Using Experimental Economics to Measure Social Capital and Predict Financial Decisions

By DEAN S. KARLAN*

Economic theory suggests that market failures arise when contracts are difficult to enforce or observe. Social capital can help solve these failures. The more individuals trust each other, the more they are able to contract with each other.[1] Hence, many believe trust is a critical input for both macro- and microeconomic outcomes. The Trust Game has become a popular tool, with many researchers conducting it in both university laboratories and field locations in developing countries (Abigail M. Barr, 2003; Joyce E. Berg et al., 1995; Edward L. Glaeser et al., 2000). These studies have found that behaviors in the Trust Game correlate intuitively with individual attitudes and the relationships between players. These are not, however, outcomes of real interest, but rather proxies (or correlates) for the ability to overcome market failures and complete otherwise difficult-to-enforce contracts.

Historically, experimental economics has limited itself to testing theories in a controlled, laboratory environment, where behavior in the game is the outcome of interest. Exceptions exist, but are limited.[2] The Trust Game presents an excellent opportunity to examine whether experimental economic games can predict non-laboratory decisions. The game is conducted between two players and an administrator, and purports to measure how much one player (A) trusts another player (B) and how trustworthy Player B is with respect to Player A.

This paper tests these characterizations: I conduct the game with borrowers in a Peruvian microcredit program, Foundation for International Community Assistance (FINCA). I find that Player Bs identified as more trustworthy in the game are more likely to repay their loans one year later. However, I find that Player As identified as more "trusting" save less and have higher repayment problems. I put the term "trusting" in quotes specifically because this paper calls into question whether Player As' behavior in the game is driven by trust or merely a propensity to gamble.

Many studies have found that answers to the General Social Survey (GSS) questions on trust, fairness, and helping others correlate as predicted with real financial outcomes. I also examine whether these GSS survey questions can predict real financial decisions on a micro-level, and they do. More positive answers to the GSS questions predict higher repayment and higher savings. In a third test, I find that individuals who contribute more in a Public Goods Game are no more (or less) likely to repay their loans. The current literature examines the link between

* Karlan: Department of Economics, Yale University, New Haven, CT 06511 (e-mail: dean.karlan@yale.edu). I thank the editor, anonymous referees, Abhijit Banerjee, Dora Costa, Angus Deaton, Esther Duflo, Ben Jones, Daniel Kahneman, David Laibson, Sendhil Mullainathan, Stephen Smith, and seminar participants at the LSE/Cornell/MIT Development, Behavioral and Public Finance Conference, 2003 AAEA Conference, Columbia University, Middlebury College Field Experiments Conference, George Washington University, University of British Columbia, Princeton University Economics Department, Princeton University Psychology Department, Dartmouth College, MIT, Grupo de Análisis para el Desarrollo (GRADE), the LACEA 2002 Conference, and the NEUDC 2002 Conference. Thanks to the Lanaos from FINCA-Peru and to Tomoko Harigaya, Alcides Medina, Fatima Oriundo, and Jeny Yucra for research assistance and field work. The research reported herein was supported by the Social Science Research Council, the Russell Sage Foundation, the MIT George Shultz Fund, and the Center for Retirement Research at Boston College pursuant to a grant from the Social Security Administration. All views and errors are my own.

[1] See Joel Sobel (2002) for a review of the social capital literature.

[2] Hans Binswanger (1980) and Binswanger and Donald Sillers (1983) use hypothetical risk questions and actual lotteries with significant payouts to predict agricultural decisions. More recently, Alvin E. Roth et al. (1991), Joseph Henrich et al. (2001), and Barr (2003) conduct experiments in the field and map findings to predictions from anthropological research. Nava Ashraf et al. (2005) use time discounting questions to identify hyperbolic individuals, and finds them to exhibit a preference for a commitment savings product. Ernst Fehr and Lorenz Götte (2002) find that workers who exhibit loss aversion in a laboratory survey are more likely to reduce effort in response to higher wages in an experiment on bicycle messengers.

the GSS questions and the Trust Game, and between the GSS questions and real-life outcomes or decisions. This paper completes the circle by linking the Trust Game directly to real-life decisions.

This project also provides insight into the determinants of default and savings for participants in a group banking project for the poor. Karlan (2005) finds that social connections, measured by geographic proximity and cultural similarity, cause lower default and higher savings due to improved monitoring or enforcement of group lending contracts. This paper finds support for an even simpler (albeit not contradictory) explanation of default: some individuals are fundamentally not trustworthy.[3]

The paper proceeds as follows: Section I discusses the literature on measuring trust and trustworthiness. Section II presents the games. Section III presents the institutional setting of the lending and savings organization and the data. Section IV presents the determinants of behavior in the games. Section V presents the predictions of future financial decisions. Section VI concludes.

I. Measuring Social Capital

Social capital can be construed on a group level (James S. Coleman, 1990; Robert D. Putnam, 2000) or on an individual level (Glaeser et al., 2002). This paper examines whether experimental economics can be used to measure individual-level social capital. Individual-level social capital can be defined as the social skills and networks that enable an individual to overcome imperfect information problems and form contracts with others.[4] Trust and trustworthiness are two critical traits encompassed by individual social capital. Glaeser et al. (2000) finds that behavior in the Trust Game correlates with the history of prior interaction and cultural similarity of the participants, and also finds that more trusting individuals, as identified by the GSS survey, behaved more *trustworthily,* but not more *trusting,* in the Trust Game. This paper's key innovation is to establish a direct link from the Trust Game to a propensity to overcome a market failure (i.e., loan repayment).

The GSS contains three questions on "trust," "fairness," and "helping," which purport to measure social capital (Table 4 provides the wording of the survey). In cross-country regressions, several studies find that these GSS questions correlate with outcomes of interest. Stephen Knack and Philip Keefer (1997) find correlations with growth; Bruce P. Kennedy et al. (1998) and Daniel Lederman et al. (2002) with crime; John Brehm and Wendy M. Rahn (1997) with civic involvement; and, Raymond Fisman and Tarun Khanna (1999) with communication infrastructure.

II. The Games

The Trust Game was conducted as follows. First, before assigning the roles, all rules were explained to the participants.[5] All participants received three nuevos soles, were paired randomly, and assigned either an A or a B.[6] As pairings were announced, they could observe the identity of their partner but were separated immediately and, hence, had no opportunity to communicate.[7] The As then had the opportunity to pass to the Bs zero, one, two, or three of their coins. If A passed zero coins, the game ended. If A passed more than zero coins, the game administrator matched the amount passed. Then, B could pass back any number of coins to A and the game ended. Given the finite end, and

[3] In more recent work on information asymmetries and default in South Africa, Karlan and Jonathan D. Zinman (2005) find direct evidence of moral hazard in a consumer credit field experiment.

[4] Also see Francis Fukuyama (1995) and Elinor Ostrom (1990) for work on social capital frameworks. See Anirudh Krishna and Elizabeth Shrader (2000) and Christiaan Grootaert and Thierry van Bastelaer (2001) for discussions on measuring social capital.

[5] Since many participants in the sample were illiterate, all instructions were given orally in both Spanish and Quechua. Most of the participants were fluent in both Spanish and Quechua. However, about 15 percent of the participants spoke only Quechua, the indigenous Incan language, and 10 percent spoke only Spanish.

[6] 3.4 Peruvian nuevos soles = one U.S. dollar. Daily income for a poor, micro-entrepreneur is 4–8 nuevos soles. Giving Player B an initial wealth, consistent with prior implementations of the Trust Game, is done to rule out "fairness" as the explanation of A passing to B, since if A passes zero, both end up with the same number of coins.

[7] Participants were told that talking would disqualify them. It was never necessary to carry out this threat. The most communication I ever witnessed was an occasional grin or smirk among participants as the B partners left the room.

TABLE 1A—TRUST GAME
(*Basic results*)

Coins passed	Player A		Player B	
	Frequency	Percent	Frequency	Percent
0	90	23	55	18
1	153	39	107	35
2	66	17	93	30
3	88	22	36	12
4			10	3
5			5	2
6			1	0
Total	397	100	307	100

assuming no post-game consequences, the subgame perfect equilibrium was for B to pass back nothing to A and, hence, for A to pass nothing to B.

Similar to Barr (2003), who conducted this game in Zimbabwe, much care had to be taken to ensure that participants understood the game. The transactions for both parties were done face to face (and privately) with the game administrator. This risked that our presence influenced their decision, but provided us the opportunity to confirm that each individual understood the rules.

Table 1A and 1B show the basic actions chosen by Player A and Player B, conditional on Player A's action. As an investment, passing is a bad idea on average: if Player A passes one coin, she can expect 0.89 back; two coins yield 1.71; and three coins yield 2.53.[8] The basic results of the game are consistent with prior implementations of similar games in many respects. In all implementations, a significant portion of players contributed more than zero, the subgame perfect equilibrium.

A Public Goods Game also was conducted with the same participants, in 41 groups. Each group contained individuals who participated in the group lending and savings program together. Group size varied from 9 to 29 based on attendance in the microfinance meeting the day of the game. The Public Goods Game typically was played before the Trust Game, but the results were not revealed until after the participants had played the Trust Game.[9] All rules were explained publicly, but with no opportunity to discuss the game. Each participant was given one coin. Privately, each individual then either gave the administrator back the coin or did not. If the administrator received 80 percent or more of the coins back, then everyone was given two coins. Group contribution rates ranged from 55.6 to 100.0 percent and averaged 80.7 percent.

III. The Institutional Setting and the Data

A. *FINCA*

The games were conducted with 864 members of FINCA, a nonprofit "village banking" organization in Ayacucho, Peru.[10] FINCA provides four-month loans to groups of 30 poor women to help them expand their individual small businesses.[11] FINCA also encourages them to save (although the savings serve as collateral for the group loans). Each individual has her own loan, but each is also ultimately responsible for the repayment of the others. Everyone borrows at the same time, and nobody can get a new loan until all prior loans are paid in full. Women meet weekly at the FINCA office to make loan payments and savings deposits. Each weekly payment includes interest, one-sixteenth of the original loan principal, a mandatory savings deposit of one-eightieth of the original loan principal, and lastly any additional voluntary deposits (which are also held as collateral for their loan and the loans of others). The accumulated savings are not held by FINCA; rather, the women lend the money back to themselves. In this sense, the savings component is similar to a rotating savings and credit association (ROSCA).[12] FINCA encourages clients to save, and these savings are at risk with their peers. Hence, to save with FINCA is to trust your peers to repay their loans. If a client defaults, the group takes the savings of that

[8] Furthermore, the percentage returned by B does not predict how much A passes. Hence, A is not "savvy" simply knowing which B's will return and which will not. These results are not shown, but are available upon request.

[9] This was done to mitigate interaction and learning effects between the two games.

[10] See Karlan (2005) for more details on FINCA, how it creates groups, and the lending and savings contracts.

[11] Typical businesses are retail, such as selling clothing, food, or other household goods from stalls in street markets.

[12] See Timothy J. Besley et al. (1993) for a description and analysis of ROSCAs.

TABLE 1B—TRUST GAME
(*Player B's reciprocity*)

Coins passed by Player A	Coins returned by Player B, frequency (percent reported in parenthesis)							
	0	1	2	3	4	5	6	Total
1	43 (28)	84 (55)	26 (17)					153 (100)
2	7 (11)	15 (23)	35 (53)	8 (12)	1 (2)			66 (100)
3	5 (6)	8 (9)	32 (36)	28 (32)	9 (10)	5 (6)	1 (1)	88 (100)

Notes: Procedures for Trust Game: Both players given 3 coins. Each coin is worth 1 Peruvian nuevo sol, which is worth US$0.29. Player A allowed to pass 0, 1, 2, or 3 coins to Player B. Game administrator doubles Player A's pass to Player B. Player B can pass back to Player A 0–100 percent of the coins received. Rules explained to both players publicly, in the same room, before assignment of individuals to Player A and B. Rules explained in both Spanish and Quechua. Players cannot communicate, but players are informed of the identity of their partner.

Typical Interpretation of Trust Game Results: Player A's actions typically interpreted as a measure of trust. Player B's actions typically interpreted as a measure of either trustworthiness or reciprocity. See Glaeser et al. (2000), Barr (2003), and Berg et al. (1995) for further analysis and results from the Trust Game.

client and also typically bars the client from further participation. Exceptions occur. In the weekly meetings, FINCA employees explicitly encourage clients to develop solidarity, both to enhance their social capital and to monitor and enforce the loans.

Many individual clients (14 percent of individuals in this sample) do not borrow the maximum allowed, and in fact maintain larger savings than debt balances. The interest rate paid on the loans is significantly higher than the interest earned on the savings (96 percent annually versus 9 percent annually, on average). This behavior is difficult to explain. Qualitative data suggest three stories dominate: (a) mental accounting: these savings are designated for a particular purpose or sense of security; (b) a commitment: the required repayment effectively commits the individual to invest the cash rather than consume it (Carol C. Bertaut and Michael Haliassos, 2002; David Laibson et al., forthcoming); and (c) individuals value the option of future leverage. Regardless of the motivation, these individuals have not maximized their debt, and for this reason I label them as financially "cautious." I will examine whether individuals who do not maximize their debt behave distinctly in the Trust Game.

B. *The Data*

The data come from three sources: an individual survey conducted privately, an individual survey conducted publicly, and financial savings and loan data. The private 15-minute survey was conducted with each individual, typically before the game was played. The second survey was conducted publicly with the whole group on questions about the existing and prior relationships between individuals in a group. Since the answers to these questions were known to many, this process elicited more truthful answers and ensured that questions were answered consistently. Then, one year after playing the game, I gathered the savings and loan outcome data. Table 2 presents summary statistics.

IV. Determinants of Behavior in the Games

A. *The Trust Game*

The analysis consists of two parts. First, I test what predicts behavior in the Trust Game both for Player A and for Player B. For the Trust Game, the dependent variable for Player A is the percentage of the three coins that were passed by Player A to Player B. For Player B, the dependent variable is the percentage of the coins received that were passed back to Player A. The typical interpretation of the Trust Game labels Player A's behavior as "trust" and Player B's behavior as "trustworthy."

Table 3 shows the analysis of the determinants of behavior in the Trust Game. The OLS specification is as follows:[13]

$$(1) \qquad Y_i = \alpha + \beta_1 X_i + \beta_2 P_i + \beta_3 G_i + \varepsilon_i$$

where Y_i is the percentage passed to the other

[13] Errors were corrected for clustering at the "village bank" level.

TABLE 2—SUMMARY STATISTICS
(*Means*)

	Mean	Obs
Financial data		
Proportion of dropout in one year following games due to default or discipline	0.251	913
	(0.143)	
Total voluntary savings deposits in one year following games	66.190	913
	(4.437)	
Highest level of default in one year following games	51.190	913
	(4.115)	
Did not maximize available debt (savings > borrowings), binary variable	0.145	913
	(0.117)	
Connectedness to group		
Proportion of group of similar culture	0.201	781
	(0.005)	
Distance to others in group (in minutes)	13.300	882
	(0.285)	
Proportion of others who live within 10-minute walk	0.211	882
	(0.007)	
Instances borrowing from group member in side-contracts	0.322	913
	(0.045)	
Number of other members able to name from memory	5.630	913
	(0.155)	
Connectedness to partner (Trust Game)		
Partner in same lending/savings group	0.753	794
	(0.015)	
Both players indigenous	0.066	781
	(0.009)	
Both players Western	0.150	781
	(0.128)	
Player Western; partner indigenous	0.576	781
	(0.008)	
Player indigenous; partner Western	0.061	781
	(0.009)	
Partner lives within 10-minute walk	0.176	882
	(0.013)	
Attends same small church as partner	0.036	730
	(0.007)	
Knew partner and her name (score of 0–2, 2 indicates knew partner and her name)	1.236	794
	(0.265)	
Attended/invited partner to party	0.024	730
	(0.006)	
Absolute value of age difference	12.720	794
	(0.376)	
Demographic information		
Completed high school	0.192	913
	(0.013)	
Age	35.610	794
	(0.439)	
Indigenous	0.198	781
	(0.014)	
Western	0.375	781
	(0.173)	
Months since last attended church	0.211	730
	(0.027)	
Does not attend church	0.042	730
	(0.007)	
Attends largest church	0.331	730
	(0.017)	

Notes: Standard errors reported in parentheses. Sample sizes differ because data come from different sources and surveys. Financial data are from the FINCA-Peru management information system. All surveys conducted between January and April 2000. Demographic data come from individual surveys conducted with each member (except for education, which comes from the FINCA-Peru management information system). Social Interaction Data collected in survey conducted with each group as a whole (i.e., not privately, but with each person answering each question publicly). General Social Survey questions answered privately in individual survey with field research team. Religious data also collected privately in individual surveys with field research team. Group and individual interviews (except religion survey) conducted before the Trust Game and Public Goods Game were played with each group. The Religion Survey was conducted six months after the games were played. Distance measured as simple linear distance between two points on a two-dimensional map. Cultural binary variables ("indigenous" and "Western") were determined by observing four characteristics of each individual: hair style, clothes, language, and headwear. Individuals then categorized threefold: indigenous, mixed, and Western.

TABLE 3—DETERMINANTS OF AMOUNT SENT IN TRUST GAME AND PUBLIC GOODS GAME: OLS

Independent variables:	Trust Game					Public Goods Game	
	Player characteristics		Partner characteristics			Player characteristics	
Dependent variable:	Proportion passed (Player A)	Proportion returned (Player B)	Proportion passed (Player A)	Passed > 0 (Player A)	Proportion returned (Player B)	Binary = 1 if individual contributed	Proportion of group that contributed
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Attitudinal/behavioral measures							
Proportion passed in the Trust Game						0.116**	0.194
						(0.051)	(1.63)
Amount received from Player A		−0.006					
		(0.010)					
Sum of 3 GSS questions, relative to group	−0.010	0.022	−0.005	−0.014	0.005	0.018	
	(0.022)	(0.021)	(0.014)	(0.023)	(0.019)	(0.015)	
Sum of 3 GSS questions, relative to society	−0.001	0.038*	−0.021	−0.024	0.001	−0.014	
	(0.027)	(0.022)	(0.026)	(0.033)	(0.018)	(0.018)	
Sum of 6 GSS questions for entire group							0.121**
							(2.29)
Did not maximize available debt (savings > borrowings)	−0.095***	0.018	0.093*	0.038	0.048	−0.077	−0.003
	(0.035)	(0.038)	(0.047)	(0.057)	(0.041)	(0.046)	(0.02)
Connectedness to group							
Proportion of group of similar culture	0.099	−0.212	0.280*	0.406*	0.177	0.091	0.068
	(0.180)	(0.132)	(0.150)	(0.216)	(0.128)	(0.103)	(0.31)
Distance to others in group	0.116	−0.148**	−0.034	0.046	0.413***	−0.190*	0.078
	(0.227)	(0.069)	(0.108)	(0.140)	(0.132)	(0.099)	(0.42)
Proportion of others who live within 10-minute walk	−0.088	0.059	−0.115	−0.010	0.143	−0.061	
	(0.130)	(0.094)	(0.113)	(0.160)	(0.092)	(0.080)	
Instances borrowing from group member in side-contract	−0.041*	0.017**	0.003	0.014*	−0.007	0.009*	
	(0.023)	(0.007)	(0.008)	(0.007)	(0.030)	(0.005)	
Number of other members able to name from memory	0.001	−0.002	−0.002	−0.007	−0.003	0.002	
	(0.004)	(0.005)	(0.004)	(0.006)	(0.003)	(0.004)	
Connectedness to partner							
Partner in same lending/savings group	−0.044	0.076					
	(0.049)	(0.052)					
Both players indigenous	0.244***	0.041					
	(0.089)	(0.069)					
Both players Western	0.052	−0.012					
	(0.056)	(0.063)					
Player Western; partner indigenous	−0.055	0.177***					
	(0.079)	(0.063)					
Player indigenous; partner Western	0.124	−0.020					
	(0.103)	(0.078)					
Partner lives within 10-minute walk	0.090**	0.055					
	(0.037)	(0.044)					
Attends same small church as partner	0.199**	0.045					
	(0.088)	(0.054)					
Knew partner and her name	0.044	−0.005					
	(0.030)	(0.029)					
Attended/invited partner to party	0.064	−0.027					
	(0.103)	(0.088)					
Absolute value of age difference	0.001	0.000					
	(0.002)	(0.002)					
Demographic information							
Completed high school	0.122**	0.052	0.041	0.080	0.076	−0.034	
	(0.046)	(0.044)	(0.061)	(0.063)	(0.049)	(0.048)	
Log(Age)	0.105**	0.078	−0.040	−0.026	0.055*	−0.061	
	(0.051)	(0.047)	(0.044)	(0.039)	(0.029)	(0.046)	
Indigenous	−0.074	0.029	0.087*	0.082	0.091*	−0.003	
	(0.080)	(0.075)	(0.051)	(0.063)	(0.047)	(0.049)	
Western	−0.002	0.079	−0.061	−0.100*	−0.019	−0.120***	
	(0.050)	(0.061)	(0.037)	(0.050)	(0.036)	(0.037)	
Months since last attended church	0.000	−0.006	0.013	0.014	0.068**	−0.045*	
	(0.044)	(0.011)	(0.011)	(0.015)	(0.028)	(0.024)	
Does not attend church	0.050	−0.050	0.244**	0.107	0.027	−0.027	
	(0.107)	(0.060)	(0.098)	(0.097)	(0.072)	(0.083)	
Attends largest church	−0.078*	−0.005	−0.078*	−0.033	−0.030	0.056	
	(0.041)	(0.044)	(0.045)	(0.055)	(0.037)	(0.034)	
Observations	397	307	307	397	397	864	41
# of clusters (groups)	41	41	41	41	41	41	
R-squared	0.12	0.15	0.06	0.04	0.09	0.06	0.28

Notes: *** 99-percent significance; ** 95-percent significance; * 90-percent significance. Standard errors corrected for clustering at the group level. For columns 1 and 3, the dependent variable is the proportion passed by Player A to Player B in the Trust Game (either 0.0, 0.33, 0.67, or 1.0). For columns 2 and 5, the dependent variable is the proportion returned by Player B to Player A (either 0.0, 0.16, 0.33, 0.5, 0.67, 0.83, or 1.0). Alternative specifications, such as binary if passed half or more, do not produce materially different results. For column 4, the dependent variable is binary, equal to one if the participant contributed to the public good and zero if not. For column 7, there is one observation for each group, and the dependent variable is the proportion of the group that contributed in the Public Goods Game. For the GSS questions in column 7, if separated into two variables (one relative to group members and one relative to society overall) as done for the individual specifications, similar results are found, with similar results for both. For the culture indicator variables in columns 1 to 5, the omitted category is the middle "mixed culture" category. Dummies included for missing data with missing values coded as zero.

player of the amount possible to pass. The determinants are categorized threefold: individual characteristics (X_i), pair characteristics (P_i), and group characteristics (G_i). The individual characteristics encompass basic demographics. The pair characteristics encompass the relationship between the individual and her partner (e.g., cultural similarity, geographic proximity, and church attendance). Group characteristics encompass aggregated measures of the geographic and cultural dispersion of the group. Columns 1 and 2 of Table 3 show these results for Player A and Player B, respectively. Columns 3, 4, and 5 show whether the partner characteristics predict the amount passed (i.e., do Player A's characteristics affect how much Player B passes to Player A?).

When both individuals are indigenous, Player A passes 24 percentage points more, whereas Player B does not behave differently. On the other hand, when Player A is indigenous and Player B is Western, Player B returns 18 percentage points more to Player A. Prior studies have found inconsistent results on cross-cultural and within-cultural trust, reciprocity, and sharing (Chaim Fershtman and Uri Gneezy, 2001; Francisco Gil-White, 2002; Glaeser et al., 2000). These conflicting results, from the United States, Mongolia, Israel, and Peru, support the view that trust and fairness norms are culture-specific constructs.

Geographic proximity to each other predicts trusting and trustworthy behavior. If Player B lives within a ten-minute walk of Player A, then Player A passes 9 percentage points more to Player B (significant at 95 percent). The analog for Player B is 6 percentage points, but is not significant statistically. For Player B, however, the further she lives from all other members of the group (not just the partner), the less she returns to Player A (significant at 95 percent). This could be construed as trustworthiness or fear of reprisal. In this sense, trustworthiness is driven by fear of reprisal rather than innate personal characteristics.

Attending the same church also predicts trusting, but not trustworthy behavior. All participants were asked which church they attend "most frequently." In both Ayacucho and Huanta, there is one church that is the largest and most frequently attended. A dummy was set, equal to one, if two people reported attending the same church, but not the largest church.[14] Player A passes 20 percentage points more to Player B if both attend the same church (but not the largest one). Other results for religious activities, such as number of days since last attendance, no attendance, or evangelical affiliation (not shown), are insignificant statistically.

Of the 397 pairings, 98 were in separate lending and savings groups. Being in the same group as your partner should suggest that the clients expect to interact with each other in the future and also suggests they know each other beforehand. The coefficient on a dummy variable for being in the same group is positive for Player B and negative for Player A, but in neither case statistically significant. Interacting this dummy with other variables of interest, such as cultural similarity and distance to each other's homes, does not change the results (results not shown).

Instances of borrowing cash directly from other members (i.e., as a side contract to the group lending and savings contract) also predict trustworthy behavior.[15] This is intuitive: individuals who are trustworthy are more able to secure loans from their peers. On the other hand, individuals who pass more as Player A have fewer such side contracts. I suggest that individuals who pass more as Player A are risk-takers, and others in the group know this and hence do not loan to them one to one. The negative and strongly significant coefficient (99 percent) on simultaneously saving more than borrowing suggests that risk-takers (specifically, individuals who borrow more than they save) pass more as Player A. This explanation is supported by anecdotal observations that when Player A handed the administrator the coins to pass to Player B, Player A often said "Voy a jugar," or "I am going to play." Hence, many Player As viewed this as a gamble, to "play" or not, and not merely as an act of trust (see Laura

[14] The largest church was removed for two reasons: first, individuals were less likely to interact with each other at the large church (or expect much future interaction); and second, if the respondent did not attend church but felt compelled to name a church in this survey, she most likely named the largest, most well-known one.

[15] Specifically, each member was asked "how many times over the past 12 months have you borrowed cash directly from another member of your group?" Note that since this is technically frowned upon by FINCA, answers to this question are biased downward, and the bias is perhaps correlated with characteristics of interest in this paper.

Schechter, forthcoming, for similar findings in Paraguay).

The GSS questions discussed earlier predict trustworthy (significant at 90 percent), but not trusting, behavior (contrary to the way the questions are worded). This particular finding is consistent with Glaeser et al. (2000), and particularly important since the questions are a leading alternative for measuring social capital. Other measures of social interaction, such as attending each other's celebrations and recalling group members' names, predict neither trusting nor trustworthy behavior.

Columns 3, 4, and 5 of Table 3 analyze the action of each player as a function of the characteristics of the partner. Columns 3 and 4 report OLS results regressing Player A's actions on B's characteristics, and column 5 reports OLS results regressing Player B's actions on Player A's characteristics.

Player A passes more to Player B when Player B is more similar culturally to the others in the lending group. This suggests that Player A passed more when Player B was more connected to others in the group, hence, perhaps indicating that Player A recognized that any sanction by Player B would be more effective. Player B also passed more back to Player A when Player A lived farther from others in the group. Furthermore, indigenous players get more passed to them and Western players get less passed to them, whether Player A or B. This could be identifying charitable motives, with culture a proxy for wealth or socioeconomic status. Those who attended church more recently are passed less, and those who do not attend church at all are passed more.

Column 4 of Table 3 shows an analysis of the Player Bs who do not get passed anything by Player A. If Player Bs are not passed anything specifically because they are not trustworthy, then any analysis of Player Bs' behavior would suffer from a selection bias, wherein the most untrustworthy were removed from the sample. I analyze the characteristics of the Player Bs who were not passed anything in order to ascertain the relevance of this potential bias.[16] Only three variables are statistically significant (at 90 percent): cultural similarity to the group (the more similar to the group, the more likely to have received a pass), being Western (less likely to have received a pass), and having borrowed from others in the group outside of the official lending program (more likely to have received a pass). This last finding suggests that the most untrusted individuals might in fact be omitted from the analysis of Player B.

B. *The Public Goods Game*

Columns 6 and 7 of Table 3 report the determinants of behavior in the Public Goods Game. Column 6 reports the OLS linear probability results. The basic specification is as follows:

$$(2) \qquad Y_i = \alpha + \beta_1 X_i + \beta_2 G_i + \varepsilon_i$$

where Y_i is equal to one if the player contributed to the public good, and zero otherwise. The determinants can be divided in two ways: the individual characteristics (X_i) and the connectedness to the group variables (G_i). For the group-level analysis (column 7), the dependent variable is the percentage of the group that contributed to the public good. Due to degrees of freedom, only a few independent variables are used.

Those who pass more in the Trust Game are more likely to contribute to the public good.[17] Individuals who have more instances borrowing directly from their peers are more likely to contribute to the public good (significant at 90 percent). Individuals who live farther from the others in the group, individuals who have not attended church recently, and Western individuals are all less likely to contribute. For the group-level analysis (column 7), groups with individuals who answer the GSS questions affirmatively contribute more on average.[18]

[16] A strategy method would have avoided this problem, but the education and literacy level of the participants did not permit such an approach.

[17] This is true for Players A and B, although the specification reported in Table 3 does not show this breakdown.

[18] This effect is statistically significant when the six GSS questions are aggregated. When separated into "relative to group" and "relative to society," as done in other specifications, the point estimates for both variables are not materially different from the point estimate on the aggregate of the six questions, but this result is marginally insignificant statistically.

TABLE 4—PREDICTING INDIVIDUAL FINANCIAL OUTCOMES
(*OLS, Probit*)

Dependent variable:	Default			Dropped out due to default or discipline			Total voluntary savings contributions		
Control variables included:	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
	OLS	OLS	OLS	Probit	Probit	Probit	OLS	OLS	OLS
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Panel A									
Player A: Proportion passed in Trust Game	4.253	−4.640	−35.873	0.117*	0.145**	0.166*	−39.630***	−46.625***	−93.969**
	(16.451)	(16.645)	(23.759)	(0.064)	(0.067)	(0.096)	(12.402)	(15.736)	(40.161)
Proportion passed in Trust Game × partner in same group			41.030			−0.015			63.425
			(33.360)			(0.111)			(42.102)
Observations	397	397	397	397	397	397	397	397	397
Panel B									
Player B: Proportion returned in Trust Game	−61.985**	−69.081**	−70.481*	−0.253**	−0.246**	−0.241	57.781**	55.680**	91.451
	(27.264)	(33.484)	(38.643)	(0.104)	(0.102)	(0.199)	(25.347)	(24.107)	(72.149)
Proportion passed in Trust Game × partner in same group			1.314			0.006			−48.852
			(53.025)			(0.216)			(79.901)
Observations	307	307	307	307	307	307	307	307	307
Panel C									
Public goods game behavior, individual	−7.898	−7.820		−0.014	−0.023		−3.180	3.154	
	(16.274)	(14.849)		(0.034)	(0.040)		(8.768)	(10.111)	
Observations	864	864		864	864		864	864	
Panel D									
GSS survey questions, relative to society	−16.431***	−16.881***		−0.051**	−0.055***		5.345	6.388	
	(5.702)	(4.790)		(0.021)	(0.018)		(6.401)	(7.068)	
Observations	794	794		794	794		794	794	
Panel E									
GSS survey questions, relative to group $n = 794$	−3.366	−3.567		−0.011	−0.010		5.508	4.482	
	(5.220)	(5.672)		(0.019)	(0.020)		(7.721)	(7.642)	
Observations	794	794		794	794		794	794	

Notes: *** 99-percent significance; ** 95-percent significance; * 90-percent significance. Columns 1, 2, and 3 examine whether behavior in the Trust Game (panels A and B), the Public Goods Game (panel C), and the GSS questions (panels D and E) predict default one year later. The GSS questions are as follows: the trust question, "Generally speaking, would you say that most people can be trusted or that you can't be too careful in dealing with people?"; the fairness question, "Do you think most people would try to take advantage of you if they got a chance, or would they try to be fair?"; and the helpful question, "Would you say that most of the time people try to be helpful, or that they are mostly just looking out for themselves?" Default is defined as the amount unpaid by the borrower on her loan to FINCA one year after playing the game. Columns 4, 5, and 6 predict being dropped from the program due to default or discipline. This is considered a perhaps less noisy measure of "bad" default, since some default can be observed by group members as acceptable and hence forgiven. Columns 7, 8, and 9 examine predictors of voluntary savings. Columns 3, 6, and 9 examine whether behavior in the Trust Game predicts the bank outcome differently for individuals who are in the same lending group as their partner in the Trust Game. Specifications with control variables include all variables included in Table 3. Marginal values reported for probit in columns 4, 5, and 6. Standard errors corrected for clustering at the group level (41 groups).

V. Predicting Financial Decisions

If the Trust Game can be taken seriously, then it should be able to predict future behavior. The heart of this paper links the borrowing and saving data to the Trust Game data, and then tests whether behavior in the games predicts real financial decisions up to one year later. I test several hypotheses: (a) individuals who return more as Player B are trustworthy and hence should be more likely to repay their loans; (b) individuals who pass more as Player A are more trusting (gambling) and hence should save more (less); (c) individuals who contribute more to public goods should be better participants of their group, and hence default less and save more; and (d) those who answer the GSS questions affirmatively are more likely to repay their loans and save more.[19]

I use three outcomes: default on the loan; dropped out due to default or discipline (self-reported by the group); and total voluntary savings. Table 4 reports the results with each cell representing a separate specification. For each outcome, the analysis is conducted first as a simple OLS in columns 1, 4, and 7 (or probit in the case of dropout); then in columns 2, 5, and 8, I include controls for many of the known predictors of financial outcomes (Karlan, 2005).

[19] I also examined whether Player Bs who received more from Player A (hence were trusted more) were more likely to repay their loans. The results were insignificant, both economically and statistically.

By adding the covariates, I am able to examine whether the Trust Game predicts financial decisions after controlling for the observable, more traditional, predictors of trust and trustworthiness. Indeed, the results remain when adding the covariates. In particular, the tests of the Trust Game include controls for the responses to the GSS questions. Results are robust to including these controls; hence, the Trust Game predictions are not a result merely of their correlation with the GSS questions.

Panels A and B show the results for the Trust Game for Players A and B, respectively. The predictions for trustworthiness, for Player B, support the hypothesis: the more trustworthy the individual, the lower the default, the less likely to drop out, and the higher the voluntary savings (significant at 95 percent). The magnitudes of these results are significant as well: a shift from 25 to 50 percent for percent returned by Player B (trustworthiness) predicts a 6.1-percent point drop in the probability of dropout due to default or discipline (panel B, column 5) and a 7.4 percent point drop[20] in the probability of default.

However, the results for trusting behavior, as measured by Player A, are exactly opposite: the more "trusting" the player, the lower the total voluntary savings and the more likely she is to drop out for default or discipline (but not significantly more likely to have higher default). The result suggests that individuals who pass more as Player A are gamblers, more willing to take on risks, or, alternatively phrased, poor investors, unable to recognize a bad proposition. Individuals who take on bad risks, or make bad investments, should default more and be less likely to save voluntarily. Player A, on average, receives 85 cents for each dollar passed.[21] This conjecture explains why individuals who pass more as Player A are more likely to default one year after playing the game. If the "trust" label were appropriate, one would expect the exact opposite, particularly with respect to savings. Savings are at risk to the default of others in the group; hence, each savings deposit is an act of trust.

These results on Player A also affect the interpretation of the Player B results. If, in fact, Player A is about not only trust but also propensity to take on risks, then can Player B behavior be labeled strictly about trustworthiness? If Player B correctly assesses that her pass represents part expectation of future interaction, part gamble, and part trust, then what should determine her behavior? The fact that Player B's behavior predicts repayment of loans suggests that despite the murkiness of Player A's motivation, Player B's behavior is indeed about trustworthiness.

Next I examine whether Player A and B action predicts the financial decisions irrespective of whether the player is in the same group as the partner. I interact the game behavior with a dummy if the partners are in the same group, and then examine whether the straight term or interaction term predicts the financial decision. If the interaction term is predictive, this suggests that the game is not measuring something about the personality of those individuals, but rather about the dynamics of the group process and the future punishment from continued interaction with the partner. Columns 3, 6, and 9 of Table 4 show these results. For both Player A and B, for all financial decisions, adding the interaction term does nothing: the coefficient on the main term, percent passed in the Trust Game, remains significant both economically and statistically, whereas the coefficient on the interaction term is not significant.

Panel C of Table 4 shows the results for the Public Goods Game. This game has no predictive power. The point estimates are close to 0, so the lack of predictive power does not seem to be merely a lack of statistical precision. While the Public Goods Game has no predictive power in this context, it would be interesting to observe its predictive power in a more direct and related link, for instance, production of such local public goods as schools, wells, or health clinics.

Panels D and E of Table 4 show the results for the GSS questions. Answering affirmatively to the questions relative to society as a whole is negatively correlated with default and dropping out due to default or discipline (significant at 99 percent). The questions do not, however, predict savings behavior. In other words, the GSS

[20] This calculation comes from a probit specification on default, not shown in the tables.

[21] Although this negative return was not known beforehand, a Player A with a keen sense of business perhaps could have determined that one is unlikely to make profits by passing money.

questions predict default, or trustworthy actions, but fail to predict savings, or trusting actions. This matches with the findings reported in Table 3 that the GSS questions predict Player B, but not Player A, behavior in the Trust Game.

VI. Conclusion

This paper demonstrates that even though behavior in the Trust Game might correlate intuitively with other measures of social capital, using it as a measure of social capital alone deserves further research, with particular attention paid to the motives behind Player A's actions. Although trust is almost by construction risky, when the social capital literature discusses trust, it is not referring to gamblers per se, but rather to an ability for social norms and relationships to mitigate risks inherent in informal contracts.

The prior literature on the Trust Game claims it measures trust for Player A and trustworthiness for Player B. I find evidence that Player A measures propensity to take risks. I also find evidence to support the social capital or "trust" hypothesis (e.g., both players being indigenous, living near their partner, and attending the same church lead to higher passes by Player A). Hence, behavior is determined by both types of traits. This murkiness raises doubts about the ability to use the game as a measure purely of trust.

Trustworthiness, on the other hand, does not suffer from this murkiness, as I find strong support for using Player B's behavior as a measure of trustworthiness. It is useful to distinguish innate trustworthiness versus trustworthiness driven by a fear of reprisal. Specifically, I find evidence supporting the game as a measure of innate individual-specific trustworthiness, not just a method of identifying individuals more sensitive to social sanctions (since Player B's action predicts financial decisions irrespective of whether the individual played against someone in his own group or against someone from another group). The positive correlation between trustworthiness in the game and answers to GSS questions relative to society (but not relative to others in their group) further suggests that the link is driven by underlying personal characteristics. However, living closer to one's partner was correlated with returning more in the game; hence, there is some evidence that the fear of reprisal did partly determine Player B behavior. Naturally, the correct answer is probably a combination of the two.

By testing experimental economics in a real setting where social capital is purported to matter, two important points are made. First, a simple Trust Game can indeed predict repayment of a loan enforced almost entirely through social pressure. This endorses experimental economics as a valid measurement tool for field research, and the Trust Game as a valid method to measure trustworthiness, but *not* as a method to measure trust. Second, it demonstrates that trustworthiness is an important component in determining the success of group lending programs. Although these data do not show whether trustworthiness can be created, they do suggest that if harnessed and/or identified, lenders can help solve failures observed in the financial markets for the poor.

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