Ties that Bind: Redistributive Pressure and Economic Decisions in Village Economies[+]

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Abstract

We identify some economic implications of pressure to share resource within a social network. We designed a set of field experiments in rural Tanzania where we randomly increased the expected harvest of the treated group by the assignment of an improved and much more productive variety of maize. We find that individuals in this group reduced their interaction with their network. We also find that treated individuals asked less network members to work in their farm during the growing season and obtained less harvest gains.

Keywords: Ego-network, Field Experiment, Redistributive pressure, Harvest, Tanzania

JEL: O12, O13, C93, H26, Z13

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Introduction

Social networks – a key component of social capital - play an important role for the livelihood and development prospects of communities in the developing world. They provide informal insurance and credit when markets are imperfect or absent (e.g. Rosenzweig, 1988; Fafchamps, 1992; Greif 1993, Coate and Ravallion, 1993; Townsend, 1994, Udry, 1994, Anderson and Baland, 2002, Ligon et al. 2002, Fafchamps and Lund, 2003, Barr et al. 2012), facilitate technology diffusion (Bandiera and Rasul, 2006; Conley and Udry, 2010) and provide opportunities for human capital investment and resources redistribution (Angelucci and De Giorgi, 2009; Angelucci et al., 2010). [1] Quintessential characteristic of network relations is the key role played by obligations for its members.[2] The more successful members of the network must help the least successful (or unlucky) members of the social network (Rosenzweig and Wolpin, 1994). They may also be requested to contribute more to local public goods (Olken and Singhal, 2011). Resources redistribution within the network can, therefore, be characterized like a sort of 'informal' redistributive tax (Platteau, 2000). And like a redistributive tax it may trigger an *evasive* response. This view is supported by recent experimental evidence (Jakiela and Ozier, 2015, Beekman et al. 2015; Boltz et al.; 2015).[3] An underexplored research question is if this evasive response may correspond to ill-suited economic decisions. For instance, would individuals reduce economically profitable social interaction to prevent subsequent sharing with network members? In

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[1] Households' expectations of future assistance and transfers are key motivations behind participation in these networks. Other explanations such as altruism, guilt and potential social sanctions also seem to play an important role in shaping individual interactions in networks (Platteau 2000, Foster and Rosenzweig 2001, Barr and Stein 2008, Leider et al., 2009, Alger and Weibull 2010, Ligon and Schechter, 2012).

[2] In this respect, Scott (1976) and Platteau (1991) refer to the 'moral economy.'

[3] In the context of experimental study of involuntary giving a similar finding emerged. Dana et al. (2006), for instance, has found that a 28% of senders in standard dictator game preferred to hide at a cost rather than send nothing to the receivers.

this paper we aim to fill this gap and explore some crucial economic implications of social network's redistributive pressure. We designed a set of field experiments in rural Tanzania and exploited the differential productivity of maize seeds. We randomly assigned to the treatment group a more productive improved variety of maize. The control group received and planted instead a traditional low yielding variety. Improved maize provides yields that are up to five times larger than the traditional ones. Those who receive them thus substantially raise their expected future income. We tested if these subjects will alter some dimensions of their usual interaction with their social network.[4] We found that individuals who were assigned the improved seeds *i)* interacted with less members of their network from the moment of their reception *ii)* mostly reduced their involvement in informal labor sharing arrangements with their *ego-network.*[5] In Tanzania, these arrangements are very common. A household head invites members of other households in his kinship to help him with specific agricultural activities such as land preparation and ploughing, weeding, harvesting and threshing, and the compensation typically consists in part of the output. Individuals – in the treatment group – are found to be less involved in labour sharing agreements.[6] We also find that the effect depends also on the number of people that they typically interact with (i.e. their *ego-network*, or *neighborhood*). Interestingly, we do not find a

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[4] An alternative would have been to provide farmers with an unconditional cash transfer. Cash is, however, more easy to conceal than seeds. This would have made the detection of potential hiding behavior more difficult. Moreover, hiding from the network comes with a cost (e.g., having less help in the farm). Our design allows capturing both these aspects.

[5] By ego-network we refer to what is typically called *neighbourhood* in the theoretical literature on social networks (see e.g. Newman, 2003, Jackson, 2008, and Borgatti et al., 2008, for an overview over the terminology in different disciplines). So, the ego-network of agent i is the set of his direct neighbors or network members.

[6] It should be stressed that the improved seeds do not require less quantity of labor. Hence the reduced interaction cannot depend on less labor requirement. In fact the labor requirement of the two maize types are very similar.

similar pattern for other types of social interactions that do not imply visibility of one's seeds (e.g. asking for information on general agricultural issues). We also find that *iii)* the…. We support our result with a theoretical model. We frame and analyze this issue in the context of Network Games (e.g., Galeotti et al., 2010; Feri and Pin, 2014). Agents are embedded in a social network and have to take decisions that have strategic interactions with the decisions of people connected to them. In doing so, however, they have limited observability of the structure of the social network beyond their direct acquaintances, and this expected utility framework is analysed with Bayesian optimization. In our context, in particular, agents do not know if, and specifically how, their direct neighbours are also able to directly communicate together. This possibility becomes higher the higher the number of closed triangles in the social networks: a property that is typically referred to as clustering. The literature has mostly analized the support of clustering for sustaining cooperation in the context of repeated interaction, e.g. in Kandori (1992), Ellison (1994), Vega-Redondo (2006), Jackson et al. (2012) and Dall'Asta et al. (2012). We use it here instead as the measure that summarizes the trade-off between having the possibility to enter labour sharing agreements with many people, and avoiding leakage of the information on own wealth. In this way, a standard expected utility framework adapted to the theory of social networks, can provide a suitable conceptual environment to explain our empirical result.

Our results are related and relevant to three different strands of literature. First,

The paper proceeds as follows. Next section provides data description and the design of the field experiment. We then present the theoretical paper and subsequently discuss the empirical results. We conclude the paper by offering some final remarks and pondering avenues for future research.

Data and Design of the Field Experiment

We conducted a set of field experiments in two areas of Tanzania, the South-East (Morogoro) and the North (Karatu) with a sample of 311 farmers. These farmers live in rural villages that can be very distant from each other. These villages may, thus, be thought as fairly isolated, self-contained, units. The average social (kinship) network (e.g. degree) is 8.5. A household thus interact on average with 8.5 members of the network in the village (with a minimum of 0 and a maximum of 29). There is also interaction with the extended family network outside the village. On average the household in our sample interact with about 6 network members located in other villages. We will make use of this information below to prove some of our results. The average household size is 5.11 (with a minimum of 1 and a maximum of 15). The degree is correlated with belonging to a farmer group and with the household size. Given that these are self-subsistence farmers, large part of the social interaction happens around agriculture. Most of information sharing in fact is around crops, harvest, access to inputs and markets and land issues. Sharing of resources in cash and in kind in response to negative shock is also a very important dimension. Our focus is the social interaction between network members. We, first, focus on a general type of interaction. We thus map with how many network members in the village has the participant discussed the seeds when they received them. This measure is extremely useful as it allow us to study if receiving one type of seed or another affect the social interaction. Second, consistent with the theory developed, we look at the number of of network members that are asked to work in the farm. These are labour sharing arrangements that individuals put in place in order to expand the factor labor and increase the harvest. These are, however, situation make farmers resources more visible, they provide a tangible benefits in terms of increased production. They also lead to a payment in kind once the harvest is done.

As mentioned high yielding seeds were allocated randomly to about half of the sample in 2013 (treatment group). The remaining half received and planted low yielding maize varieties (control group). The research team handed in the seeds in bags. Maize is a key crop in Tanzania and basically all farmers in the areas of the study grow it. The crop is used either consumed or (in case of surplus) marketed. The improved variety is named Situka-M1 and was released in 2001 by the Selian Agricultural Research Institute (SARI). It has a very high yield potential of 3-5 ton/ha and its optimal production altitude ranges 1000-1500. The traditional variety instead has a potential of 0.5-1 ton/ha under similar conditions. In Tanzania, the improved variety is grown in the Eastern and Northern regions where our study districts are located. It is the second most important open pollinated variety (OPV) called Situka- M1. About 12% of farmers used Situka-M1during the 2010/1. The variety is tolerant to drought, and maize streak and grey leaf spot diseases. Seeds where handed over to the farmers in closed packages. The balance check for the predetermined variables is reported in the appendix.

The experiment exploits the large productive advantage of the improved variety. This variety indeed increases the harvest. We compare if the use of social interactions varies between the farmers in the treatment group versus the control group. We focus on a very relevant use of social interaction in the village: informal labour sharing agreements. These agreements are crucial in this part of the world as they allows the farmers to use extra units of labour to help working in the operated fields during growing season. This kind of interaction could be affected by the size of the ego-network. Indeed a larger ego-network allows asking for help to the more productive individuals. Therefore, assuming a constant marginal cost of asking for help, a larger ego-network could induce more social interactions. On the other side asking other kinship member in the village to enter into labour sharing agreements entails one crucial implication: visibility. Therefore, a farmer with improved seeds has to weight the benefit and cost of asking for help on the farm, for example the benefit of marginal increase in production thanks to the helping hands compared with the cost of an increase in probability of being asked for help in future, i.e. being *taxed* by the social network. Farmers with improved seeds might change are part of the lucky group who got the improved seeds and expect higher yields, i.e. the one to whom one turn if one needs some help. If an evasive response is to be detected, then it should take place particularly among the farmers of the treatment group with large ego-networks. Indeed, the news that a farmer got the improved seed could be communicated to all members of his ego-network and larger it is, more people are likely to ask him for help.

Summarizing the above considerations we can state the following behavioural hypothesis:

1. We should observe farmers in the control group increase the extent of social interaction as the ego-network increases.
2. We should observe farmers with improved seeds to have a smaller number of social interactions with respect to the farmers in the control group. This difference could increases as the ego-network increases.
3. We suppose that the incentive to conceal the increased expected harvest overcomes the benefits from a larger ego-network. So, as the ego-network increases we could observe a decreasing number of social interactions in the treatment group.

We will present in the next section a formalisation of the argument based on expected utility theory. But let us first describe a bit the farmers who took part to both studies with a set of summary statistics.

The dependent variable is the number of people each farmer has asked to come to give help on the farm over the preceding 12 months. We focus on this particular social interaction because it has a direct positive effect and two costs, a direct one and an indirect one. Through labour sharing agreements, farmers can increase the labour input and increase productivity, and this is the positive effect. The direct cost is that part of the harvest has to be shared with the members who helped. The indirect cost is that, by asking for help on the farm, farmers reveal their seeds and expose themselves to the socially imposed *network tax*. For farmers with an improved seeds, there should be hence a clear trade-off between the marginal increase in labour productivity and the increase in direct and indirect costs.

The explanatory variables are a dummy for having got improved seeds; the ego-network size; an interaction term between the type of seeds and the size of the ego-network.

[TABLE 1 – ABOUT HERE]

As we see in table (1), the average number of network member asked to enter a labour sharing agreement during the last 12 months is 2 people while the standard deviation is 2.46 with a maximum at 20. Half of the sample randomly received the improved seeds. The average household's size is 5.11, with the head of the household 45 years old, 60% of which with some education. Only 11% of the farm households' heads are female. The average size of the farm is 1.6 ha and only 23% of household own an ox. The operating plots are quite scattered across space. On average farmers operate plots 20 minutes away from the homestead.

Consistently with many other part of Africa a large part of the sample belongs to rotating saving schemes and burial societies (76%), while 36% belongs to farmers associations. We control for important environmental conditions that affect harvest.

Therefore we include a dummy for pest damage (it occurred on 23% of farms). We capture differences in the climatic conditions by the The Standardized Precipitation Index (SPI). This index captures the rarity of a drought at a given time scale of interest for any rainfall station with historic data. It can also be used to determine periods of anomalously wet events. Being a standardized measure, it identifies nomal conditions when close to zero. High SPI value corresponds to heavy precipitation event over time period specified while low SPI signal situations of low precipitation event. The lower the SPI the more dramatic is the drought. We used the GIS information to locate the farmers and then matched this information with ranfall data to produce the SPI.

A Model of "family tax" evasion in network

As mentioned earlier we randomly assigned improved seeds to half of the sample, while traditional varieties were assigned to the other remaining half. The idea is to compare social interactions between the (lucky) farmers who got the improved seeds and the control group's farmers who got local seeds. The social interaction we are focusing on is asking network members to take part in a labour sharing agreement. This implies spending time in one's farm undertaking crop related activities (e.g., ploughing, planting, weeding, threshing, etc). It can be asking anyone, as long as he is member of the social network (e.g. a relative or a member of the kinship group). Suppose that there are N self-subsistence farmers as nodes in an exogenous undirected social network. As assumed in an emerging literature on Network Games, they have incomplete information on the network, and they know only their own degree, and the *clustering coefficient* of the network[7]. We measure the clustering coefficient as the i.i.d.

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[7] As will be clear in the following, the coefficient c can be interpreted as the probability that one farmer i's neighbour communicates the relevant information to another farmer i's neighbour

probability *c* that two nodes that have a network member in the village in common are also linked together (again, refer to Newman, 2003, and Jackson, 2008, for a few alternative definitions of the same concept). In this economy there is a single good that can be produced using two technologies. One is older and less productive. The other is newer and much more productive. We assume that each agent needs at least one unit of this good to survive, agents are risk neutral and they have linear preferences over the good.[8] There are three time–steps.

Time 0: A single agent, denoted by i, is picked at random. Agent i has ℓ network members, i.e. ℓ is the number of individuals in the ego-network of agent i - the number of agents she is interacting (some time in the following we denote ℓ as the *degree* of agent i). Agent i receives the new production technology. The quantity of the good produced by this technology depends on the number of people working on it, denoted by k. Formally, the technology is $f(k)$, where $k \in \{0,1,\ldots,\ell\}$. If we call $\Delta f(h) = f(h) - f(h-1)$, for any $h \in \{1 \ldots, \ell\}$, then we assume that $f(0) > 1$ and that $\Delta f(h)$ is always positive but decreasing in h (i.e. concavity of the production function). In other words, for any $h \in \{2 \ldots, \ell\}$

$$\Delta^2 f(h) = \Delta f(h) - \Delta f(h-1) \leq 0$$

Every other agent in the social network, who is not i, use the old technology, that provides a quantity of 1 with probability $1-p$, and 0 with probability p, where these probabilities are *i.i.d*.

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[8] Note that we do not need any assumption about replacement of agents do not survive, because we focus on “one-shot” situation. Moreover by this assumption we model the agent’s incentives to work for others.

Time 1: At the beginning of the period agent i chooses, among his ℓ neighbors, k agents that she can employ in her technology. Agent i makes a take–it–or–leave–it offer to each of the chosen k network members. This offer is a form of insurance where agent i commits herself to pay 1 in the case that the realize income of the employed agent is 0. It is straighforward to see that it is dominant for each of them to accept, but for less they would not, because they would risk not surviving.

Time 2: Some agents with bad luck have still a chance to survive: they must be members of the network of both agent i and of one of the agents employed by i. Agent i will have to use all her excess profit to sustain them, up to the point that she is also back to 1.

Note that this model has the following assumptions:

1. The technology used by agent i is observed only by people working on his farm;
2. People working for agent i can inform their neighbours that agent i has a new production technology and then a possible higher income;
3. People not working for agent i cannot observe the labour sharing arrangements of other agents.

The optimization problem

This model is just an optimization problem for agent i that has to choose k. Once k is chosen, the probability that some agent j, out of the other $\ell - k$ agents, is linked to some of the k agents is $1-(1-c)^k$.

So, the problem of agent i is to maximize her expected payoff, that is:

$$\max_k f(k) - k \cdot p - g(k,l) \tag{1}$$

where $g(k,l) = p(l-k)(1-(1-c)^k)$ is the expected *family tax*.[9]

We have that

$$\Delta g(k,l) = g(k,l) - g(k-1,l) = p\big((1-c)^{k-1}\big(1+c(l-k)\big)-1\big) \qquad (2)$$

whose sign is not determined, but

$$\Delta^2 g(k,l) = \Delta g(k,l) - \Delta g(k-1,l) = -p(1-c)^{k-2}c\big(2+c(l-k)\big) < 0$$

meaning that $\Delta g(k,l)$, the marginal family tax, is decreasing in k. Indeed increasing k reduces the number of agents that can be potentially linked to the k agents.

The following facts will turn useful in the analysis of the maximization problem (1).

1. The expected *family tax* is equal to zero when either p or c is equal to 0, furthermore it is equal to zero when $k = 0$ or $k = l$;
2. $\Delta g(1,\ell) = pc(l-1) \geq 0$, with strict inequality when $\ell \geq 2$;
3. The expected *family tax* is concave and has its maximum value for intermediate values of k, it means that, for any given ℓ, $\Delta g(k,\ell)$ is decreasing in k and there exists a value $\bar{k}$ such that $\Delta g(k,\ell) > 0$ if and only if $k < \bar{k}$;
4. $\Delta g(k,\ell)$ is increasing with respect to ℓ.

Note also that the introduction of the family tax causes a distortion in the expected marginal costs. Given that the marginal family tax can be positive or negative, the

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[9] In this formulation we have simplified, assuming that agent i can face a negative payoff, when the family tax is large. However, since $f(0) > 1$ is always a possibility, this is without loss of generality.

distortion on the labour sharing decision can be both in the direction of more or less network members in the village respect to the case of no family tax.[10]

We propose here below our main result, and we invite the reader to refer to Appendix A for its derivation, based on three lemmas, and for its technical details. We stress here the fact that it is a very general and (up to our knowledge) original result. Note to begin with that the individual optimization problem in (1) may not have a unique optimal k, and that is why we call $\mathrm{k}_{\mathrm{l}}^{+}$ the greater argmax of the problem in (1), for a given value of ℓ.

Proposition 1 *Suppose that* $\Delta f(1) > p$*, and that there exists* k' *such that for all* $k > k'$, $\Delta f(k) < p(1-c)^{k-1}$*, then there exist* ℓ' *and* $\ell'' \geq \ell' \geq 1$ *such that:*

- *for any* $\ell \leq \ell'$, $k_\ell^+ = \ell$*;*
- *for* $\ell > \ell''$*, we have* $k_\ell^+ = 0$.
- *for* $\ell' < \ell \leq \ell''$, $0 < k_\ell^+ < \ell$ *and it is not increasing in* ℓ.

So, up to a certain degree ℓ' we have that $k_\ell^+ = \ell$, then k_ℓ^+ decreases and it becomes null at ℓ''. Figure 1 provides an intuition for the result, even if the figure is based on the case where both ℓ and the solution to the problem in equation (1) are continuous.

[Figure 1 – ABOUT HERE]

Another interesting question is the following, how does the family tax bias the production with respect to what would be optimal without this informal taxation? As a

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[10] Moreover agent i faces a maximization problem that is discrete and not necessarily concave, allowing for multiple local maxima.

benchmark we take the continuous number k^*such that $\frac{\mathrm{df}(\mathrm{k}^*)}{\mathrm{dk}} = \mathrm{p}$. k^* is the ideal optimal continuous amount of input for production, and we call $\lfloor \mathrm{k}^* \rfloor$ the maximum integer smaller or equal than k^*. The answer toprevious question is apparently not straightforward because the effect of the family tax on the individual optimization problem is not monotone. Some farmers with increased harvest may use less input (i.e. workers) than optimal, to reduce the leakage of information about their increased output, other may instead hire more workers to reduce the population of neighbors that are not employed and may therefor ask for help. There is however also the constraint imposed to farmers that have an increased harvest but a small social network, as they cannot hire more people than those they actually know.

The three effects described above have actually a combined non-monotone effect, that is expressed in the following corollary (where *ℓ' and ℓ'' are those from Proposition 1).*

Corollary 2 *Suppose that $\lfloor \mathrm{k}^* \rfloor \geq 1$, and that there exists k' such that for all $k > k'$, $\Delta f(k) < p(1-c)^{k-1}$, then there exists two integers $\bar{\ell}$ and $\underline{\ell}$, with $\ell'' \geq \bar{\ell} \geq \ell' \geq \underline{\ell} \geq$ 1 such that:*

- *for any ℓ such that $\bar{\ell} \geq \ell \geq \underline{\ell}$, $k_\ell^+ \geq \lfloor \mathrm{k}^* \rfloor$;*
- *otherwise $k_\ell^+ < \lfloor \mathrm{k}^* \rfloor$.*

So, for an intermediate range of degree ℓ we have optimal or excessive production, outside this range we have reduced production, with $\ell = 0$ and $\ell \geq \ell''$ being degenerate case of no input used at all.

Again, figure 1 provides an intuitive explanation for the result, based on the continuous approximation. Actually to prove Corollary 2 we use the continuous case as a benchmark, and we show that the continuous analogous of ℓ', called ℓ^* in the figure, is always greater than the continuous analogous of k_ℓ^+, called k^* in the figure.

To conclude this section let us open here a brief discussion about the assumptions of our model. Note that the assumptions $\Delta f(1) > p$ (generalized to $\lfloor k^* \rfloor \geq 1$ in Corollary 2) is eliminating the case where the solution of the problem is equal to 0 for all ℓ.[11]

The second condition on the production, namely that $\Delta f(k) < p(1-c)^{k-1}$ for any $k > k'$, only states that in some point the marginal revenues have to become smaller than marginal costs. This is a plausible assumption for all production processes characterized by congestions problems, when there is even a value of k such that an additional unit of k causes a reduction in the production level (so, the assumption is consistent with negative marginal revenues). This assumption is eliminating the case where the solution of the problem is always equal to ℓ for any size of the ego-network, which happens when the marginal revenues are so high that hiring everyone is always the best solution.[12]

Finally, one implicit assumption of the model that, at a first view, appears strong is that only one agent within a given network receives the new production technology. A natural question is to ask what happens if more agents receive the new production

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[11] Indeed if $\Delta f(1) < p$ the solution of the problem when $\ell = 1$ is $k = 0$: this has to be the solution for all problems with $\ell > 1$ (as comes out from the Lemmas discussed in Appendix A). This case happens when the marginal revenues are too small to profitably hire someone. This case is not of our interest because the same solution is applied when there is no family tax.

[12] Note that this solution is applied to the case of no family tax only when $\Delta f(k) \geq p$ for all k. But in the presence of family tax the solution to hire everyone can happen even if $\Delta f(k) < p$, because the marginal costs for k sufficiently close to ℓ are negative.

technology. We find natural that in this case individuals do not know who has received the new technology. They know that with some probability one or more of his neighbours for instance have received the new technology, and that his neighbours could be linked to someone endowed with the new technology. In such a case we can have the following effects.

1. The expected payment to individuals in labour sharing arrangements is lower, because with some probability someone of them is endowed with the new technology.
2. The expected payment to individuals in labour sharing arrangements is lower, because with some probability someone of them has a connection with someone that is endowed with the new technology.
3. The family tax is lower because in the set of no labour sharing with network members someone received the new technology or has a connection with someone endowed with the new technology.
4. With some probability the worker works or has worked with other people endowed with the new technology (either in the current period or in the past). This has the beneficial effect that some knowledge can be transferred, increasing the expected marginal revenue.

Our model can take into account all these effect simply changing the parameters' value.

The effects in points 1, 2 and 3 are reducing parameter p. The effect in point 4 could induce higher marginal revenues. So we can reasonably assume that removing this assumption (only a single agent receives the new production technology) the main results remain unchanged.

Empirical results

We now study how the results in the previous section can be related to our empirical understanding of how social interaction, within a network, is affected by a positive expected harvest. Our focus is on the potential interplay between evasive response to the family tax and the size of the network. If farmers that received the most productive technology want to avoid some of the redistributive pressure from other network members, then we can expect that they would reduce to some extent their social interaction. We first analyse this very general hypothesis by testing if just receiving an improved seed that raise substantially the expected harvest reduces interaction by simply telling to a smaller number of their peers about the seeds they received.

[Tab 2- About here]

Table 2 reports the results. Colum (1) reports a baseline specification without controls. We find that individuals that are assigned the improved seed reduced the number of network interactions substantially. Compared to the control group (those who received a traditional low yield variety) they told to less people in their network that they received seeds. How does the size of the village network affect this result? Column (2) presents the results of the extended model where the effect of the size of the village network is included. The network is positively correlated with the dependent variable. The effect of improved seeds is indeed sensitive to the size of the network. The larger the network the larger is the number of people one tells that some seeds are received. The interaction between the size of the network and improved seeds is negative and significant. This highlights that individuals with the increased expected harvest interact less once we consider the size of the network. To probe the robustness of our results we add a large battery of controls, X. These include individual and farm characteristics such as age of the household head, household size, female headed household (dummy), education (dummy), risk aversion of the household head, land size, oxen (dummy), labour, walking distance to the plot (in minutes), participation in rotating saving schemes and burial societies, farmers association, pest damage (dummy), Standardized Precipitation Index (SPI - ARC2 dataset), dummy for region.

We expect them to reduce those interactions that would make their harvest more visible. This is a typical situation provide by entering labour sharing agreements. In these agreements one asks other members of the network to work on her plots and share some of the output. Lets consider a situation in which a farmer ask normally some members of her social network to come on her operating plots and help with land preparation, seeding, harvesting etc. If she has the improved seeds and she does not want to share (e.g., being taxed) with all of them, she may ask only a smaller number of more trusted members. Perhaps, those individuals are less likely to diffuse the information about their expected harvest with the rest of the network. The model we propose to estimate is the following:

$$Ask = \beta_0 + \beta_N N + \beta_N S + \beta_I I + \boldsymbol{X}'\boldsymbol{\beta} + \varepsilon \tag{7}$$

where Ask is the number of people one asked to enter into a labour sharing agreement The main variables of interest are hence the dummy variable S equal to 1 if the farmer belongs to the group with improved seeds and zero otherwise (local seeds), the ego-network size, N, and the interaction effect between both these variables. [13]

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[13] Although the seeds' allocation to farmers was randomized and is hence totally exogenous, the ego-network variable, N, might be correlated with some unobserved heterogeneity. *A priori*, this could be a serious concern since the resulting endogeneity. We emphasize, however, that our variable of interest is

The null hypothesis that farmers ignore the marginal cost of asking for help implies that farmers with improved seeds should ask the same number of people for help on the farm than farmers with local seeds. The marginal benefit has been shown analytically to be positive. The intuition is that they want to make the most of their high potential seeds. Furthermore, this should be true whatever values take N because the ego-network size is only mediated via the marginal cost, set to zero under the null hypothesis. Hence, the null hypothesis can be summarized as follows:

$$H_0 : \beta_I = 0$$

Rejecting H_o implies that the marginal cost is different from zero. Furthermore, if we do find that $\beta_I < 0$, then we can confirm that the difference in propensity to ask other members of the network to help in the farm decreases as n increases We can also test the hypothesis that the marginal benefits are larger than zero by testing the hypothesis that $\beta_s > 0$.

We also control for reciprocity. We include a variable that captures the number of passive interactions. If the household head has been asked for help in the farm by network members during last 6 months. This potentially an important variable as

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the interaction between the ego-network size and an exogenous variable (random assignment of seeds). This is in line with the study of heterogenous treatment effects where a treatment is interacted with other potentially endogenous variables (e.g. Glewwe et al. 2009, Banerjee et al. 2007, 2010). Nizalova & Murtazashvili (2012) have shown, both analytically and with simulations, that the OLS produces a consistent estimate of the interaction effect.

subjects may already be in a labour sharing agreement. They therefore ask because they have been asked.

Table 2 presents the results of the analysis. Both OLS and Poisson regressions (to accommodate the count nature of the left hand side variable) are provided. The key explanatory variables are the dummy for the improved seeds assignment, the size of the total ego-network and the interaction term between ego-network and positive shock.[14] The first part of the table reports the results for the labour sharing. We find that the interaction parameter is highly significant and negative.

[TABLE 3 – About HERE]

The results are robust to the inclusion of a large battery of controls. The null hypothesis that $\beta_I = 0$ is rejected. The impact of the increased expected harvest on the labour sharing is sensitive to the size of the social network. The larger the ego network the smaller will be request of labor sharing. This result is consistent with the idea of an evasive response. Farmers that received the increased expected harvest with improved seeds may try to escape the network tax by reducing a dimension of social interaction that makes their harvest visible: informal labour sharing agreements. Results are very consistent. A larger ego-network is associated with a larger number of labor sharing requests. The interaction terms between the exogenous improved seeds variable and the size of the ego-network is however negative. This underscores the possibility that luckier farmers do interact less to avoid sharing their future larger resources. Interestingly the interaction is not consistently significant when we look at different

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[14] We probed the presence of outliers with a residual versus fitted plot and identified 6 observations with residual greater than the 99th percentile. They were removed from the estimation.

types of social interaction such as sharing information or asking for help in kind or cash.

[Figure 2 – ABOUT HERE]

The estimated coefficient for social network is positive and significant across the different model. This highlights the positive role of kinship network in providing labor, information and resources. Figure 2 summarizes the results by presenting the social interaction in labour sharing on the left axis and the size of the ego-network on the horizontal axis. As expected, social interaction increases with the size of the social ego-network for the control group of farmers with the local seeds. Both groups of farmers are very similar with the obvious exception of the use of the improved or the local seeds. Farmers with improved seeds should be located on the green line while they are actually way below. For instance, a farmer with 15 people in his ego-network is expected to ask 2.5 persons for help on the farm, but he asked only 1.5 people for help on the farm. Furthermore, both lines cross at a very low size of the social ego-network (about 4 people – the median value of the ego-network size), indicating that even at a moderate size of the ego-network, the marginal cost of asking for help, i.e. the risk of a social network tax, is sufficient enough to discourage farmers from benefiting from a helping hand on the field. Hence, half of the sample, i.e. the one with the greater social network, prefers not to ask for help on the farm in order to avoid being taxed. Farmers with improved seeds tend to ask more for help on the farm than farmers who received local seeds as long as the ego-network size doesn't reach a threshold at around 4 members, i.e. the median value of the ego-network size. After this limit, the marginal benefit of asking for help, i.e. the marginal productivity of labour on an improved seeds plot, is outweighed by the marginal cost of asking, i.e. the increase in risk of being asked for help in the future. In other words, the risk of a network tax leads to suboptimal labour allocation, which is the price for evading social network taxes.

Concluding remarks

In this paper we presented field experiment evidence of the impact of increased expected harvest on social interaction. We use an experimental approach that relies on the random assignment of improved seeds that provide increased expected harvest. We find that farmers that receive a improved seeds interact less with their social ego-network in one important dimension: entering labour sharing agreements. This may indicate an evasive response to avoid network-sharing pressure. Farmers, that receive positive income shocks, prefer reducing their visibility by less involvement with their ego-network. These findings echo the work of Baland et. al (2011) where farmers in Cameroon were ready to incur a cost to avoid being taxed by their ego-network. In the case presented in this article, the cost is the forgone marginal productivity of labour on an improved seeds plot. Hence, both studies highlight another mechanism by which the *dark side* of social capital can compromise wellbeing: the inefficiency is not only due to *disincentivized* farmers free-riding on the solidarity of their peers, but to a suboptimal level of labour due to the fear of being taxed. Although it is difficult to draw any conclusion on long term welfare equilibrium dynamics due to the cross-sectional nature of the present study, this implicit cost can be interpreted as the *deadweight loss* of the informal insurance system that are social networks. It is a *deadweight loss* because the additional food that could have been produced by marginally increasing labour will simply never exist, which implies that the members of the solidarity networks will have fewer resources to share.

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Table 1. Summary statistics

	Mean	Standard deviation	Min	Max
Labour sharing agreements asked by the household to the other network members	2	2.45	0	20
Farmers assigned improved seed – see text for description	0.47		0	1
Network (Total number of kinship network in the village)	8.5	7.9	0	29
Network outside the village (Total number of kinship network outside the village)	6.1	7.29	0	29
Risk averse	0.22	0.41	0	1
HH size	5.11	2.24	1	15
Farm size	1.58		0	7.37
Oxen (Dummy 1=yes; 0= otherwise)	0.23		0	1
Female household head (Dummy 1=yes; 0= otherwise)	0.11		0	1
Education of the household head (Dummy 1=yes; 0= otherwise)	0.60		0	1
Farmers association (Dummy 1=yes; 0= otherwise)	0.39		0	1
Saving association and burial society (Dummy 1=yes; 0= otherwise)	0.76		0	1
Pest attack (Dummy 1=yes; 0= otherwise)	0.23		0	1
SPI (see text for description)	0.22	0.66	-1.27	0.91
Age of the household head	45.74	12.43	16	96
Walking distance to plot (in minutes)	18.86	19.12	0	120
Labour (Number of man days)	9.27	6.87	0	48.85

Table 2. Social interaction and increased expected harvest

Dependent variable: Number of network members with whom you discussed the seeds received			
	Baseline	With no controls	With controls
	(1)	(2)	(3)
Positive harvest shock	-0.665*	0.738	0.426
	(0.365)	(0.831)	(0.672)
Network size		0.151**	0.128**
		(0.0597)	(0.0528)
Positive harvest shock* Network size		-0.127*	-0.123**
		(0.0654)	(0.0553)

Clustered standard errors in parentheses. Significance code: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Controls: age of the household head, household size, female headed household (dummy), education (dummy), risk aversion of the household head, household size, land size, oxen (dummy), labour, walking distance to the plot (in minutes), been asked for help in the farm by network members during last 6 months, HH member is the village leader, self help group, farmers association, pest damage (dummy), Standardized Precipitation Index (SPI - ARC2 dataset), dummy for region. Constants not reported.

Table 3. Labour Sharing agreements and increased expected harvest

Dependent variable: Number of members of your network you made labour sharing agreements			
	Base	With no controls	With controls
	(1)	(2)	(3)
Positive harvest shock	-0.354*	0.143	0.165
	(0.210)	(0.262)	(0.218)
Network size		0.0648***	0.0660**
		(0.0243)	(0.0270)
Positive harvest shock* Network size		-0.0426***	-0.0453***
		(0.0153)	(0.0147)
N	311	311	311

Clustered standard errors in parentheses. Significance code: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Controls: age of the household head, household size, female headed household (dummy), education (dummy), risk aversion of the household head, household size, land size, oxen (dummy), labour, walking distance to the plot (in minutes), been asked for help in the farm by network members during last 6 months, HH member is the village leader, self help group, farmers association, pest damage (dummy), Standardized Precipitation Index (SPI - ARC2 dataset), dummy for region. Constants not reported.

Table 4. Economic implications

Dependent Variable: Harvest			
	Base	With no controls	With controls
	(1)	(2)	(3)
Positive harvest shock	0.579^{***}	0.970^{***}	0.837^{***}
	(0.162)	(0.250)	(0.256)
Network size		0.0362^{***}	0.0369^{***}
		(0.0123)	(0.00970)
Positive harvest shock* Network size		-0.0350^{***}	-0.0314^{**}
		(0.0122)	(0.0138)
N	309	308	301

Clustered standard errors in parentheses. Significance code: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Controls: age of the household head, household size, female headed household (dummy), education (dummy), risk aversion of the household head, household size, land size, oxen (dummy), labour, walking distance to the plot (in minutes), been asked for help in the farm by network members during last 6 months, HH member is the village leader, self help group, farmers association, pest damage (dummy), Standardized Precipitation Index (SPI - ARC2 dataset), dummy for region. Constants not reported.

Table 5. Social interaction not related with the positive harvest shock with the village network.

Dependent variables	**Number of interactions with network members on markets**			**Number of interactions with network members on agricultural practices**		
	Base	With no controls	With controls		With no controls	With controls
	(1)	(2)	(3)	(4)	(5)	(6)
Positive harvest shock	0.534	-0.0342	-0.0600	0.0773	-0.289	-0.310
	(0.437)	(0.722)	(0.706)	(0.284)	(0.488)	(0.423)
Network size		0.0493***	0.0599***		0.0597***	0.0627***
		(0.0134)	(0.00996)		(0.0149)	(0.0113)
Positive harvest shock* Network size		0.0619	0.0502		0.0426	0.0373
		(0.0749)	(0.0671)		(0.0688)	(0.0604)
N	313	313	313	313	313	313

Clustered standard errors in parentheses. Significance code: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Controls: age of the household head, household size, female headed household (dummy), education (dummy), risk aversion of the household head, household size, land size, oxen (dummy), labour, walking distance to the plot (in minutes), been asked for help in the farm by network members during last 6 months, HH member is the village leader, self help group, farmers association, pest damage (dummy), Standardized Precipitation Index (SPI - ARC2 dataset), dummy for region. Constants not reported.

Table 5 (continued). Social interaction not related with the positive harvest shock with the village network and increased expected harvest.

Dependent variables	**Number of interactions with network members on products and cash**			**Number of interactions with network members on land issues**		
	Base	With no controls	With controls	Base	With no controls	With controls
	(1)	(2)	(3)	(4)	(5)	(6)
Positive harvest shock	-0.397	-0.770	-0.992	0.134	-0.444	-0.438
	(1.024)	(1.474)	(1.235)	(0.296)	(0.439)	(0.370)
Network size		0.181^{**}	0.193^{***}		0.0601^{***}	0.0658^{***}
		(0.0828)	(0.0715)		(0.0110)	(0.0120)
Positive harvest shock* Network size		0.0552	0.0426		0.0639	0.0577
		(0.185)	(0.163)		(0.0634)	(0.0562)
N	313	313	313	313	313	313

Clustered standard errors in parentheses. Significance code: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Controls: age of the household head, household size, female headed household (dummy), education (dummy), risk aversion of the household head, household size, land size, oxen (dummy), labour, walking distance to the plot (in minutes), been asked for help in the farm by network members during last 6 months, HH member is the village leader, self help group, farmers association, pest damage (dummy), Standardized Precipitation Index (SPI - ARC2 dataset), dummy for region. Constants not reported.

Table 6. Placebo test. Social interaction related with the positive harvest shock with the outside the village network and increased expected harvest, Harvest.

Dependent variables	**Number of labour sharing agreements with network members outside the village**	**Number of interactions with network members outside the village after receiving the seeds**	**Number of interactions with network members outside the village after plant reached flowering stage**	**Harvest**
	(1)	(2)	(3)	(4)
Positive harvest shock	-0.179	0.301	0.329	0.786***
	(0.376)	(0.539)	(0.629)	(0.212)
Network size	0.0240	0.156***	0.152**	0.0278***
	(0.0198)	(0.0406)	(0.0596)	(0.00696)
Positive harvest shock* Network size	-0.0230	-0.120***	-0.111	-0.0251
	(0.0297)	(0.0363)	(0.0694)	(0.0258)
N	310	312	312	307

Clustered standard errors in parentheses. Significance code: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 7. Social interaction related with the positive harvest shock with the village network and increased expected harvest. Alternative estimators.

	Number of labour sharing agreements with network members		**Number of interactions with network members after receiving the seeds**		**Number of interactions with network members after plant reached flowering stage**	
	Poisson	ZIP	Poisson	ZIP	Poisson	ZIP
	(1)	(2)	(3)	(4)	(5)	(6)
Positive harvest shock	0.0613	0.393^{**}	0.0701	-0.107	-0.000247	-0.000247
	(0.123)	(0.198)	(0.0876)	(0.140)	(0.0898)	(0.0898)
Network size	0.0284^{***}	0.0173^{***}	0.0265^{***}	0.0236^{***}	0.0225^{***}	0.0225^{***}
	(0.00535)	(0.00614)	(0.00372)	(0.00401)	(0.00387)	(0.00387)
Positive harvest shock* Network size	-0.0191^{***}	-0.0177^{**}	-0.0250^{***}	-0.0202^{***}	-0.0195^{***}	-0.0195^{***}
	(0.00702)	(0.00791)	(0.00487)	(0.00527)	(0.00498)	(0.00498)
N	311	311	313	313	313	313

Clustered standard errors in parentheses. Significance code: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Controls in all specifications. List of controls: age of the household head, household size, female headed household (dummy), education (dummy), risk aversion of the household head, household size, land size, oxen (dummy), labour, walking distance to the plot (in minutes), HH member is the village leader, self help group, farmers association, pest damage (dummy), Standardized Precipitation Index (SPI - ARC2 dataset), dummy for region. Constants not reported.

Figure 1: Graph of k_ℓ^+ as a function of ℓ, in the continuous case

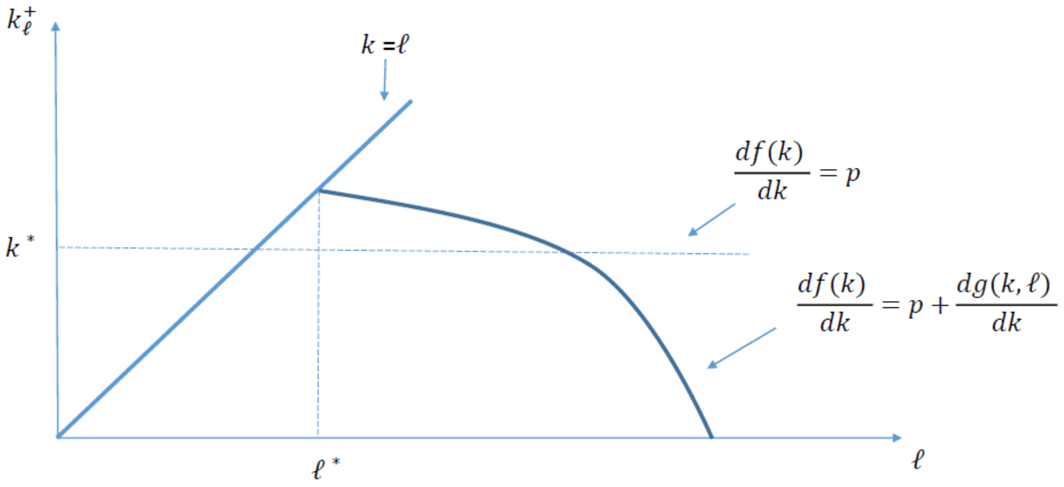
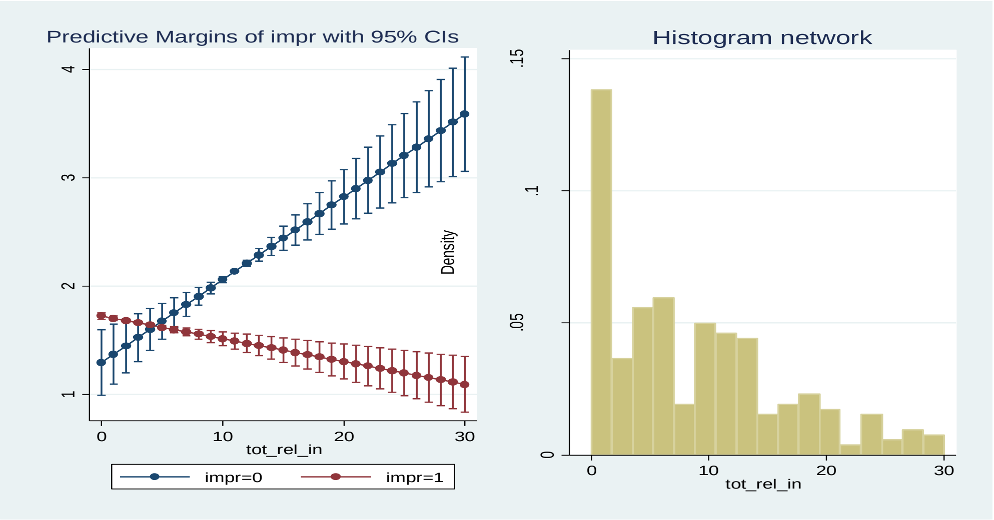


Figure 2: Number of network members in the village asked for help on the farm: traditional Vs. improved seeds - OLS.



Appendix A - Proofs

In this appendix we prove Proposition 1, and we start with the next definition.

Definition 1 (Greater optimum) *We call* k_l^+ *the greater* argmax *of the problem in (1), for a given value of* ℓ.

The following Remark just poses *local* optimality conditions: a point must not be worse than its left–most adjacent point and strictly better than its right–most adjacent point.

Remark 1 *A necessary condition for* $k_\ell^+ \in \{0, \dots, \ell\}$ *to be a greater optimum for agent i's problem is that, when defined,*

$$\Delta f(k_\ell^+) \geq p + \Delta g(k_\ell^+, \ell) = p(1-c)^{k_\ell^+ - 1}\left(1 + c(l - k_\ell^+)\right) \qquad (3)$$

$$\Delta f(k_\ell^+ + 1) < p + \Delta g(k_\ell^+ + 1, \ell) = p(1-c)^{k_\ell^+}\left(1 + c(l - k_\ell^+ - 1)\right) \qquad (4)$$

In the statement, 'when defined' means that when $k_\ell^+ = 0$ then (3) is not defined and only (4) must hold; when instead $k_\ell^+ = \ell$ then (4) is not defined and only (3) must hold.

Now, we propose some lemmas that will help us in analyzing the comparative statics of the optimization problem in (1), with respect to ℓ.

Lemma 1 *If for some* ℓ', $k_{\ell'}^+ = \ell'$, *then* $k_{\ell'-1}^+ = \ell' - 1$.

Proof: Since $k_{\ell'}^+ = \ell'$, for any $k \in \{0,1, \dots \ell' - 1\}$, we have

$$f(\ell') - p \cdot \ell' \geq f(k) - p \cdot k - p(\ell' - k)(1 - (1-c)^k)$$

otherwise $k_{\ell'}^+ = \ell'$ would not be a maximum for ℓ'. This expression can be rewritten as:

$$\frac{f(\ell') - f(k)}{\ell' - k} > p - p(1 - (1-c)^k) \qquad (5)$$

Note as the left hand side is the average of the marginal revenues between ℓ and k. Now suppose $k^{+}_{\ell'-1} = k' < \ell' - 1$. Then we have:

$$f(\ell'-1) - p(\ell'-1) \leq f(k') - p \cdot k' - p(\ell'-1-k')\left(1-(1-c)^{k'}\right),$$

This expression can be rewritten as:

$$\frac{f(\ell'-1)-f(k')}{\ell'-1-k'} \leq p - p\left(1-(1-c)^{k'}\right) \qquad (6)$$

Note that the left hand sides of (5) and (6) are decreasing in ℓ. Then we can write:

$$\frac{f(\ell')-f(k')}{\ell'-k'} \leq \frac{f(\ell'-1)-f(k')}{\ell'-1-k'} \leq p - p\left(1-(1-c)^{k'}\right)$$

A contradiction with the condition in (5) (just relabelling k as k'). QED.

Lemma 2 *Suppose $k^{+}_{\ell} < \ell$. Then $k^{+}_{\ell+1} \leq k^{+}_{\ell}$.*

Proof: Call $x = k^{+}_{\ell}$. First of all, for any $k \in \{x+1, \ldots \ell\}$, we have

$$f(x) - p \cdot x - g(x,\ell) > f(k) - p \cdot k - g(k,\ell)$$

otherwise *x* would not be the maximal optimum for ℓ.

Now let us compare any $k \in \{x+1, \ldots \ell\}$ against x for $\ell + 1$. Playing with the above inequality, we have

$$f(k) - f(x) < g(k,\ell) - g(x,\ell) + p(k-x)\ .$$

Since

$$\frac{\partial(g(k,\ell) - g(x,\ell))}{\partial \ell} = p((1-c)^{x} - (1-c)^{k}) > 0$$

this holds also for any $\ell' > \ell$, including $\ell + 1$.

It must be that for $\ell' + 1$ the only candidate against x and greater than x for being a solution is $\ell' + 1$. Now assume that $k^+_{\ell+1} = \ell' + 1$. This is in contraddiction with the assumption $k^+_\ell < \ell$ and with the result in Lemma1. QED.

This last result allows us to state that, when for a given ℓ, say ℓ'', the solution of the problem is not hiring anyone, then the same solution is applied to all problems with $\ell > \ell''$. The following Lemma states sufficient conditions for the existence of such ℓ''.

Lemma 3 *Assume there exists k' such that for all $k > k'$, $\Delta f(k) < p(1-c)^{k-1}$. Then there exist ℓ'' such that for all $\ell \geq \ell''$, $k^+_\ell = 0$.*

Proof: For any $k > k'$, condition (3) never holds, because for any $\ell \geq k$ we have

$$\Delta f(k) < p(1-c)^{k-1} \leq p(1-c)^{k-1}\big(1 + c \cdot (\ell - k)\big)$$

For any k such that $0 < k \leq k'$, there is always an ℓ_k such that condition (3) does not hold, because right–hand–side of that condition is linearly increasing in ℓ. QED

As a result of the three lemmas we have that k^+_ℓ increases in ℓ as long as ℓ is small (hiring everyone), then, as a interior solution, it decreases in ℓ under certain conditions, up to the point that the unique solution is not hiring anyone.

Proposition 1 *Suppose that $\Delta f(1) > p$, and that there exists k' such that for all $k > k'$, $\Delta f(k) < p(1-c)^{k-1}$, then there exist ℓ' and $\ell'' \geq \ell' \geq 1$ such that:*

- *for any $\ell \leq \ell'$, $k^+_\ell = \ell$;*
- *for $\ell > \ell''$, we have $k^+_\ell = 0$.*
- *for $\ell' < \ell \leq \ell''$, $0 < k^+_\ell < \ell$ and it is not increasing in ℓ.*

Proof: The assumption $\Delta f(1) > p$ is enough to prove that ℓ' exists and that it is at least equal one. Indeed it is straightforward that $k_1^+ = 1$. The behaviour of the maximum up to ℓ' is given by Lemma 1.

ℓ'' exist because of Lemma 3. Note that because of Lemma 2, if $k_\ell^+ = 0$, then $k_\lambda^+ = 0$ for any $\lambda > \ell$.

If $\ell'' > \ell'$ then there is an interval which exhibits internal solutions and the result is coming from Lemma 2. QED.

Corollary 2 *Suppose that* $\lfloor k^* \rfloor \geq 1$ *, and that there exists* k' *such that for all* $k > k'$, $\Delta f(k) < p(1-c)^{k-1}$*, then there exists two integers* $\overline{\ell}$ *and* $\underline{\ell}$*, with* $\ell'' \geq \overline{\ell} \geq \ell' \geq \underline{\ell} \geq 1$ *such that:*

- *for any* ℓ *such that* $\overline{\ell} \geq \ell \geq \underline{\ell}$*,* $k_\ell^+ \geq \lfloor k^* \rfloor$ *;*
- *otherwise* $k_\ell^+ < \lfloor k^* \rfloor$ *.*

Proof: First of all note that the condition $\lfloor k^* \rfloor \geq 1$ implies $\Delta f(1) > p$, so that we are in the conditions of Proposition 1. Let us call ℓ^* the continuous number that satisfies $\frac{df(\ell)}{dk} = p + \frac{dg(\ell,\ell)}{dk}$. It is easy to see that $\ell^* > k^*$, because $\frac{dg(\ell,\ell)}{dk} < 0$ for any positive ℓ. Now, ℓ' is either $\lfloor \ell^* \rfloor$ or $\lceil \ell^* \rceil$, and in both cases we have $\ell' \geq \lfloor k^* \rfloor$.

Proposition 1 tells us that k_ℓ^+ is not decreasing up to ℓ', and not increasing afterwards, and this provides the result. In particular, since for $\ell = 0$ and for $\ell \geq \ell''$ we have that $k_\ell^+ = 0$, we get the strict inequality in the second bullet point. QED.

Table A1. Balance check

	Control	Treated	Diff
Risk averse	0.21	0.20	0.00
	[0.00 - 1.00]	[0.00 - 1.00]	(0.05)
Household size	5.04	5.16	0.12
	[1.00 - 11.00]	[1.00 - 15.00]	(0.27)
Farm size (ha)	1.62	1.56	-0.07
	[0.08 - 7.37]	[0.00 - 6.92]	(0.14)
Oxen	0.22	0.23	0.00
	[0.00 - 1.00]	[0.00 - 1.00]	(0.05)
Female	0.14	0.10	-0.04
	[0.00 - 1.00]	[0.00 - 1.00]	(0.04)
Secondary education	0.59	0.58	-0.01
	[0.00 - 1.00]	[0.00 - 1.00]	(0.06)
Member of a self-help group (Sacco, vicoba, funeral society)	0.40	0.39	-0.00
	[0.00 - 1.00]	[0.00 - 1.00]	(0.06)
Member of a social association (e.g. religious, youth, women)	0.74	0.78	0.04
	[0.00 - 1.00]	[0.00 - 1.00]	(0.05)
Crop damage due to pest, disease or fungi	0.26	0.17	-0.09*
	[0.00 - 1.00]	[0.00 - 1.00]	(0.05)
Standardized precipitation Index (march, ARC 2 dataset)	0.17	0.26	0.08
	[-1.27 - 0.91]	[-1.27 - 0.91]	(0.08)
Age of the household head	46.06	45.17	-0.89
	[16.00 - 84.00]	[22.00 - 96.00]	(1.43)
Distance plot	18.76	18.73	-0.03
	[0.00 - 120.00]	[0.00 - 90.00]	(2.23)
	[0.00 - 1.00]	[0.00 - 1.00]	(0.05)