Full length article

Profiling trust: An empirical analysis

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ABSTRACT

We conduct an empirical study in an educative community in Mexico City. Our objective is to identify which are the profiles (individuals' set of observable characteristics) that people in our sample consider more trustworthy. We also analyze how these perceptions of trustworthiness are matched by the responses and characteristics of individuals upon whom trust was deposited (reciprocity). Our results indicate that age and social proximity are regarded as good signals of trustworthiness by the individuals in the sample. However, reciprocity decisions are determined by education, risk aversion, and the individuals' expectations about how much other individuals will trust them. Even considering that there would be some element of error in the individuals' perceptions, we observe that there is no intersection between the characteristics that individuals perceive as the best components of a trustworthy profile and the characteristics that determine reciprocity decisions.

1. Introduction

Social closedness, which can be measured through an individual's social network, might determine trust (Karlan et al., 2009); but there are other determinants of trust, such as personal characteristics, institutional factors, and environmental features (Bachmann and Zaher, 2013). Moreover, Ljunge (2014) finds evidence that trust is influenced by cultural ancestry due to the existence of intergenerational channels of trust transmission. Given the above, it can be inferred that an individual's decision of trusting or not another individual is complex since several factors come into play. We work with the hypothesis that individuals use profiles or set of other individuals' observable characteristics when trying to identify trustworthy people. In this paper, we empirically analyze which are the set of characteristics (profiles) that makes one individual more trustworthy in the eyes of another individual, given their social network, and whether certain individual characteristics that are included in the most preferred profiles truly identify trustworthy individuals.

Answering this question is of relevance because it might contribute to the explanation of why, in a given social network, some economic transactions, informal or formal, take place and some other do not. Social networks and trust play a role in reducing the asymmetric information problems associated with financial transactions (Townsend, 1994; Foster and Rosenzweig, 1995; Easterly and Levine, 1997; Zak and Knack, 2001; Guiso et al., 2001; Adato et al., 2006; Chantarat and Barret, 2007). These information frictions limit financial contracts and participation in formal financial markets.

The central idea is that social networks develop direct monitoring mechanisms that produce information about

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the financial behavior of the individuals that belong to such networks. Also, social networks tend to use social sanctions to improve the enforcement of contracts. Furthermore, this literature sustains that the operation of financial institutions is always-regardless of the degree of development-based on trust. Trust and social networks can improve the efficiency of a society by facilitating the coordination of actions, and the negotiation and execution of compliance of agreements and contracts (Putnam, 1993). According to Guiso et al. (2001) and Ferrary (2003), the existence of social networks and trust translates into greater degrees of development and institutionalization of the financial sector. Higher levels of trust placed in both other individuals and formal institutions indicate greater use of formal financial instruments and increased efficiency in the implementation of contracts (Guiso et al., 2001; Zak and Knack, 2001; Ferrary, 2003; Guiso et al., 2008).

On the other hand, social networks have been classified according to three layers of social interaction (Putnam, 1993; Guiso et al., 2001; Lin, 2005a,b). The first layer is characterized by close and trusted relations that are established with direct family members or close friends. These relations provide individuals with support and/or resources, are characterized as being intense and reciprocal, and generate dense and closed social networks. The second layer consists of links that serve the purpose of sharing information and resources with business partners, acquaintances, colleagues, and people with the same political or religious affiliation. These networks are typically open. The third layer of social relations creates networks that pool individuals who share a vertical or authority-based relationship.

Individuals who participate in dense social networks have been found to demonstrate higher levels of interpersonal trust (Marsden and Campbell, 1984; Coleman, 1990; Granovetter, 1973, 1985; Hansen, 1999), whereas higher levels of trust in institutions have been found in individuals who participate in open and diverse social networks (Fukuyama, 1995; Putnam, 2000). Hierarchical networks connect people with political resources and formal institutions preserving their anonymity. Trust toward society in general is considered the foundation of collective action and social cohesion (Fukuyama, 1995; Putnam, 1993, 2000; Zak and Knack, 2001). These studies that support the argument that social networks create trust (Granovetter, 1985; Coleman, 1990; Putnam, 2000). For example, Karlan et al. (2009) develop a model where social networks create trust when individuals use their connections in social networks as social collateral to ensure informal financial transactions.

Moreover, Bacharach and Gambetta (2001) consider trust as a type of belief that emerges in games with a particular payoff structure. According to those authors, the *primary problem of trust* is the question that the person who deposits trust upon someone else asks to her/himself: Can I trust this person to do X? Hence, the truster faces uncertainty about the other person's payoffs derived from doing X. This uncertainty about the true nature of the trustee causes the emergence of the *secondary problem of trust*: The truster must analyze whether external signs sent by the trustee are good predictors of her/his true level of

trustworthiness. In this paper, we employ this definition of trust in the sense that agents use profiles (sets of external characteristics) of people with whom they might establish a trust-based relationship to decipher whether certain trustee's profiles are good indicators of her true level of trustworthiness.

There are several attributes that identify a trustworthy individual that span from individual characteristics to cultural conventions. When an individual has been considered trustworthy, based on her apparent characteristics and does not act as expected, then she should expect to suffer adverse consequences that might affect her future contracts. Punishment and bad reputation should provide enough incentives for an individual to choose to behave in a trustworthy manner. Notice that the idea of network connections as social collateral that generate trust, as used by Karlan et al. (2009), is also present in this context.

It is difficult for an individual who potentially trusts another individual to be certain about the relevant attributes that define a trustworthy individual. Thus, an individual's observable attributes are signals about her trustworthiness. Attributes that are identified as better signals of trustworthiness should be less costly to display for those individuals who are truly trustworthy than for those who are not trustworthy but want to appear as if they were. Hence, the problem of an individual who potentially trusts another individual is decoding the trustworthiness signals sent by the individual.

The objective of this paper is to find out which are the individual's set of characteristics that determines her level of trustworthiness, given her social network. That is, we intend to use the idea of social connections as social collateral of Karlan et al. (2009) with the notion of trust of Bacharach and Gambetta (2001), in which an individual who trusts another must rely on observable signals (set of observable characteristics) in order to ascertain how trustworthy any given individual is.

To achieve this goal, we design and implement an empirical strategy to identify which profiles (or sets of individual characteristics) a group of people in a particular community consider more trustworthy. Finally, we analyze reciprocity to determine whether these perceptions are matched by the responses of the individuals upon whom trust was placed. The steps we take in our empirical methodology are the following: (i) we study the socio-demographic and social network characteristics of a particular community's members by means of a survey, (ii) we determine the profiles that individuals who belong to this community consider trustworthy by implementing a vignette experiment and a trust game, and (iii) we study whether the profiles that individuals consider trustworthy are good predictors of a true level of trustworthiness – in terms of reciprocity – using the results of the trust game.

The experimental protocol known in the literature as the trust or investment game (Berg et al., 1995) has been used to measure the degree of trust and reciprocity between the players. This game has been implemented in laboratories as well as in the field (Glaeser et al., 2000; Karlan, 2005; Houser et al., 2010; McEvily et al., 2012). Similarly to these studies, we combine two experiments and a survey to measure trust and trustworthiness.

Moreover, we make use of the individuals' actual social networks, elicited from the aforementioned survey, to make inferences about which profiles he/she considers trustworthy. There are recent studies that have made explicit use of participants' real-world social network by letting participants play the dictator game or trust game with someone of their social network (Leider et al., 2009; Ligon and Schechter, 2012; Binzel and Fehr, 2013).

This paper aims to complement this literature in understanding the particular attributes that people consider good signals of trustworthiness within the individuals' social networks. To date, these attributes are not empirically identified because: (i) the theory is inconclusive about this matter, and (ii) those attributes might change with the social network and temporal dimension in which a trust-based relationship might emerge.

The remainder of this article is organized as follows: in Section 2, we describe our empirical methodology and our unit of analysis. In Section 3, we develop a measure of an individual's social network size that will be employed in subsequent sections. In Section 4, we show the results of a vignette experiment we implemented to rank the profiles of individual subjects considered to be more trustworthy. In Section 5, we discuss the results we obtained from a trust game conducted to measure trust and reciprocity. Finally, we present our concluding remarks.

2. Methodology and unit of analysis

In this section, we describe our empirical methodology, which includes a survey, a vignette experiment, and an investment or trust game.

First, we conducted a survey at an educational institution located in Mexico City, *i.e.*, Centro de Investigación y Docencia Económicas (CIDE), to gather information about the socio-demographic and economic characteristics of a group of individuals. To select the sample out of the population of people employed at CIDE, we classified this population in four groups of people, according to their occupation at the institution: Maintenance and Operations Services, Administrative Services, Academics/Research, and Authorities. In this way, individuals who belong to each group share similar conditions with respect to years of formal education, income level, and personal interests. Within each group, we randomly selected a sample of employees.

The survey's particular goal was to gather the following information about the individuals comprising the sample: (i) the size and composition of their social networks, and (ii) their socio-demographic and economic characteristics. The survey was conducted in June 2010 at CIDE. The effective sample consisted of 117 individuals out of a total of 326 employees. The individuals in the sample participated voluntarily, and responded to an invitation sent by electronic mail by this paper's authors, with permission from the relevant authorities to be excused from their obligations during the time the survey lasted.

Information about the size and composition of social networks was obtained by including four questions in the survey that were based on four hypothetical situations:

two of a personal nature and two of a financial nature. The two questions of a personal nature were the following:

(i) If you were alone at home and became sick, who would you call for help?
(ii) If you had to ask somebody to take care of your children for one day, who would you call for help?

The two questions of a financial nature consisted of the following:

(i) If you had an emergency and needed $2000 Mexican pesos,[1] from whom would you borrow that money?
(ii) If you had an emergency and needed $20,000, from whom would you borrow that money?

As was mentioned in the introduction, social networks have been classified according to diverse layers of social interaction. These different types of networks are useful because they allow participants to obtain different types of resources that are classified according to the purpose they serve as either expressive or instrumental (Lin, 2001). Expressive resources are those that already exist within the network and are identified with the advantages of having strong group cohesion (social solidarity). Instrumental resources are new or additional to those that already exist within the network and are typically obtained by means of market institutions (market competition, socioeconomic status). According to Lin (2001), expressive resources are associated with the need to share existing resources within a network. For this reason, we expect that when an individual borrows small monetary amounts (i), his objective is to solve an immediate emergency and not to make an economic profit. Additionally, it is likely that someone who belongs to his network has the possibility of lending him that monetary amount. By contrast, when an individual requires a relatively large amount of money (ii), it is likely that his purpose is to make an economic profit and that this amount likely exceeds the lending possibilities of the individuals who belong to his network. Needs that require resources not found within an individual's social network and that are more likely to be found through market transactions are known as instrumental resources, according to Lin (2001). Our intention is to distinguish between a monetary amount that this community would consider as an expressive resource ($2000) and one that would be considered as an instrumental resource ($20,000). We made this decision based on the demographics of this community in which less than 3% of the surveyed individuals are in a household with a monthly income less than $3000, and about 23% of the surveyed individuals are in a household with a monthly income between $9000 and $30,000. So, the first monetary amount seems to be readily available for the vast majority of these individuals while the second monetary amount does not seem to be so easily obtained in relative terms (see Table 1).

To measure the types of links that prevail in a social network, we consider three relationship levels or categories.

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[1] From this point forward, all monetary amounts will be given in Mexican pesos. The average exchange rate in June of 2010 was 0.078685 US dollars per 1 Mexican peso.

Table 1
Individuals' socio-demographic characteristics.
Source: Survey and experimental data.

Characteristics	Survey		Experiment	
	n	n/N	n	n/N
Total of individuals (N)	117	100%	42	100%
Age (years)				
18–30	19	16%	7	17%
31–60	94	80%	35	83%
60+	4	4%	0	0%
Gender				
Female	61	52%	18	43%
Male	56	48%	24	57%
Marital status				
Single	41	35%	14	33%
Married	72	61%	25	60%
Other	5	4%	3	7%
Household size (# of people)				
1	10	8%	3	7%
2	20	17%	9	21%
3	27	23%	10	24%
4	38	33%	14	33%
5	12	10%	3	7%
6	7	6%	3	7%
7	2	1%	0	0%
8	1	1%	0	0%
Level of education				
Secondary	10	8%	3	7%
High School	33	28%	11	26%
College	31	26%	15	36%
Master	10	8%	2	5%
Ph.D.	34	29%	11	26%
Car ownership				
Yes	77	66%	27	64%
No	40	34%	15	36%
Home ownership				
Yes	80	68%	27	64%
No	37	32%	15	36%
Household monthly income				
$1,500−	2	2%	0	0%
$1,501–$3,000	1	1%	0	0%
$3,001–$6,000	14	12%	5	12%
$6,001–$9,000	18	16%	6	14%
$9,001–$15,000	20	17%	8	19%
$15,001–$$30,000	18	16%	8	19%
$30,001–$45,000	14	12%	6	14%
$45,000+	29	25%	9	21%
Type of position at CIDE				
Maintenance services	17	15%	5	12%
Administrative	36	30%	13	31%
Authority	31	26%	16	38%
Academics/research	33	29%	8	19%

We also include a fourth category that is complementary in nature, "Out of the network", to exhaust all possible relationship categories. The relationship category we consider here is the following:

(i) In the first category, we include people with whom the individual has a close and personal relationship, including parents, children, siblings, spouses, and close relatives who belong to the same household.

(ii) The second category includes people with whom the individual's relationship is personal but not as close as in the previous category, such as relatives who do not belong to the same household, friends, neighbors, and colleagues.

(iii) The third category includes people who the individual considers to be in a position of authority, such as those in the top hierarchical level in the organization in which the individual works or in any other organization (for example, a governmental employee in a position of power).

(iv) The fourth category includes people and institutions that provide professional services in exchange for some type of payment, such as doctors, attorneys, or a financial institution. As discussed briefly above, this category is considered "Out of the network" and is complementary in nature.

The answers to the aforementioned questions allow us to estimate the size of the network an individual has with respect to each of the different purposes (expressive or instrumental). To avoid sub-estimations of an individual's network size due to a certain level of discomfort, that she might experience while answering each of the four aforementioned questions, the survey considers a maximum of six mentions that the individual must identify by order, name and relationship level.

Because the size of an individual's network is related to her socio-demographic and economic characteristics, the survey includes questions about age, gender, civil status, occupation, size of her household, formal education level, and asset ownership, such as house or vehicle. Also, from answers to some survey questions, we are able to calculate the income of each individual's household by adding the monthly incomes of each household member. Finally, the survey includes questions addressing the individual's attitude toward risk and her financial habits and knowledge. In Table 1 we present some descriptive statistics. The individuals in this survey are not representative of the Mexican population, since this is a closed academic community with a substantial number of highly educated individuals.

To identify the individual preferences regarding money lending in non-formal markets interpreted as a measure of trustworthiness, we implement a vignette experiment or credit game that is included in the survey.

In this experiment, all the surveyed individuals must rank a list of hypothetical borrowers by assigning them amounts of money that range from $1000 to $100,000, which add up to a total of $461,550.[2] These monetary amounts were calculated in such a way that the logarithmic differences between them were approximately equal, a process that produced a higher quantity of low monetary amounts compared with the number of high monetary amounts.

The hypothesis behind the design of this credit game is that the different amounts of credit imply different risk levels incurred by the lender (that is, the surveyed

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[2] The exact monetary amounts are: $1000; $1300; $1650; $2100; $2650; $3400; $4300; $5500; $7000; $8900; $11,300; $14,400; $18,350; $23,400; $29,800; $38,000; $48,400; $61,600; $78,500; and $100,000.

individual), and that, while considering these risk levels, the lender considers the degree of trust that he/she deposits on different profiles of hypothetical borrowers. The result of this assignment task is an expression of the implicit preferences of the individual toward the different profiles when distributing all possible credit amounts. This is inspired by a methodology used in market research when exploring the impact on customers' purchasing decisions of possible changes in products' characteristics (Gustafsson et al., 2003). The result of this game would allow us to evaluate the congruence of its results with those of the following experiment. See Appendix A for details.

The description of each of the hypothetical borrowers is made using profiles of possible characteristics related to the borrowers' gender (male or female), age (18–30, 30–60, 60+), level of education (up to junior high school, up to high school, and up to college), occupation (employed, unemployed, homemaker), and their social proximity (family and friends, neighbors and co-workers, community authority, no personal relation) to the hypothetical money lender. Because the five characteristics and their various levels resulted in 216 possible combinations, we had to reduce the number of profiles. In total, twenty profiles were constructed based on these characteristics.[3] In Table 2, we report the specific characteristics for each profile.

To study and identify how generic profiling might affect trust and reciprocity in an investment or trust game, a sub-sample of 42 participants was randomly selected from our sample of 117 employees originally surveyed. In Table 1, it is possible to observe that the distribution of this sub-sample in terms of several characteristics (Age, Gender, Marital Status, Household Size, Education Level) roughly follows that of the sample.

During the experimental sessions, the participants were divided in groups of about 5 people. These experimental sessions were conducted by the authors of this study two weeks after the survey's implementation. The five sessions were run almost simultaneously in order to avoid contagion from information sharing among the participants. Monetary incentives were given to the participants at the end of the sessions.

After explaining in detail the payoff procedure of the experiment to each subject, we requested that he/she make three different types of decisions[4]: (i) the first related to eliciting his/her attitude about investing in a risky asset, (ii) the second related to his/her trust in a generic individual's profile that might inspire her to invest different amounts of money, and (iii) the third related to the amount that he/she would be willing to repay to an anonymous individual who has decided to invest a specific amount of money in him/her. So, there is a total of fifteen exercises within this experiment that will be explained in the following paragraphs.

The first component of the game aims to measure subjects' attitudes toward financial risk. With this objective in mind, we follow the experimental procedure proposed by Gneezy and Potters (1997), in which each participant must decide how much of an initial capital of $500 he/she is willing to invest in a risky asset where he/she might receive either 2.5 times the amount invested or lose everything with equal probability.

The rest of the experiment is a modified investment or trust game. In its original form, (Berg et al., 1995), the participants of an investment or trust game are divided into two groups. Every individual of one of the groups has to decide the monetary amount he/she will send to an individual in the other group, who is anonymous, and how much of his/her initial capital to keep. In this setting, the individuals in the first group are labeled Type A individuals, and those in the second group Type B individuals. After a Type A individual has made his/her decisions, a Type B individual receives the money sent by the Type A individual multiplied by three. Afterward, the Type B individual decides the monetary amount he/she wants to send back to the Type A individual, and the difference between what the Type B individual receives and the monetary amount he/she decides to return to the Type A individual is kept by the Type B individual. The quantity of money sent by the Type A individual to the Type B individual is considered a measure of trust, while the quantity of money the Type B individual returns to the Type A individual is considered a measure of reciprocity or trustworthiness.

In our setting, the trust game is implemented in the following way: Each participant is at first identified as a Type A agent, and he/she is asked to decide how much of an initial capital of $300, that was not paid upfront but was included in all the possible final payments, he/she will be willing to invest in each of the seven profiles of hypothetical Type B agents presented to him/her.[5] Information regarding the profiles of each of these profiles of Type B agents is provided to the participants in the same fashion as in the vignette experiment. In Table 3, we present the seven profiles used in this stage of the game.

Each Type A participant has the option to send to each of the seven hypothetical Type B agents the following monetary amounts out of a total of $300: $0, $50, $100, $150, $200, $250, or $300. Each Type A participant is also told that for each monetary unit that he/she sends to any particular Type B individual, the Type B individual will also receive two additional monetary units. Thus, a particular Type B agent will receive $0, $150, $300, $450, $600, $750 or $900, based on the amount the Type A agent decides to send him. The Type A agents are also informed that each Type B agent will have the option to send back some money or nothing, based on the amount he receives. They are also told that the monetary amounts selected by each Type B agent had already been determined. We informed the experiment's participants that: (i) those monetary amounts come from the responses of human subjects

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[3] The subset of profiles was determined by the Orthoplan procedure of SPSS, which generates main-effects orthogonal fractional factorial plans.

[4] At the end of the experiment, the result of one of fifteen exercises is chosen randomly, and a payment is made accordingly.

[5] Each profile was selected from the set of the twenty profiles used in the vignette experiment conducted in the initial survey.

Table 2
Profiles' sets of characteristics used in the vignette experiment.
Source: Survey.

	Borrowers' profiles																			
	2	11	8	15	3	4	20	7	14	12	10	13	16	5	17	19	18	1	6	9
Gender																				
A. Male	A	A	A	A	A	A	A	A	A	A										
B. Female											B	B	B	B	B	B	B	B	B	B
Age group																				
C. 30 > Age	C	C	C	C							C	C	C	C	C	C				
D. 60 ≥ Age ≥ 30					D	D	D										D	D		
E. Age > 60								E	E	E									E	E
Education																				
F. Up to junior high school	F	F			F	F			F		F	F	F				F		F	
G. High school							G	G						G	G	G				
H. College			H	H						H								H		H
Occupation																				
I. Employed	I			I	I			I	I		I	I		I			I	I		
J. Unemployed		J					J			J					J				J	
K. Homemaker			K			K							K			K				K
Relationship level																				
L. Family and friend	L				L		L					L			L					L
M. Neighbor or co-worker		M							M				M					M		
N. Authority			N					N		N						N	N			
O. No personal relation				O		O					O			O					O	

Table 3
Profiles' sets of characteristics used in the trust game experiment and their amounts allocated.
Source: Survey and experimental data.

	Type B agents' characteristics						
Profile identification number used in the trust game experiment	B5	B3	B4	B7	B6	B2	B1
Profile identification number used in the vignette experiment	6	4	5	19	7	2	1
Gender							
A. Male		A			A	A	
B. Female	B		B	B			B
Age group							
C. 30 > Age			C	C		C	
D. 60 ≥ Age ≥ 30		D					D
E. Age > 60	E				E		
Education							
F. Up to junior high school	F	F				F	
G. High school			G	G	G		
H. College							H
Occupation							
I. Employed			I		I	I	I
J. Unemployed	J						
K. Homemaker		K		K			
Relationship Level							
L. Family and friend						L	
M. Neighbor or co-worker					M		M
N. Authority				N			
O. No personal relation	O	O	O				
Amount allocated in the trust game experiment — Average	$50	$74	$120	$133	$163	$174	$206
Standard error	$7	$10	$11	$12	$9	$10	$11

who participated in previous experiments with a similar setup, and (ii) the aforementioned setup was a pilot study conducted prior to the actual experiment, from which we obtained Type B agents' responses according to different

Table 4
Frequency of existence of a social network and help from outside the network.
Source: Survey.

Hypothetical situation	Do you have a social network?			Help from outside the network
	Yes	No	Total	
Home alone and sick	117	0	117	10
Children care for a day	109	8	117	11
$2,000 loan	114	3	117	15
$20,000 loan	110	7	117	30

profiles. It is important that we clarify that we did not inform our subjects where this pilot was conducted. So, they might consider certain Type B agents' characteristics, such as being unemployed or a homemaker, as real possibilities. The amount of money sent by Type A agents to Type B agents is considered a measure of interpersonal trust.

Next, each participant is asked to play as a Type B agent. In his/her new role, each individual has to decide how much of the money he/she he/she will send back to the Type A agent out of the monetary amount he/she has, which is the sum of his/her original endowment of $300 plus the Type A agent's investment multiplied by three. The participants are told that they must assume that there is no social relationship between them and the Type A individuals. This exercise was repeated for each possible monetary amount the Type A agents had possibly sent: $0, $50, $100, $150, $200, $250 or $300. Remember that these amounts are translated to the following monetary amounts received by the Type B agents: $0, $150, $300, $450, $600, $750 or $900, respectively. The amount of money sent by the Type B agents to the Type A agents is considered a measure of reciprocity or trustworthiness.

As it is explained in Appendix B, when the participants made their monetary decisions in each of the fifteen exercises of the game, they had the information that the reward they would receive at the end of the experiment will be randomly determined from their actual decisions in <u>one</u> of those fifteen exercises.

3. Measuring the size of individuals social networks

The objective of this section is to explain how we calculate the size of the surveyed individuals' social networks. The objective is to include a social network measurement of the surveyed individuals when we rationalize our results in both the vignette experiment and the trust game.

We calculate the size of an individual's social network for each of the aforementioned hypothetical situations by accounting for the number of people included in the three relationship levels to whom the individual would reach out for help. The number of references of institutions or people outside the network is not included.

In Table 4, we report the number of surveyed individuals who answered having or not having a social network in each of the hypothetical situations. For example, in the case of being alone at home and becoming sick, the grand total of the surveyed individuals reported having a social network (117), and ten of these reported having to hire pro-

fessional services.[6] In this table, we note that a relatively uniform number of people report having a social network for each of the hypothetical situations, except for the case of the $20,000 loan, in which case we observe that the number of people who report having to hire outside help is relatively higher.

In Fig. 1, we show the distribution of network sizes by percentage for each of the hypothetical situations. We classified network sizes into three categories: small (one to two people), medium (three to five people) and large (six people).[7] We observe a high level of frequency at the number six for each of the hypothetical situations, particularly for the case of being home alone and sick, which suggests a sub-estimation problem in the real network sizes.

Conversely, for the situations of a personal nature, Fig. 1 shows that the proportion of small social networks is lower with respect to what is observed in situations of a financial nature. Moreover, for the case of the $20,000 loan, the proportion of small social networks is highest when compared with any other of the hypothetical situations. These observations are consistent with Lin (2001) in the sense that individuals tend to have larger (smaller) social networks to obtain expressive (instrumental) resources.

4. The vignette experiment

The purpose of the vignette experiment or credit game is to explore and test hypotheses regarding which of the borrowers' profiles and particular attributes within profiles are more highly valued by the participants in the experiment. In this section, we estimate a rank-order logistic regression model by maximum likelihood using actual allocations of resources. In this model, each of the ranked alternatives made by each participant forms an observation; therefore, all observations related to a participant are linked together as a group.

The value function is assumed to be linear in the attributes with the coefficients expressing the direction and weight. In our case, the value function will associate the amount of money that each participant decides

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[6] It is important to note that when someone reports not having a social network, it is not necessarily true that there is no one this person can reach out to for help. For instance, possible reasons for someone reporting not having a social network in the situation of needing help to care for her children might be that this person does not have children or that the children are no longer under her responsibility.

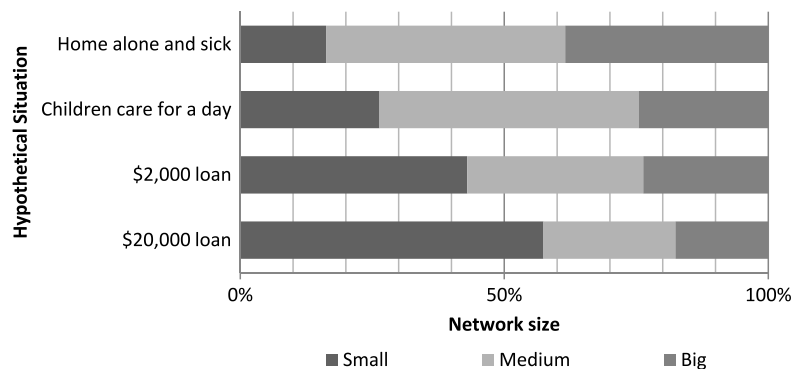[7] In Fig. 1, people who reported not having a social network were not included.

Fig. 1. Network size proportion according to each hypothetical situation.
Source: Survey.

to allocate to a specific individual profile. Thus, our specification is represented as follows:

$$value_i = \delta_1 female_i + \delta_2 age_{[30,60]i} + \delta_2 age_{[>60]i}$$
$$+ \delta_3 highschool_i + \delta_3 college_i + \delta_4 unemployed_i$$
$$+ \delta_5 homemaker_i + \delta_6 neighbor_i + \delta_7 authority_i$$
$$+ \delta_8 norelation_i + \varepsilon_i,$$

where the random residual, ε_i, captures all omitted attributes and follows an extreme value distribution type I.

As we discussed briefly above, the variable value represents the rank order given by subject i to each of the twenty profiles that he has ranked; *female* is a dummy variable that takes the value of one if the hypothetical profile corresponds to a woman; $age_{[30,60]}$ and $age_{[>60]}$ are dummy variables that take the value of one when the profile corresponds to an individual whose age is either between 30 and 60 or above 60, respectively; *highschool* and *college* are dummy variables that take the value of one when the profile corresponds to an individual whose school education is either high school or college, respectively; *unemployed* and *homemaker* are dummy variables that take the value of one when the profile corresponds to an individual who is either unemployed or a homemaker, respectively; and finally, *neighbor*, *authority*, and *norelation* are dummy variables that take the value of one when the profile corresponds to an individual who has one of these types of relationships with the money lender. Table 5 reports all the estimates of the rank-order estimation.

In our results, we could not find any impact of gender in the allocation of resources. Second, we find that borrowers between 30 and 60 years of age tend to receive more monetary resources, and those above 60 tend to receive less if we compare both categories with the baseline variable of under 30 years old. Third, we also find that higher education is increasingly paid for in terms of lending allocation. Fourth, we find that being unemployed or a homemaker involves receiving less in terms of resources compared to what an employed person would have received. Finally, in terms of the social network resources, we find that participants tend to lend less money to those profiles with whom she keeps a subordinate relation or does not have any relation.

Fig. 2 reports the estimated probabilities for each hypothetical profile of receiving money from the lender.

Table 5
Estimates of the rank-order estimation.
Source: Survey.

Variable		Coefficient
Gender	Female = 1	0.027
	Male = 0	(0.048)
Age	60 ≥ Age ≥ 30	0.271***
		(0.059)
	Age > 60	−0.282***
		(0.063)
Education	Senior high school	0.312***
		(0.059)
	College	0.621***
		(0.064)
Occupation	Unemployed	−1.619***
		(0.067)
	Homemaker	−1.187***
		(0.067)
Social closeness	Neighbor or co-worker	−0.057
		(0.068)
	Authority	−0.195**
		(0.065)
	No relationship	−0.869***
		(0.071)
Number of obs.		2200
Number of groups		111

* $p < 0.05$.
** $p < 0.01$.
*** $p < 0.001$.

Additionally, Fig. 3 reports the estimated probabilities of being ranked as the most preferred option based on the characteristics of each profile. Each characteristic is compared with a baseline hypothetical subject, who is considered a male borrower, under 30 years old, with no high school education, employed, and who is related to or a friend of the money lender.

Based on this model, we conclude that the borrower's profile that has the highest probability of being the most preferred option, in terms of the amount the participant is willing to lend him, is a male or a female, between 30
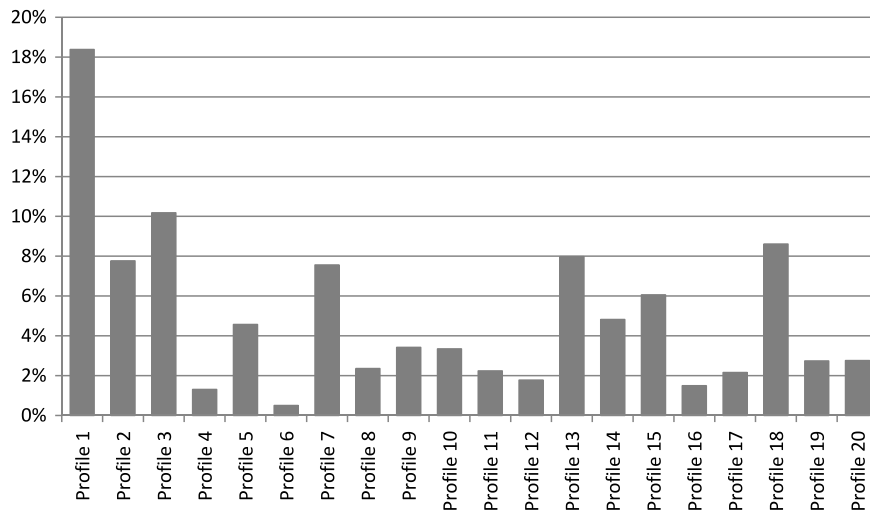
Fig. 2. Profile estimated probabilities for receiving money from the money lender.
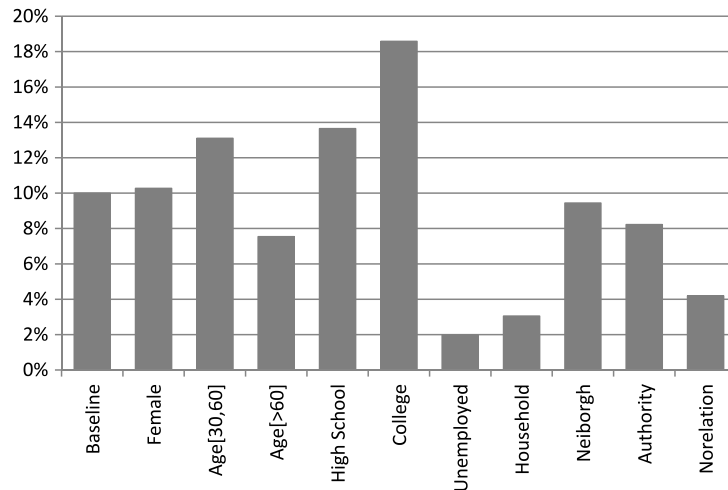*Source:* Survey.

Fig. 3. Estimated probabilities of being ranked as the most preferred option based on the profile characteristics.
Source: Survey.

and 60 years old, with a college education and a job, and who has a close relationship (family, friend or neighbor) with the money lender. The borrower's profile that has the least probability of being the most preferred option (least trustworthy profile) would be a male or a female, over 60 years old, without a high school education, who is unemployed or a homemaker, and who has no relation with the money lender. So, these results indicate that having a social connection is a desirable characteristic when making an informal monetary transaction; but not the only one. Age and education seem to rank high in the characteristics' preferences of the individuals who belong to this community when carrying on an informal transaction. These results will be checked against the ones of the next section in order to be able to draw a conclusion about trustworthiness.

5. The trust game

In this section, we present the results of the trust game we implemented in a sub-sample of the surveyed individuals, as described in Section 2. In Fig. 4, we show the histogram of frequencies of the observed amounts invested in the risky asset, following Gneezy and Potters (1997). The average amount that is invested in a risky asset is $197 out of $500, with a standard error of $12. The histogram and the average just reported indicate that this set of individuals tends to bet less than half the endowment they have ($500) in the risky asset.

In Fig. 5, we show the histogram of frequencies of the observed amounts invested in Type B agents by Type A agents. The average amount invested is $131, with a standard error of $5. Additionally, Table 6 shows the
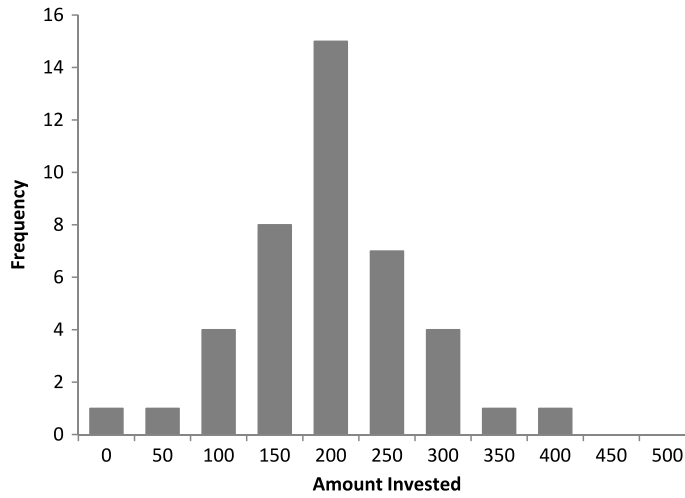
Fig. 4. Distribution of amounts invested in the risky asset.
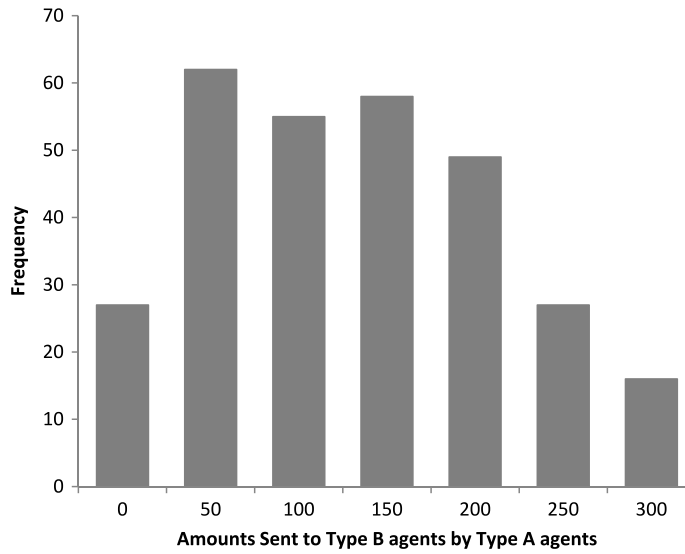*Source:* Survey.

Fig. 5. Amounts sent to Type B agents by Type A agents.
Source: Experimental data.

average monetary amounts sent to each profile of Type B agents and the average monetary amounts sent to Type B agents, classified according to certain characteristics of Type A and B agents. In Fig. 6, we show the histogram of frequencies of the observed amounts returned to Type A agents by Type B agents. The average amount returned is $226, with a standard error of $11.

To rationalize the results from the previous tables, we estimate the proportion of money sent by Type A agents to Type B agents, conditioned on certain socio-demographic characteristic of Type A agents and hypothetical Type B agents. Our specification is the following:

$$promoncap_i = Intercept + \beta_1 riskave_i + \beta_2 age_i + \beta_2 family_i$$
$$+ \delta_1 female_i + \delta_2 shs_i + \delta_3 college_i$$
$$+ \delta_4 master_i + \delta_5 phd_i + \delta_6 smallnet_i$$
$$+ \delta_7 mediumnet_i + \delta_8 largenet_i$$

$$+ \gamma_1 femaleb_{ij} + \gamma_2 unempb_{ij}$$
$$+ \gamma_3 homemakerb_{ij} + \gamma_4 authorityb_{ij}$$
$$+ \gamma_5 norelb_{ij} + \gamma_6 age_{[30,60]ij} + \gamma_7 age_{[>60]ij}$$
$$+ \gamma_8 highschoolb_{ij} + \gamma_9 collegeb_{ij} + \varepsilon_{ij},$$
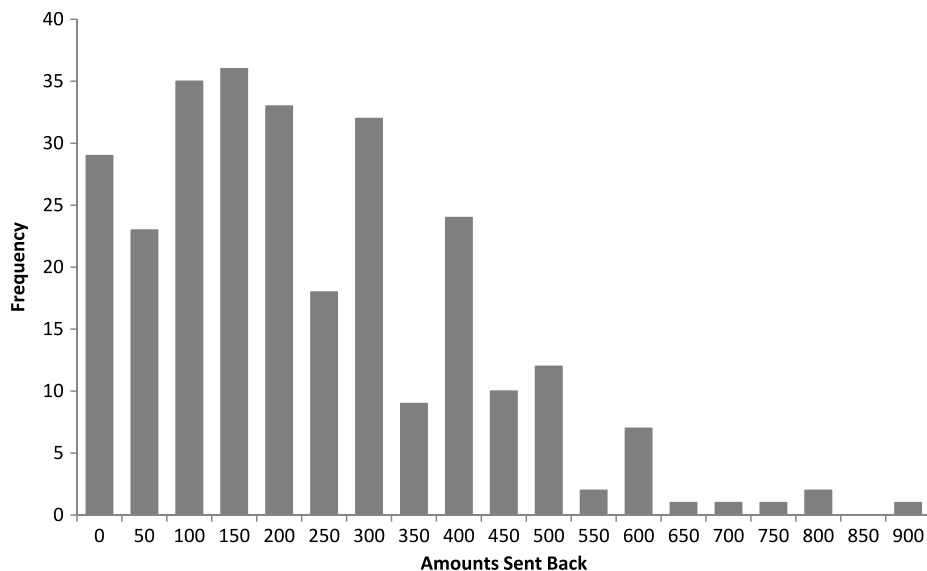
where the random residual, ε_i, captures all omitted attributes and follows a normal distribution. The variable *promoncap* represents the proportion of the $300 pesos that Type A agent i sends to Type B agent j; *riskave* is the coefficient of risk aversion elicited using Gneezy and Potters' method; *age* is Type A agent i's age; *family* is the number of people in Type A agent i's household; *female* is a dummy variable that takes the value of one when Type A agent i is a female; *shs, college, master,* and *phd* are dummy variables that take the value of one when Type A agent i's education level corresponds, respectively, to senior high school or more, college or more, master's degree or

Table 6
Average amounts sent to Type B agents, classified according to certain characteristics of Type A and B agents.
Source: Experimental data.

Group characteristics	Category	Variable	Average amount ($)	Standard error ($)
Individual A's characteristics	Gender	Female	126	8
		Male	139	6
	Education	Up to Junior HS	157	20
		HS	121	8
		College	142	8
		Master's	114	28
		Ph.D.	123	9
	Size of Social Networks	None	175	18
		Small	134	7
		Medium	117	8
		Large	156	8
Individual B's characteristics	Gender	Female	127	7
		Male	137	7
	Occupation	Employed	166	6
		Unemployed	50	7
		Housekeeper	104	8
	Social Closedness to A	Family and friends	181	6
		Authority	133	12
		No relationship	100	6
	Age	$30 > $ Age	142	7
		$60 \geq $ Age $ \geq 30$	140	10
		Age $ > 60$	107	9
	Education	Up to Junior HS	99	7
		HS	139	6
		College	206	11

Fig. 6. Amounts sent back to agents A by agents B.
Source: Experimental data.

more, and doctorate degree. The *smallnet*, *mediumnet*, and *largenet* variables are dummy variables that take the value of one when Type A agent i reports having one or two, three or four, or five or more friends, respectively to whom she would lend $20,000 pesos. The *femaleb* variable is a dummy variable that takes the value of one when the Type B agent j is a female; *unempb* and *homemaker* are dummy variables when the Type B agent is supposed to be unemployed and a homemaker, respectively. *Authorityb*

(authority) and *norelb* (no relation) are dummy variables that take the value of one when the profile corresponds to an individual who has one of these types of relationships with the lender. Finally, $age_{[30,60]}$, $age_{[>60]}$, *highschool* and *college* have the same definitions given above.

Table 7 reports all the coefficient estimates. The higher the level of the risk aversion of the Type A agent, the smaller the proportion of money sent by the Type A agent to Type B agents. Older participants tend to send less

Table 7
Estimates of the proportion of money sent by Type A agents to Type B agents.
Source: Experimental data.

	Variable		Coefficient		Variable		Coefficient
	Intercept		0.869***			Gender (Female = 1)	-0.107*
			(0.099)				(0.042)
Agents A's characteristics		Risk aversion	-0.004***	Agents B's characteristics	Occupation	Unemployed	-0.198**
			(0.001)				(0.052)
		Age	-0.005*			Housekeeper	-0.091
			(0.002)				(0.047)
		Gender (Female = 1)	0.021		Social Closedness	Authority	-0.234***
			(0.044)				(0.041)
		Family Size	0.038			No relationship	-0.044
			(0.019)				(0.040)
	Education	High School	-0.214***		Age	60 ≥ Age ≥ 30	-0.056
			(0.060)				(0.030)
		College	-0.113*			Age > 60	-0.135***
			(0.055)				(0.026)
		Master	-0.264*		Education	High School	0.099***
			(0.122)				(0.026)
		Ph.D.	-0.166**			College	0.063
			(0.052)				(0.041)
	Size of Social Networks	Small	-0.069				
			(0.076)		Number of obs.		276
		Medium	-0.047				
			(0.049)				
		Large	0.159**		Number of clusters		42
			(0.050)				

* $p < 0.05$.
** $p < 0.01$.
*** $p < 0.001$.

money. Neither gender nor family size has any impact on the proportion of money sent by Type A agents. Regarding the level of education of Type A agents, all participants whose level of education is above junior high school tend to send less money. Agents with no networks or large networks tend to send more money than those with small or medium-sized networks. Regarding the characteristics of Type B agents, we find that Type A agents send less money to those with whom they have a subordinate relation or no personal relation, supporting the notion of social connection viewed as social collateral and social networks as generators of trust. They also tend to send less money to Type B agents who are over 60 years old or have an education of senior high school or above.

Now, we estimate the proportion of money returned by Type B agents to Type A agents, conditioned on certain socio-demographic characteristic of Type B agents. Our specification is the following:

$$ratioba_i = Intercept + \beta_1 amount3_i + \beta_2 riskave_i + \beta_3 age_i$$

$$+ \beta_4 family_i + \delta_1 female_i + \delta_2 shs_i + \delta_3 college_i$$
$$+ \delta_4 master_i + \delta_5 phd_i + \delta_6 smallnet_i$$
$$+ \delta_7 mediumnet_i + \delta_8 largenet_i + \varepsilon_{ij},$$

where the random residual, ε_i, captures all omitted attributes and follows a normal distribution. The variable *ratioba* represents the proportion of the amount of pesos that a Type A agent received from Type B agent i conditioned on the amount of money he would have received (plus the original endowment); *amount3* is the amount that Type B agents would have received from a Type A agent; *riskave* is the coefficient of risk aversion elicited using Gneezy and Potters' method; *age* is Type B agent i's age; *family* is the number of people who are in Type B agent i's household; *female* is a dummy variable that takes the value of one when Type B agent i is a female; *shs*, *college*, *master*, and *phd* are dummy variables that take the value of one when Type B agent i's education level corresponds to senior high school or more, college or more, master's degree or more, and doctorate

Table 8
Average proportion of money sent by agents B to agents A based on their group characteristics.
Source: Experimental data.

Variable		Coefficient
Intercept		0.068 (0.087)
Three times the amount of money received		2.31E−04*** (5.05E−05)
Risk aversion		0.004*** (0.001)
Age		0.001 (0.003)
Family size		0.019 (0.020)
Gender (Female = 1)		−0.046 (0.051)
Education	High school	0.170** (0.055)
	College	0.121** (0.040)
	Master's	0.076 (0.070)
	Ph.D.	0.151*** (0.041)
Size of social networks	Small	0.011 (0.080)
	Medium	−0.013 (0.052)
	Large	0.091 (0.062)

* $p < 0.05$.
** $p < 0.01$.
*** $p < 0.001$.

degree, respectively. The *smallnet*, *mediumnet*, and *largenet* variables are dummy variables that take the value of one when Type B agent i reports having one or two, three to five, or six friends, respectively to whom he would lend $20,000 pesos.

Table 8 reports all the estimates of the coefficients. The higher the amount of money they expect to receive from Type A agents, the larger the proportion of money Type B agents are willing to send back to Type A agents. The higher the level of risk aversion of the Type B agent, the larger the proportion of money sent by the Type B agent to the Type A agents. Age, gender and family size do not have an impact on the proportion of money sent back by Type B agents. Regarding the level of education of Type B agents, all participants whose level of education is above junior high school tend to send more money back. The sizes of agents' networks do not have an impact on the amount of money sent back to Type A agents. This last result suggests that in this community reciprocity is driven by the individual's personal characteristics.

6. Conclusions

In this article, we combine the notion of social connections as social collateral of Karlan et al. (2009) with the notion of trust of Bacharach and Gambetta (2001), in which an individual who trusts another must rely on external signals (set of observable characteristics) in

order to ascertain how trustworthy any given individual is. Our strategy is empirical. We conduct and implement a survey, a vignette experiment and a trust game in an educative community located in Mexico City. Our objective is to identify which are the profiles this group of people considers more trustworthy. We also analyze whether these perceptions are matched by the responses of the individuals upon whom trust was placed (reciprocity).

The profile that is shown by the vignette experiment to be the most preferred is a male or a female, between 30 and 60 years old, with a college education and a job, and who has a close relationship (family, friend or neighbor) with the money lender. The least preferred profile would be a male or a female, over 60 years old, without a high school education, who is unemployed or a homemaker, and who has no relation with the money lender.

The trust game's results show that the higher the level of risk aversion of the Type A agents, the smaller the proportion of money they send to Type B agents. We also observe that older participants tend to send less money. Neither gender nor family size has any impact on the proportion of money sent by Type A agents. Regarding the level of education of Type A agents, all participants whose level of education is above junior high school tend to send less money. Agents with no networks or large networks tend to send more money than those with small or medium-sized networks. Regarding Type B agents' characteristics, we find that Type A agents send less money to those with whom they have a subordinate relation or no personal relation. They also tend to send less money to Type B agents whose age is over 60 years old or have an education level of high school or above.

Now, when we check the results of the vignette experiment with those of the trust game regarding the behavior of Type A agents, we can conclude that the characteristics that this set of agents consider as part of a trustworthy profile include having a social network proximity and being under 60 years old. So, this result brings support to the notion of social connections as social collateral; but also to our idea that, given a social network, there are other characteristics that help individuals to identify those who are more trustworthy. In this sample, age along with social proximity seems to be the characteristics that individuals see as observable signals of trustworthiness when making an informal financial transaction.

The results regarding reciprocity show that Type B agents tend to send more money to Type A agents when they (i) expect that Type A agents will send them a large amount of money, (ii) are more risk averse, and (iii) have an education level above junior high school. Age, gender, family size, and the social network measurement do not affect the amount of money sent by Type B agents to Type A agents. Moreover, education and risk aversion play a role in forming Type B individuals' expectations regarding the behavior of Type A individuals, and this is what really seems to matter when making reciprocity decisions.

Hence, we conclude that characteristics that individuals in our sample consider as part of a trustworthy profile seem not to be good predictors of a true level of trustworthiness in terms of reciprocity. In other words, the characteristics that Type A agents believe should be part

of a trustworthy profile of Type B agents, social proximity and age, are not those that determine their responses when they decide how much money to send back to Type A agents: risk aversion, education and their expectations about Type A individuals' decision. Even considering that there would be some element of error in the individuals' perceptions of what constitutes a trustworthy profile and true level of trustworthiness, what is interesting here is that there seems not to be any intersection between them.

Finally, as a line for future research, we could aim to find more solid empirical measures of trust and trustworthiness by working with a larger and more heterogeneous sample. Also, it is our aim for further research to find a better empirical mapping between observable and non-observable characteristics (expectations, risk aversion) that help individuals identify a trustworthy profile. A more detailed analysis of the reciprocity behavior, in the style of Herner et al. (2013), should be carried on in order to discern whether or not social influence may affect individual decisions about reciprocity. This is relevant to understand why within a social network, with its embedded level of trust (low or high; as mentioned by Ljunge, 2014), economic transactions, formal and informal, are carried out more often with certain individuals or institutions.

Acknowledgments

Appendix A. Vignette experiment instructions

Provide the interviewee the cards with the profiles of applicants for loans and the cards with the available amounts. Then, explain the exercise and record the results on this sheet. Read the instructions as follows:

You are being provided with data cards of 20 different people who are applying for a loan at a savings bank. You are responsible for deciding what amount to assign to each person. To help you in your decisions, in each card you will find five characteristics of each applicant: sex, age group, highest level of education, main occupation and type of relationship with you.

You also have 20 cards with the amounts you can grant to each applicant this year, ranging from $1000.00 (one thousand pesos) to $100,000.00 (one hundred thousand pesos). Each card contains a different amount (show examples of the options of contained amounts in the cards).

Taking into account that the savings bank charges a monthly interest rate of 8% and loans must be paid within 12 months at most, what amount would you grant to each of the 20 applicants?

Explain each of the characteristics that form a profile.

Allow the interviewee to quickly review the different profiles and amounts before he or she begins to decide.

Allow some flexibility in decisions, i.e., the interviewee may change her opinion at any time as the assignment progresses.

Appendix B. Investment or trust game instructions

SECTION I. Allocation according to the type of investment.

Initial capital: $500

Description of the two types of investment:

Safe investment: For every peso invested, you will gain the same peso back.

Risky investment: For every peso invested, you will gain a return of $2.5 pesos if, when throwing a die, the outcomes are 1, 2 or 3; you will not gain anything if the outcomes are 4, 5 or 6.

Considering the amount of $500, what amount do you want to invest in each type of investment?

SECTION II. The Type A agent sends investment (monetary amount) to seven profiles of hypothetical Type B agents.

Initial capital of A: $300

Initial capital of B: $300

Explain the two stages of the investment game, and the characteristics of each of the seven profiles of the hypothetical Type B agents. Then, provide the Booklet of Investments and ask: What amount will you send to each profile of Type B agent?

The possible amounts that a Type A agent can send to a Type B agent are: $0, $50, $100, $150, $200, $250 or $300.
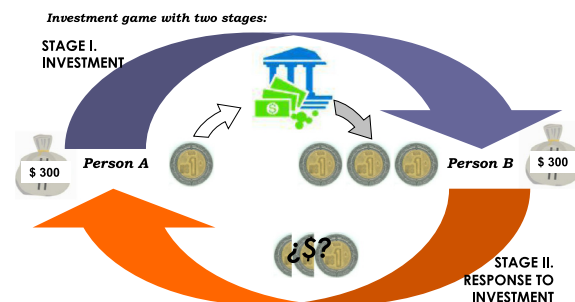
SECTION III. Response of the Type B agent to the investment of the Type A agent.

Initial capital of A: $300 minus the amount sent to B

Initial capital of B: $300 plus three times the amount sent to B by A

Explain the change of roles from Type A to Type B agent, and ask the participant to write down the amount he/she would return to each monetary amount sent by the Type A agents.

SECTION IV. Calculation of the amount that must be paid to the participant

The monetary amount that will be paid to each participant will be decided by a random game. First, one of the fifteen

balls in the raffle will be selected and will contain the following options:

SI–RI[*]	A to B1	B to A1
	A to B2	B to A2
	A to B3	B to A3
	A to B4	B to A4
	A to B5	B to A5
	A to B6	B to A6
	A to B7	B to A7

[*] SI–IPE: Safe investment–Risky investment.

- If the ball selected was SI–RI and the interviewee used money in the risky investment in the activity of Section I, **the die must be tossed** to calculate the earnings she will take.
- If the ball selected was A to B i, $i = 1, \ldots, 7$, for section II, the **Booklet of Decisions of B** must be reviewed to know the total amount that A must receive, conditioned on the previous decisions of B.
- If the ball selected was B to A i, $i = 1, \ldots, 7$, for section III, the total amount for B must be calculated by subtracting the amount she decided to send to A.

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