly, I excluded all settlements with greater than 30 families or less than 10 families. This ensured I compared settlements of similar size and allowed me to administer a census survey.

Once I sorted the subprojects in my two chosen municipalities for these criteria I was left with seven settlements. I included one additional settlement (Settlement 1) in the municipality of Itapipoca, which had a strong affiliation with the MST. In Settlement 1 and 2, I conducted interviews with 14 and 12 households respectively (around half the households in each settlement). Interviewees were purposively sampled for variation in age, gender, and leadership roles within each settlement. Using this information I created a survey instrument that I applied to all households in the remaining six settlements; a total of 93 households. The census survey allowed me to obtain household level descriptive statistics for the settlements surveyed. My study design maintains the confidentiality of all interviewees and survey participants.

The productive SJA subprojects in my study included beekeeping, irrigation for fruit trees and vegetable crops, growing *capim* (a grass feed for livestock), and a cashew plantation. Infrastructure subprojects mainly dealt with water storage and perimeter fences.[5]

4 Clientelism

Community-driven Development projects emphasize a devolution of power from central government to the local government (in my case studies this was from the central to the state government). Optimally, decentralization creates local spaces that are more responsive to local constituencies' demands. Yet, it can also foment local-level clientelism. Characteristics

[5]The WB and the SDA classify a particular project as infrastructure or productive. Infrastructure indicates that the subproject is built to create or reinforce the settlement's infrastructure, indirectly contributing to increasing the productive potential of the settlement and/or directly increasing the well-being of the settlers (Coirolo and Lammert, 2009). Productive subprojects are designed to increase the settlement's production aimed for sale in the market-place (Coirolo and Lammert, 2009). I use their classification.

of clientelism include inequality between the patron and client (which allows for threats of coercion), reciprocal exchange, and a personal relationship (Mainwaring, 1999). Brazil has a history of deeply entwined practices of clientelism (Mainwaring, 1999; Finan, 2004). As such CDD projects in Brazil are particularly susceptible to clientelism. Clientelism becomes problematic when the exchange of subprojects for votes results in the non-targeted receiving subprojects, which can contribute to both greater inequality and greater inefficiency as resources are used for the short-term goal of (re)election (Mansuri and Rao, 2012; Camacho and Conover, 2011).

Interviews at the state level with representatives of the SDA, MST, and the state level agricultural workers' union (*Federação dos Trabalhadores Rurais Agricultores e Agricultoras Familares do Estado do Ceará*, FETRAECE) revealed that the greater SJII project had encountered considerable difficulties with clientelism, but that it was a lesser problem in the SJA project. In the larger SJII subprojects, according to one interview, clientelism occurred in the following way. Since many of the communities had difficulty writing the subproject pre-proposal and also frequently lacked access to a computer necessary to prepare the subproject proposal, politicians would offer to help communities develop the subprojects in exchange for votes (FETRAECE Representative B, 2013).

In the SJA project, clientelism was mitigated by the accompaniment of the MST and by the settlers themselves. The Landless Workers' Movement is conscious of the problem of clientelism and spends significant energy opposing it (Starr et al., 2011). In some cases upon the release of the SJA subprojects, politicians would show up and attempt to take credit for the subprojects. The settlers, with the backing of the Landless Workers' Movement, refused to accept that the politicians deserved credit (and votes) for these subprojects. One MST representative described it this way.

> In order for you to note the magnitude of the norm [clientelism], how deep-seated it is, many politicians and municipal administrations went to the radios to say that the [sub]projects that had arrived in the municipalities, the São José [Sub]Projects, had been an achievement of the politicians, of their policies. But the people respond[ed]. We had rallies in the inauguration of the [sub]projects to raise awareness that they had been the workers' achievement. [We raised awareness] that the struggle [for the subprojects] was worth it, that we struggled and that you could see the result. On those occasions, the workers would say: "Look, this work here, this project here is the result of the organization of the worker. The only power here is the power of the struggle. Nobody did this for us" (Landless Workers Movement Representative A, 2013, Author's Translation).

The participants in the SJA project challenged the politicians from a position of asymmetric power, to prevent the co-option of the projects into an exchange for votes. As such, it is clear that while clientelism is an embedded norm of the region, the SJA subproject participants in my study with the assistance of the Landless Workers' Movement overcame this problem.

5 Elite Capture

Elite capture has also been well documented in the CDD literature. In fact CDD programs implemented in heterogenous communities are often faulted with aggravating elite capture (Arcand and Wagner, 2016; Platteau and Abraham, 2010). Mansuri and Rao who have conducted exhaustive literature reviews into the realm of CDD write, "The studies that have looked at who participates in CDD projects have found that on average participants are wealthier, better educated, more politically connected, and from higher status ethnic and tribal groups" (2012, 128).[6].

Studies that found significant evidence of elite capture also attempted to analyze under what circumstances it occurs (Fritzen, 2007; Platteau, 2004; Platteau and Gaspart, 2003). There is a body of evidence suggesting a community's ability to minimize elite capture and thereby to maximize the effectiveness of collective action is facilitated by group homogeneity, either ethnic, social, or economic (Okten and Osili, 2004; Alesina et al., 1999; Araujo et al., 2008). The settlements in my sample had extensive experience with collective action, significant 'social capital', and democratic management, all of which the research has found to prevent and limit elite capture (Das Gupta et al., 2004; Chebil and Haque, 2003; Fritzen, 2007; Manssouri and Sparacino, 2009).

The elite can be defined along many parameters, such as income, education, power, gender, religion, and caste, among others (Dasgupta and Beard, 2007; Mohan and Stokke, 2000; Platteau et al., 2014; Rigon, 2014). In the context of project targeting, an elite is generally defined against the targeted. The São José Agrário project was under the umbrella of SJII, which defined its target as low-income, rural people engaged in agricultural production (The World Bank, 2009, 2). SJA further restricted targeting to only agrarian settlements. In the next sections, I will explore possible sources of elite power in my case studies stemming from income, education, background, and access to leadership positions.

5.1 Income

I gathered income data for each family, including crops and animals sold over the year 2012, transfer payments including *Bolsa Familia*,[7] retirement payments for agricultural workers, and crop insurance — as well as any wage or salary labor on or off the settlement, and donations from other family members not living in the settlement. I then calculated the yearly income for the households. I compare this yearly household income with the household income data collected by the Brazilian government's 2011 household survey (PNAD, Pesquisa Nacional por Amostra de Domicílios) (Instituto Brasileiro de Geografia e Estastistica, 2011). The Brazilian government divides income groups into five classes based on household (assuming a family size of four) average monthly income (which I converted to yearly income for ease of comparison): Class A (equal to or above R$116,940), Class B (from R$89,700 to R$116,940), Class C (from R$20,808 to R$89,700), Class D (from R$13,020 to

[6]Elite capture does not always have to have a negative effects on the community Platteau and Gaspart (2003); Das Gupta et al. (2004); Fritzen (2007). For example, in a case study of the Jamaican Social Fund it was found that, although there was evidence of elite capture by educated connected groups for projects that had not been ranked as a priority by the majority of the community, after the fact 80 percent of the people were satisfi

ed with the project and wouldn't change the project (Rao and Ibanez, 2005, 33)

[7]A national conditional cash transfer program.

R$20,808), and Class E (from R$0 to R$13,020) (Centro de Politicas Sociais, 2011). Class C covers a large range of almost 70,000 reais per year.[8]

Although the World Bank's Implementation Completion and Results Report of the SJII project does not explicitly list the incomes of those targeted, it does describe them throughout the report as the poor and very poor (The World Bank, 2009). Two studies of the SJII project, one financed by the WB and one independently financed found that on average the SJII project beneficiary households fall into the Class C designation (The World Bank, 2009, 57, 64).

In Table 1, I classify all the households from my survey implemented in six settlements into each of the classes. I then compare the settlements by class. No settlement households fell into the Classes A or B. The class with the most households from my survey was Class E (also the poorest class) with 55 households (59%). There was also a sizable portion that fell into Class D, 21 households (23%) and Class C, 17 households (18%). Table 1 indicates moderate income inequality in the settlements. The breakdown shows that eighty-two percent of the beneficiaries fell into Class D and Class E and may be considered poor or very poor. For the most part, the SJA subprojects in my case studies did reach those targeted by the greater SJII project as poor and very poor.[9]

I compare this distribution with that of rural Ceará. I also use the Brazilian government's household survey, the PNAD survey, to get a measure of the income classes in rural Ceará, which includes a total of 3,532 households. Interestingly, Table 1 shows that if I take all households in my survey and classify them into the Brazilian government's income classes, the percentage in each income class of C, D, and E, reflects that of the rural Ceará.

Table 1: Income by Class

	Number					Percent				
Class	A	B	C	D	E	A	B	C	D	E
Settlement 3	0	0	1	1	10	0	0	8.3	8.3	83 .3
Settlement 4	0	0	1	5	4	0	0	10	50	40
Settlement 5	0	0	0	4	15	0	0	0	21	79
Settlement 6	0	0	2	1	7	0	0	20	10	70
Settlement 7	0	0	7	6	12	0	0	28	24	48
Settlement 8	0	0	6	4	7	0	0	35	24	41
All Settlements	0	0	17	21	55	0	0	18	23	59
Rural Ceará	7	3	607	853	2062	.2	.08	17	24	58

Author's Data and PNAD 2011 (Brazilian government's Pesquisa Nacional por Amostra de Domicílios).

I also calculated the Gini for the households by settlement and find that the settlement Ginis fall between .32 and .57.[10] These Ginis are useful in understanding the level of income inequality in these settlements. Overall the Ginis as compared with country-level Ginis would indicate a moderate to high level of income-inequality. Yet, if we refer to Table 1 above, we see that all household incomes fall into classes C, D and E. Those that did fall

[8]Over the period of 2011-2013 the average exchange rate was around R$2:USD1. As such the income classes (based on annual income) would be Class A (equal to or above USD 58,470), Class B (from USD 44,850 to USD 58,470), Class C (from USD 10,404 to USD 44,850), Class D (from USD 6,510 to USD 10,404), and Class E (from USD 0 to USD 6,510).

[9]See online data appendix for a breakdown of assets.

[10]See the online data appendix for per capita Ginis.

into the rather large range of class C, did so at the lower end. Thus, the income inequality in the settlements reflects *levels* of poverty, ranging from very poor to moderately poor/lower middle income.

Table 2: Household Income Inequality by Settlement

Settlement	Min	Max	Median	Gini
All	918	48232	10776	.42
3	918	29468	2994	.57
4	3523	30951	1398	.32
5	2416	18850	7973	.34
6	2794	22927	9018	.34
7	1690	29930	15586	.36
8	5540	48232	15667	.33

Author's Data. Reais per year per household. Over 2013, the exchange rate was roughly two Reais to one US Dollar.

My data paints a picture of the settlements as a place of moderate income inequality.[11] I decomposed the overall Gini for my data and found that a main component of the income inequality was due to receiving monthly pension payments (set at the minimum monthly salary for the region) from the government, which can be significantly greater than what the average settler makes via agricultural production.[12] This indicates that rather than a social or class-based hierarchy creating differences, it is demographic differentiation related to age.

5.2 Education

Education can also engender elite power, and as such, provide an avenue for elite capture. In the case study settlements, education differed by generation. In general, schooling was inversely correlated with age after excluding those under eighteen. Historically, in rural areas due to lack of transportation and a lack of rural schools, access to schooling was limited. Policies focused on education implemented post-1995 increased access to and attendance in schools.

I argue age, once we exclude those under eighteen, is a main determinant of education. If this is true then even though there are differences in education, often these differences will be found within households.[13] It would make little sense for the younger generations to exclude the older generations from project benefits (as the older generations may be their family members).

Below I run an OLS regression to check that age is indeed an explanatory variable controlling for gender and settlement in which the individual resides. My survey included questions on education, age, and gender for all household members, resulting in a total of 420 observations (in 93 households). Once I drop all people under the age of 18, I am left with 259 observations. I drop those younger than eighteen because in this group age will be structurally correlated with education. I test the hypothesis that older age will predict less education.

[11] I also found moderate asset inequality. See the online data appendix for more details.

[12] See online data appendix for the decomposition.

[13] A breakdown of my data by age and education occurs in the online data appendix.

Table 3: OLS Regression Results Dependent Variable Education

Variables	Education (1)
Age	-0.154***
	(0.011)
Female	0.938***
	(0.351)
Settlement 4	0.806
	(0.677)
Settlement 5	0.506
	(0.592)
Settlement 6	1.670**
	(0.714)
Settlement 7	-0.399
	(0.567)
Settlement 8	2.083***
	(0.587)
Constant	10.03***
	(0.579)
Observations	259
R-squared	0.526

The model is an OLS regression estimating the effect of age on educational achievements of adults (age>17)with dummy variables for gender and settlement on which the person lives. Standard errors in parentheses, *** significant at 1%; ** significant at 5%; * significant at 10%.

I find that age is significant at the one percent level confirming my hypothesis that adult age and number of years of education are correlated (see Table 3). One additional year of age is correlated with 0.15 years less of education holding gender and the settlement fixed. This is a particularly strong result as some young adults may still be in school increasing their education, which would weaken this relation. In addition, I find that being female results in an additional 0.938 year of education. For older generations going to school and working in the fields were competing activities, in which boys spent more time working in the fields, and girls may have found it feasible to attend school for longer.[14]

5.3 Background and Leadership Positions

Elite power can also originate from one's background or the ability to occupy leadership positions. In my case studies, most people came from similar backgrounds and almost all were involved in agriculture prior to the settlement. This is to be expected as an agricultural background is a requirement to join the settlement. Only one of the settlers previously worked as a small rural producer who owned his own land. Five worked with their families on their families' land. All others were permanent or temporary agricultural workers, or were sharecroppers. In addition, the majority (79 of 93 who completed the

[14]Being a member of Settlement 6 and Settlement 8 had a statistically significant impact on educational outcomes. Settlement 6 had a number of middle-aged and young adults who had become teachers. Settlement 8 had a strong affiliation with the local municipal agricultural workers union which supported post-secondary education for the Settlement 8 youth.

survey) came from the same municipality as the settlement location.[15]

The small size of the settlements, from 10 to 30 registered members, necessitates that almost everyone occupy a leadership position. In fact, 35% of the 93 households at the time of the survey held leadership positions. Positions are rotated every two to four years. In many settlements, the president cannot hold the position for more than two terms consecutively. As such, the ability for an elite to occupy and hold leadership positions is difficult. While those with more literacy, often the younger members, are more comfortable as president, vice president, and secretary, many people who are less educated or illiterate have also been successful at carrying out these jobs. In addition, the treasurer was often a position occupied by someone with little traditional literacy, but with numerical literacy. My data showed no evidence that background or leadership positions were sources of elite power in the settlements.

5.4 Discussion

The SJA subprojects in my sample successfully reached their targets of the low-income, rural, workers engaged in agricultural production located on settlements. While on average the SJA subprojects met the income targets of the greater SJII project (median income for all settlements falls into Class D or E), there was moderate income inequality in the settlements, creating the potential for those with relatively more income to manipulate the subprojects. Thus, the question remains whether this potential was realized. In order to answer this question, I evaluated whether the households had wanted and voted for the chosen subproject, if the households had participated in the subproject, reasons for non-participation, and overall satisfaction with the subprojects.

Ninety percent (63/70) of the households surveyed in my six case studies that were currently living on the settlement when the SJA subprojects were chosen had wanted and voted for the chosen subproject. Of the seven households that wanted a different SJA subproject, six of them occurred in Settlement 5 which received an apiculture subproject. Settlement 5 had initially decided on a pisciculture (fish farming) subproject, but at the behest of a technician who heavily favored apiculture (bee-keeping) subprojects and worried about the lack of water, the majority voted for an apiculture subproject. When the subproject was confirmed as an apiculture subproject, eight of nineteen households left the subproject. [16] Additionally, Settlement 5 had very little income inequality; all households fell into the income classes D and E (4 and 15 households respectively), and the household income Gini was 0.34, at the low end for the settlements.

Almost all eligible households began by participating in the subprojects. Seventy-one percent (66/93) of the households were participating in the SJA subproject during my fieldwork or had been participating when the subproject ended.[17] Settlement 7 stands out as having had less than half (11/25) of the households participating in its subproject when it ended. This settlement did face moderate income inequality. But the high level of non-participation was in part a result of a high turnover of households in this settlement. In

[15] See online data appendix for a breakdown.

[16] The technician may have greater education, income, and power than the community but it is helpful to separate out his influence from that of the influence of a community elite. This particular case is explored in more detail in Carrick-Hagenbarth (Carrick-Hagenbarth, 2016).

[17] See appendix for a breakdown.

fact, fourteen households had joined the settlement after the subproject was put in place. This and the fact that the subproject was both short-lived and subject to many problems meant new households were not quick to join the subproject.

There were two main reasons the majority of the twenty-seven non-participating households gave for either their non-participation or attrition from the subproject. First, some households had joined the settlement after the subproject had been put in place. Depending on the settlement subproject rules, those arriving after the subproject had been constructed were either allowed or not allowed to join the subproject. When they were allowed to join, sometimes families decided they did not wish to join the subproject. Second, some households prioritized their individual production in crops and livestock over that of participation in the subproject. Table 4 details the reasons given.

Table 4: Reasons for Non-Participation in SJA Subprojects

Reasons for Non-Participation	Frequency
Entered the settlement after the project was put in place and did not want to join	9
Did not want to participate in the project due to time constraints	7
Did not want to participate in project because of collective nature	3
Did not want to participate in project because of distance	1
Did not want to participate in project because of fear of project	1
Not allowed to by rules of the project	2
Wanted a different project	1
Other	3
Total	27

Author's Data.

When questioned as to whether the households felt the subproject was good for the community, sixty-one (84%) of the seventy-three settlers who answered the question said it had been good for the community, and twenty (27%) said they did not know. When asked to comment on their answer, many said that it was useful to the communities to gain access to such subprojects and that the subprojects had begun well. The many criticisms of the subprojects did not cite evidence of elite capture and mostly pointed toward technical failures.[18] Of the twelve that did not feel the subproject was good for the community; half came from Settlement 6. Settlement 6's subproject was never implemented.

I do not find evidence to support the elite capture of the subprojects. The targeted communities received the SJA subprojects. Most settlement members voted for and participated in the subprojects. Subproject outcomes also did not appear to be disproportionately benefiting one group over another.

6 Free Riding

While there is an abundance of literature addressing free riding in the context of common pool resources, there has been little analysis of free riding in CDD projects. This may be because, in the past, many CDD projects have been dedicated to infrastructure. Once built, infrastructure subprojects require minimal labor or monetary input from participants. Currently, however, CDD projects are moving toward new livelihood activities (productive

[18] I explore this further in Carrick-Hagenbarth (Carrick-Hagenbarth, 2016).

subprojects), which require long-term ongoing labor and as such present a greater potential challenge of free riding.

Free riding can be theorized in terms of consumption or production activities (Olson and Cook, 2006). In the context of public goods and common pool resources, the free rider problem can be thought of as a consumption activity, in which the challenge is in either providing an optimal amount of the public good for public consumption when the incentive is to minimize one's contribution and to understate one's 'true' preference for the quantity and quality (McMillan, 1979) or preventing the over-consumption of common pool resources (Hardin, 1968). Employees and managers in capitalist firms and collective workers in cooperatives face a free rider problem based in productive activity. Here people may shirk by under-providing effort in the firm or cooperative. This occurs because of the difficulty of monitoring effort due to the challenge of measuring the marginal contribution of each individual (Alchian and Demsetz, 1972).

Most of the settlements I studied established collective work when the settlement was created. This collective work was aimed at settlement maintenance. Since I choose settlements established between 1998 and 2002, all settlements had over ten years of experience addressing this obstacle in their settlement collective work. Generally, settlers had successfully handled the free rider problem largely due to settlement institutions.

6.1 The Institutions of Collective Settlement Work

Elinor Ostrom lists in her seminal book *Governing the Commons* important design principles for the successful collective management of common pool resources. First, it must be clear who has access to the resource and who has a right to use the resource. Second, the rules regarding the appropriation of the resource, and the rules outlining who and how much is provided by the members when there is a need, must reflect local conditions and means. Third, the majority of the people participating in the use of the resource can affect the rules. Fourth, the community must have active monitors who are accountable to the community that uses the resource. Fifth, there should be graduated sanctions so the gravity of the offense can be taken into account. Sixth, there must be conflict-resolution mechanisms that are both accessible, rapid, and low-cost. Seventh, the external government must recognize the rights of the community to create and implement rules, as well as to monitor and sanction members, and must not challenge the community's rules. Eighth, all design principles must exist as 'nested enterprises' in that these rules are nested within the local, regional and national governments to some extent, as well as within the community itself (Ostrom, 1990, p.90).

The settlement collective work institutions begin with the general assembly (see Figure 1). The general assembly is a meeting of all settlement members held once a month and additionally when needed. This is the arena in which all settlers can participate in creating the rules for the collective work (and for the settlement in general) and deciding on the sanctions for members who free ride. This reflects Ostrom's principle two and three. All settlers serve as monitors and can easily identify people who do not participate in the group time set aside for settlement maintenance work. When members do not participate, the settlement leadership charges them the previously agreed upon fine as a sanction. If a member continues to fail to participate in the collective work they can be evicted from the settlement. These sanctions are graduated, Ostrom's principle number five.

There are three steps to resolving problems when fines do not prevent non-participation and the threat of eviction also fails to motivate members to participate (outlined in Figure 1). In the first step, the leadership can meet both individually or in a group with the offending members to reinforce the need for their participation (this occurred in Settlements 4, 5, 6, 7, and 8). Occasionally, these meetings uncover logistical problems that are preventing the settlers from participating (this occurred in Settlements 4 and 5). The settlers can then move to step 2. In step 2, the leadership brings the obstacles that the individuals are facing to the general assembly to problem-solve (this occurred in Settlements 4 and 5). The group may then reorganize the settlement work and modify the rules and sanctions. This corresponds closely to Ostrom's principle number six.

If this still fails to resolve the free riding problem, the settlers can move to step 3. In step 3 the settlers can appeal to the outside entities of the MST, the agricultural workers' union, INCRA[19], or IDACE[20], to reinforce the sanctions and the need for collective work (this occurred in Settlement 5). Collective work on the settlements and in the SJA subprojects can be difficult to sustain and accompaniment by groups, such as the MST and the Agricultural Workers Union, have served an important role in maintaining effectiveness. In particular, the MST has worked with the settlers on valuing settlement collective work and reinforcing settlement leadership authority. Thus, these entities serve what Ostrom has referred to in her principle eight as 'nested enterprises' in that the institutions of the settlement are nested within those of the local, regional, and state government. In Figure 1 this is indicated by the circle surrounding the settlement. Furthermore, the ability to appeal directly to entities of the government, for example, INCRA and IDACE, shows that the self-management rules of the community are recognized by the government, Ostrom's principle number seven.

6.2 The Institutions of SJA

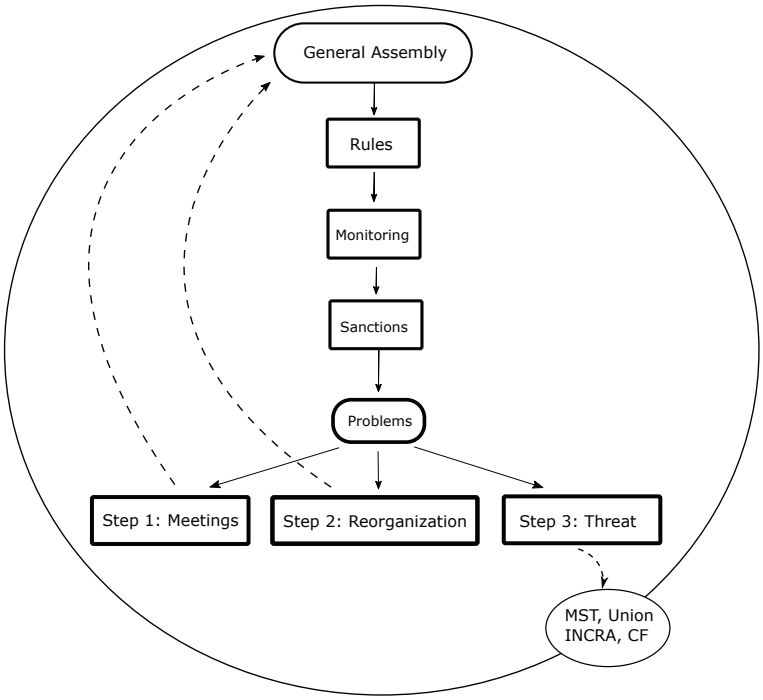
The subprojects studied had the goal of either the production of a local-level public good, a common pool resource, or a shared private good. Infrastructure subprojects included perimeter fences and reservoirs for settlements. Both perimeter fences and reservoirs are non-excludable. The fence is non-rival, while the reservoir is rival (due to limited quantity and quality of water). Thus, the perimeter fence has the characteristics of a local-level public good, and the reservoir has the characteristics of a common pool resource. Productive subprojects included irrigation, bee-keeping, tractors, and crops. These goods are both rival and excludable; as such they have the characteristics of a private good. Subproject rules allow for subproject members to freely exit subprojects, but they are not allowed to rejoin. Subproject rules also allow the group to exclude members from a subproject if they fail to participate.

It would seem likely that within the SJA subprojects, free riding would present a more significant potential problem for the infrastructure subprojects than for the productive subprojects because of the type of good created. Yet, the ability to exclude free riders from productive subproject gains also proved difficult. Exclusion depends on the design and implementation of subproject rules, which were often vague. In fact, I found little

[19]Instituto Nacional de Colonização e Reforma Agrária, the national agency in charge of land reform

[20]Instituto do Desenvolvimento Agrário do Ceará, the state agency in charge of the Crédito Fundíario, the market-based land reform program.

Figure 1: Flowchart 1: Settlement Collective Work Institutions



evidence that subproject participants had excluded members from productive subproject outcomes, even in the presence of free riding. Unfortunately, the long time to maturity of productive subprojects and their high failure rate meant I had little data by which to assess the ability of the settlers to exclude free riders from productive subprojects. It seems likely that, in the event these subprojects were to succeed in increasing production and income for members, they would become more desirable to members, increasing their participation. The persistent problems the settlement collective work faces predicts successful, productive subprojects, with their need for ongoing collective work and vague rules, might also face free riding problems in the future, particularly in the case of communities that do not have strong institutions of collective action.

Table 5 provides a breakdown of the types of free riding and when they can potentially occur. Boxed numbers indicate that this type of free riding affected my case studies. The Implementation Stage of both the infrastructure and the productive subprojects had very few problems with free riding. During this stage, there are two factors which prevent free riding. First, technical agencies assist the settlers in constructing the subprojects. Often the settlers work alongside the technical agencies, which serve as an outside monitor of non-participation during the implementation period, serving as a complement to internal institutional structures that limit free riding. For example, Settlement 4 constructed a shed with the assistance of two hired masons. Community members were required to assist the masons, rotating the jobs among the families each day. Second, the settlers are generally enthusiastic about the subproject prospects resulting in high levels of motivation and participation.

In the case of infrastructure subprojects, once the Implementation Stage is complete, the technical agency leaves the settlement and the project transitions into an Operations and

Table 5: Types of Free Riding

		Stage 1	Stage 2	Stage 3	Stage 4
Infrastructure		Approval	Implementation	O&M	None
	Public Goods	1	1,2,3	1, [2] ,3	
	CPR	1	1,2,3	1, [2] ,3,4	
Productive		Approval	Implementation	Incubation	Output
	Private Goods	1	1,2,3	[1], [2], [3]	—, —, —

Author's typology. 1,2,3,4 indicate different types of free riding that could occur in the projects included in my case studies.
1 = Failure to participate in organizational activities
2 = Failure to provide monetary contributions
3 = Shirking subproject work
4 = Overuse of resource
A box around the numbers indicates I observed this type of free riding in my case studies.
— Indicates that none of the productive projects in my study had reached the Output Stage and as such I could not observe or interview settlers about free riding. I would assume that free riding could occur here as either 1, 2 or 3.

Maintenance Stage (O&M). In this stage, much of the collective work in the infrastructure subprojects is completed during the time set aside for settlement collective work. Thus, if shirking is present in the settlement collective work, it will also affect the SJA subproject work. The infrastructure subprojects in my case studies occurred in Settlements 2, 4, and 6. Settlements 2 and 4 had few problems with collective settlement work. Settlement 6's subproject failed but not for reasons of free riding.

Unlike the settlement collective work, many of the rules of the subprojects were established by the SDA and the WB, and not by the participants themselves. This is different from Ostrom's principle three. For example, in the infrastructure subprojects during the O&M stage the settlement is expected (by the WB and SDA) to charge a fee to each member for the use of the good. Settlements 2 and 4 were unable to charge a fee to its members for the use of the fence (Settlement 6's subproject, a reservoir, was never built). Since the good is non-excludable, it becomes difficult to enforce a fee for use. The leadership did not seem concerned that members were not paying the fees and had made no attempts to resolve the (supposed) problem. This required rule did not seem to reflect community values.

Stage 3 is the Incubation Stage for the productive subprojects, and this is where free riding occurred for Settlement 5, and where possible indications of free riding occurred for Settlements 3 and 7. Settlement 5 tried to institute rules dealing with free riding in their apiculture project by creating a document outlining the rules of the subproject. For example, the document states if a person misses more than two days in a row without a reasonable excuse it will be brought to the attention of the group (Assentamento 5, Associacao do Projecto de Assentamento 5, 2008). If they continue missing work, then it will be brought up in an administrative meeting, and the person can be excluded from the subproject (Assentamento 5, Associacao do Projecto de Assentamento 5, 2008). There were two problems with this rule. One, it does not delineate practical guidelines, such as the number of missed days leading to an administrative meeting or exclusion from the subproject. Second, although a document outlining the rules existed, none of the interviewees mentioned it except the president.

Unfortunately, the drought that had persisted in the region for the two years preceding

the period of my investigation had weakened Settlement 5's subproject. The drought had contributed to a lack of flowers and subproject participants were feeding the bees in order to keep them alive. Of the eleven households who considered themselves current members of the project, only four households were contributing money to buy the sugar and contributing labor to feed the bees. Those who were not contributing were not expelled from the subproject. Invariably, they said they were waiting for good rains and the bees to begin producing honey to start working on the subproject again. In this case, even though they had a list of rules for the subproject, the settlement members were not using them to exclude free riding members from the subproject.

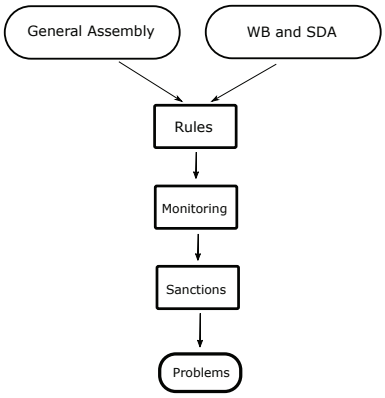
Settlements 3 and 7 both had irrigation subprojects. One of the main challenges to these two subprojects was the need to provide monthly electricity payments. The settlers were not willing to pay these charges. In both cases, the settlements were eligible for government-subsidized electricity. Neither settlement was willing to go through the government bureaucracy to access these funds indicating a failure of the subproject members to take on the necessary (re)organizational chores. In Settlement 3, the group as a whole decided to leave the project. The fact that members were unwilling to either pay for electricity or to undertake the bureaucratic process of accessing subsidized electricity might indicate some free riding. In Settlement 7, there was persistent attrition from the subproject until the costs of electricity were too much for the remaining project members and they quit as well. Subproject attrition could also indicate free riding problems.

I did not observe free riding in Stage 4, the Output Stage, in which the productive subproject is successfully harvesting and marketing the output because none of the productive SJA subprojects had reached that phase successfully (despite being established in 2007-2010 and my not visiting till 2012-2013). This is explored in greater detail in Carrick-Hagenbarth (Carrick-Hagenbarth, 2016).

Ostrom also notes the importance of monitoring and graduated sanctions (Ostrom, 1990). Monitoring was done on an ad hoc basis by those involved in subprojects, but specific monitors were not designated. Finally, there were not graduated sanctions for rule transgressions in the productive SJA subprojects. In groups with institutions that do not have graduated sanctions, a person falls into only one of two classifications: a participant or a non-participant. The production is then divided among the participants regardless of total effort contributed to the production. Yet, participants may shirk or even fail to show up for collective work in varying amounts, free riding on the labor of others. In the absence of graduated sanctions, it may seem overly harsh to exclude a participant for small transgressions. In addition, it might be politically and socially costly to exclude free riding participants from the subproject. Lastly, the method by which to exclude participating members may not have been defined prior to the subproject adequately to enable the community to enforce such exclusion. Generally, if people violated rules or free rode extensively, they could be asked to leave the subproject. I did not find that the settlers had imposed this sanction. Additionally there no other mechanisms to resolve SJA subproject conflicts. Lastly, the SJA subprojects did not provide an institutionalized way to solve subproject problems.

In the Figures 1 and 2, it is clear that the institutions of the settlement collective work are much more robust than those of SJA subprojects. Shirking in productive subprojects in my sample tended to increase over time. Thus, subprojects with ongoing labor — productive subprojects — tend to face more shirking than those based primarily around

Figure 2: Flowchart 2: São José Agrário Subproject Institutions



an implementation stage — infrastructure subprojects. Free riding may become a more severe problem for successful, productive collective subprojects than for successful collective infrastructure subprojects (not what would be expected based on the kind of good created).

Collective work on the settlements and in the SJA subprojects can be difficult to sustain and accompaniment by groups, such as the MST and the Agricultural Workers Union, have served an important role in maintaining effectiveness. As we saw in a previous section, Settlement 5 asked the MST for help when they were facing free riding in collective work. Through community meetings, the MST worked with settlers on valuing of settlement collective work. Their presence also served the purpose of reinforcing the leadership's authority. Settlements 1 and 2, which were strongly linked to the MST, had community members who worked directly with the MST, served as militants for the MST, or were studying in one of the educational programs of the MST. These settlements appeared to have a stronger commitment to the values of collective work. Interviews in these settlements revealed no problems with collective work in either settlement maintenance or in the SJA subprojects. Due to the institutions of the settlements and the accompaniment of the MST most problems with free riding in collective settlement work and in the subprojects were overcome.

7 Conclusion

São José Agrário's partnership with the Landless Workers' Movements (MST) combined a project-based approach to participatory development with a radical approach creating a better institutional environment for the implementation of a community-driven development project. My case studies showed how the settlers overcame political pressure and avoided clientelistic relationships. Although I found significant differences in income and education of participants, I found no evidence of elite capture of project funds or subproject benefits in the case studies. Free riding presented challenges to settlement collective work and, to a lesser extent to the SJA subprojects, but these challenges were mostly surmounted. The settlers were able to overcome problems of clientelism, elite capture, and free riding due to the robust institutions created in the agrarian settlements and the accompaniment of the MST.

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A Assets

As Angus Deaton points out in his book *The Analysis of Household Surveys: a Mircoeconometric Approach to Development Policy* there are a number of obstacles to accurate income data collection via survey (Deaton, 1997, 29). Income data is often subject to recall bias and seasonality. In the case of rural households, income data becomes harder to collect and quantify as rural households often supplement their consumption through subsistence production and collection via nearby forests and bodies of water. Additionally, people are more hesitant to reveal income data as compared with consumption data. Furthermore, survey data understates inequality as wealthier households are less willing to reveal their income as compared with lower-income households. On the other hand, surveys that measure income via consumption will tend to under report wealthier households' income, as such households generally save a greater portion of their incomes, which may not be recorded in such surveys (Deaton, 1997).

For these reasons, I also collected data on assets. In particular, I concentrated on durable household goods as a check on my income data. Table 6 presents a breakdown of the number and percent of households from my survey that have a particular good. Some households have more than one of a good, for example, cell phones, fans, televisions, bicycles, and motorcycles. I list the number of families that have more than one of a good in the table notes. Those assets that are of greater value and only held by a subset of the families indicate income inequality; cars, sewing machines, and washing machines. The main form of transportation were by motorcycle and bicycle. Around forty percent of my sample had a motorcycle. Together these make up some of the most expensive goods (excluding bicycles). It might seem that a freezer should also be included here, but many households who have a freezer do not have a refrigerator and vice versa. Thus the freezer and refrigerator function as substitutes. The existence of some goods that only between six and thirty percent of households own indicates some asset inequality. In addition, there are some families that had more than one motorcycle (seven households have two motorcycles, and one household had three), also reinforcing my finding of some asset inequality.

Table 6: Durable Household Assets

Household Assets	Frequency	Percent
Cell Phone*	62	67
Stove	82	88
Refrigerator	86	92
Freezer	13	14
Blender	79	85
Fan*	59	63
Washing Machine	15	16
Sewing Machine	25	27
Satellite	66	71
Television*	86	92
DVD Player	66	71
Radio	81	87
Stereo	47	51
Bicycle*	72	77
Motorcycle*	56	40
Car	6	6
Truck	0	0

Author's Data. * Indicates that some households had more than one. Cell phones: 36 households had 1, 16 households had 2, 9 households had 3, 1 household had 5. Fan: 57 households had 1, 2 households had 2. Television: 84 households had 1, 2 households had 2. Bicycle: 48 households had 1, 15 households had 2, 5 households had 3, 4 households had 4. Motorcycle: 48 households had 1, 7 households had 2, 1 household had 3. I also asked about landlines and VHS players, but since no one had these, I eliminate them from the table.

B Per Capita Ginis

Here I have calculate the overall per capita Gini and the per capita Gini for each settlement. The per capita Gini for each settlement varies between 0.33 and 0.47.

Table 7: Per Capita Income Inequality by Settlement

Settlement	Min	Max	Median	Gini
All	92	16077	1741	.47
3	92	3683	630	.47
4	881	15476	2109	.42
5	680	3770	1610	.33
6	559	15750	1647	.47
7	668	10515	3103	.39
8	1010	16077	2770	.41

Author's Data. Reais per year per capita. Over 2013, the exchange rate was roughly two Reais to one US Dollar.

C Household Gini Decomposition

The Gini decomposition following the Lopez-Feldman method has several components (López-Feldman et al., 2006). S_k is the share of the source income as a proportion of the Gini, G_k is how unequal the source income is, R_k is the relationship between the source income and the Gini, $Share$ is the share of the Gini coefficient the source income makes up,

$\%Change$ shows how a one percent increase in the source income would affect the overall Gini.

I find according to this decomposition that all source income apart from retirement/pensions and livestock income decrease inequality. Livestock income has only a small effect: a 1% increase in income deriving from livestock sale increases the Gini by .01%. Since Settlement 8 has the highest amount of income coming from livestock, I exclude this settlement (going from 93 observations to 76) to evaluate if livestock income would still be a source of increasing inequality. I then calculate the new Gini and new Gini decomposition. Excluding settlement 8, the household Ginis are almost the same going from 0.415 in Table 8 to 0.418 Table 9. It also suggests that Settlement 8 is driving the result that livestock income contributes to increasing inequality as once we exclude Settlement 8, Livestock Income has a small negative effect on the overall Gini. The retirement/pension income continues to positively affect the Gini in both decompositions.

Table 8: Household Gini Decomposition by Income Source

Source	Sk	Gk	Rk	Share	% Change
income from outside work	0.2167	0.7838	0.5149	0.2107	-0.0060
retirement/pensions	0.3374	0.7349	0.9171	0.5479	0.2105
welfare (*Bolsa Família*)	0.1311	0.4457	-0.1449	-0.0204	-0.1515
other transfers	0.1057	0.4365	0.4035	0.0448	-0.0608
crop income	0.0066	0.9448	0.0758	0.0011	-0.0054
livestock income	0.2026	0.6919	0.6389	0.2158	0.0132
Total income	0.4150				

Author's Data. Using Lopez-Feldman's Descogini command in Stata. Observations equals 93.

Table 9: Household Gini Decomposition by Income Source Excluding Settlement 8

Source	Sk	Gk	Rk	Share	% Change
income from outside work	0.2280	0.8100	0.5100	0.2251	-0.0029
retirement/pensions	0.3510	0.7517	0.9096	0.5737	0.2227
welfare (*Bolsa Família*)	0.1544	0.4424	-0.0476	-0.0078	-0.1621
other transfers	0.1058	0.3713	0.5906	0.0555	-0.0504
crop income	0.0091	0.9324	0.1703	0.0035	-0.0057
livestock income	0.1517	0.6845	0.6042	0.1500	-0.0017
Total income		0.4183			

Author's Data. Using Lopez-Feldman's Descogini command in Stata. Observation equal 76.

D Level of Education by Age 18 Years and Older

In Table 10 it is clear that the older generations were significantly less educated than the younger generations, in fact, many are illiterate. The youngest generations have much more education, including some post-secondary schooling.

Table 10: Education Differences by Generation: Years of Education

Age	0 years	1-4 years	5-8 years	9-11 years	Post-Secondary	Total
18-27	0	10	18	42	6	76
28-37	2	26	11	5	2	46
38-47	6	33	17	2	0	58
48-57	11	18	2	1	0	32
58-67	11	12	1	0	1	25
68-77	9	7	1	0	0	17
78-87	5	0	0	0	0	5
Total	44	106	50	50	9	259

Author's Data. Number of people in each age group with the given level of education, for those 18 and older.

E Age as a Predictor of the Level of Education Extended

Belonging to a particular household may affect the result that age is highly correlated with the level of education achieved. In particular, the educational levels of the head of household may be positively correlated with the educational outcomes of children, as parents with greater levels of education may place a higher value on the education of their children. I have included the results from model 1 for comparison. In the second model, column two, I control for the head of household's educational level. I drop all people that are ten years younger than the head of household or older. This way I exclude the majority of extended family members such as aunts, uncles, or grandparents. I also drop all individuals younger than eighteen. I am left with a significantly reduced and younger sample size of 90.

My regression is the following

$$ED_i = \beta_1 + \beta_2 A_i + \beta_3 H_i + \theta_1 F_i + \delta_4 S_{4i} + \delta_5 S_{5i} + \delta_6 S_{6i} + \delta_7 S_{7i} + \delta_8 S_{8i} + \mu_i \qquad (1)$$

where ED is education, H is the education level of the head of household, A is age, F is a dummy variable for female, and S is a dummy variable for Settlements 4 through 8, with Settlement 3 as a baseline, i indexes individuals.

Overall, I find the education level of the head of household has a positive but not significant effect on the educational levels of younger household members. The age of the individual continues to be strongly significant in predicting educational outcomes, one additional year of age is correlated with almost .2 years less of education.

The coefficient for being female has changed signs. For women in this sample, gender has a negative but not statistically significant effect on education. There could be a qualitative difference between the education of older generations and that of younger generations. For older generations going to school and working in the fields were competing activities, in which male children spent more time working in the fields, and female children may have found it feasible to attend school for longer. Currently, education has expanded, and conditional cash transfers require children to attend school. As such, gender may not have a large effect on educational outcomes.

Table 11: OLS Regression Results Dependent Variable Education

Variables	Education (1)	Education (2)
Age	-0.154***	-0.199***
	(0.011)	(0.030)
HOH Education		0.115
		(0.138)
Female	0.938***	-0.020
	(0.351)	(0.606)
Settlement 4	0.806	0.009
	(0.677)	(1.098)
Settlement 5	0.506	1.952*
	(0.592)	(0.996)
Settlement 6	1.670**	1.758
	(0.714)	(1.150)
Settlement 7	-0.399	-1.185
	(0.567)	(0.924)
Settlement 8	2.083***	2.601***
	(0.587)	(0.801)
Constant	10.03***	11.907***
	(0.579)	(0.912)
Observations	259	90
R-squared	0.526	0.539

Model 1 is an OLS regression estimating the effect of age on educational achievements of adults (age>17) with dummy variables for gender and settlement on which the person lives. Model 2 presents an OLS regression estimating the same as Model 1 but also controlling for the impact of the education of the head of household on educational achievements of individuals. Standard errors in parentheses, *** significant at 1%; ** significant at 5%; * significant at 10%.

F Agricultural Background

Table 12 shows the agricultural backgrounds of the settlers. Almost all worked in some type of agricultural work prior to joining the settlements.

Table 12: Types of Work

Type of Work	Number	Percent
Temporary Rural Wage Worker	20	22
Permanent Rural Worker	18	19
Small Rural Producer (less than 50 ha)	1	1
Worked as a relative of a Small Rural Producer	5	5
Sharecroppers	43	46
Other	4	4
NA	2	2
Total	93	100

Author's Data. NA signifies not applicable, these were young people whose first jobs were being settlers.

G Participation in SJA Subprojects

Table 13 provides information on the number of participating households compared with total eligible households either at the time of my visit (2012-2013) or at the time when the subproject ended if it had ended prior to my visit.

Table 13: Participation in SJA Subprojects

Settlement	Number Participating/Total Households
Settlement 3	10/12
Settlement 4	10/10
Settlement 5	11/19
Settlement 6	7/10
Settlement 7	11/25
Settlement 8	17/17
Total	66/93

Author's Data.