Medium-term Impacts of a Productive Safety Net on Aspirations and Human Capital Investments

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Abstract

This paper analyses the medium-term impacts of a productive safety net program and focuses on the role of interactions with local leaders in sustaining poor households' investment response after the end of the program. The causal effect of social interactions is identified through the randomized assignment of leaders and other beneficiaries to three different interventions aimed at increasing human capital and productive investments. Social interactions were found to augment program impacts on households' investments in education and nutrition, and to affect households' attitudes towards the future during the intervention. This paper shows the social multiplier effects are instrumental in sustaining the shift in households' human capital investments even after the end of the program.

Keywords: social interactions, leaders, human capital investments, randomized trial, policy evaluation

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1. Introduction

Many development interventions aim to increase the investment of poor households in the education and nutrition of their children. Conditional cash transfer programs in particular have been found to augment households' investment in human capital in many settings (Fiszbein and Schady, 2009; Murnane and Ganimian, 2014). A key question is whether their impact on households' investments can go beyond the immediate impact of relieving liquidity constraints and result in sustainable shift towards higher levels of investment in nutrition and education by the poor. Only a few studies have focused on whether the impacts on households' human capital investments persist even after such programs end (Baird, McIntosh and Ozler, 2016; Macours, Schady and Vakis, 2012) and the evidence is somewhat mixed.[1] Even less is known about the possible mechanisms underlying the potential persistence. Understanding the mechanisms is key in order to derive lessons regarding optimal design of new programs, or even to potentially adjust existing ones.

This paper provides evidence on the role of social interactions within beneficiary communities for the persistence of program impacts. The paper builds on Macours and Vakis (2014), where we showed that social interactions with successful leaders substantially increased program impacts on nutritional and educational investments while the program was operating. We use data collected two years after the program ended, to show that these social multiplier effects persisted to a remarkable degree. Two years after the transfers stopped, households who live in the proximity of successful leaders still show significantly higher investments in both education and nutrition of their children.

As in the previous paper, we rely on the two-staged randomized design of a short-term transfer program in Nicaragua to identify the social interaction effects. The program combined conditional cash transfers

[1] There is a somewhat larger and growing literature on whether the impacts on human capital outcomes or overall welfare outcomes, as opposed to investments, persist on the longer run (Gertler, Martinez, and Rubino-Codina, 2012; Barham, Macours, and Maluccio, 2013a, b; Barrera-Osorio, Linden and Saavedra 2015; Filmer and Schady, 2015; Macours, Premand and Vakis, 2013; see also Molina-Millan et al. 2016 for an overview).

(CCT) with interventions aimed at increasing households' productive potential. Because it targeted the vast majority of households in each community and explicitly encouraged group formation, it provides a unique opportunity to analyse the role of social interactions. Households were randomly assigned to three different intervention groups within randomly selected treatment communities. Eligible female leaders (henceforth leaders) were also randomly allocated to one of these three interventions. This provides random variation in whether beneficiaries live close to the leaders that received the largest package. We use this exogenous source of variation and analyse whether the successful examples of leaders affected human capital investments of other beneficiaries.

Macours and Vakis (2014) show that social interactions with nearby leaders positively affected human capital and productive investments as well as the future-oriented attitudes of other beneficiaries during the program. Our results suggest that interactions with leaders may have affected other households' aspirations by setting good examples and sharing their experiences. The earlier work does not establish whether these shifts are sustainable, and a priori the answer is not obvious. Indeed, increasing aspirations in the presence of many other remaining constraints, possibly only led to short term gains, and households might well quickly revert back to pre-program behaviour when the transfers stop. On the other hand, if interactions with successful leaders successfully changed norms and beliefs regarding human capital investments, the increased investment levels might persist even after the end of the program. Evidence in Macours, Schady and Vakis (2012) suggests that at least for parental investments in early childhood there was a persistent effect. Considering a much wider age group of children, this paper shows that social interactions with local leaders were crucial for the persistence in the educational and nutritional investment.

Our results further show that interactions with leaders changed parents' beliefs or expectations about their children's educational and occupational potential, which can help explain the sustained higher levels of human capital investments. This paper hence relates to findings by Beaman et al (2012) on the role of

reservations for female leaders in changing parental aspirations for girls in India. It also resonates with the findings of Bernard et al (2014) who show that videos of successful peers in Ethiopia changed aspirations and forward looking behaviour, including investment in education, and also find that effects are further enhanced by social interactions. More broadly it relates to recent empirical work on the potential of social interactions to shift norms and behaviour (e.g. Feigenberg, Field, and Pande, 2013; Paluck and Shepherd, 2012) and to the emerging literature about mental models and attitudinal changes (e.g. Jensen and Oster 2009, La Ferrara, Chong, and Duryea 2012, World Bank, 2014).

The paper is organized as follows: in the next section we discuss the key features of the program and the relevance of social interactions. Section 3 discusses the data and the empirical strategy. Section 4 then shows that social interactions with successful leaders led to persistent impacts on other beneficiaries' human capital investments and also shows impacts on parental expectations. Section 5 concludes.

2. Program information and design

2.1. Program description and treatment packages[2]

The *Atención a Crisis* program was a one-year pilot program implemented in 2006 by the Ministry of the Family in Nicaragua. In the treatment communities, three different treatments were randomly allocated among 3000 eligible households. All selected households were eligible for the basic CCT, which included cash transfers conditional on children's primary school and health service attendance. The transfers came with a strong social marketing message reinforcing the importance of investing in children's education and in diversified nutrition. Take up of the CCT was 95%. In addition to the CCT, one third of the eligible households received a scholarship for a vocational training (with take-up of 89%). Finally, another third received, in addition to the basic CCT, a 200 US$ grant for productive investment aimed to develop a

[2] More details about the program and its different components are provided in the online appendices of Macours, Schady and Vakis (2012) and Macours and Vakis (2014), as well as the following website: http://go.worldbank.org/VUYJAQ3UN0

small non-agricultural business (with take-up of 99%). Given the high take-up rates, we henceforth refer to eligible households in treatment communities as beneficiaries.

The program design aimed to change household's investment behaviour through several mechanisms. The level of transfers was substantial, ranging from 18 per cent of average annual household income for those receiving the basic CCT package to 34 per cent for those receiving the productive investment package. The conditionalities and social marketing on education, health and nutrition aimed at changing households' perspectives about investment in long-term human capital. The program design also created many opportunities for enhanced interactions between beneficiaries. More than 90 per cent of the households in treatment communities were eligible for the program, increasing the opportunities for information sharing and interactions, possibly resulting in higher motivation and program ownership. Program participants were also required to participate in a number of local events ranging from discussions on nutrition practices to workshops on business development and labour market skills. The program also put in place a system of volunteer local *promotoras* to further enhance information flows and compliance with program requirements. The *promotoras* met frequently with a small groups of (about 10) beneficiary women to talk about these requirements and the program's objectives. While these women self-selected to lead these groups, they were randomly allocated to one of the three program packages.

2.2. Program randomization

The program was targeted to 6 municipalities in the Northwest of Nicaragua, and a first lottery randomly selected 56 intervention and 50 control communities. Baseline data were used to define household program eligibility using proxy means methods for both treatment and control.[3] In the treatment communities, the main female caregiver from each eligible household was then invited to a registration

[3] As more than 90% of all households were eligible, the analysis in this paper is limited to the eligible households.

assembly. If there were more than 30 eligible households in a community, several assemblies were organized at the same time, and households were assigned to one of the assemblies based on the geographic location of their house. In total, there were 134 assemblies (hence on average 2.4 per community).

During the assemblies, the program objectives and its various components were explained and women were asked to volunteer for the *promotora* positions. Volunteers were approved by the assembly and each *promotora* was assigned a group of approximately 10 beneficiaries living close to her, based on a joint decision. At the very end of each assembly, all the beneficiaries - including the *promotoras* - participated in a second lottery process through which the three packages described above were randomly allocated among the beneficiaries, with each of the three packages assigned to one-third of households in the treatment communities. As a result, we can compare 4 experimental groups: the control group (in the control communities), and 3 treatment groups (in the treatment communities): the CCT only group, the CCT plus training group and the CCT plus productive investment grant group. Since *promotoras* and other existing female leaders in the treatment communities were randomly allocated to one of the three treatment groups, all other beneficiary households were also randomly exposed to leaders with different treatment packages.

3. Data and empirical strategy

In treatment communities, data were collected from all households. In control communities, a random sample of households was selected at baseline so the control group was of equal size as each of the three intervention groups (of 1000 households). The data analysed in this paper was between august 2008 and May 2009, approximately 2 years after the last transfer. The household attrition rate was very low (3 per cent) and attrition is uncorrelated with treatment.

Identification relies on two key program design elements, namely the randomized allocation of beneficiaries to one of the three program packages, and the random allocation of these same packages among leaders. The randomizations worked well (see Macours and Vakis, 2014). The variables used to identify social interaction effects rely on the random allocation of leaders to one of the three intervention groups. As before, we consider both the leadership positions created in the treatment communities by the program (the *promotoras)* and other women with leadership positions because they are not mutually exclusive (many health coordinators and teachers volunteered to be *promotoras*). Leaders tend to be younger and more educated than the average beneficiary. While beneficiaries on average have completed 3 years of education, leaders have on average 5 years.

In Macours and Vakis (2014) we show that short-term returns to the productive investment grant for the leaders were higher than for the other beneficiaries. During the intervention leaders with the productive investment package also had higher non-agricultural and total income than leaders with other packages, reflecting the additional cash they had received to start new activities. As such leaders with the biggest package provide successful examples to other beneficiaries, and might have motivated and inspired others. We also showed that the income level and the income structure of these leaders at baseline were similar to those of the other beneficiaries, which might make it easier for the others to identify with their subsequent positive experiences of the leaders.

The productive investment package is also the intervention that created sustainable gains in income and consumption levels two years after the end of the program (Macours, Schady and Vakis, 2012; Macours, Premand and Vakis, 2013). Table 1 shows that for the leaders this translates in similar differences than before. Two years after the end of the intervention, leaders with the productive investment package continue to have higher incomes from non-agricultural self-employment than both other leaders and other beneficiaries. Importantly, leaders' human capital investments in their children are also higher than those

of others, both before, during and after the program. Overall leaders with the productive investment package hence continue to provide positive examples for others.

As in our previous work, we therefore focus on whether social interactions with leaders that received the productive investment package affected investments of other beneficiaries. Specifically, we calculate the share of leaders that was randomly allocated into the productive investment package in each registration assembly. The average numbers of leaders in an assembly is four, so that there is substantial variation in the share of leaders that got the productive investment package in an assembly. There is much less variation in the share of other beneficiaries that got the productive package as the number of households in each assembly was relatively large and the number of leaders is small, so that the share of non-leaders with the productive investment package in each assembly is close to one-third in all cases.

Our general specification is:

$$Y_{ia} = \delta_0 + \delta_1 T_{ia} + \delta_2 (T_{ia} * S_a) + \delta_3 S_a + \varepsilon_{ia} \quad (1)$$

where Y_{ia} is an outcome indicator for eligible household (or individual) i who was invited in assembly a, T_{ia} is assignment of i to any of the three treatment groups, and S_a is the share of leaders (over all leaders in the assembly) that randomly received the productive investment package in i's registration assembly. Given that households were invited to particular assemblies based on geographic proximity, S_a will capture the share of leaders with the productive investment package that live in the proximity of i.[4] Since S_a is always 0 in the control communities, and since all eligible households in the treatment communities receive one of the three intervention packages, the term $\delta_3 S_a$ cancels out of the estimation. The coefficients of interest are δ_1 and δ_2. A finding, for example, that δ_1 and δ_2 are both positive would imply that while assignment to the treatment group increases the outcome of interest (δ_1), there is an additional

[4] Location of one's house might be endogenous, and people living in the proximity of leaders might also be more likely to be their family members, or otherwise have similar characteristics. The identification in this paper does not depend however on the proximity to the leader per se, but instead it depends on the random allocation of certain packages to those leaders.

impact of the program that comes from the social interactions (δ_2). We also explore how the share of leaders with the productive investment package affects impacts for beneficiaries of each of the three packages separately. All regressions are estimated on the sample of eligible households (or individuals) that are not leaders themselves.

4. Social interaction effects on human capital investments

4.1 Main results

We first pool households across treatment packages and investigate whether there is a general relationship between program impacts and the proximity to leaders who received the productive investment package. Table 2 presents the results for 2008, the main focus of this paper in the top panel. In the bottom panel, the tables replicates the findings for 2006 from our earlier work for comparison. The interaction terms in top panel of Table 2 suggest that social interactions are crucial to sustain program impacts on education and nutrition investments after the end of the intervention. Indeed the estimates indicate that there are no significant sustained impacts on human capital investments when no leader was assigned the productive package, in contrast with findings while the program was in place (see bottom panel). But the higher the share of leaders with that package, the less likely children are absent in school and the more households invest in education, in animal proteins and in fruit and vegetables.

The multiplier effects are not only statistically significant but also large. For example, school expenditures increase with 49% if all the leaders in one's assembly got the productive investment package, while school absences decline with 21%. Strikingly, the magnitude of the multiplier effects two years after the end of the program are similar, if not larger, than those found while the intervention was in place.

Table 3 shows the social interaction impacts on human capital investments by treatment group. The effects are the strongest for beneficiaries of the productive investment package. For instance, the school expenditures doubles for beneficiaries of the productive package in the extreme case that the share of leaders with the same package changes from 0 to 1. The impacts are about half the size for the beneficiaries of the training packages (and even smaller for those with the basic package) for most outcomes and many of the interaction terms are not significant. Nevertheless, as in our earlier findings, the P-values indicate that we cannot reject that the social effects are different for the three groups for most variables. When pooling the basic and the training packages together, the interaction effects for the school expenditures, and expenditures for fruit and vegetables are significant.

Note that while the coefficients of the interaction effects are large, their interpretation needs to account for the fact that there are on average about 4 leaders in a registration assembly. The estimates hence indicate that having one additional leader with the productive investment package in one's assembly reduces absences with 0.4 days per month and increases school expenditures by about 16 percent. And for households who themselves have the productive investment package, one additional leader with the same package increases school attendance with 2.5 percentage points, and increases school expenditures with 25%. These are not only large effects, but are similar or even higher than the spillovers in 2006. Hence interactions with leaders had a remarkable persistent impact on other households investment behaviour, and those are particularly important for households who themselves received the largest package.

4.2. Robustness checks

The results on social interaction effects on human capital investments are robust to several alternative specifications.[5] A first concern could be that the results are driven by extreme values in the independent

[5] Table 6 presents robustness checks for the beneficiaries with the productive investment package. Results pooling all beneficiaries are similarly robust.

variable. While the average share of leaders with the productive investment package is 0.33, for 95% of the observations, it is between 0 and 0.67. A first robustness check in Table 4 therefore excludes the observations with values above 0.67. This does not substantially alter any of the results, even if, as expected, the standard errors increase. The results are also robust to clustering the standard errors at the level of the registration assembly, as opposed to at the community-level, and to not excluding outliers. The next two specifications show that the results are also robust to controls for the total number of people in an assembly, or the total number of peers (defined as beneficiaries that are not leaders) in an assembly. The next specification includes a community fixed effect. While this reduces the variation in the independent variable, the results are generally robust, with the exception of the food expenditures for animal products.

Table 4 further shows alternative specifications using the number of leaders with the productive investment package instead of the share. These specifications also control for the total number of leaders in the registration assembly. The coefficient on the number of leaders with the productive investment package is consistent with the main results in terms of sign, size, and magnitude. We can then also compare the coefficient of the number of leaders with the productive investment package, with the coefficient of the number of peers with the productive investment package (last specification in Table 4). The results suggest that social interaction effects from peers might be more limited: the coefficients are generally not significant and smaller than the coefficients for the number of leaders, with the exception of the expenditures for animal products. The coefficients for leaders and peers are significantly different for school attendance, absences and spending on fruit and vegetables. Note however that these results should be interpreted with caution, given that they could be driven by the fact that there is less variation to identify the social effects of peers.

4.3. Mechanisms

While the identification strategy in our paper allows to clearly demonstrate the importance of the social interaction effects with local leaders, it does not necessarily help to understand how exactly leaders might be influencing other households' investments. Indeed, as with other papers on social learning, one can wonder whether the interaction effects reflect that other households mimic the behaviour of leaders or whether they reflect actual shifts in believes regarding returns to (and/or the importance of) education by non-leader households. By analysing data regarding mothers' expectations about children's final educational levels and future occupation we can shed some exploratory light on this question. Table 5 shows results of the main specification for such outcomes, and also shows the spillover on the educational level attained by 2008. We restrict the sample for this analysis to children less than 15 years old, as older children are more likely to already have reached their final education levels. We also exclude children less than 9, as they would not have benefitted directly from the educational component of the intervention.

Table 5 shows first of all that the large spillover effects in investments found in table 3 are reflected in spillovers in educational attainment by 2008. Indeed 2 years after the end of the intervention, having one additional leader in one's registration assembly increases children's school attainment with .2 years of schooling. Considering then the spillover on beliefs, we note that parents expect these gains to persist and potentially slightly increase in the future. Possibly even more strikingly, parents expectations about their children obtaining professional jobs or skilled wage jobs is also strongly affected by the proximity with successful leaders. Having one more leader in one's registration assembly increases expectations of parents for their children to become (white-collar) professionals with almost 50%.

These findings hence show that interactions with leaders actually changed parents' beliefs or expectations about their children's educational and occupational potential, which may well explain the sustained higher levels of human capital investments. In the next version of the paper, we will incorporate data collected in 2011 to further analyse whether these expectations materialized in actual subsequent gains.

5. Conclusions

Many development interventions aim, through a variety of mechanisms, to shift the investment behaviour of beneficiary households. When programs are designed to only last for a limited period, the sustainability of the impacts might crucially depend on whether changes in investment behaviour persist after the end of the program. Yet, the mechanisms through which such change can be obtained and reinforced are not always clear.

This paper shows that social interactions with local leaders can contribute to sustainable changes in educational and nutritional investment. The results suggest natural leaders living in people's close proximity can hence be important vehicles for change by motivating and encouraging others and by providing examples that people aspire to follow. We find these effects for a program in which both leaders and other beneficiaries received sizable transfers and social effects are particularly large when leaders and beneficiaries received the same package. Hence the results do not suggest that interventions should be primarily targeted to such leaders, but rather that examples of positive experiences of nearby leaders can help increase households' investments when they are provided with resources to follow those examples.

More generally, the results have implications for the debate on sustainability of using cash or asset transfer programs in low-income countries. The evidence in this paper suggests that designing such programs in ways that facilitate and encourage social interactions may be important to create sustainable change.

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Table 1: Comparison of follow-up outcomes of leaders with productive investment package with other leaders and non-leaders

	Leader T1	Leader T2	Leader T3	Non-leader T3	P-value Leaders T3-T1	P-value Leaders T3-T2	P-value Leaders T3-Non-leader T3
Human capital investment							
Attending school (7-18 year)	0.863	0.84	0.82	0.77	0.49	0.96	0.00***
Number of days absent from school (7-18 year olds)	4.329	5.16	5.71	6.35	0.44	0.70	0.02**
School expenditures (7-18 year olds)	767	683	636	518	0.51	0.67	0.00***
Share of food expenditures for animal products	0.17	0.17	0.18	0.16	0.37	0.97	0.07*
Share of food expenditures for vegetables and fruit	0.07	0.07	0.08	0.07	0.47	0.51	0.16
Economic activities (in cordoba per capita)							
Income from non-agricultural self-employment	489.1	546	810	557	0.04**	0.09*	0.04**
Income from commercial activities	190.9	156	404	222	0.05**	0.02**	0.05**
Income from agricultural wages	602.8	749	679	973	0.51	0.55	0.01**
Value animal stock	1630	2104	2191	1631	0.14	0.84	0.13
Total income	11707	12049	12272	10925	0.51	0.78	0.05*

Note: Sample includes intent-to-treat households in treatment communities. Economic outcomes and food expenditures are household level data. Data on education are child-level data. Highest and lowest .5% outliers of income and expenditures data trimmed. P-values account for clustering at the community level. *** p<0.01, ** p<0.05, * p<0.1

Table 2: Social interaction effects on human capital investments

	Education			**Nutrition**	
	Attending school (7-18 year olds)	Number of days absent from school (7-18 year olds)	School expenditures (7-18 year olds)	Share of food expenditures for animal products	Share of food expenditures for vegetables and fruit
			2008		
Intent-to-treat*	0.045	-1.506*	310.9***	0.0387**	0.0221***
share of leaders with largest package	(0.040)	(0.88)	(118)	(0.017)	(0.008)
Intent-to-treat	-0.008	0.197	-68.80	-0.005	0.0008
	(0.026)	(0.58)	(62.5)	(0.010)	(0.004)
Mean dependent variable in the control	0.777	6.341	493.4	0.154	0.0581
Observations	5228	5228	5205	3214	3214
			2006		
Intent-to-treat*	0.062*	-1.760***	191.7***	0.022	0.014**
share of leaders with largest package	(0.032)	(0.669)	(70.9)	(0.017)	(0.006)
Intent-to-treat	0.050***	-1.352***	188.6***	0.055***	0.019***
	(0.019)	(0.405)	(34.8)	(0.010)	(0.004)
Mean dependent variable in the control	0.761	6.209	300.9	0.152	0.066
Observations	5176	5169	5153	3278	3279

Note: The share of leaders measures the share of female leaders with the productive investment package over all female leaders in a beneficiary's registration assembly. Individual level data for education, household level data for food expenditures. Excluding households with female leaders. Intent-to-treat estimators. Highest and lowest .5% of outliers in expenditures trimmed. Robust standard errors in parentheses, corrected for clustering at the community level. *** p<0.01, ** p<0.05, * p<0.1

Table 3: Social interaction effects on human capital investments by intervention group

	Education			**Nutrition**	
	Attending school (7-18 year olds)	Number of days absent from school (7-18 year olds)	School expenditures (7-18 year olds)	Share of food expenditures for animal products	Share of food expenditures for vegetables and fruit
			2008		
Productive investment package*	0.0926*	-2.676**	485.4**	0.0500**	0.0338***
share of leaders with largest package	(0.050)	(1.09)	(200)	(0.019)	(0.011)
Productive investment package	-0.0339	0.764	-114.0	-0.00403	-0.000783
	(0.032)	(0.69)	(72.0)	(0.0099)	(0.0046)
Training package*	0.0293	-1.017	246.2	0.0381*	0.0227**
share of leaders with largest package	(0.061)	(1.38)	(165)	(0.021)	(0.011)
Training package	0.00673	-0.0413	-36.92	-0.0120	-0.00227
	(0.030)	(0.69)	(77.2)	(0.013)	(0.0056)
Basic package*	-0.000652	-0.538	192.8	0.0315	0.0111
share of leaders with largest package	(0.053)	(1.15)	(154)	(0.020)	(0.012)
Basic package	0.0107	-0.299	-46.06	0.000742	0.00536
	(0.031)	(0.69)	(69.4)	(0.011)	(0.0053)
Mean dependent variable in the control	0.777	6.341	493.4	0.154	0.0581
Observations	5228	5228	5205	3214	3214
P-value test social effect on T1 vs T2	0.671	0.744	0.779	0.743	0.350
P-value test social effect on T3 vs T1	0.109	0.116	0.193	0.252	0.069*
P-value test social effect on T3 vs T2	0.360	0.291	0.348	0.575	0.373
			2006		
Productive investment package*	0.097**	-2.579***	291.6***	0.044**	0.019*
share of leaders with largest package	(0.047)	(0.975)	(102.5)	(0.019)	(0.011)
Productive investment package	0.045**	-1.107**	174.3***	0.049***	0.020***
	(0.022)	(0.458)	(39.5)	(0.011)	(0.005)
Training package*	0.047	-1.356	145.6*	0.017	0.008
share of leaders with largest package	(0.041)	(0.844)	(81.9)	(0.021)	(0.007)
Training package	0.049**	-1.438***	181.4***	0.057***	0.018***
	(0.023)	(0.479)	(39.4)	(0.011)	(0.004)
Basic package*	0.045	-1.293	149.3*	0.006	0.016
share of leaders with largest package	(0.052)	(1.128)	(82.8)	(0.021)	(0.010)
Basic package	0.057**	-1.574***	211.8***	0.058***	0.020***
	(0.026)	(0.584)	(42.2)	(0.011)	(0.005)
Mean dependent variable in the control	0.761	6.209	300.9	0.152	0.066
Observations	5176	5169	5153	3278	3279
P-value test social effect on T1 vs T2	0.964	0.959	0.964	0.603	0.518
P-value test social effect on T3 vs T1	0.306	0.238	0.124	0.0325**	0.810
P-value test social effect on T3 vs T2	0.434	0.360	0.151	0.174	0.327

Note: The share of leaders measures the share of female leaders with the productive investment package over all female leaders in a beneficiary's registration assembly. Individual level data for education, household level data for food expenditures. Excluding households with female leaders. Intent-to-treat estimators. Highest and lowest .5% of outliers in expenditures trimmed. Robust standard errors in parentheses, corrected for clustering at the community level. *** p<0.01, ** p<0.05, * p<0.1

Table 4. Robustness checks and alternative specifications : beneficiaries of productive investment grant

	Attending school (7-18 year olds)	Number of days absent from school (7-18 year olds)	School expenditures (7-18 year olds)	Share of food expenditures for animal products	Share of food expenditures for vegetables and fruit
Base specification	0.0926*	-2.676**	485.4**	0.0500**	0.0338***
	(0.050)	(1.09)	(200)	(0.019)	(0.011)
Robustness checks					
Excluding extreme values independent variable	0.0638	-2.087*	319.5*	0.0609***	0.0373***
	(0.057)	(1.25)	(186)	(0.022)	(0.012)
S.e. clustered at level of assembly	0.0926	-2.676**	485.4***	0.0500**	0.0338***
	(0.061)	(1.29)	(177)	(0.022)	(0.010)
Not excluding outliers			726.0**	0.0510**	0.0403***
			(325)	(0.020)	(0.012)
Controlling for number of people in assembly	0.0928*	-2.681**	485.8**	0.0510***	0.0338***
	(0.049)	(1.06)	(201)	(0.019)	(0.011)
Controlling for number of peers in assembly	0.0950*	-2.745**	495.4**	0.0513***	0.0339***
	(0.048)	(1.05)	(203)	(0.019)	(0.011)
With community fixed effects	0.0959*	-2.668**	350.2	0.00916	0.0218**
	(0.051)	(1.16)	(226)	(0.019)	(0.010)
Alternative specifications with # number of leaders					
# leaders with productive investment grant	0.0186	-0.599*	94.64**	0.0128**	0.0088***
controlling for total nr leaders	(0.015)	(0.33)	(47.2)	(0.0052)	(0.0029)
# leaders with productive investment grant	0.0328**	-0.855**	72.98	0.00122	0.00620**
controlling for total nr leaders and community f.e.	(0.016)	(0.36)	(53.8)	(0.0051)	(0.0031)
# leaders with productive investment grant	0.0313	-0.833*	100.3*	0.00934	0.00686**
controlling for total nr leaders	(0.019)	(0.42)	(55.2)	(0.0069)	(0.0031)
# peers with productive investment grant	-0.00284	0.0283	32.76	0.0123**	0.00107
controlling for total nr peers and community f.e.	(0.020)	(0.45)	(36.9)	(0.0054)	(0.0027)
P-value test social effect leader = social effect peer	0.064*	0.046**	0.265	0.567	0.100*

Note: See notes table 3. Every line corresponds to a separate specification, with the exception of the last specification where the number of leaders and peers are included in the same specification. Peers are defined as all beneficiaries with the same package that are not leaders. Specification with extreme values of independent variable excluded: excludes observations for which the value of the share is in the upper 5% of the distribution.

Table 5: Social interaction effects on educational attainment and parental beliefs

9-15 year olds	Years of education attained	Mother's expectation on total years of education	Mother expect child to get professional job	Mother expect child to get professional or skilled wage job
Intent-to-treat*	0.777***	0.936*	0.0419**	0.162***
share of leaders with largest package	(0.22)	(0.49)	(0.020)	(0.059)
Intent-to-treat	-0.251	-0.217	0.00303	-0.0335
	(0.16)	(0.28)	(0.0086)	(0.031)
Mean dependent variable in the control	3.686	8.612	0.022	0.254
Observations	3348	3329	3323	3323

Note: The share of leaders measures the share of female leaders with the productive investment package over all female leaders in a beneficiary's registration assembly. Individual level data for children 9-15 years old in 2008. Excluding households with female leaders. Intent-to-treat estimators. Robust standard errors in parentheses, corrected for clustering at the community level. *** p<0.01, ** p<0.05, * p<0.1