Measuring Trust in Peruvian Shantytowns

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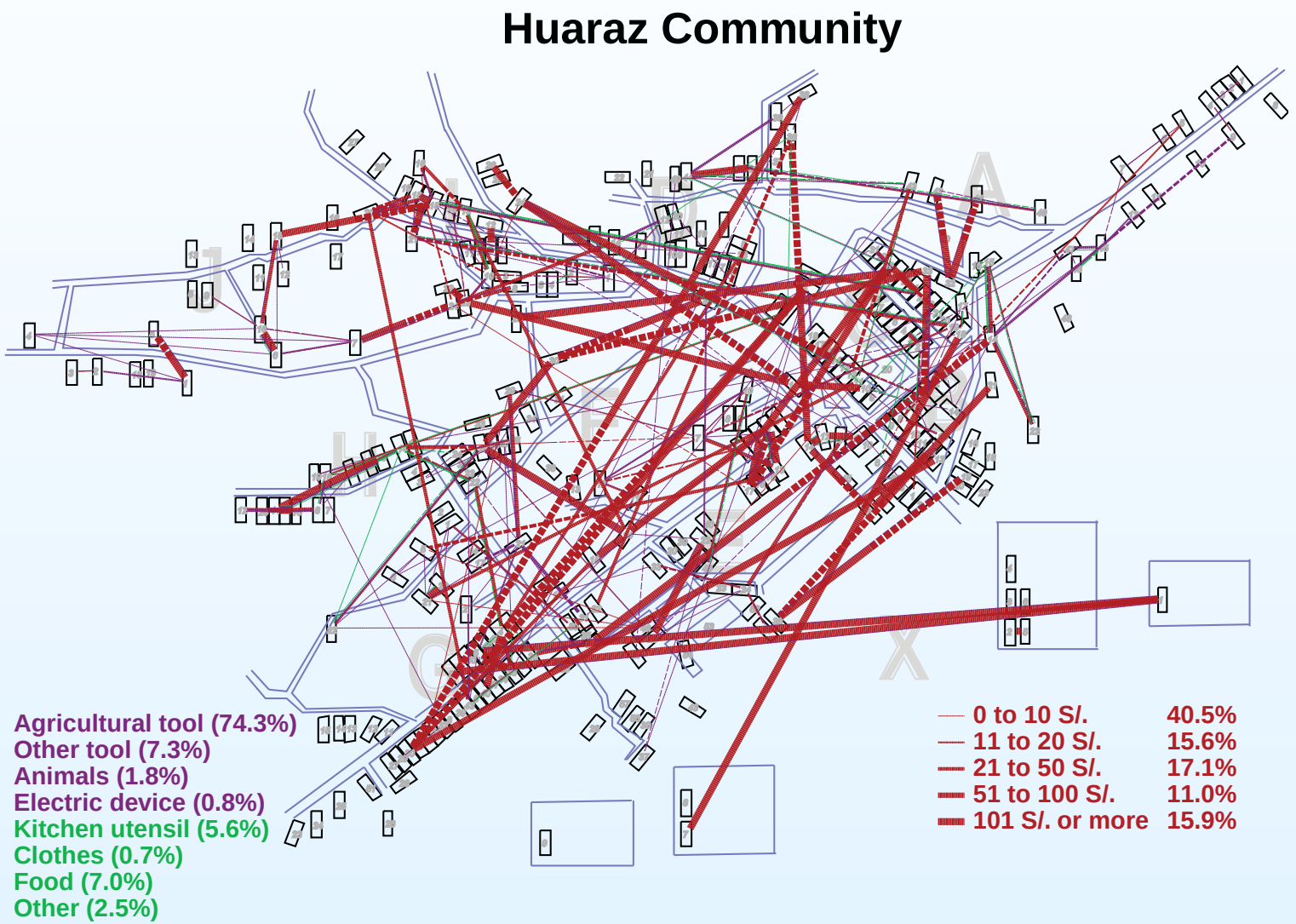
Introduction

- Trust and social capital created by networks may be important:
  - Loans between friends and relatives.
  - Informal consumption insurance (Townsend 1994), and microfinance (Banerjee-Duflo 2010).
  - More broadly, social capital can reduce transactions costs and improve efficiency (Putnam, 2000).
- Many transactions take place in networks, but how valuable is the network?
- **This paper**: measure relative importance of social links and prices for borrowing in a field experiment in Peru.
  - What is the value of a relationship for borrowing?
  - How quickly does it fall with social distance?
  - Why do connections help?
- Lessons about microfinance design and measurement of social capital.

Huaraz, Peru - Borrowing and Lending of Money and Tools



Overview

Experimental design: basic idea

- Setting: borrower needs a co-signer to obtain loan from micro-finance agency.
  - Borrower must convince co-signer to come on board.
- Consider choice between following two options for borrowing $1000:
  - Co-signer is a friend, interest rate is 20%;
  - Co-signer is a non-friend, interest rate is 20%.
- Now consider following two options for borrowing $1000:
  - Co-signer is a friend, interest rate is 20%;
  - Co-signer is a non-friend, interest rate is 0%.
- Trade-off: borrowing through a friend may be easier, but financially more costly.

Conceptual framework

- Project creates net surplus for the two parties

$$L \cdot [S(\text{social distance}_{ij}) - R_{ij} + \varepsilon_{ij}]$$

- **Key assumption**: borrower and cosigner are matched efficiently to maximize net surplus.
  - Holds with costless transfers or if cosigners get outside option.
- Why might borrowing through a friend be easier?
  1. Limits moral hazard through monitoring or enforcement;
  2. Creates selection based on borrower type;
  3. Altruism directed to friends;
  4. Interaction between moral hazard and type.
- Baseline experiment measures the sum of these mechanisms.

Social distance and surplus

- A simple model of monitoring and borrower type yields

$$S = \alpha \cdot \text{type} - \beta \cdot \text{d} + \gamma \cdot \text{type} \times \text{d} \times \text{obs} - \delta \cdot \text{type} \times \text{d} \times \text{unobs} + \varepsilon$$

- Main modeling assumptions:
  1. High types are more likely to repay;
  2. Monitoring is costlier at higher social distance;
  3. High type needs less monitoring.
- Key predictions about effect of social distance on surplus:
  - Social distance reduces surplus;
  - For high type, effect is mitigated when type is observed by all agents, but amplified when type is only known to close friends.
- This equation will guide our empirical analysis.

Field experiment

Field experiment: overview

1. Baseline survey (household level)
2. Social network survey (individual level)
3. “Sponsors” are invited.
4. Microfinance program starts.

Baseline data

- 2005 survey in two Lima commmunities: 299 households
- social network survey for household head and spouse
- 8.6 links on average (41 meters apart); distance between two random houses was about 120 meters
- 59 % neighbors, 39 percent as “amigo”, 2 percent relatives
- 90 percent of friends met in the neighborhood
- for each link we also asked whether transfers occurred in the past: 254 informal loans (167 borrowers in 138 households and 76 S/. loan size on average, 173 lenders); mean age of borrower and lender is 39 years and they live 36 meters apart

	Mean	Standard Dev.		Mean	Standard Dev.
Demographic Variables			*Social Network Variables*		
Female	0.50	0.50	Number of contacts	8.60	4.15
Age	35.84	14.37	Share of “neighbors”	0.59	0.49
Secondary Ed.	0.71	0.21	Share of “friends”	0.39	0.49
Household Inc.(S/.)	887.39	1,215.74	Share of “relatives”	0.02	0.15
Business-owner	0.20	0.40	Avg. size of loan (S/.)	75.88	121.20
			Geographic dist.	41.16	49.17

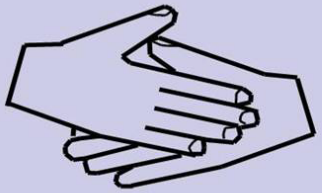
Sponsors

- Invite 25 members of community to become “sponsors”.
- Clients can only get a loan if a sponsor cosigns the loan.
- A sponsor receives a “credit line” which depends on his income and wealth.
- 30 percent of the credit line can be used by the sponsor. The rest can only be used for sponsoring loans of other people in the community.
- 70 percent of the credit line is therefore an asset which is potentially valuable to other community members but not to the sponsor.
- In case of default, both borrower and sponsor are reported to the credit bureau.

Sponsors

Manos Juntas

Alternativa está llevando a cabo un nuevo servicio de crédito. El servicio ofrece un crédito flexible, ágil e individualizado a personas de su comunidad.



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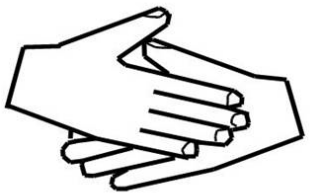
Programa de Microcrédito

Manos Juntas

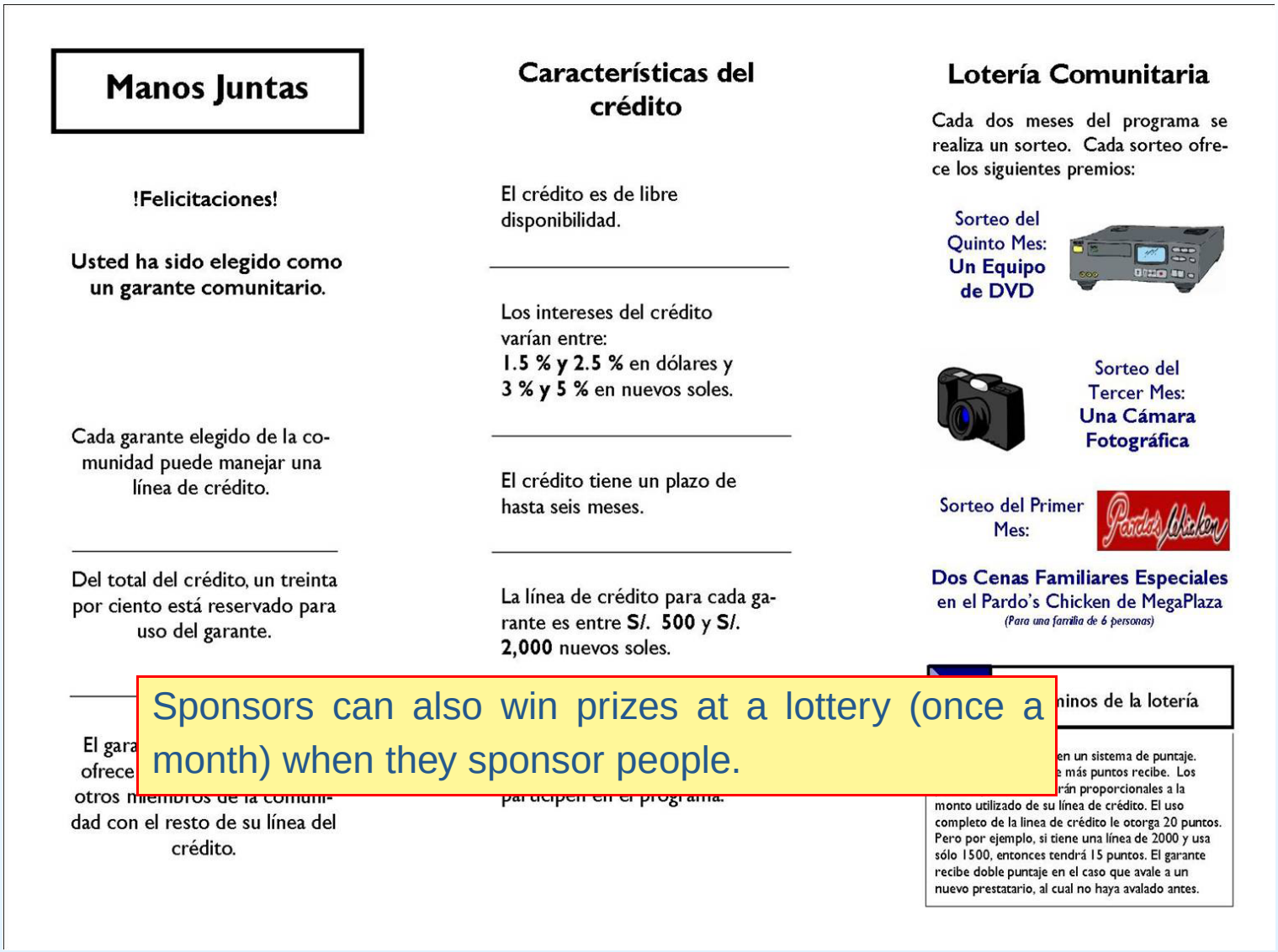


Programa de Microcrédito

ALTERNATIVA

Tel: 481-5801

Sponsors



Manos Juntas

!Felicitaciones!

Usted ha sido elegido como un garante comunitario.

Cada garante elegido de la comunidad puede manejar una línea de crédito.

Del total del crédito, un treinta por ciento está reservado para uso del garante.

El gara… ofrece… otros miembros de la comunidad con el resto de su línea del crédito.

Características del crédito

El crédito es de libre disponibilidad.

Los intereses del crédito varían entre:
1.5 % y 2.5 % en dólares y
3 % y 5 % en nuevos soles.

El crédito tiene un plazo de hasta seis meses.

La línea de crédito para cada garante es entre **S/. 500** y **S/. 2,000** nuevos soles.

…participen en el programa.

Lotería Comunitaria

Cada dos meses del programa se realiza un sorteo. Cada sorteo ofrece los siguientes premios:

Sorteo del Quinto Mes: **Un Equipo de DVD**

Sorteo del Tercer Mes: **Una Cámara Fotográfica**

Sorteo del Primer Mes: **Dos Cenas Familiares Especiales** en el Pardo's Chicken de MegaPlaza
(Para una familia de 6 personas)

…ninos de la lotería

…en un sistema de puntaje. …e más puntos recibe. Los …rán proporcionales a la monto utilizado de su línea de crédito. El uso completo de la linea de crédito le otorga 20 puntos. Pero por ejemplo, si tiene una línea de 2000 y usa sólo 1500, entonces tendrá 15 puntos. El garante recibe doble puntaje en el caso que avale a un nuevo prestatario, al cual no haya avalado antes.

Sponsors can also win prizes at a lottery (once a month) when they sponsor people.

Cards

- Each household receives a customized “card”.
- The card explains the rules of the lending program.
- To get a loan the client has to find a cosigner among the list of 25 sponsors.
- **Each sponsor provides the client with a different, randomized interest rate!**

Cards

Each card is addressed to particular household.

Each sponsor gives client a particular interest rate.

Manos Juntas
Programa de Crédito

Manzana : L
Lote: 2

Estimado **Sr(a). JORGE VENTOCILLA GONERO** y **Sr(a).**

Alternativa los invita a participar de un nuevo servicio de crédito. El mismo, ofrece créditos flexibles, ágiles y personalizados, por intermedio de garantes comunitarios, a todos los vecinos de Los Olivos de Pro. El crédito es de libre disponibilidad.

PASO 1: ¿Qué es lo primero que necesita antes de iniciar el trámite?

Contar con un garante. Usted como residente de la comunidad Los Olivos de Pro, puede escoger un garante de la siguiente lista:

	Tasa (soles)		Tasa (soles)		Tasa (soles)
Jesus Gonzales Tiícla	4.25%	Elizabeth Sierra Chávez	4%	Claudia Catalán	4%
Martha Norma Castro Espinoza	3%	Luis Santos Barilles	4%	Rosa Pari Condori	3.5%
Rosa Edith Panduro Ramírez	3.25%	Aura Sandoval Valiente	4%	Andres Inca Cauti	3.5%
Julia Sabina Maguiña Toledo	3.75%	Julia Bustinza Choque	3.75%	Ivan Diaz Mallma	3.25%
Pedro Francisco Salazar Aquino	3%	Guisella Vargas Valdivia	3.25%	Leodina Diaz	4.5%
Delia Rodriguez Encarnación	3.5%	Balvina Alcalde Vizconde	3%	Jesus Lopez	3.25%
Gladys Selene Alvarado Saldaña	3.25%	Manuel Medrano Gómez	3.5%	Marisol Julca	4%
Aurelio Pedro Oscanoa Rosas	3%	Alfredo Fernando Castillo	3%		
Manuel Amador Chávez Lezama	4%	Melquiades Huayta Tafur	3%		

Nota: La tasa de interés que ofrece cada garante difiere para cada solicitante. La tasa se ha decidido por sorteo.

PASO 2: ¿Cómo iniciar el tramite y en dónde?

Una vez que elija un garante, debe presentar: número de DNI, nombre completo y dirección de usted y de su cónyuge. Lo puede hacer personalmente en la reunión semanal de los miércoles o mediante una llamada telefónica al promotor.

Dirección: Contáctese con el **Sr. Carlos Carbajal**, los días miércoles de **3 a 5** de la tarde en cualquiera de las siguientes direcciones: mz L2 lote 20, mz L1 lote 34, o mz L Lote 38.

Teléfono: 481-5801, 481-5466
Celular: 9 652-4485

PASO 3:¿Que documentación debe llevar la semana siguiente de iniciado el trámite?

Deberá asistir acompañado por su cónyuge a la reunión semanal para llenar y proveer los siguientes documentos:

- Fotocopia de su DNI y el de su cónyuge
- Ficha de Información Económica Básica
- Contrato de Crédito
- Pagaré

Los montos del crédito van desde S/.50.00 a S/.2000.00 o $15.00 a $650.00 dólares.
Los créditos se pagarán en cualquiera de las Sucursales del Banco Continental.

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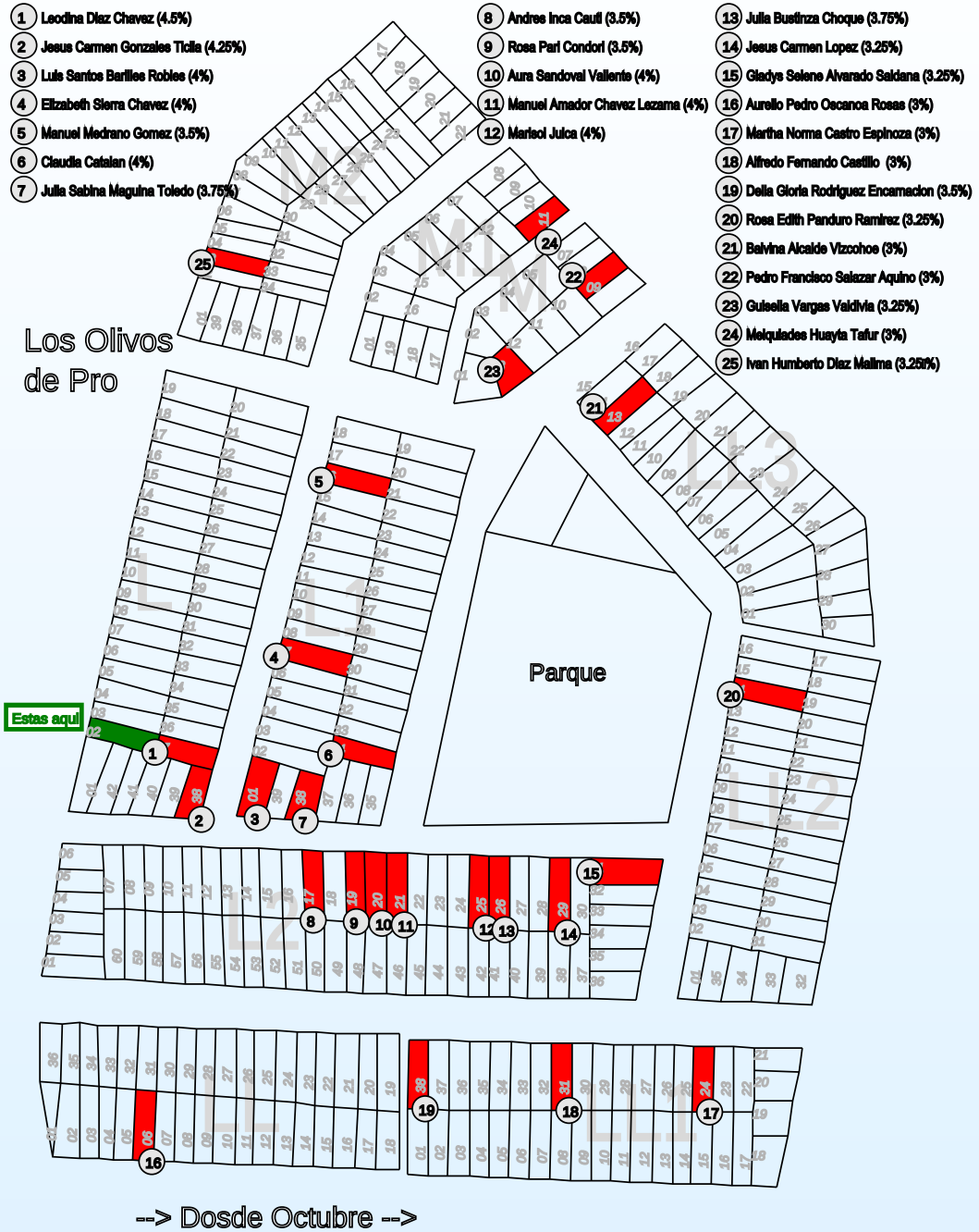
Cards

Back of card shows map of community and location of sponsors (and interest rates).



Interest Randomization

- Each client has a “slope” of 1 to 4 assigned which determines the decrease in monthly interest rates depending on social distance (SD) to sponsor:

	SD=1	SD=2	SD=3	SD=4
SLOPE=1	4.500	4.375	4.250	4.125
SLOPE=2	4.500	4.250	4.000	3.750
SLOPE=3	4.500	4.000	3.500	3.000
SLOPE=4	4.500	3.750	3.000	2.250

- *Social distance* is length of shortest path in the network between the agents.
  - Equals 1 for direct friends, 2 for people who share a common friend, etc.
- We use any kind of link (friends, acquaintances) to construct social distance.

Results

Aggregate outcomes

- 128 loans between clients and 51 sponsors in two Lima communities
- 53 percent of loans between direct friends
- 26 percent between friends of friends
- mean loan size 1228 S/. and median loan size 1000 S/. (about 330 US$)
- 60 percent of loans to women
- 88 percent of average loan was repaid

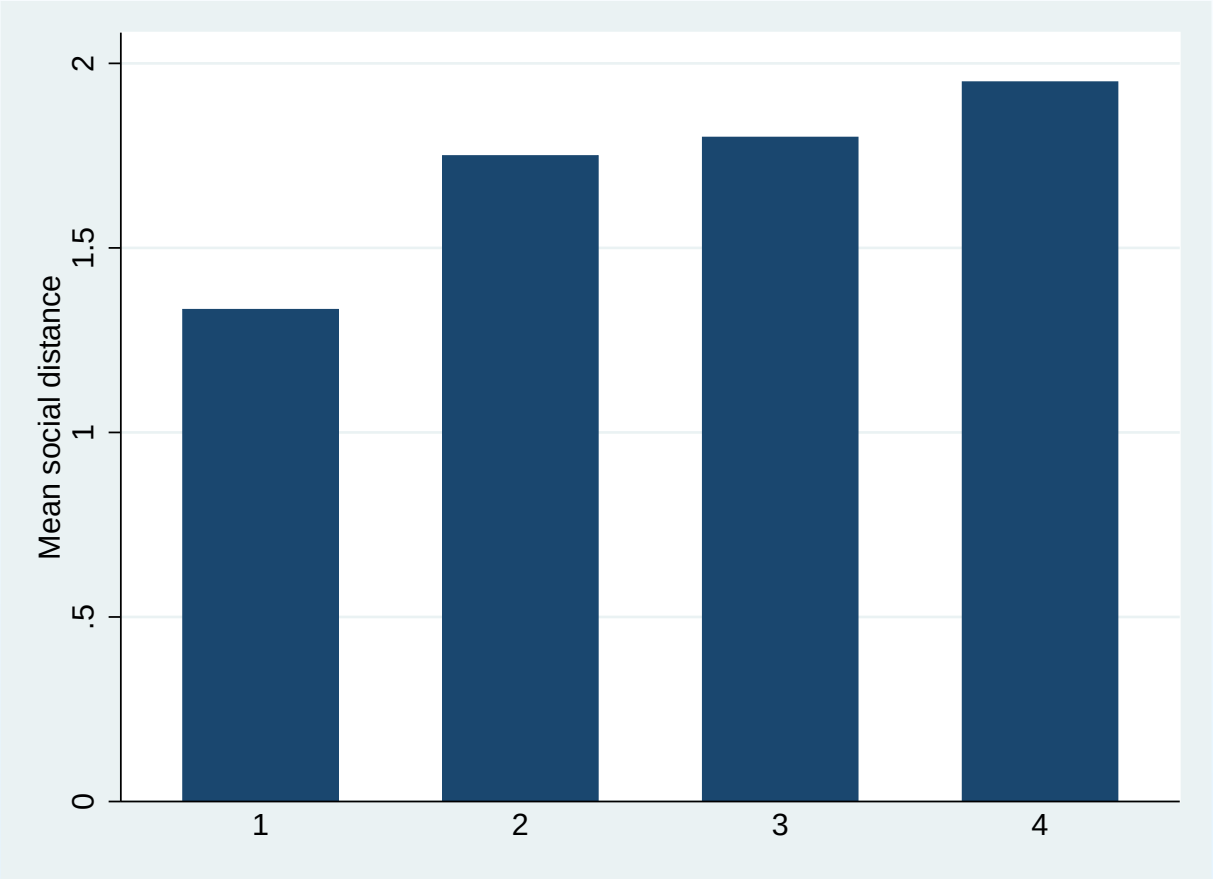
Aggregate outcomes

Distribution of loans by slope and social distance:

	SD=1	SD=2	SD=3	SD=4
SLOPE=1	24	5	2	1
SLOPE=2	20	12	3	4
SLOPE=3	17	9	5	3
SLOPE=4	18	14	7	6

Do interest rates affect choice of sponsor?

Average social distance between client and sponsor by slope:



Clients assigned a greater slope were more likely to choose socially distant sponsors (tradeoff between interest rate and social distance).

Estimating equation

- Recall specification for surplus:

$$S = \alpha \cdot \text{type} - \beta \cdot \text{d} + \gamma \cdot \text{type} \times \text{d} \times \text{obs} - \delta \cdot \text{type} \times \text{d} \times \text{unobs} - \theta \cdot R + \varepsilon$$

- We estimate equation as a conditional logit in a **discrete choice** framework.
  - Dependent variable is choice of cosigner from pool of 25 possibilities.
  - Allows for computing interest rate variation that compensates for social distance.
  - Analogous to choice models used in IO such as Berry, Levinsohn and Pakes (1995).
- We first ignore borrower type unobserved to the econometrician.
  - Estimate trade-off between social distance and money for average type.

Conditional Logit

Surplus of client i for being sponsored by j:

$$S_{ij} = \beta * \text{Soc Dist} + \theta * \text{Interest rate} + \kappa * \text{Geo. Dist} + \varepsilon$$

Interest	-.802 (0.3)***	-.801 (0.306)***	-.800 (0.3)***	-.884 (0.307)***	-.785 (0.301)***	-.804 (0.3)***
Relative		2.359 (0.871)***				
Friend			-.232 (0.33)			
Neighbor				0.93 (0.325)***		
Lent to					0.701 (0.355)**	
Borrowed						0.248 (0.433)
SD=1	4.830 (0.897)***	4.624 (0.905)***	4.882 (0.9)***	4.510 (0.913)***	4.695 (0.9)***	4.813 (0.898)**
SD=2	2.534 (0.852)***	2.448 (0.854)***	2.518 (0.852)***	2.626 (0.856)***	2.544 (0.852)***	2.542 (0.852)**
SD=3	1.624 (0.785)**	1.607 (0.784)**	1.615 (0.785)**	1.672 (0.79)**	1.630 (0.784)**	1.626 (0.785)**
Distance	-.006 (0.002)**	-.007 (0.003)***	-.006 (0.002)**	-.006 (0.003)**	-.006 (0.002)**	-.006 (0.002)**
Obs.	3021	3021	3021	3021	3021	3021

Conditional Logit

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						006 02)**
						021

Borrowing through direct vs indirect friend equivalent to 2.9 pp decrease in the monthly interest rate, or 17% of face value of 6 month loan. SD=2 vs SD=3 equivalent to additional 1.1 pp monthly interest.

Conditional Logit

Surplus of client i for being sponsored by j:

$$S_{ij} = \beta * \text{Soc Dist} + \theta * \text{Interest rate} + \kappa * \text{Geo. Dist} + \varepsilon$$

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Within SD=1, sponsoring relatives, neighbors and previous creditors have particularly large effects.

Effect of Borrower Type

Surplus of client i for being sponsored by j:

$$S_{ij} = \beta * \text{Close} + \gamma * \text{Type} * \text{Close} + \theta * \text{Interest} + \kappa * \text{Geo. Dist} + \varepsilon$$

Interest	-.752 (0.223)***	-.722 (0.253)***	-.736 (0.223)***	-.711 (0.241)***	-.723 (0.222)***
Close	3.261 (0.365)***	3.322 (0.361)***	3.312 (0.475)***	3.419 (0.375)***	3.495 (0.401)***
Business*Close		-0.789 (0.554)	-0.789 (0.611)		-0.838 (0.562)
Female*Close		-0.844 (0.427)*	-0.841 (0.498)		-0.911 (0.438)**
Good Type*Close				-0.801 (0.421)*	-0.814 (0.427)*
Bad Type*Close				.0091 (0.400)	.0158 (0.400)
Distance	-.006 (0.002)**	-.007 (0.003)***	-.006 (0.002)**	-.006 (0.003)**	-.006 (0.002)**
Sponsor FE	No	No	Yes	No	No
Obs.	3021	3021	3021	3021	3021

Effect of Borrower Type

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Sponsor FE	No	No	Yes	No	No
Obs.	3021	3021	3021	3021	3021

Borrowing through a “close” link is equivalent to a 4.6 pp decrease in the monthly interest rate. For women the effect of closeness is equivalent to a 3.4 pp decrease in monthly interest.

Observing Unobservables

- Regressions only used observable demographic proxies for borrower type.
- To measure borrower type **unobserved to econometrician**, we use a second **ex-post randomization**.
- After loans were taken out, half of all sponsors were randomly selected and their responsibility was reduced to 50% of loan value.
  - Both sponsor and client were informed about this.
- Idea: higher types are more likely to repay even when cosigner is not responsible.

Selection and repayment

- If residual type is observed in community, model predicts

  1. Low types more likely to choose friends:

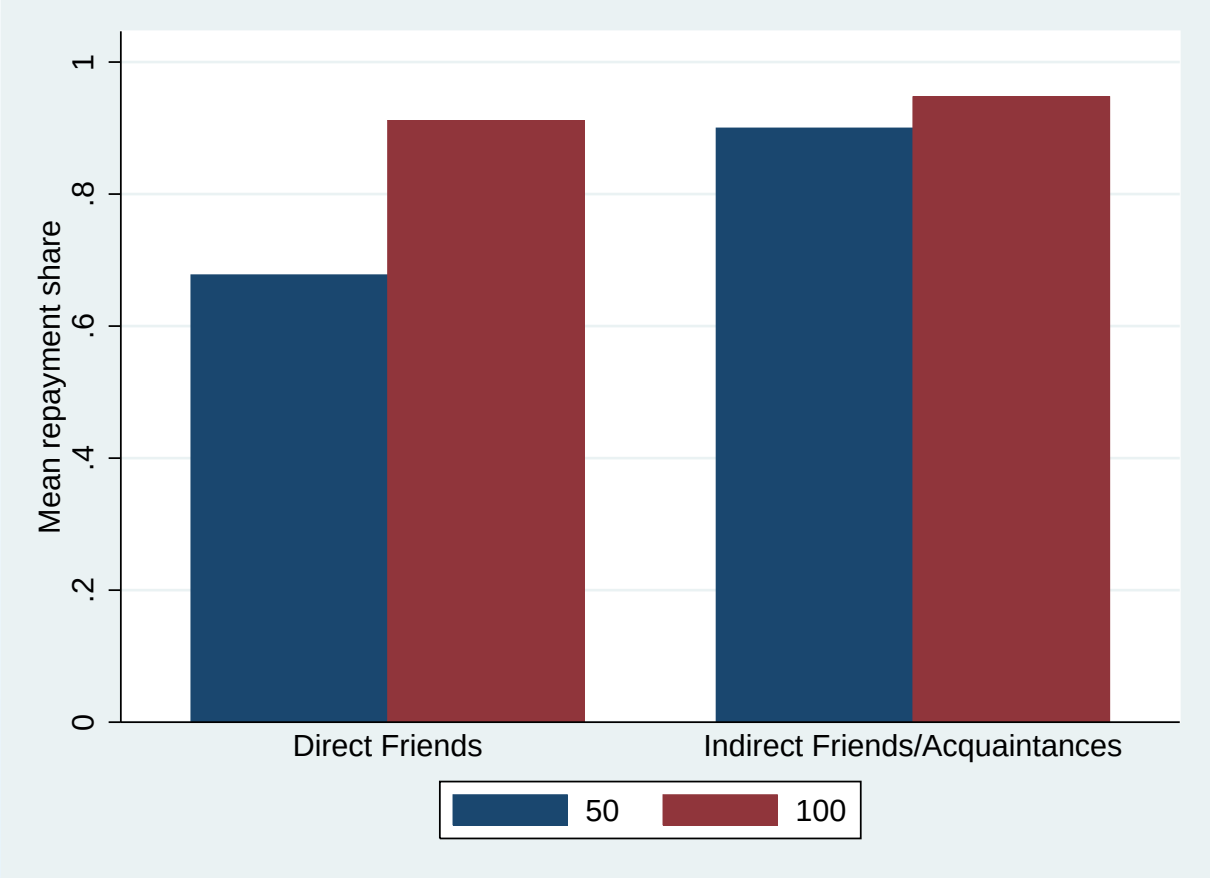
$$\bar{t}(\text{close}) < \bar{t}(\text{far})$$

  2. High types switch to non-friends at flatter slopes:

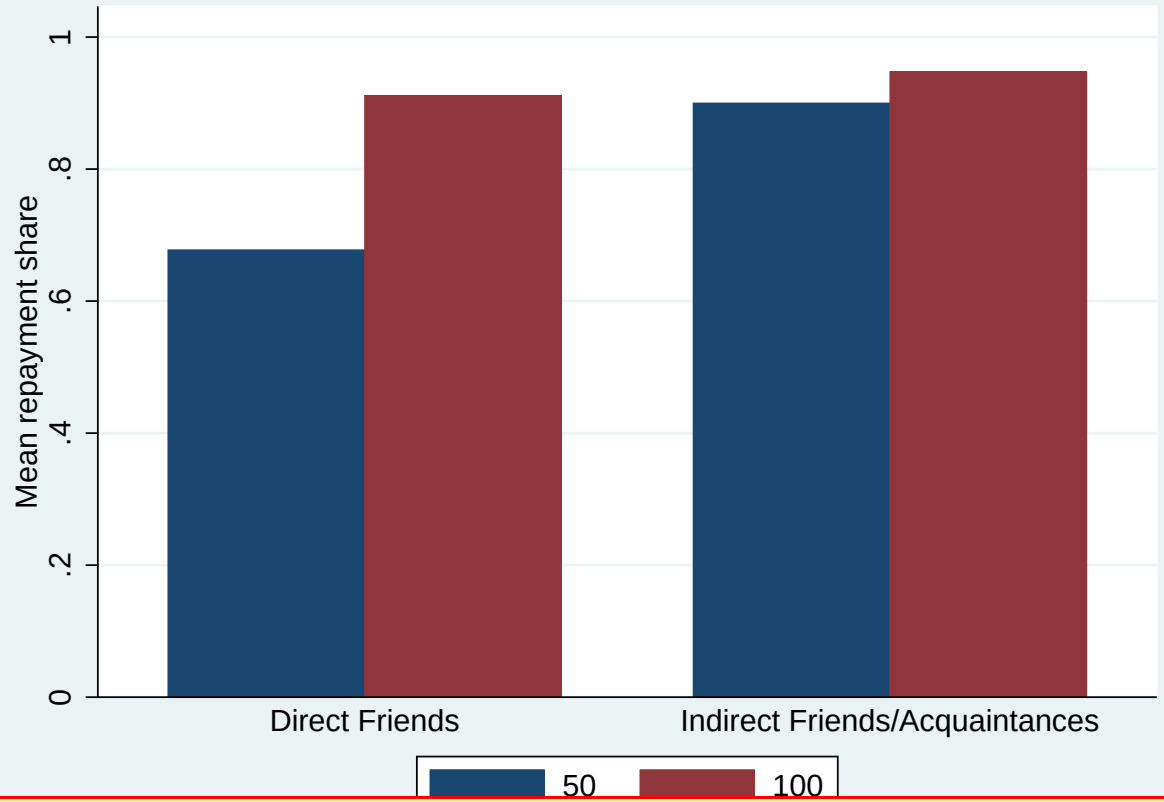
$$\bar{t}(\text{far, flat}) > \bar{t}(\text{far, steep})$$

- Opposite predictions with asymmetric information, when residual type only observed to friends.
- Can test using second randomization: Do high types repay even when cosigner not responsible.

Second randomization: basic results

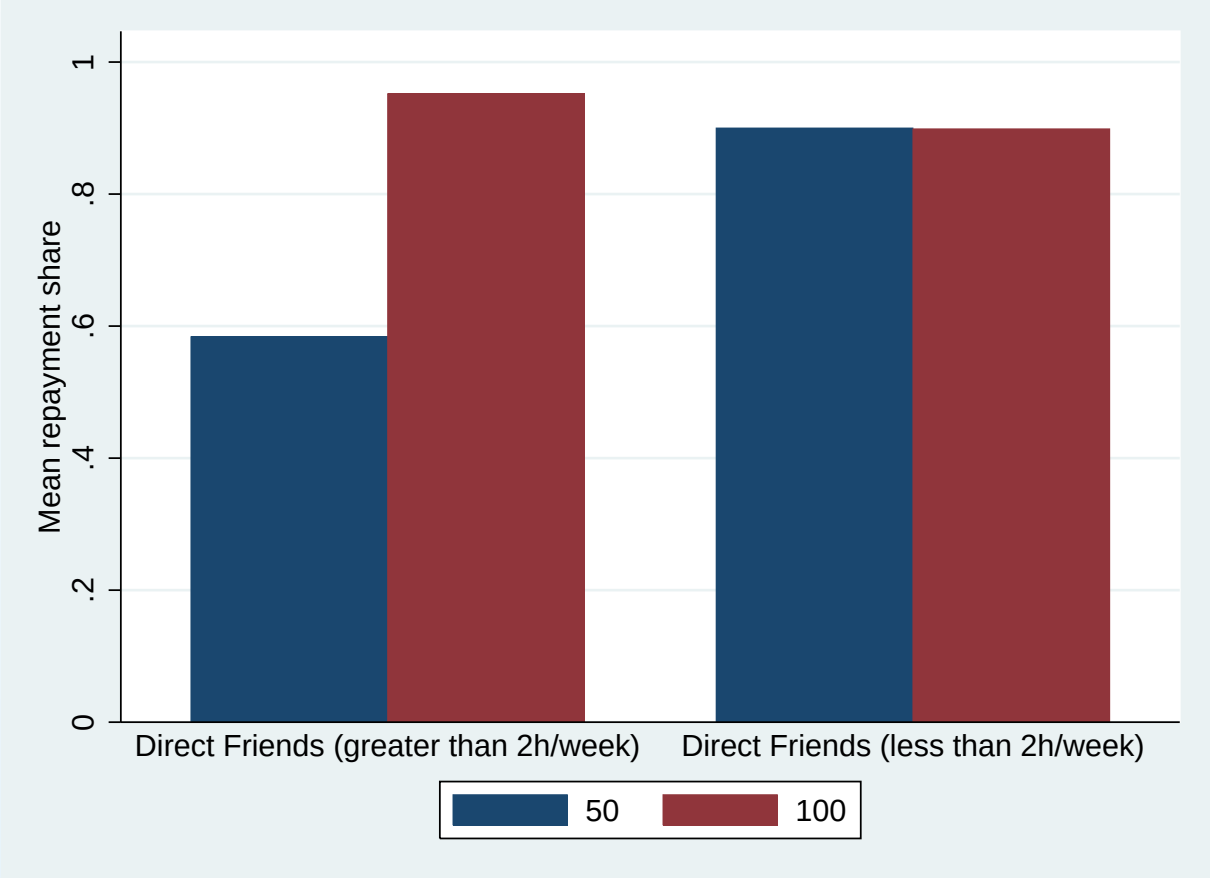


Second randomization: basic results

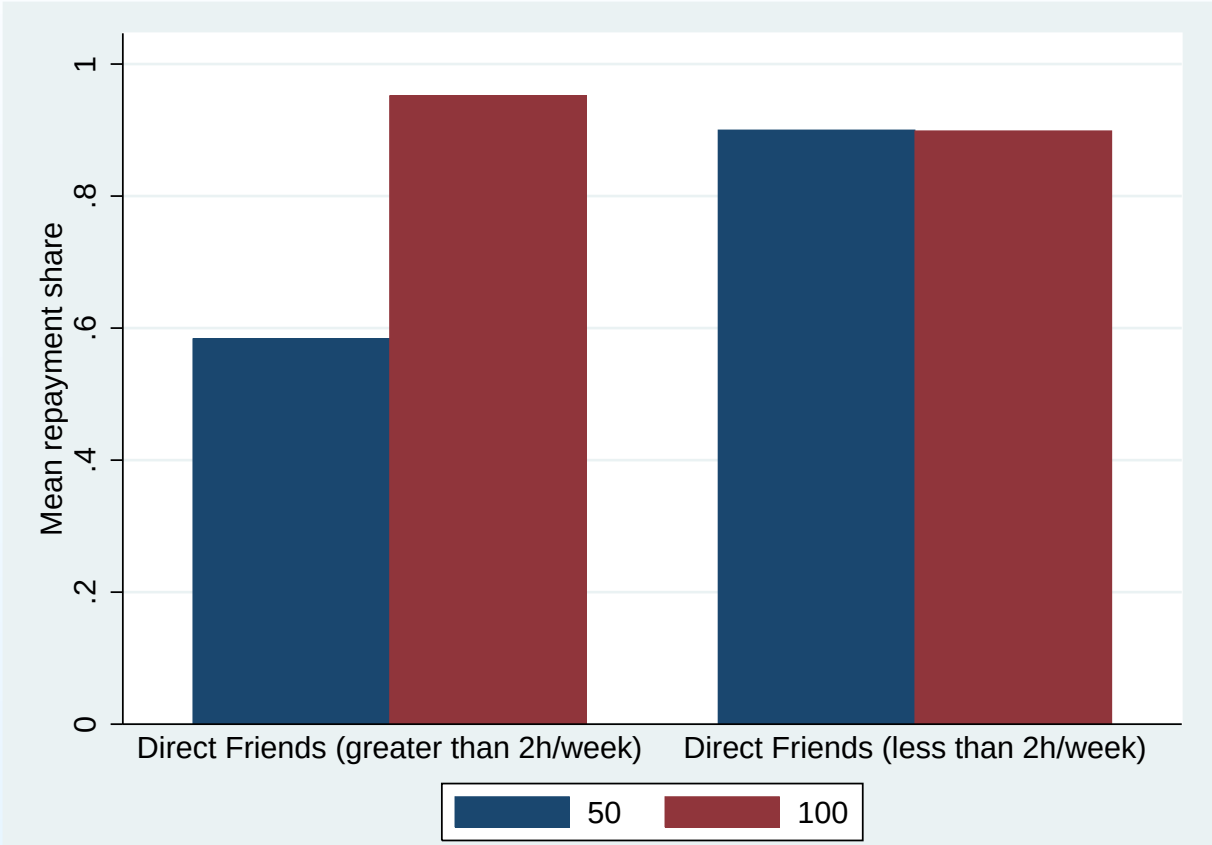


Reducing the sponsor's responsibility affects repayment mostly for SD=1 links. Consistent with *symmetric information* view: high-types can switch to non-friends while low types are monitored by friends.

Second randomization: within direct friends



Second randomization: within direct friends



Among direct connections the sponsor's responsibility affects stronger links. Further supports symmetric information view.

Repayment and borrower type

Effect on repayment of distance (1) and slope when high distance (2, 3).

Close	-0.086		
	(0.087)		
Close * Second Randomization	-0.175		
	(0.083)**		
Second Randomization	-0.089	-0.159	-.179
	(0.130)	(0.155)	(0.160)
Slope		-0.035	-0.045
		(0.101)	(0.067)
Slope * Second Randomization		-0.107	-0.095
		(0.045)**	(0.044)**
Female	-0.005		-0.184
	(0.090)		(0.155)
Female * Second Randomization	0.341		0.549
	(0.270)		(0.370)
Business	-0.072		-0.145
	(0.112)		(0.150)
Business * Second Randomization	0.380		1.009
	(0.227)*		(0.552)*
Obs.	128	68	68

(1) Subjects who borrow through non-friends reduce repayment by less. (2) Within this group, subject pool at steeper slope reduces repayment by more.

Money vs Social Distance for Unobserved High Type

- Repayment results suggest that borrower type is symmetrically observed in the community.
- Do agents revealed as high types ex post face different trade-off ex ante?
- Classify each borrower in second randomization as
  - Good type: repays even though sponsor is not responsible.
  - Bad type: fails to repay when sponsor is not responsible.
- While these proxies are noisy, they also contain information about **unobserved** borrower type.
- Do “good types” switch to non-friends at flatter slopes?

Surplus for Unobserved Type

Surplus of client i for being sponsored by j:

$$S_{ij} = \beta * \text{Close} + \gamma * \text{Type} * \text{Close} + \theta * \text{Interest} + \kappa * \text{Geo. Dist} + \varepsilon$$

Interest	-.752 (0.223)***	-.722 (0.253)***	-.736 (0.223)***	-.711 (0.241)***	-.723 (0.222)***
Close	3.261 (0.365)***	3.322 (0.361)***	3.312 (0.475)***	3.419 (0.375)***	3.495 (0.401)***
Business*Close		-0.789 (0.554)	-0.789 (0.611)		-0.838 (0.562)
Female*Close		-0.844 (0.427)*	-0.841 (0.498)		-0.911 (0.438)**
Good Type*Close				-0.801 (0.421)*	-0.814 (0.427)*
Bad Type*Close				.0091 (0.400)	.0158 (0.400)
Distance	-.006 (0.002)**	-.007 (0.003)***	-.006 (0.002)**	-.006 (0.003)**	-.006 (0.002)**
Sponsor FE	No	No	Yes	No	No
Obs.	3021	3021	3021	3021	3021

For "good type" effect of closeness is reduced by 1.1 pp in monthly interest. Supports symmetric info view.

Conclusion

Conclusion

- Connections have large value for borrowing in Peru communities.
  - Cosigning by a friend equivalent to 3 percent monthly interest.
  - Agents do trade off financial and social costs.
- Cosigner's joint liability improves repayment through ex post effort like monitoring.
- Terms of trade between money and friendship differ by type.
  - Joint liability may increase *access to finance* because friends are effective in monitoring low types.
  - Social capital and conventional banking may be complements.
- No asymmetric information within community, but evidence of information not spanned by demographics.
- Broader lesson: field experiments can measure social capital embedded in networks.