



Enhancing capabilities through credit access: Creditworthiness as a signal of trustworthiness under asymmetric information

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ABSTRACT

Creditworthiness and trustworthiness are almost synonyms because, under asymmetric information, the act of conferring a loan has the indirect effect of signaling the trustworthiness of the borrower. We test the creditworthiness/trustworthiness nexus in an investment game experiment on a sample of participants/non-participants in a microfinance program in Argentina and find that trustors give significantly more to (and believe they will receive more from) microfinance borrowers. The first- and second-order beliefs of trustees are also consistent with this picture. Our findings then show that MF participants appear more trustworthy and this may help microfinance to work. A related consequence is that, if (and only if) borrower's trustworthiness is not public information, the mere loan provision acts as a reputation enhancing signal increasing the borrower's attractiveness as a business partner. In such case we have a channel through which a private financial intermediary contributes to the provision of a public good like information, thereby reducing the adverse consequences of market failures on the creation of economic value.

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1. Introduction

According to Sen poverty should be viewed as the "deprivation of basic capabilities,"¹ rather than merely as a consequence of low income" (Sen, 1999, p. 20). In this perspective development has to provide people with greater freedom and choice which implies increasing capabilities. Welfare approaches must therefore focus not only on the means but also on people's ends and on the freedoms needed to satisfy these ends.

Sen identifies two types of (constitutive and instrumental) freedom. The first is the primary end while the second is the principal mean of development. Microfinance is in the category of instrumental freedom (Cabraal et al., 2006) involving freedom of access to credit for poor borrowers lacking of collateral. However, microfinance affects borrowers' capabilities and functionings in at least other two ways. First, if dignity and social reputation are two crucial pillars which enhance individual capabilities (or shift ahead the frontier of combination of functionings that individual are able to achieve), microfinance has a

strong impact on them when it becomes, through credit concession, a channel of social inclusion.² Second, and not explored so far by the literature, we show with results of our paper that, if (and only if) the situation of imperfect information on individual characteristics of the experiment applies to real life business relationships,³ microfinance enhances capabilities owing to a *horizontal positive externality* which stems from loan concession. More specifically, since loan concession occurs after a severe screen of the microfinance institution (from now on also MFI) and (in case of group lending) of group mates, it becomes a signal of trustworthiness which increases private and social outcomes of the borrower in the "investment games" (Berg et al., 1995) she plays in her professional and non professional life. Hence, by creating a positive trustworthiness externality microfinance improves the capacity of interpersonal relationships of enhancing individual capabilities.

As a starting point of our argument we observe that 'creditworthiness' and 'trustworthiness' are almost synonyms.⁴ With the lending

² This is highly likely to have something to do with the high repayment rates observed in several microfinance projects: the temptation of strategic default is reduced by the cost of losing the additional capabilities conquered with the loans.

³ The trustworthiness reputation enhancing effect does not apply in case of perfect information and if only trustworthy individuals are microfinance borrowers since the MF borrower trustworthiness is already known to the public and to potential business counterparts. In such case we have no signaling effect.

⁴ Guinnane (2005) reminds us that the Latin root of "credit," *credere*, means, among other things, to trust, while in the German word *gläubiger* the two meanings of credit and trust coincide.

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¹ For the development of the concept of capabilities see Sen (1985a,b). As it is well known capabilities are defined in the same contribution as "the alternative combinations of functionings that are feasible for a person to achieve" (p. 75) and, in turn, functionings as "various things a person may value being or doing." (p. 75).

decision, a financial intermediary is not just transferring money but also expressing confidence in the borrower's ability to use the money properly and pay back the principal and the interest to the bank after the success of her⁵ investment project.

The act of conferring confidence has not just a private effect; it also has a social one. The lending relationship may be conceived as a bond in which the lender's trust contributes to a trustworthiness reaction by the borrower; that is, a bond which generates mutual trust. It is also understandable that a borrower's positive experience with the microfinance institution (MFI) may generate the trust of friends and relatives in the microfinance organization (a "vertical" individual/organization externality).⁶ What is generally not explored, however, is the horizontal trust externality that the loan concession may generate. The loan reveals to all those who come to know about it that the borrower has been considered trustworthy by a financial institution which is conventionally regarded as having specific expertise in screening the qualities of projects and their proposers. In the case of microfinance with group lending and joint liability, the signal may be even stronger, because the borrower also passes the scrutiny of peers (groupmates), who are expected to be more informed than the bank about her type and project quality.

Hence, by providing a loan, the financial institution is also creating social capital in the form of trustworthiness.⁷

In an economic environment in which individuals operate within a framework of imperfect and incomplete information and cannot foresee (and regulate with contract clauses) all possible future contingencies arising from a business relationship,⁸ the creation of trustworthiness has important economic effects. It makes it more likely that economic agents will accept the borrower as a business counterpart even though they do not have full information about her and the events which will affect the relationship in the future.

This is all the more so because many aspects of business relationships have an investment game structure⁹ (Berg et al., 1995). The relationships between business partners, between an entrepreneur and her suppliers, have generally a sequential structure such that one of the two parties must take the initial initiative by sharing something (knowledge, physical or financial assets). After the first player move, the counterparty may be induced to do the same or to abuse the trust of the first mover. As in the investment game, the counterparts' joint decision to share (the trustor) and not to abuse (the trustee) generates superadditivity and therefore an outcome higher than the two suboptimal equilibria in which the first player shares and is abused or the first player decides not to share because she is afraid of the risk of being abused. In this framework, situations in which the second party is more trustworthy induce the trustor to give more, thereby increasing the total payoff of the game.

Hence, in some way, the mere act of giving credit, by creating trustworthiness, generates an indirect positive effect on the capacity of the borrower to repay the loan. This mechanism is all the more important in the context in which microfinance operates.

Microfinance loans are often uncollateralized. Hence the lender's expectations about the borrower's trustworthiness are of paramount importance. Even though the microfinance literature has shown that, in

the absence of collateral, other incentives such as peer pressure under group lending (Banerjee et al., 1994), progressive loan mechanisms under individual lending, and social sanctions (Wyck, 1999; Karlan, 2005a) are at work, the question remains relevant, because all these incentives have drawbacks¹⁰ and their effectiveness depends largely on the social environment in which a microfinance institution operates.

To our knowledge, the nexus between creditworthiness and trustworthiness has never been tested directly in microfinance. This paper reports such a test in the form of an experiment on the borrowers of a microfinance institution operating in the suburbs of Buenos Aires, and on a control group of eligible non-borrowers living in the same area and with no other banking relationship. The treatment and control groups play an investment game where the sole information possessed by a player has about her counterpart is whether or not she is a microfinance borrower (in their same institution). The investment game provides, in our opinion, a faithful reproduction of the dilemma of business partnerships where trust and trustworthiness are fundamental for the innumerable decisions in which one of the two parties anticipates something to the other (money, know-how, etc.) in a framework of imperfect information and incomplete contracts.

The hypothesis that MF loan concession may be a signal of this wider kind of trustworthiness should therefore be tested empirically. Note that our result is not trivial also because, given the characteristics of the game, the investment game's trustworthiness is not the same as that required in the actual microfinance relationship (in the former there is no social or pecuniary sanction on non-payback by the receiver).

The main result of our field experiment is that both treatment and control (MF and non-MF borrower) trustors give significantly more to MF than to non-MF trustees, and they believe that the former will repay significantly more than the latter. We interpret trustors' behavior in the sense explained in this introduction (they do so because the creditworthiness revealed by being clients of the MF institution is a signal of trustworthiness).

The behaviors and beliefs of trustors are validated by the actual behavior of trustees who pay back significantly more when they are MF borrowers. Trustees' first- and second-order beliefs are also consistent with this pattern: that is, when trustees are MF-borrowers they expect more from trustors (I-order beliefs) and believe trustors expect more from them (II-order beliefs).

The aim of the analysis is to contribute in an original way to important issues debated in the literature.

In a historical reconstruction of the factors responsible for the success or failure of credit programs for the poor, Guinnane (2005) argues that it is the quality of incentives and sanctions (and not a difference in the level of trust) which makes a program successful. However, without underestimating the fundamental role of incentives, our results show that microfinance borrowers are not trustworthy because of incentives alone. MF trustees give more even in the anonymous investment game experiment where no individual penalty or social blame is imposed on a lack of trustworthiness.¹¹

Karlan (2005b) evaluates the predictive power of revealed trust and trustworthiness in investment games by looking at their impact on future borrowers' performance. He shows that borrowers' trustworthiness (but not trust) is a good predictor of their financial performance. On this basis, he concludes that investment games are valid in eliciting trustworthiness, and that the latter is important for the success of group lending programs. His concluding remark that his

⁵ We had both male and female borrowers in our experiment, but here we shall use the female pronoun and adjective for the sake of simplicity.

⁶ "You trust them and they too make a trust jump that is key to the institution" (Rodrigo Zarazaga, co-founder of *Protagonizar*, the microfinance institution involved in the experiment presented and discussed in this paper).

⁷ Social capital is a multifaceted concept which includes at least five dimensions: trust, trustworthiness, willingness to pay for public goods, civic sense, and trust in institutions (Becchetti-Degli Antoni (2010)). Here we refer only to the first two meanings.

⁸ The issue has been thoroughly debated in the incomplete contract literature originating from the pioneering contributions by Grossman and Hart (1986) and Hart and Moore (1988). The incomplete contract paradigm has been fruitfully applied to issues such as political economy, fiscal federalism, industrial organization, public procurement, regulation, privatization, transition economies, international trade, or law and economics.

⁹ For details on investment games see Section 4.2.

¹⁰ Group lending with joint liability may generate free riding on peer monitoring (Besley and Coate, 1995) when groups become large and borrowers' run (Bond and Rai, 2006) when they come to know before the lender about groupmates' inability to repay the loan. Furthermore, the joint liability imposes an extra burden on the borrower, who generally prefers individual lending. This explains the tendency of many MFIs (including the Grameen) to switch from group lending to progressive individual loans.

¹¹ Of course, *Protagonizar* incentives may have helped in selecting trustees more trustworthy even in the absence of monetary or social sanctions.

data “do not show whether trustworthiness can be created” opens the way for the investigation conducted here.

Our findings provide an answer to Karlan (2005b) by illustrating a channel through which trustworthiness can be created; that is, by showing that, under imperfect information, creditworthiness in MF programs is a signal of trustworthiness which triggers trust from other individuals living in the neighborhood, independently of their MF borrower/non-borrower status.¹²

Our results do not suffer from the almost unsolvable problem of endogeneity and reverse causality in microfinance impact studies where it is difficult to establish whether microfinance borrowers are better-off (where they are demonstrated to be) because of the microfinance “treatment” or because of their prior higher abilities with respect to the control group of non-borrowers.¹³

Unlike studies aimed at evaluating the impact of microfinance on borrowers' outcome variables, in our field experiment we test whether the act of giving credit is a signal which triggers trustworthiness. If this result is found, the mechanism works no matter whether trustworthiness exists before or is created after the loan concession. Accordingly, also the usual heterogeneity argument about how different responses of individuals to the treatment (i.e. borrower status) may affect estimations of the average treatment effect is not an issue in our experiment; in fact, we are not interested in the *direct responses* of individuals to microfinance in terms of the trust/trustworthiness level, but rather – as will be clear in the next sections – in how *microfinance indirectly signals trustworthiness*.

We further argue that framing effects (if any) do not weaken the relevance of our findings. If trustors' choices were determined only by our emphasis on the sole revealed element of the counterparty's identity (the MF/non-MF borrower status) in the instructions given before playing the game, trustee responses and beliefs should also be affected by this information, while we document that they are not. In fact, our evidence suggests that MF trustees contribute more independently of the trustor's MF/non-MF status.¹⁴ However, and more importantly, our core finding is the signaling effect arising from the MF borrower's status. Hence, even if our result were determined by a mere framing effect, it would nonetheless be relevant and have the important policy consequence that economic agents, in the particular economic environment analysed, should signal their MF borrower status in order to make their business relationship more successful. Consider again, however, that the reasoning above works only if players are imperfectly informed about counterpart's characteristics in the real life exactly as in the experimental treatment. Results are observationally equivalent if counterpart's trustworthiness is already known and only trustworthy individuals are selected by the MF institutions. In such case there is no signaling effect, no creation of horizontal externality and no impact on the total payoff of the game. Even in this case, however, our results identify that one of the potential factors of microfinance success lies in its capacity of selecting more trustworthy individuals.

¹² In essence Karlan's goal is to document the external validity of experimental results showing that they affect real life economic outcomes (trustworthiness in the experiments affects borrowers' financial performance). Our work is closely related since we show that microfinance affiliation may signal or create trustworthiness under imperfect information or, if we assume public information, MFIs select trustworthy individuals. More in general, and valid also under the public information scenario, Karlan shows that trustworthy individuals in the experiment have better performance as MF borrowers in real life, while we show that microfinance borrowers are perceived as more trustworthy in the experiment. The link between the two may be that MFIs are aware of the Karlan point and therefore select more trustworthy individuals. Other economic agents know this and perceive MF borrowers as more trustworthy.

¹³ Among the first microfinance papers dealing with these issues see Hulme and Mosley (1996), Pitt and Khandker (1998) and Coleman (1999).

¹⁴ If our findings would be entirely determined by the framing effect any player should give more to the MF versus the non-MF counterpart. However, we observe that this is not the case for trustees since MF trustees give more not only to MF trustors but also to non MF trustors. Even though the framing effect is enough to reproduce the trustworthiness reputation enhancing effect (when we assume asymmetric information), this specific finding suggests that beyond it there is an effectively higher trustworthiness of MF trustees.

We conclude by arguing that our findings – under the assumption that business relationships take the form of investment games and there is asymmetric information on counterpart trustworthiness – identify a clear-cut causality effect between the loan concession and trustworthiness, and therefore show the causality nexus between loan concession and economic performance which is so difficult to identify in microfinance studies with non-randomized experiments owing to the traditional selection bias problem.

Our results provide a new interesting contribution to public economics beyond the traditional microfinance one. As it is well known microfinance institutions are a case of private financial organizations contributing to the achievement of traditional targets of public policies by tackling a traditional market failure (credit rationing) generated by asymmetric information between lenders and borrowers. Oversimplifying, in an economy where we have potential borrowers with good projects but no collateral and potential lenders (net savers) with no productive ideas, the asymmetric information prevents the match between lenders and borrowers under the standard collateralization rules and the creation of economic value is nil. Microfinance mechanisms reduce this problem by easing access to credit for uncollateralized borrowers.

Within this more general element of the relationship between microfinance and public economics we discover in our paper a second element of interest in relation to the public good literature. Consider that the informational asymmetry hampers the creation of economic value also in business relationships between two counterparts if the latter take the form of trust games (i.e. there is a sequential relationship in which one of the two parts has to make a first move and makes herself vulnerable to others' action (Hong and Bohnet (2007))). In this framework, the *ex ante* microfinance screening process contributes to the production of a public good such as information by giving signals to third members (including potential business partners playing trust games with the borrower) who have asymmetric information on the borrower. This, in turn, given the specific characteristics of trust game, enhances trust and trustworthiness with positive effects on the outcome produced in investment games. Hence, if we believe that investment games mimic the process of creation of economic value in real life, the microfinance screening process contributes *per se* to enhance the creation of economic value and the creditworthiness of the borrower.

In this sense, beyond its traditional role, the microfinance has a second indirect effect on the provision of a public good like information, by increasing the reputation of the borrower in her business relationships. It must be however noted, once again, that this second indirect effect works only under the assumption of non-publicly available information about the MF borrower's trustworthiness.

The paper is divided into eight sections (including introduction and conclusions). In the second section we sketch our theoretical framework. In the third section we describe the main features of the MF organization in which we performed our experiment. In the fourth section we illustrate the characteristics of the game and our specific design. In the fifth section we present descriptive evidence on trustor's and trustee's behavior. In the sixth section we present and comment on the econometric findings. The seventh section sheds more light on the causality nexus between trustworthiness and players' MF/non-MF borrower status. The eighth section concludes.

2. Theoretical framework

Our theoretical hypothesis divides into two parts. The first part asserts that, in a framework of asymmetric information, loan concession is a signal of creditworthiness which implies trustworthiness. The second part claims that, if most business relationships take the form of investment games, trustworthiness may significantly increase the borrower's business success. Hence, the microfinance loan concession generates by itself an effect which may increase the probability of the borrower's successful repayment.

2.1. The model under asymmetric information

The population is composed of A- and B-types. The two types differ in their degree of trustworthiness, measured in terms of the payback share ($p \in [0,1]$) when they are trustees in an investment game (Berg et al., 1995) (whose characteristics are explained in Section 4). More specifically, $p_A > p_B$, that is, A-type individuals are more trustworthy. The trustor does not know the trustee type but may receive a signal on her trustworthiness. We define as q the trustor's guess that the trustee is of A-type ($q \in [0,1]$) and s is a signal ($s \in [0,1]$) affecting that guess. Trustor's belief (TrB) in trustee's contribution and contribution (TrC) are a function of q , that is, $TrB'(q) > 0$ and $TrC'(q) > 0$. We assume that s is higher when the trustee has received a MF loan than when she has not. The loan concession event is a signal because when an individual becomes a borrower this implies that she has been regarded as trustworthy in the MF screening procedure and, in case of group lending, also by her group-mates. Hence $q(s)$ is such that $q(s_{MF}) > q(s_{N-MF})$.

The model is common knowledge, so that trustees' first-order (FOB) and second-order (SOB) beliefs are also consistent with this framework. More specifically, trustees believe that

1. trustors will give significantly more when they know that their counterpart is a MF borrower [$FOB(q(s))$] with $FOB'(q(.)) > 0$;
2. trustors think that trustees will give more if they are MF borrowers [$SOB(q(s))$] with $SOB'(q(.)) > 0$.

2.2. Hypothesis testing

The above-mentioned theoretical framework induces us to formulate the following hypotheses:

a) Trustor contribution	$H_{01}: TrC(q(s_{MF})) = TrC(q(s_{N-MF}))$ vs. $H_{A1}: TrC(q(s_{MF})) > TrC(q(s_{N-MF}))$
b) Trustor belief	$H_{02}: TrB(q(s_{MF})) = TrB(q(s_{N-MF}))$ vs. $H_{A2}: TrB(q(s_{MF})) > TrB(q(s_{N-MF}))$
c) Trustee contribution	$H_{03}: TeC_{MF} = TeC_{NON-MF}$ vs. $H_{A3}: TeC_{MF} > TeC_{NON-MF}$ ^a
d) Trustee first-order belief	$H_{04}: FOB(q(s_{MF})) = FOB(q(s_{N-MF}))$ vs. $H_{A4}: FOB(q(s_{MF})) > FOB(q(s_{N-MF}))$
f) Trustee second-order belief	$H_{05}: SOB(q(s_{MF})) = SOB(q(s_{N-MF}))$ vs. $H_{A5}: SOB(q(s_{MF})) > SOB(q(s_{N-MF}))$

^a If this null hypothesis is rejected in favor of the alternative, the microfinance signal in terms of trustworthiness is truthful.

If these null hypotheses are rejected in favor of the alternatives, and if the business relationships of the borrowers can be conveniently represented by investment games, this implies that the MFI loan provision enables the borrower to receive more trust from business partners and generate higher payoffs. Hence, the loan provision generates a positive indirect effect on the probability of the borrower's success.¹⁵

¹⁵ We also analysed whether there were significant differences among MFI players' strategies according to the seniority of the borrower-bank credit relationship. Specifically, restricting the sample to MFI players only, the additional hypotheses we checked were the following:

g) Trustor contribution	$H_{01}^{(MFI)}: TrC(\bullet)_{VETERAN} = TrC(\bullet)_{NEW}$ vs. $H_{A1}^{(MFI)}: TrC(\bullet)_{VETERAN} > TrC(\bullet)_{NEW}$
h) Trustor belief	$H_{02}^{(MFI)}: TrB(\bullet)_{VETERAN} = TrB(\bullet)_{NEW}$ vs. $H_{A2}^{(MFI)}: TrB(\bullet)_{VETERAN} > TrB(\bullet)_{NEW}$
i) Trustee contribution	$H_{03}^{(MFI)}: TeC_{VETERAN} = TeC_{NEW}$ vs. $H_{A3}^{(MFI)}: TeC_{VETERAN} > TeC_{NEW}$
l) Trustee first-order belief	$H_{04}^{(MFI)}: FOB(\bullet)_{VETERAN} = FOB(\bullet)_{NEW}$ vs. $H_{A4}^{(MFI)}: FOB(\bullet)_{VETERAN} > FOB(\bullet)_{NEW}$
m) Trustee second-order belief	$H_{05}^{(MFI)}: SOB(\bullet)_{VETERAN} = SOB(\bullet)_{NEW}$ vs. $H_{A5}^{(MFI)}: SOB(\bullet)_{VETERAN} > SOB(\bullet)_{NEW}$

As discussed in Sections 5 and 6's footnotes, we never accepted the alternative hypothesis. Such evidence suggests that – in our sample – credit seniority (defined in our terms) does not significantly affect trust and trustworthy behaviour.

3. The main features of the MF institution under scrutiny

"[...] The help we received from Protagonizar was enormous. I felt that not everything was lost. On some occasions we tried to get a bank loan but they asked for a credit card and wages receipt; impossible. Here instead, we go with our word, they believe and trust us. This is beautiful and I feel we are not alone [...]"¹⁶

Protagonizar is a small and young organization which has issued more than 3000 uncollateralised loans in its six years of life. Located in the area of San Miguel (in the second belt of Gran Buenos Aires, Argentina), this non-profit foundation lends to support the small businesses (bakeries, textile enterprises, beehives? or basketworks?) of poor microentrepreneurs.¹⁷ To achieve its aims, *Protagonizar* has located its agencies in the three "villas" (densely populated sub-urban areas) of *Santa Brigida*, *Barrio Mitre* and *Villa de Mayo*.

According to the organization, its competitive advantage derived from low operating costs (modest facilities, low installation and reduced functioning costs), the closeness of its location to the borrowers, and the personalized attention given to borrowers by a group of motivated volunteers working together with paid professional staff members.

Protagonizar is also an interesting case of an organization which has moved in a direction the reverse of that followed by the Grameen: it began with *staggered individual credits* and then, after its first period of life, shifted almost entirely to a *group lending mechanism with full joint liability*.

The *staggered individual credit* mechanism creates a group of three entrepreneurs with independent projects and gives credit sequentially to each member of the group conditional on repayment by the member who has borrowed before.

The *group lending* approach taken by *Protagonizar* is based on the creation of groups of 4–6 individuals to whom money can be disbursed simultaneously. The full joint liability among members implies that, when one of them is unable to repay, the groupmates are required to cover that amount in full.

Eligibility criteria in group lending require that borrowers *i*) must have a minimum six-month enterprise experience; *ii*) cannot be relatives, but *iii*) must live a maximum of three blocks away from each other (a rule which facilitates peer monitoring); and, in order to diversify risk within the group, and *iv*) must have different business activities (only one street vendor per group is allowed). Finally, the coordinator of the group (one of the group members) is responsible for obtaining the money from the foundation, distributing it to the other members, and collecting the installments on behalf of the lender.

Under both (staggered individual and group) lending approaches, the administrative costs charged by the Foundation are 5% monthly¹⁸ over the debt balance.¹⁹ Repayments are made on a weekly basis.

Note that the *Protagonizar* group-lending system has a three-sided screening process on the prospective borrower. The organization

¹⁶ Extracted from the "microentrepreneurs' stories" section of *The Protagonizar handbook* (2005).

¹⁷ See Section 5 comments on Table 1.

¹⁸ Real interest rates seem high if we consider official inflation rates, but less so if we consider unofficial ones. To be noted is that several authors judge Argentinean poverty lines to be grossly undervalued because of a downward bias in the computing of domestic inflation. One of the best-known independent research centers, Ecolatina, estimates that prices rose by 65% between 1 December 2006 and 31 July 2009, compared with the 20% increase calculated by the statistical institute (to follow this debate see <http://www.bloomberg.com/apps/news?pid=newsarchive&sid=aKQUiLozzzko> and http://www.bloomberg.com/apps/news?pid=newsarchive&sid=a5joySC_mXc).

¹⁹ The average lending rate charged by moneylenders in the three villas is around 50% monthly.

evaluates both the payment capacity of the client and the consideration that other bank borrowers (beyond groupmates) have of her. Finally, the group-lending mechanism is expected to induce assortative matching so that, for groupmate-neighbours, trust in the borrower is not just declared in words but is demonstrated by agreeing to create a group with her with a joint liability.

As regards the micro-lender screening/monitoring activities, before potential borrowers obtain a loan, they are visited by credit advisors, and they fill out a questionnaire with socio-demographic and business information. They are then visited by credit counselors/advisors, who assess their credit capacity. The credit counselors/advisors then submit a proposal to the Credit Committee which is almost always accepted. Once the money has been received, counselors/advisors carry out post-credit visits to verify that the money is being used for the purpose for which it was requested. There are also additional personalized monitoring visits made on a weekly basis.

4. The experiment design

In what follows we describe the experiment design by sequentially focusing at the sampling scheme, the characteristics of the game, the matching procedure and the implementation.

4.1. The sampling scheme prior to the experiment

From a list of all the *Protagonizar*'s beneficiaries, we randomly select 152 borrowers (in equal proportions from *Barrio Mitre*, *Santa Brigida* and *Villa de Mayo*) and split them into two equal-sized groups according to credit seniority (i.e. *new* vs. *veteran* MF borrowers) in order to enhance representativeness in this respect.²⁰ We use credit cycle information, not the time distance from the first loan, for definition of borrowers' seniority because the former is better suited to proxying for borrowers' quality in terms of solvency. As a control sample, from the three areas of interest and according to the *Protagonizar*'s eligibility rules, we randomly chose 152 eligible micro-entrepreneurs²¹ who were borrowers from neither *Protagonizar* nor any other MFI at the time of the interview.²²

Following the standard notation in the impact analysis literature, the group composed of the 152 MF borrowers will be referred to as the "treatment group", whereas the group of the 152 eligible non-participants will be denoted as the "control group". The selection of control group members according to the eligibility criteria allows us to reduce the potential heterogeneity between MF and non-MF individuals, thus moderating the impact of *selection bias* in our quasi-experimental framework.

However, as will be better specified in the next sections, a potential selection on unobservable characteristics is crucial neither for the robustness of our main proposition nor for our results.

By focusing on the MF participation as a signal of trustworthiness, rather than on its general impact on welfare's quantitative indicators, the question of the exact direction of causality between trustworthiness and selection is not crucial. In other words, whether individuals

were (or not) already trustworthy before joining *Protagonizar* does not alter the signaling effect that the loan concession generates on trustors.

4.2. The investment game

The experiment is based on a standard two-player Investment Game (Berg et al., 1995). At the beginning of the game both players are endowed with 10 tokens. The exchange rate is 1 token per 2.5 pesos, which corresponds to 0.5 euros as the average exchange rate between the two currencies during the experiment period (August–September 2009).

Unlike what usually happens in investment games played by students, and given the standard of living of borrowers in the area, the money at stake is not negligible. In fact, the maximum amount the trustor (trustee) can win in the game is 80 (85) pesos, which represents 80% (85%) of the MF borrowers' average weekly installment (100 pesos).²³

In the standard version of the game, the first mover, the trustor, must decide how much of her endowment to send to the second mover, the trustee. The amount sent is tripled when delivered to the trustee, who must decide how much of the tripled sum to send back to the trustor (Fig. 1). Assuming that players have purely self-interested preferences, the subgame perfect Nash equilibrium of this game is the strategy vector in which both players send zero to their counterpart.

Our investment game has three specific features. First, players do not move simultaneously but, according to an *ex-ante* matching procedure which allows both of them to play twice, against a MF counterpart and against a non-MF one (see Section 4.3). This enables us to capture *within* effects and not just *between* ones. Second, we adopt the *strategy method* by asking the trustee to illustrate her response conditional on any possible strategy chosen by the trustor. Third, we use direct surprise questions to elicit the trustee's first- and second-order beliefs and, finally, the motivations behind the choices of both players (see Section 4.4).

We combine the experimental analysis of the investment game with a survey²⁴ which collects socio-demographic characteristics and information about the subjects' attitudes, habits, feelings, satisfaction with their life and work, etc.²⁵ The information collected is used to construct control variables for the econometric estimation.

4.3. The matching procedure

All the selected individuals are randomly divided into two macro-groups according to their role in the game (152 trustors and 152 trustees). Each individual plays twice and the round order is randomly alternated. The game is played in anonymity so that players do not know anything about their counterparts except for their MF/non-MF borrower status (and below/above median MF seniority) as revealed by the experimenter before the beginning of the game. To sum up, as regards the matching scheme, of the 152 trustors:

- 76 are MF borrowers (38 *new* and 38 *veterans*) and each of them is matched with i) a non-MF trustee; and ii) a MF trustee (randomly, *new* or *veteran*);
- 76 are non-MF borrowers and each of them is matched with i) a non-MF trustee; and ii) a MF trustee (randomly, *new* or *veteran*).

²⁰ Specifically, borrowers' seniority is evaluated according to their credit-cycle. Since borrowers must first reimburse the previous loan in order to ask for a new one, a higher credit cycle is a proxy for a higher degree of borrower's solvency. Given a median credit-cycle of 17, borrowers with a credit-cycle higher than or equal to 17 are categorized as "veterans" while borrowers with a credit-cycle below the median are "new".

²¹ Eligibility criteria are those described in Section 3. Those applied in our experiment are: i) residence in the three districts in which the bank operated; and ii) minimum of six months' enterprise experience.

²² The proportion of borrowers from the three areas (S. Brigida, Mitre and Villa de Mayo) is the same among borrowers and eligible non-participants.

²³ The realized average payoff of the game was 34.78 pesos, which was around 35% of the average weekly installment. Consider, however, that part of the payoff was not known to players before they begin the game because it is represented by surprise questions on first- and second-order beliefs.

²⁴ The survey is available upon request.

²⁵ Examples of studies based on this combination of classic surveys and experiments based on simple games are, among others, those by Glaeser et al. (2000) and Fehr et al. (2003).

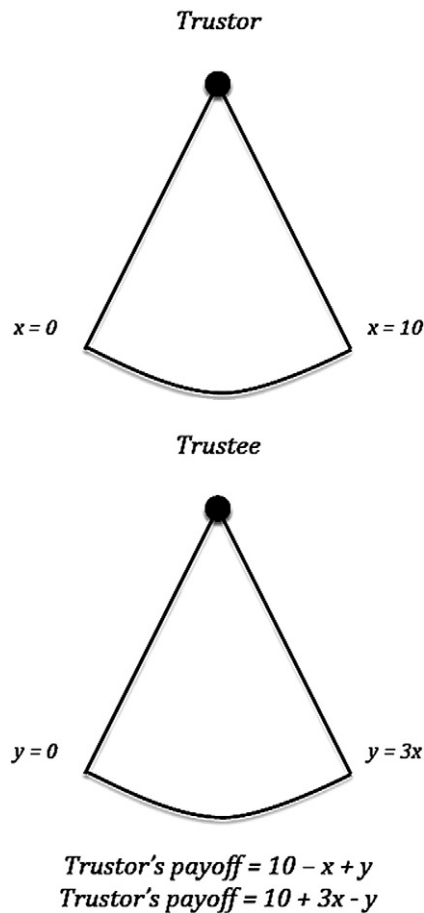


Fig. 1. The standard two-player Trust Game.

Second, of the 152 trustees:

- 76 are MF borrowers (38 *new* and 38 *veterans*) matched with i) a non-MF trustor; and ii) a MF trustor (randomly, *new* or *veteran*);
- 76 are non-MF entrepreneurs matched with i) a non-MF trustor; and ii) a MF trustor (randomly, *new* or *veteran*).

The matching mechanism is summarized in the following table.

Trustor	MF trustee	Non-MF trustee
76 MF (38 <i>New</i> + 38 <i>Veterans</i>)	19 <i>Veterans</i> 19 <i>New</i>	38
76 Non-MF	19 <i>Veterans</i> 19 <i>New</i>	38

4.4. Implementation

The field-experiment (June–September 2009) is carried out by two couples of experimenters, each of which consists of a foreign researcher and a local field-assistant. The survey is conducted in two steps: i) a brief questionnaire with questions on qualitative and quantitative well-being, which is administered before the game²⁶ and ii) the investment game. The game is carefully explained to the interviewees through a series of standardized instructions²⁷ (which do not include simulations in order to prevent the players from framing some specific solutions). In order to avoid confounding discount rate effects, each player knows that

²⁶ In order to avoid potential framing of the game, questions do not directly concern trust or trustworthiness.

²⁷ Instructions are in an Appendix to the paper available upon request.

she will receive the payment according to her payoff from only one of the two rounds (randomly chosen) and 45 days after the interview.²⁸ However, given the non-simultaneous structure of the game, neither the trustors nor the trustees know the exact payoff at the end of each round.

The player is informed about the role that she will play (trustor or trustee) throughout the game and – in each round – about the characteristics of her counterpart (i.e. (*new* or *veteran*) MF or non-MF borrower). For instance, in the first round she can play against a veteran MF borrower, whereas, in the second round, she can play against a non-MF micro-entrepreneur. In each round, the player specifies how much she is willing to *send* (if she plays as trustor) or *return* (if she plays as trustee) to the counterpart.

With regard to trustees, we adopt the strategy method and in every round ask for their response strategy in correspondence to any possible move by the trustor.²⁹ This approach, used in many investment games,³⁰ enables us to interview the trustees in a non-simultaneous framework and without prior knowledge of the trustor choice. Moreover, this modification also provides us with more accurate insight into the trustee's overall strategy, which is not fully revealed when we measure only her response contingent on the actual trustor's play.

At the end of the two rounds, player's beliefs are elicited by means of an ex-post surprise question on how much they believe that the counterpart has actually *sent* (if she plays as trustee) or *returned* (if she plays as trustor). Consistently with the literature, we will refer to the answers to those questions as *first-order beliefs*. With another surprise question we ask trustees to guess the counterparts' beliefs about their strategy: that is, we elicit their second-order beliefs.³¹ Answers on beliefs of both orders are remunerated by an additional payoff of 5 tokens (10 pesos) in the case of a correct guess.³²

Finally, at the end of the game, both players are asked to select which motivation among the four listed alternatives best explained their choices with respect to each round. This question gives us additional information with which to grasp the potential determinants of the players' strategies.³³

5. Descriptive findings and hypothesis testing

Two first introductory tables (Tables 1 and 2) illustrate the characteristics of the respondents in our sample, first in aggregate and then divided between MF borrowers and eligible non-participants.

The overall sample statistics document that the average respondent's education level is quite low (8.4 years) and that of the partner is even lower (5.8 years). Average monthly household income is 4096 pesos while median income is 3000 pesos. This implies that half of the

²⁸ Players were asked to come to *Protagonizar's* office 45 days after the interview to receive their payoffs.

²⁹ The typical questions are: "How much do you send back to the trustor if she sends you 2.5 pesos? How much if she sends 5 pesos?... What about if she sends all her initial endowment of 25 pesos?"

³⁰ For a comparison of the strategy and game methods see, among others, Brandts and Charness (2000), Cason and Mui (1998), Oxoby and McLeish (2004) and Brosig et al. (2003).

³¹ The question – repeated for every round – was: "in your opinion, how much does the trustor think you will actually send back to her?"

³² The literature is mixed in its opinions on the use of point or interval elicitation of beliefs (see Blanco et al., 2008). Both of them have pros and cons. The limitation of point elicitation is that the player may be discouraged from identifying the correct guess when too many alternatives are provided. The limitation of the interval elicitation of beliefs is that it leads to strategic use of beliefs. Consider a case in which the range of the possible counterpart choices is $x \in [A, B]$ and the bonus is given if the deviation between belief and choice is not larger than $\pm \gamma$. If a player's point guess of the counterpart choice is B (the upper interval of player's choices) it is better to declare $B - \gamma$ rather than B . As a consequence, typically observed is an abnormal peak at $B - \gamma$ in the distribution of beliefs, and this makes it difficult to interpret the belief distribution. We opted for point elicitation of beliefs in order to avoid strategic elicitation and because the range of possible answers was not too large.

³³ As potential determinants of trustor's strategy, we selected i) *trust*; ii) *strategic altruism*; iii) *inequity aversion*; and iv) *pure altruism*. As determinants of trustee's strategy, i) *trustworthiness*; ii) *inequity aversion*; iii) *pure altruism*; and iv) (*positive or negative*) *reciprocity*.

Table 1
Summary statistics of socio-demographic and economic variables.

Variable	Obs	Mean	Std. dev.	Min	Max
Age	361	43.19114	12.74666	17	79
Female	361	65.43622	0.026609	0	1
Household income (pesos)	361	4096.097	4922.754	150	65,000
Household food expenditure (pesos)	361	38.85286	30.12302	6.666667	400
Total productivity ^a	361	17.3678	22.59894	0	312.5
Job experience (years)	350	8.340974	8.728824	0.6	50
Savings/month (pesos)	361	186.0295	525.4139	0	5000
No. of persons in the household	360	4.247911	1.920879	1	15
No. of children	361	2.99169	2.135009	0	13
Schooling years (respondent)	359	8.477716	3.054131	1	18
Schooling years (partner)	361	5.587258	4.503548	0	18
Credit cycle	361	6.614958	8.687712	0	26
Total amount of last microcredit received	209	1086.158	647.1381	150	3000
Amount of last repayment	209	108.3245	64.54202	11	354
Duration of the microcredit (weeks)	209	10.85167	3.185304	4	30

^a Income from first and second activity per hour worked.

sample households lived on around 100 pesos per day. Since the median number of members of the household is around 4, the interviewees live on roughly 12.29 PPP-US\$ per day.³⁴

The average amount of the last monthly repayment for the microfinance loan among MF borrowers is 108 pesos, that is, 27% of median income.

Nevertheless, around 20% of income is saved. The respondents have no temporary employees. Average total productivity (considering main and other jobs) is around 17 pesos per hour.

When we decompose the sample into two groups (clients and eligible non-participants), we find that eligible non-participants earn on average 73% of the monthly average household income of MF borrowers (the difference in means, however, is not significant at 95% level).

The productivity of MF borrowers³⁵ is 21 pesos per hour worked, against the 16 pesos of eligible non-participants (again the difference in means is not significant at 95% level).

Interestingly, MF borrowers save relatively more (313.84 pesos) than do eligible non-participants (78.48 pesos). This difference is perhaps due to the need of MF borrowers to save more in order to repay the debt.

5.1. Trustors

In both rounds of the game, the vast majority of trustors (81%) sent more than zero (the subgame perfect Nash equilibrium of the game).

Table 3.1 reports the matrices of the average trustor contribution and belief in trustee response by trustor/trustee type. The mean amount of money sent by all trustors (irrespective of their MF/non-MF type) is 10.05 pesos, whereas the mean amount that they expect from trustees is 13.74 pesos (Table 3.1).³⁶ The table also shows that trustors give more (around 50% more), whatever their type, when the trustee is a MF borrower (around 12 pesos against 8 as the overall sample average, 11.7 against 8.8 if they are not MF clients, and 12 against 7.6 if they are MF clients). It is also clear that MF trustors do not give

unconditionally more than non-MF trustors (the difference is small and in favor of non-MF trustors).

The results on beliefs go in the same direction. This second important finding provides one possible explanation for the first finding on trustors' choices. Trustors may give significantly more to MF trustees because they expect significantly more from them³⁷ (16 against 11 on average, with a similar difference when only MF or non-MF trustors are considered).³⁸

Fig. 3a–b provide additional information on these findings, showing that the distribution of trustors' contribution and expectations from MF and non-MF trustees first intersect at around 6 pesos.

Our first two results on trustors' behavior and beliefs are confirmed by within-parametric as well non-parametric tests. The difference for the same trustor when sending to a MF vs. a non-MF trustee is 3.6 pesos and significantly different from zero. This leads to rejection of the null hypothesis H_{01} with both parametric and non-parametric tests (Table 3.2). The trustor expects that such difference will pay, since, for the same trustor, the difference in the expected money returned by MF vs. non-MF trustees is on average 5.42 pesos (rejection of the null hypothesis H_{02} with both parametric and non-parametric tests, Table 3.2).

We repeat the analysis considering the differences in MF seniority. Despite the presence of a small horizontal discrimination effect on MF status (trustors give more to the trustees with the same MF status), the within tests do not show significant differences on trustor's contributions and expectations when both players' MF seniority is accounted for.³⁹

If we examine the main revealed motivation of the trustor's choice, we find that trust plus strategic trust (that is, the motivation that would be most suggested by choices and beliefs) does not greatly exceed equality concerns (Fig. 2). The data on revealed strategies are however less informative than those on beliefs, and they have the shortcoming that only one motivation can be provided by each player. Even if a trustor reveals equality concerns as her main motivation, the fact that she sends more and believes that she will receive more from MF trustees shows that trustors, whatever their type, believe in the superior creditworthiness of MF vs. non-MF trustees.

³⁴ During the survey period (July–Sept. 2009), the average malnutrition and poverty thresholds were set by the INDEC (National Statistical Agency of Argentina) at 4.88 and 11.04 pesos/day respectively, which were in turn equivalent to 3.84 and 8.70 PPP-US\$ according to the country's PPP factor as evaluated by the World Bank in 2005. When considering the country's implied PPP factor in 2009 (US\$ 2.033, source: IMF), both the malnutrition and poverty lines fall to 2.40 and 5.43 PPP-US\$ per day respectively. However, if we correct these lines for the unofficial and more realistic inflation rates discussed at footnote 13 *Protagonizar* borrowers are much closer to them.

³⁵ Measured as the ratio between respondent and her partner's monthly income (from all their activities) and the hours that they spent on each activity.

³⁶ This implies that they expect to gain from their sending decision even though they also expect on the basis of their first order beliefs that the trustees' payoff will far exceed theirs.

³⁷ Such behaviour is consistent with Ashraf et al. (2006) finding that trust is highly correlated with an expectation of reciprocity, that is, we give because we expect to receive.

³⁸ We verified whether MF seniority has an effect which is independent from the MF/non-MF status, but we did not obtain significant results. The estimates are in an Appendix omitted for reasons of space and available upon request.

³⁹ The evidence is an Appendix omitted for reasons of space and available upon request.

Table 2
Descriptive statistics for MF borrowers and eligible non-participants.

Variable	Eligible non-participants				Clients			
	Obs	Mean	Std. err.	[95% conf. interval]	Obs	Mean	Std. err.	[95% conf. interval]
Age	152	43.68421	1.104722	41.5015 45.86692	150	42.53333	0.9579838	40.64034 44.42632
Female	152	0.62789	0.038607	0.61179 0.70422	150	0.69666	0.03651	0.62452 0.7688
Household income	152	3662.599	462.1428	2749.497 4575.7	150	4982.687	387.5127	4216.956 5748.417
Household food expenditure	152	42.29793	3.249835	35.87691 48.71895	150	35.89159	1.725943	32.4811 39.30207
Total productivity	152	15.79351	2.223757	11.39981 20.18721	150	20.60705	1.636741	17.37283 23.84127
Job experience (years)	152	7.447368	0.684113	6.095699 8.799038	147	9.390476	0.7362667	7.935359 10.84559
No. of temporary employees	152	0.0263158	0.0130265	0.000578 0.0520536	150	0.06	0.0254358	0.0097385 0.1102615
Savings/month	152	78.48684	25.43209	28.23815 128.7355	150	313.8444	57.65782	199.9118 427.7771
No. of persons in the household	150	4.013333	0.1608108	3.695569 4.331098	150	4.44	0.1529662	4.137737 4.742263
No. of children	152	2.519737	0.1600503	2.20351 2.835964	150	3.253333	0.169797	2.917812 3.588854
Schooling years (respondent)	150	8.9	0.2614278	8.383415 9.416585	150	8.403333	0.2370445	7.93493 8.871736
Schooling years (partner)	152	5.828947	0.3903659	5.057663 6.600232	150	5.28	0.3360675	4.615926 5.944074
Credit cycle					150	15.76	0.4911458	14.78949 16.73051
Total amount of last microcredit received					150	1209.513	52.15598	1106.452 1312.574
Amount of last repayment					150	121.1681	5.290582	110.7139 131.6224
Duration of the microcredit (weeks)					150	10.84	0.1938841	10.45688 11.22312

5.2. Trustees

Also in the case of the trustee sub-population, the Nash behavior is seldom observed, because players' responses to non-zero trustor contributions are zero in only two cases (1.3% of the sample). The *mean* amount returned by all the trustee-types as a response strategy is 25.11 pesos, whereas the *mean* amount that they expect from the trustor is 15.16 pesos (Table 4.1).⁴⁰

The most important finding here is that trustees' contributions and beliefs are not affected by the MF/non-MF nature of trustors (Table 4.2, rows 1–3), while they are so by the MF/non-MF nature of trustees (Table 4.2, rows 4–6).⁴¹ Recall that in this case we use the strategy method; hence what we calculate is the average of the ten possible trustee's responses to the ten possible trustor's plays. More specifically, the trustees give on average 21.3 pesos when not clients, 30.1 when young clients, and 28 when old clients. The test on the difference sent when being a MF vs. a non-MF trustee was significant (rejection of the null hypothesis H_{03} in Table 4.2, row 4).⁴²

First-order beliefs are consistent with the overall picture: trustees believe that trustors would give significantly more when they know that trustees are MF borrowers. Their belief is 12.5 when trustors

know that they were playing with non-MF trustees, and it rises to 17.3 and 18.3 when they know that they are playing with new and old MF trustees respectively. The MF/non-MF difference of the trustee is significant in non-parametric tests (rejection of the null hypothesis H_{04} , Table 4.2, row 5).

Second-order beliefs are also consistent with the overall picture. Trustees believe that trustors believe that they will give more when they are MF trustees. The difference is more than 5 pesos (12.5 vs. 17.8) and is significant in the non-parametric tests (rejection of the null hypothesis H_{05} , Table 4.2, row six).

Fig. 4a–c provide additional information on these findings. They show that distributions of non-MF trustee's responses, first- and second-order expectations are always larger in the first part of the value interval and then smaller after the intersection (which occurs at 23 pesos for contributions, 16 and 17 for first- and second-order beliefs respectively).

Overall, these findings illustrate that trustees are not concerned about the trustor's MF/non-MF characteristic in their choices⁴³ and beliefs. This result runs counter to the possible interpretation that the result on the higher trustors' contribution to the MF trustee is due to a mere framing effect (that is, the fact that the only information about the counterparty that we give is about her MF/non-MF status may, by itself, influence the player's choice).

What the trustees know when playing the game is whether or not the trustors are (*new* or *veteran*) borrowers of the MFI (see Section 4.3). But this information does not seem to affect their beliefs because it occurs for trustors when they learn about the same characteristic regarding the trustees.

In essence, our result on trustees depends on their own characteristics and not on elements part of the description of the game. Hence the framing interpretation does not apply. And if the trustor

⁴⁰ Note that, on average, trustees give more than what trustors expect. Furthermore, based on contributions of the two player's types, trustors end up with more than trustee. Does this imply that trustees are extremely altruistic? Not very much so since trustees expect from trustors more than what they actually give. Based on these beliefs trustees expect to end up with a payoff which is higher than that of trustors.

⁴¹ Note that within tests are possible only when testing trustor type differences. For trustee type differences we therefore report between nonparametric tests.

⁴² Again, we do not find an increase in the contribution when moving from young to old clients. Neither do we observe that the matching between old trustors and old trustees induce the trustees to give more; although an amount of discrimination on MFI status is present, it is small in magnitude and vanishes when the trustee is an MFI veteran. The non-parametric tests which account for trustee's MFI seniority do not show significant differences in responses.

⁴³ Obviously, the use of the strategic method largely explains why choices (but not beliefs) are not affected.

Table 3.1
Trustor's contributions and expectations.

Trustor		Trustee		
		Non-MF	MF	Total
Non-MF	Sent	8.83	11.70	10.26
	Expected	11.53	16.46	14.06
MF	Sent	7.57	12.07	9.82
	Expected	10.65	15.87	13.41
Total	Sent	8.21	11.88	10.05
	Expected	11.10	16.16	13.74

The first number in the cell is the amount in pesos sent by trustors, whereas the second is the amount expected back from trustees.

behavior consistently anticipated a behavior by trustees which do not depend on a framing effect, it would be itself less likely to be affected by the framing effect as well.⁴⁴

6. Econometric findings

We conduct econometric estimates in order to check whether our results on the five variables of interest (amount sent and first-order beliefs of trustors, mean trustee responses⁴⁵ and first- and second-order beliefs of trustees) are affected by socio-demographic factors or other measured controls. We perform four estimates for each dependent variable.

The first estimate (Table 5, column 1) is specified as follows

$$\begin{aligned}
 TrustorSend_i = & \beta_0 + \beta_1 HIncome_i + \beta_2 HComponents_i + \sum_{j=3}^4 \beta_j Village_j \\
 & + \beta_5 Age_i + \beta_6 Female_i + \sum_{k=7}^9 \beta_k CivilStatus_k \\
 & + \beta_{10} JobExp_i + \beta_{11} Schooling_i + \varepsilon_i \tag{1}
 \end{aligned}$$

where the amount sent by trustors (*TrustorSend*) is the dependent variable. Regressors are household income measured as the sum of each family member's disposable income (*HIncome*), the number of individuals living in the household (*HComponents*), two village dummies (*Village*), the respondent's years of schooling (*Schooling*), age, gender dummy (*Female*, equal to 1 if the interviewee is female), *CivilStatus*⁴⁶ and job experience (*JobExp*), that is, the number of years in the entrepreneurial activity financed by the loan.⁴⁷

In the second specification (Table 5, column 2), we add two dummy variables for the player's MF/non-MF status, *TrustorType* and

TrusteeType, which are equal to 1 if the player is a member of a MF institution and 0 otherwise.

$$\begin{aligned}
 TrustorSend_i = & \beta_0 + \beta_1 HIncome_i + \beta_2 HComponents_i \\
 & + \sum_{j=3}^4 \beta_j Village_j + \beta_5 Age_i + \beta_6 Female_i \\
 & + \sum_{k=7}^9 \beta_k CivilStatus_k + \beta_{10} JobExp_i + \beta_{11} Schooling_i \\
 & + \beta_{12} TrustorType_i + \beta_{13} TrusteeType_i + \varepsilon_i \tag{2}
 \end{aligned}$$

In the third and the fourth specifications, the last model is estimated in subgroups of MF (or non-MF) trustors only (Table 5, columns 3 and 4).

The results from model 2 show that the trustor type variable is strongly significant with a magnitude of 3.67 pesos (very close to the 4 pesos average effect in descriptive statistics) in the overall sample estimates. The effect is significant not only statistically but also economically, because it corresponds to an around 33% increase with respect the average contribution to a non-MF trustee. The variable remains significant in both sub-sample estimates. On the contrary, the MF borrower status does not matter when evaluating the trustor's behavior.

We use the same four specifications when looking at the trustor's beliefs (Table 6, columns 1, 2, 3 and 4). More specifically, models 1 and 2 become:

$$\begin{aligned}
 TrustorExpect_i = & \beta_0 + \beta_1 HIncome_i + \beta_2 HComponents_i \\
 & + \sum_{j=3}^4 \beta_j Village_j + \beta_5 Age_i + \beta_6 Female_i \\
 & + \sum_{k=7}^9 \beta_k CivilStatus_k + \beta_{10} JobExp_i + \beta_{11} Schooling_i + \varepsilon_i \tag{3}
 \end{aligned}$$

and

$$\begin{aligned}
 TrustorExpect_i = & \beta_0 + \beta_1 HIncome_i + \beta_2 HComponents_i \\
 & + \sum_{j=3}^4 \beta_j Village_j + \beta_5 Age_i + \beta_6 Female_i \\
 & + \sum_{k=7}^9 \beta_k CivilStatus_k + \beta_{10} JobExp_i + \beta_{11} Schooling_i \\
 & + \beta_{12} TrustorType_i + \beta_{13} TrusteeType_i + \varepsilon_i \tag{4}
 \end{aligned}$$

where *TrustorExpect* measures how much trustors expect to receive back from trustees.

Our findings show that trustors expect that their higher donation to MF trustees will pay because they expect 5.14 pesos more from MF trustors. The result is robust in trustor's type sample splits (Table 6, columns 3 and 4). No other controls matter in these estimates, with the exception of the weak significance of household income (higher-income players expect slightly less from trustees).

Table 7 reports the results of the same estimates for the trustee sample, considering the trustee's mean response (*TrusteeRESP*) as the dependent variable (see below).⁴⁸

$$\begin{aligned}
 TrusteeRESP_i = & \beta_0 + \beta_1 HIncome_i + \beta_2 HComponents_i + \sum_{j=3}^4 \beta_j Village_j \\
 & + \beta_5 Age_i + \beta_6 Female_i + \sum_{k=7}^9 \beta_k CivilStatus_k \\
 & + \beta_{10} JobExp_i + \beta_{11} Schooling_i + \varepsilon_i \tag{5}
 \end{aligned}$$

⁴⁸ Specifications with observations including each elements of the trustee strategy are also estimated by clustering for individual player variance. As expected, the results are confirmed and are omitted for reasons of space. We repeated all the specifications saturating the model with an interaction term between trustee and trustor MF/non-MF status. The additional regressor was insignificant in all the specifications; the results are omitted but are available from the authors upon request.

⁴⁴ In other words, trustors anticipate that trustees believe that they are affected by the framing effect and that trustees were not. This is quite implausible and would anyway restrict the framing effect to the trustors' behavior.

⁴⁵ The average of the ten possible trustee's responses to the ten possible trustor's plays.

⁴⁶ Specifically, the dummies used for civil status are *Married*, *Cohabitant* and *Single*; the benchmark dummy is *Separated*.

⁴⁷ Several studies have reported that socio-economic variables like the ones included in our regression – age, gender, income, marital status, education and dwelling – are correlated with trust (see, among others, Alesina and La Ferrara, 2000; Bellemare and Kroger, 2007; Rainer and Siedler, 2009; Sutter and Kocher, 2007). In particular, Alesina and La Ferrara (2000) classify among the strongest trust-reducing factors that of belonging to a group historically discriminated against (such as minorities and women) and lack of success in terms of income and education. Sutter and Kocher (2007) argue that trust increases almost linearly from early childhood to early adulthood but remains rather constant within different adult age groups, whereas trustworthiness prevails in all adult age groups. Bellamare et al. (2008) find that heterogeneity in social capital behaviour is characterized by several asymmetries: that is, men, the young, the elderly, and low-educated individuals invest relatively less, but reward significantly more investments. Finally, Moorman et al. (1993) argue that, among other interpersonal factors, expertise is a strong predictor of trust in market research relationships.

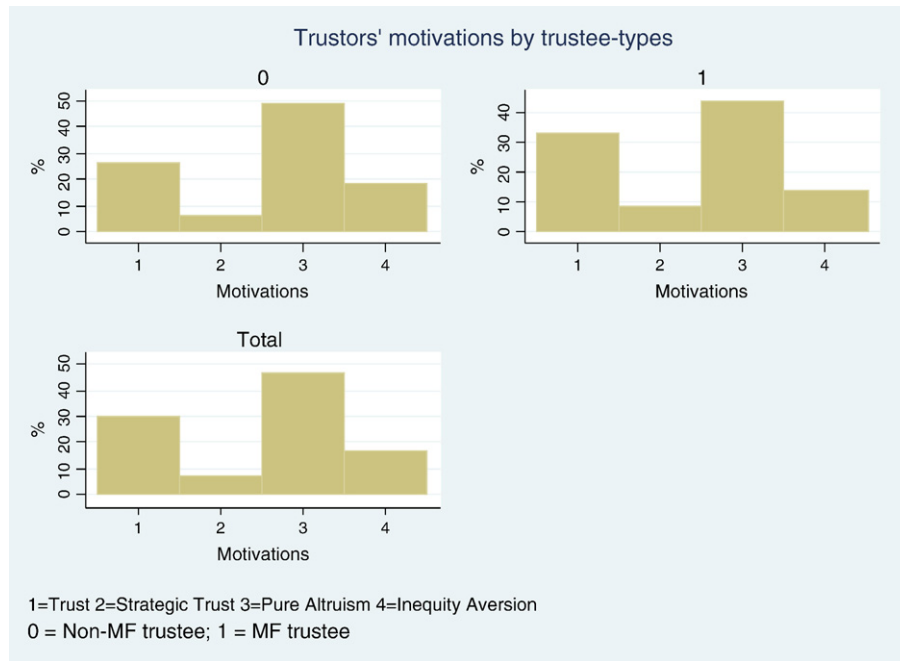


Fig. 2. Distribution of trustors' motivations.

and

$$\begin{aligned}
 TrusteeRESP_i = & \beta_0 + \beta_1 HIncome_i + \beta_2 HComponents_i \\
 & + \sum_{j=3}^4 \beta_j Village_j + \beta_5 Age_i + \beta_6 Female_i \\
 & + \sum_{k=7}^9 \beta_k CivilStatus_k + \beta_{10} JobExp_i + \beta_{11} Schooling_i \\
 & + \beta_{12} TrustorType_i + \beta_{13} TrusteeType_i + \varepsilon_i
 \end{aligned} \quad (6)$$

The estimate results show that the mean trustee response is 7.50 pesos and higher if the trustee is a MF borrower (52% more than what a non-MF trustee gives on average). The trustor's type is not significant, consistently with what is shown by descriptive statistics and non-parametric tests (Table 7, columns 1 and 2). The result is robust in the (counterpart) trustor's type splits (Table 7, columns 3 and 4). With regard to other controls, it is interesting that higher-income trustees tend to give less, while females give significantly more. The findings in the literature on gender effects in experimental games are quite mixed, although there seems to be partial agreement on the fact that women behave more socially in less risky situations.⁴⁹

Tables 8 and 9 show the estimate results when trustees' first-order (*Belief(I)*) and second-order (*Belief(II)*) beliefs are dependent vari-

⁴⁹ For a non-exhaustive discussion on gender effects, see Becchetti et al. (2009) experiment based on the traveller's dilemma, where women in the sample prove to be less trustful than men; Solnick (2001) shows that both women and men expect higher offers by a female proposer; Andreoni and Vesterlund (2001) show that in a dictator game with asymmetric information men are more selfish; On the basis of Eckel and Grossman (1998) finding that women are more socially oriented in less risky situations, Croson and Buchan's (1999) experiment based on a trust game reveal that they behave like men when they play as trustors but are more generous when they play as trustees. This last result, however, is not comparable with ours (in which women behave more generously) because the participants in Croson and Buchan's (1999) (lab) experiment are undergraduate students at the University of Melbourne, a very different sample from the one that we have in our field experiment.

ables

$$\begin{aligned}
 Belief(I)_i = & \beta_0 + \beta_1 HIncome_i + \beta_2 HComponents_i + \sum_{j=3}^4 \beta_j Village_j \\
 & + \beta_5 Age_i + \beta_6 Female_i + \sum_{k=7}^9 \beta_k CivilStatus_k + \beta_{10} JobExp_i \\
 & + \beta_{11} Schooling_i + \beta_{12} TrustorType_i + \beta_{13} TrusteeType_i + \varepsilon_i
 \end{aligned} \quad (7)$$

and

$$\begin{aligned}
 Belief(II)_i = & \beta_0 + \beta_1 HIncome_i + \beta_2 HComponents_i + \sum_{j=3}^4 \beta_j Village_j \\
 & + \beta_5 Age_i + \beta_6 Female_i + \sum_{k=7}^9 \beta_k CivilStatus_k \\
 & + \beta_{10} JobExp_i + \beta_{11} Schooling_i + \beta_{12} TrustorType_i \\
 & + \beta_{13} TrusteeType_i + \varepsilon_i
 \end{aligned} \quad (8)$$

The first-order belief estimates are also consistent with the descriptive statistics because trustees believe that trustors would give significantly more when they know that they are MF borrowers. The magnitude of the effect is 5.6 pesos (Table 8, columns 1 and 2). This finding is robust when we re-estimate the model in the two (MF and non-MF trustees) subsamples (Table 8, columns 3 and 4).

The second-order belief effect is again significant and robust in subsamples. Trustees believe that trustors believe that they will give more if they are MF trustees (Table 9, columns 1, 2, 3 and 4). Its magnitude (around 9.5 pesos) is around 2 pesos larger than the actual difference between the MF and non-MF trustee behavior. An interesting finding is that this is the only case in which the trustor's MF status seems to matter. Hence, trustees' second-order beliefs are significantly and positively affected by the MF trustor status too.

One might object to this interpretation of our findings that the presence of unknown interviewers induces (sceptical) players to react less truthfully in a game with pecuniary payoffs. Even if such an effect is present, however, it does not explain why trustors – of whatever

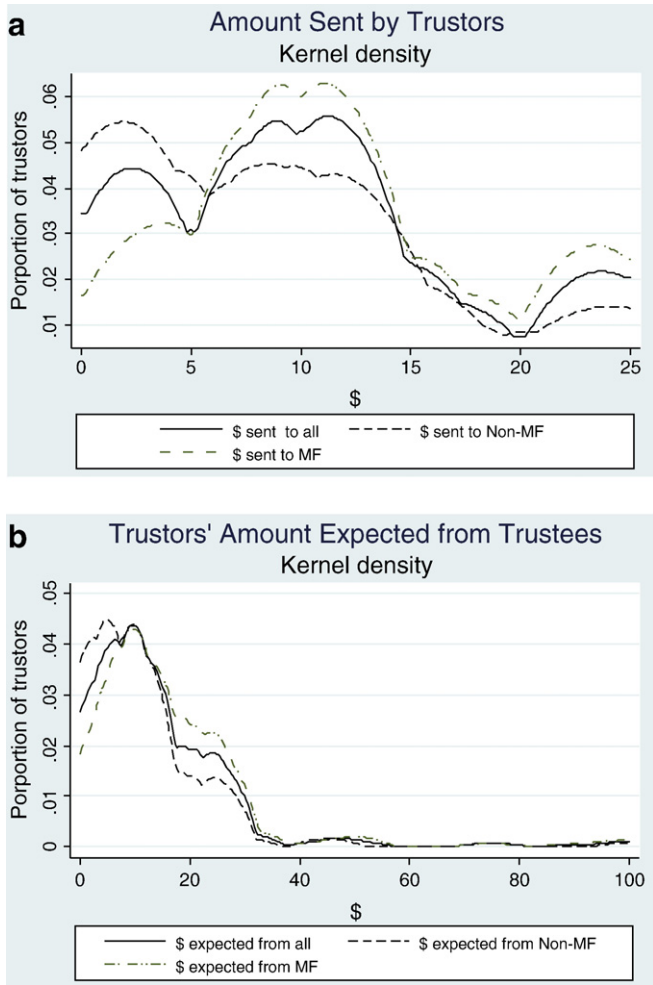


Fig. 3. a–b. Distribution of trustor's contributions and expectations by trustee type.

type – give more to (expect more from) MF trustees, and why MF trustees' responses, I- and II-order beliefs are higher than those of their non-MF peers.

The same reasoning applies to the objection that, in field experiments, players seek to protect their reputations or to impress the experimenter. This would not be able to explain the observed differences in players' strategies based on MF/non-MF status.⁵⁰

7. Conclusions

In the Sen's welfare perspective access to credit may be typically regarded as enhancing capabilities of uncollateralized poor borrowers not only by increasing their instrumental freedom but also by reinforcing their dignity and social recognition. In this paper we find a third nexus by showing how credit access, in the framework of asymmetric information postulated by the experiment, creates a positive trustworthiness externality for the borrower which reinforces the mechanism by which interpersonal relationships augment his individual capabilities in “investment games”.

A fundamental characteristic of investment games is that trustees hold private information about their type; that is, trustors cannot

Table 3.2
Hypothesis testing on trustors' contributions and beliefs.

Test type	Average difference	z-stat	p-value
Parametric tests			
Within test on trustor contribution to a MF vs. a non-MF trustee (Hyp. H ₀₁)	3.76	4.64	(0.00)
Within test on trustor expectations from a MF vs. a non-MF trustee (Hyp. H ₀₂)	5.42	4.86	(0.00)
Non parametric tests			
Wilcoxon rank-sum equality test on trustor's contribution to a MF vs. a non-MF trustee (Hyp. H ₀₁)		-4.26	(0.00)
Wilcoxon rank-sum equality test on trustor's expectation from a MF vs. a non-MF trustee (Hyp. H ₀₂)		-3.77	(0.00)

discern the type of a trustee (Diekmann and Przepiorka, 2008). It is therefore clear that if the trustee could signal her good quality type, this would potentially increase the total payoff of the game. In our field experiment on microfinance borrowers and eligible non-participants, we show that the problem can be solved by a “signaling technology” based on revelation of the MF borrower's status.

We start from a theoretical framework in which loan concession may signal the trustworthiness of MF borrowers. On testing this hypothesis, we obtained results on players' choices and beliefs which do not reject it.

We further argue that if the total payoff of the trust investment game can be reasonably considered to be a proxy for the value added that can be created in business relationships, it may be concluded that the MF loan concession is also a signal of trustworthiness that has, by itself, positive effects on economic activity and on the borrower's capacity to repay the loan.

An important caveat to our findings is that an alternative rationale consistent with what we find is that counterpart trustworthiness characteristics are public information and only trustworthy individuals are screened by the microfinance institution. In such case we still observe that the extra trustworthiness effect without the above mentioned positive impact of loan concession on economic activity and loan repayment. As a consequence, a more general result of our paper, valid also under this public information scenario, is that the capacity to select more trustworthy individuals may be one of the reasons of microfinance success.

We believe that our findings illustrate one possible methodological solution to endogeneity problems in this kind of research. If we add an investment game experiment to the impact study on the effects of microfinance, and successfully test that becoming a MF borrower

Table 4.1
Trustees' response, I and II order beliefs.

Trustee		Trustor		Total
		Non-MF	MF	
Non-MF	Response	21.54	20.80	21.17
	I belief	11.46	13.53	12.49
	II belief	12.17	16.53	14.35
MF	Response	29.58	28.51	29.04
	I belief	17.15	18.47	17.81
	II belief	21.93	24.51	23.24
Total	Response	25.56	24.66	25.11
	I belief	14.30	16.02	15.16
	II belief	17.26	20.75	19.02

The first number in the cell is the trustee's response in pesos to trustors' hypothetical strategies, whereas the second and the third one represent the I and the II order beliefs respectively (in pesos).

⁵⁰ Finally, we repeated all the estimates introducing seniority dummies as additional regressors, but the latter were not significant. The results are omitted for reasons of space and are available from the authors upon request.

Table 4.2
Hypothesis testing on trustees' responses, I- and II-order beliefs.

Test type	Average difference	z-stat	p-value
Parametric tests			
Within test on trustee's response to a MF vs. a non-MF trustor	-0.90	-1.48	(0.14)
Within test on trustee's I-order belief on a MF vs. a non-MF trustor move	1.81	1.64	(0.10)
Within test on trustee's II-order belief on a MF vs. a non-MF trustor move	3.56	1.32	(0.007)
Non parametric tests			
Wilcoxon rank-sum equality test on trustee's response to a MF vs. a non-MF trustor		0.676	(0.4988)
Wilcoxon rank-sum equality test on trustee's I order belief to a MF vs. a non-MF trustor		-2.222	(0.0263)
Wilcoxon rank-sum equality test on trustee's II order belief to a MF vs. a non-MF trustor		-2.612	(0.0090)
Wilcoxon rank-sum equality test on trustee's response by MF vs. a non-MF trustee (Hyp. H ₀₃)		-4.73	(0.00)
Wilcoxon rank-sum equality test on trustee's I order belief by MF vs. a non-MF trustee (Hyp. H ₀₄)		-4.139	(0.00)
Wilcoxon rank-sum equality test on trustee's II order belief by MF vs. a non-MF trustee (Hyp. H ₀₅)		-3.635	(0.0003)

generates trustworthiness (of the investment game type) under the imperfect information hypothesis, we know that an important mechanism of direct causality operates between obtaining a MF loan and improving one's well-being. In other words, if the MF loan concession event produces a trustworthiness effect in the trust investment experiment, it is highly likely that the correlation observed between loan concession and the borrower's actual performance from the impact study contains that causal relationship from the first to the second fact. This implies that, even though we cannot exclude other direct or reverse causality patterns (or correlations with third omitted factors), in this correlation we have *at least one causal relationship* documenting that microfinance matters.

Table 5
Determinants of trustors' contributions (OLS estimates).

	Whole sample		Non-MF Trustors only	MF Trustors only
	1	2	3	4
Age	0.0449 (0.0514)	0.0444 (0.0520)	0.0202 (0.0647)	0.0705 (0.0789)
Female	-0.596 (1.207)	-0.535 (1.233)	0.556 (1.518)	-1.771 (2.115)
Single	-0.640 (2.065)	-0.626 (2.078)	1.106 (3.550)	-2.883 (2.617)
Married	-1.878 (1.699)	-1.883 (1.709)	0.938 (2.689)	-4.403* (2.442)
Cohabitant	-1.219 (1.904)	-1.222 (1.914)	0.292 (2.851)	-2.542 (2.603)
JobExp	0.0123 (0.0631)	0.0147 (0.0643)	0.0752 (0.0898)	-0.0853 (0.0996)
Villa de Mayo	0.886 (1.526)	0.653 (1.647)	0.859 (1.789)	
S. Brigida	1.479 (1.253)	1.476 (1.254)	1.672 (2.005)	1.338 (1.947)
Schooling	-0.0673 (0.191)	-0.0676 (0.192)	-0.206 (0.272)	-0.0122 (0.274)
HIncome	-0.000143* (8.15e-05)	-0.000140* (8.22e-05)	-0.000114 (0.000196)	-0.000101 (9.91e-05)
HComponents	0.517 (0.331)	0.507 (0.337)	0.852* (0.454)	0.185 (0.527)
TrustorType		-0.351 (1.230)		
TrusteeType		3.670*** (0.705)	2.862*** (1.053)	4.500*** (0.969)
Observations	300	300	152	148
R-squared	0.032	0.087	0.092	0.146

Robust clustered standard errors in parentheses.

*** p < 0.01.
** p < 0.05
* p < 0.1.

In this regard, however, an important question to be assessed by future analyses using the same approach is whether our results rely on the specific group-lending features of *Protagonizar* or whether they

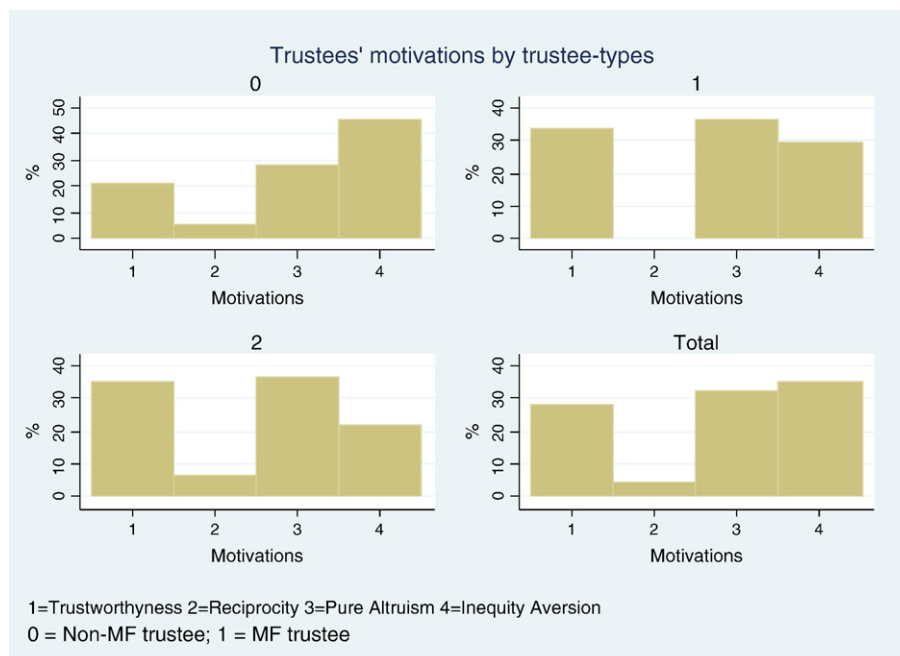


Fig. 4. Distribution of trustees' motivations.

Table 6
Determinants of trustors' expectations (OLS estimates).

	Whole sample		Non-MF trustors only	MF trustors only
	1	2	3	4
Age	0.0190 (0.0960)	0.0181 (0.0935)	0.0754 (0.0972)	-0.0632 (0.201)
Female	-1.339 (2.731)	-1.533 (2.968)	1.820 (2.673)	-4.835 (5.762)
Single	2.629 (5.753)	2.667 (5.777)	6.782 (6.540)	-2.931 (7.966)
Married	-2.854 (3.651)	-2.927 (3.626)	2.922 (3.870)	-8.857 (6.246)
Cohabitant	-3.296 (4.479)	-3.311 (4.466)	2.050 (3.631)	-8.994 (8.122)
JobExp	0.0590 (0.0835)	0.0505 (0.0860)	0.200* (0.115)	-0.174 (0.137)
Villa de Mayo	3.824 (3.291)	4.359 (3.431)	4.824 (3.572)	0 (0)
S. Brigida	3.298 (2.262)	3.285 (2.255)	4.658 (3.020)	1.957 (2.691)
Schooling	-0.233 (0.406)	-0.239 (0.408)	-0.462 (0.455)	-0.241 (0.822)
HIncome	-0.000258** (0.000122)	-0.000257* (0.000130)	-3.87e-05 (0.000301)	-0.000210 (0.000133)
HComponents	0.740 (0.686)	0.779 (0.688)	1.511 (1.035)	0.0784 (0.882)
TrustorType		0.575 (2.377)		
TrusteeType		5.144*** (1.213)	4.955** (1.997)	5.569*** (1.403)
Observations	278	278	140	138
R-squared	0.039	0.069	0.123	0.100

Robust clustered standard errors in parentheses.

*** $p < 0.01$.** $p < 0.05$.* $p < 0.1$.**Table 7**
Determinants of trustees' responses (OLS estimates).

	Whole sample		Non-MF Trustor only	MF Trustor only
	1	2	3	4
Age	0.0437 (0.104)	0.0422 (0.104)	0.0639 (0.112)	0.0206 (0.107)
Female	5.975*** (2.170)	4.967** (2.079)	5.012** (2.307)	4.923** (2.176)
Single	1.280 (4.232)	1.663 (4.194)	1.728 (4.482)	1.598 (4.400)
Married	3.450 (3.757)	4.050 (3.700)	3.982 (3.973)	4.117 (3.904)
Cohabitant	1.232 (4.224)	0.580 (4.125)	1.920 (4.492)	-0.759 (4.344)
JobExp	-0.0759 (0.139)	-0.135 (0.140)	-0.159 (0.149)	-0.112 (0.141)
Villa de Mayo	-7.744** (3.643)	-2.371 (3.949)	-4.913 (4.334)	0.171 (4.118)
S. Brigida	-1.277 (2.543)	0.297 (2.490)	0.923 (2.636)	-0.329 (2.578)
Schooling	0.282 (0.353)	0.250 (0.336)	0.277 (0.383)	0.222 (0.330)
HIncome	-0.000257** (0.000106)	-0.000296*** (0.0000994)	-0.000272*** (0.000103)	-0.000320*** (0.000112)
HComponents	0.676 (0.720)	0.327 (0.735)	0.498 (0.772)	0.156 (0.751)
TrustorType		-0.903 (0.601)		
TrusteeType		7.501*** (2.295)	6.756*** (2.442)	8.246*** (2.382)
Observations	304	304	152	152
R-squared	0.087	0.142	0.141	0.153

Robust clustered standard errors in parentheses.

*** $p < 0.01$.** $p < 0.05$.* $p < 0.1$.**Table 8**
Determinants of trustees' 1-order beliefs (OLS estimates).

	All sample		Non-MF trustor only	MF trustor only
	1	2	3	4
Age	-0.0550 (0.0806)	-0.0551 (0.0809)	0.0123 (0.0886)	-0.122 (0.0903)
Female	-0.861 (1.615)	-1.632 (1.432)	-2.027 (1.489)	-1.247 (2.015)
Single	-0.791 (2.914)	-0.676 (2.872)	-1.726 (2.952)	0.373 (3.602)
Married	0.272 (2.552)	0.703 (2.599)	-1.934 (2.382)	3.331 (3.893)
Cohabitant	-0.877 (2.679)	-1.303 (2.676)	-1.556 (2.876)	-1.051 (3.193)
JobExp	0.0458 (0.113)	0.00252 (0.116)	0.0804 (0.0995)	-0.0757 (0.186)
Villa de Mayo	-2.730 (2.340)	1.353 (2.437)	4.819 (2.981)	-2.110 (3.503)
S. Brigida	-2.341 (1.802)	-1.064 (1.645)	-0.117 (1.557)	-2.017 (2.371)
Schooling	0.0146 (0.268)	-0.00630 (0.253)	0.236 (0.247)	-0.248 (0.352)
HIncome	1.00e-04 (6.85e-05)	7.05e-05 (5.97e-05)	0.000142* (7.62e-05)	-1.56e-06 (0.000123)
HComponents	0.145 (0.395)	-0.114 (0.439)	0.496 (0.327)	-0.724 (0.743)
TrustorType		1.695 (1.140)		
TrusteeType		5.626*** (1.735)	5.423*** (1.550)	5.838** (2.663)
Observations	299	299	149	150
R-squared	0.019	0.069	0.147	0.076

Robust clustered standard errors in parentheses.

*** $p < 0.01$.** $p < 0.05$.* $p < 0.1$.

can be generalized.⁵¹ As we know from the literature (Ghatak, 1999), the mechanism of giving credit to groups of 4–6 individuals with joint liability and the group's commitment to fully covering the inability to pay of groupmates is a very strong incentive to assortative matching. In the framework in which microfinance operates, given the impossibility of using the scoring mechanisms employed by traditional banks, peer monitoring reinforces bank screening and may create a much stronger trustworthiness effect.

For this reason, and to enrich the debate, the conduct of other field-experiments would be welcome in order to verify whether the same significant trustworthiness effect is generated in the presence of an MF institution using individual rather than group lending.

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⁵¹ It is important, however, to emphasise that, in our experiment, non-MF players were briefly informed before they started the game about the main characteristics of the MF institution (specifically about the group-lending mechanism and the interest rate). For this purpose, a standardized written set of instruction was prepared in order to limit potential experimenter discretionality in selecting information on the MF's main features.

Table 9
Determinants of trustees' II-order beliefs (OLS estimates).

	All sample		Non-MF trustor only	MF trustor only
	1	2	3	4
Age	-0.138 (0.146)	-0.141 (0.144)	-0.193 (0.158)	-0.0865 (0.167)
Female	-1.942 (3.447)	-3.192 (3.273)	-1.332 (3.366)	-5.087 (3.782)
Single	-7.296 (5.024)	-7.948 (5.019)	-8.474 (5.263)	-7.370 (5.843)
Married	-2.538 (4.559)	-2.018 (4.390)	-3.634 (4.680)	-0.433 (4.790)
Cohabitant	-0.492 (7.006)	-1.063 (6.773)	-6.225 (6.851)	4.111 (7.933)
JobExp	0.200 (0.230)	0.119 (0.235)	0.0188 (0.200)	0.222 (0.344)
Villa de Mayo	-5.895* (3.450)	1.015 (3.826)	2.684 (5.280)	-0.593 (4.432)
S. Brigida	0.00511 (3.375)	1.768 (3.552)	0.156 (4.095)	3.376 (3.692)
Schooling	0.182 (0.414)	0.0714 (0.427)	0.0368 (0.469)	0.121 (0.519)
HIncome	8.57e-05 (0.000103)	5.54e-05 (0.000142)	0.000139 (0.000103)	-2.65e-05 (0.000220)
HComponents	-0.00783 (0.585)	-0.541 (0.687)	-0.198 (0.701)	-0.831 (0.842)
TrustorType		3.442*** (1.301)		
TrusteeType		9.388** (3.715)	8.654** (4.167)	10.21** (3.987)
Observations	278	278	140	138
R-squared	0.032	0.081	0.060	0.122

Robust clustered standard errors in parentheses.

In these specifications we have fewer observations because trustees who believe that the trustor has sent nothing are not included.

*** $p < 0.01$.

** $p < 0.05$.

* $p < 0.1$.

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