Social Networks and the Decision to Insure: Evidence from Randomized Experiments in China

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  - Demand for insurance in rural areas is surprisingly low: 4.6% in India
  - Social interactions can be an important factor in the diffusion process: Social learning about product benefits or experience, imitation, etc.
- Using a field experiment in rural China, I investigate:
  - The effect of social interactions on the adoption of a new financial product
  - The monetary equivalence of the network effect
  - Mechanisms through which social networks operate

Literature Review and Contributions

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- My contributions:
  - Use experimental designs to identify mechanisms of network effects
  - Estimate the monetary equivalence of social network effects

Literature Review and Contributions (continued)

II. Insurance demand literature:

- Existing explanations for low insurance demand:
  - Cole et al. 2011: Liquidity constraint, Lack of trust
  - Bryan 2010: Ambiguity aversion
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- My contributions:
  - Document that social networks have large effects on insurance demand
  - Study both initial participation rate and renewal decisions

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- There is a significant effect of social networks on insurance adoption
- The monetary equivalence of the network effect equals 15% of the insurance premium
- Mechanisms including scale effect, imitation, and informal risk-sharing cannot explain the effect
- The social network effect is mainly driven by social learning about insurance knowledge and friends' experience

Outline

- I. Background
- II. Short-term effect of social networks on insurance demand
  - II.1. Experimental design
  - II.2. Causal effect
  - II.3. Monetary value
  - II.4. Mechanisms
- III. Effect of social networks over time
- IV. Conclusion

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- Insurance contract:
  - Price : 3.6 RMB after subsidy (actuarially fair price 12 RMB = 1.9 dollars)
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    Heavy rain, flood, windstorm, drought, etc.
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    Heavy rain, flood, windstorm, drought, etc.
  - Indemnity Rule: 200 RMB $\times$ Loss%
- The maximum payout covers 30% of the gross rice production income or 70% of the production cost

I. Background: Experimental Sites

- 185 randomly selected villages in Jiangxi, China
- On average, around 70% household income comes from rice production
- No similar types of insurance provided before

II.1 Experimental Design: Within-village Randomization

- *Two rounds of information sessions in each village:*

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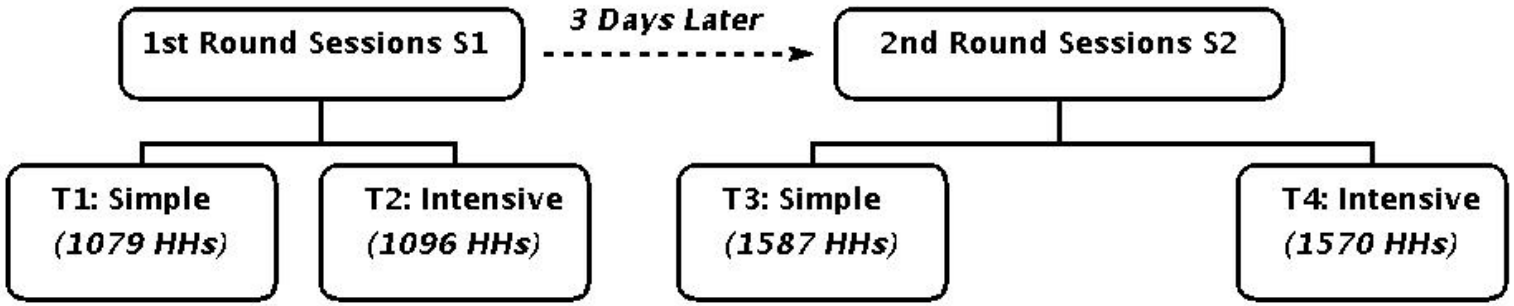
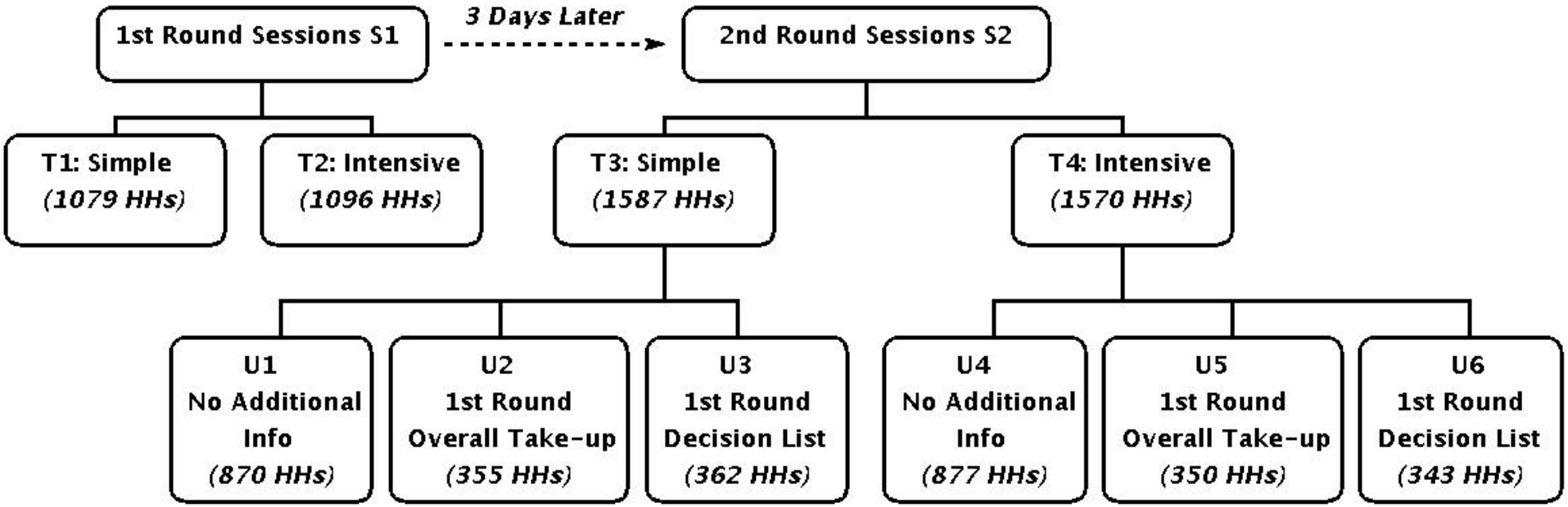
- *In each round, two types of information sessions:*
  1. Simple sessions: Distribute insurance flyer + introduce the contract briefly
  2. Intensive sessions: In addition to information covered in simple sessions, provide financial education about weather insurance products



Definition of social network: the fraction of five friends (named in a social network census) who were invited to an early round intensive session

II.1 Experimental Design: Within-village Randomization

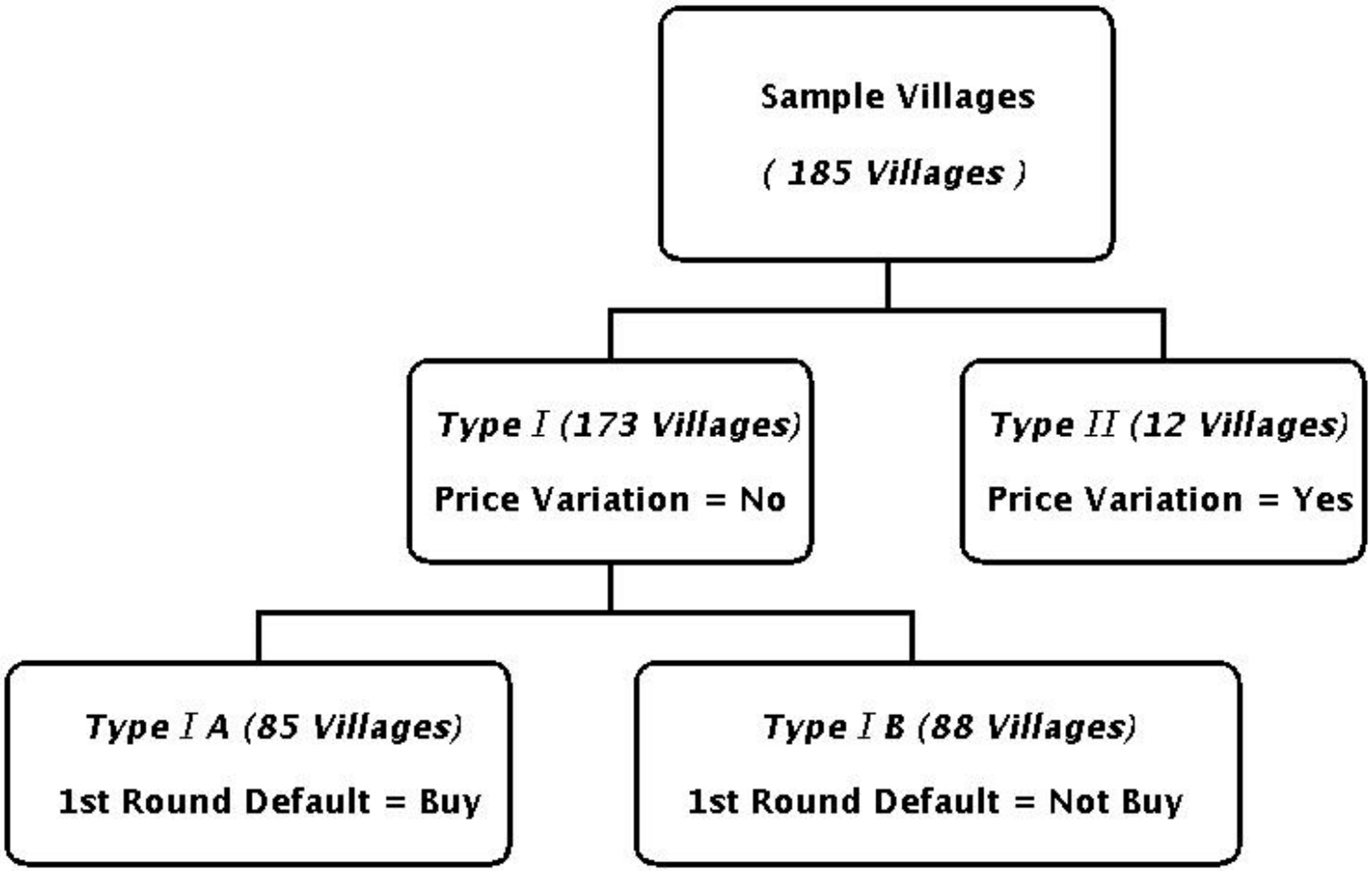
- *After the presentation in each second-round session, disseminate first-round take-up information to a subgroup*



In all cases, households make decisions individually at the end of our visit

A Sample Information Session

II.1 Experimental Design: Village-level Randomization



II.2 Estimation Strategy - Financial Education Effect

- Effect of financial education: Type I villages, 1st round sessions

$$\text{Takeup}_{ij} = \alpha_0 + \alpha_1 \text{Intensive}_{ij} + \alpha_2 \text{X}_{ij} + \eta_j + \epsilon_{ij} \tag{2}$$

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- Around 14 percentage points (from 35% to 50%)

Table 2. Effect of Financial Education on Insurance Take-up, Year One

VARIABLES	Insurance Take-up (1 = Yes, 0 = No)	
	(1)	(2)
Intensive Financial Education Session	0.149***	0.140***
(1 = Yes, 0 = No)	(0.0261)	(0.0259)
No. of Observation	2,175	2,137
Village Fixed Effects	Yes	Yes
Household Characteristics	No	Yes
R-Squared	0.121	0.129

II.2 Estimation Strategy - Social Network Effect

- Social network effect: Type I villages, 2nd round (no take-up info)

$$\text{Takeup}_{ij} = \beta_0 + \beta_1 \text{Network}_{ij} + \beta_2 \text{X}_{ij} + \eta_j + \epsilon_{ij} \tag{3}$$

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$$\text{Takeup}_{ij} = \beta_0 + \beta_1 \text{Network}_{ij} + \beta_2 \text{X}_{ij} + \eta_j + \epsilon_{ij} \quad (3)$$

- Having one addition friend attending 1^{st} round intensive session (financial education) increases own take-up by 6.7 percentage points, which is around 45% of the direct financial education effect
- The magnitude of social network effects depends on the strength of ties

Table 3. Effect of Social Networks On Insurance Take-up, Year One

VARIABLES	Insurance Take-up (1 = Yes, 0 = No)		
	(1)	(2)	(3)
%Network Receiving 1st Round Financial Education	0.337***		
	(0.0810)		
%Network Receiving 1st Round Financial Education		0.428**	
(Strong ties, mutually listed)		(0.182)	
%Network Receiving 1st Round Financial Education			0.0843
(Weak Ties, second order links)			(0.149)
No. of Observation	1,274	1,255	1,255
Village Fixed Effects and Household Characteristics	Yes	Yes	Yes
R-Squared	0.087	0.112	0.115

II.3 Monetary Equivalence of Social Network Effect

- Estimate the monetary equivalence of the network effect: Type II villages

$$\begin{aligned}\text{Takeup}_{ij} = \gamma_0 + \gamma_1 \text{Price}_{ij} + \gamma_2 \text{Network}_{ij} + \gamma_3 \text{Price}_{ij} \times \text{Network}_{ij} \\ + \gamma_4 \text{X}_{ij} + \eta_j + \epsilon_{ij}\end{aligned}$$

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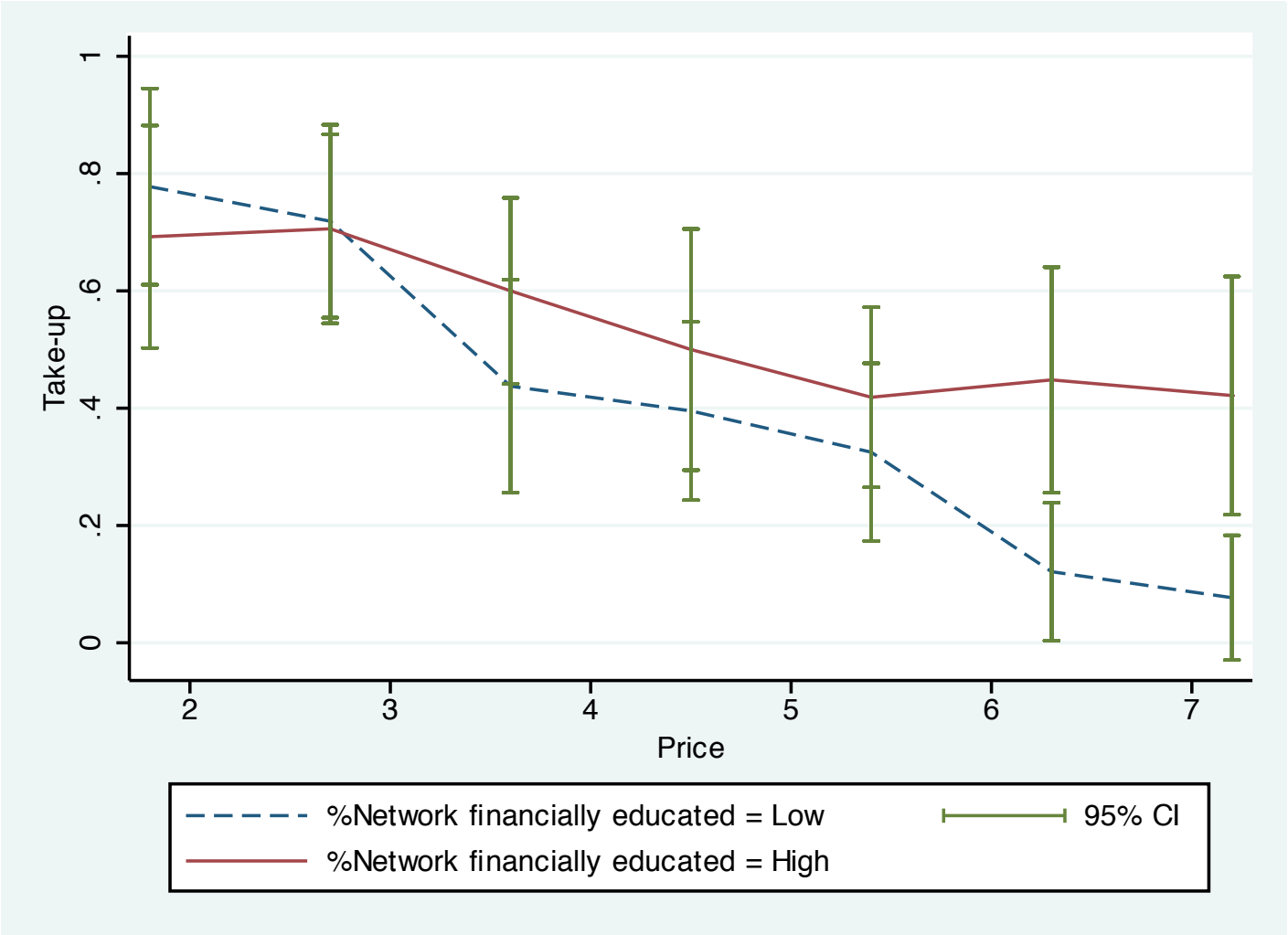
- The network effect is equivalent to reducing the insurance price by 15%

Table 6. Monetary Value of the Social Network Effect on Insurance Take-up, Year One

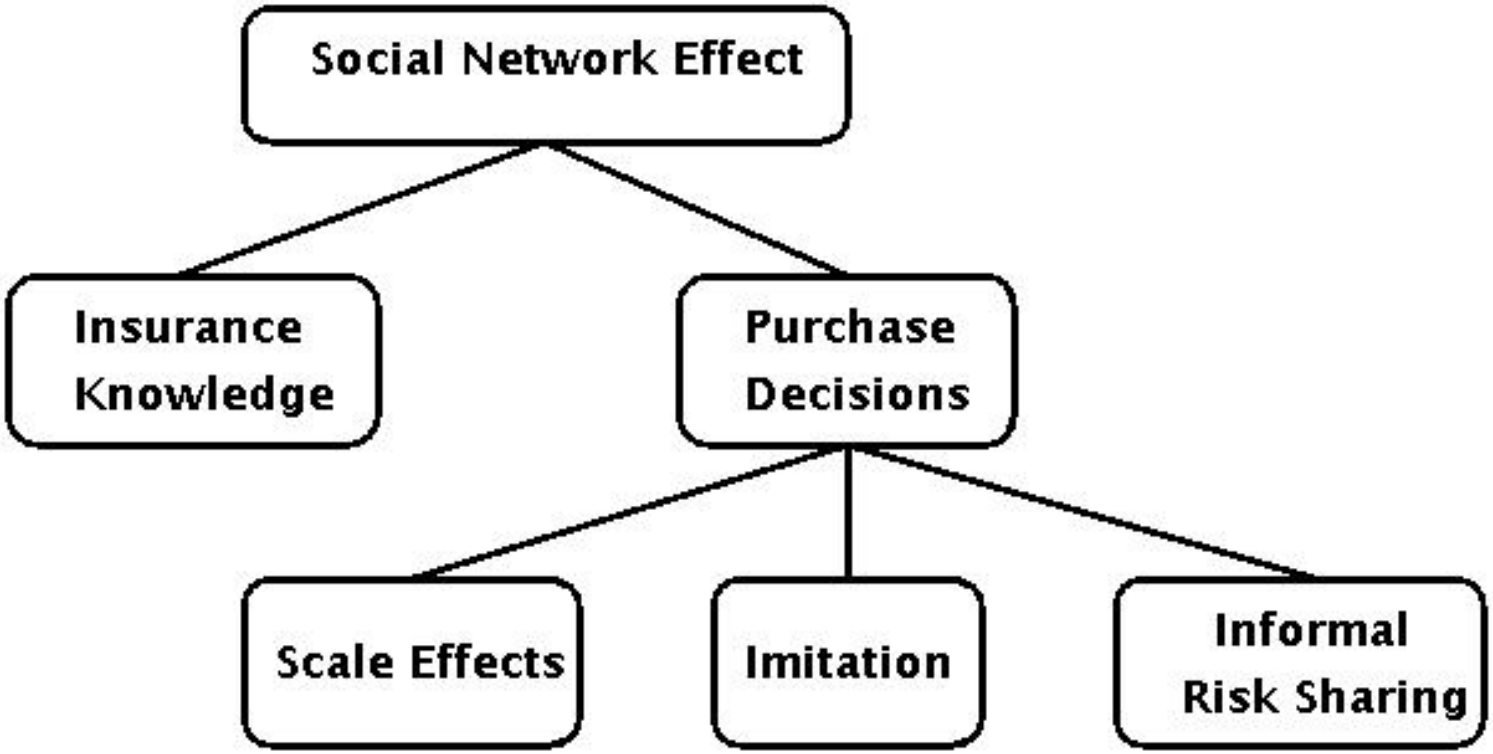
VARIABLES	Insurance Take-up (1 = Yes, 0 = No)	
	(1)	(2)
Price	-0.112***	-0.151***
	(0.0162)	(0.0306)
%Network Receiving 1st Round Financial Education	0.364***	-0.241
	(0.0979)	(0.243)
Price * %Network Receiving 1st Round Financial Education		0.151**
		(0.0520)
Observations	429	429
Village Fixed Effects and Household Characteristics	Yes	Yes
R-Squared	0.239	0.260
P-value of Joint-significance: Price		0.0013***
%Network Receiving 1st Round Financial Education		0.0018***

Figure 3. Effect of Having Friends Attending Financial Education on Insurance Demand, Year One



II.4 Mechanisms of the Social Network Effect

- Possible mechanisms:



II.4 Mechanism I: Insurance Knowledge

Do social networks diffuse insurance knowledge?

- Strategy A: Compare the effect of financial education on both take-up and insurance knowledge between first and second round sessions

$$\begin{aligned} \text{Outcome}_{ij} = \omega_0 &+ \omega_1 \text{Intensive}_{ij} + \omega_2 \text{Second}_{ij} \\ &+ \omega_3 \text{Intensive}_{ij} \times \text{Second}_{ij} + \omega_4 \text{X}_{ij} + \eta_j + \epsilon_{ij} \end{aligned} \tag{9}$$

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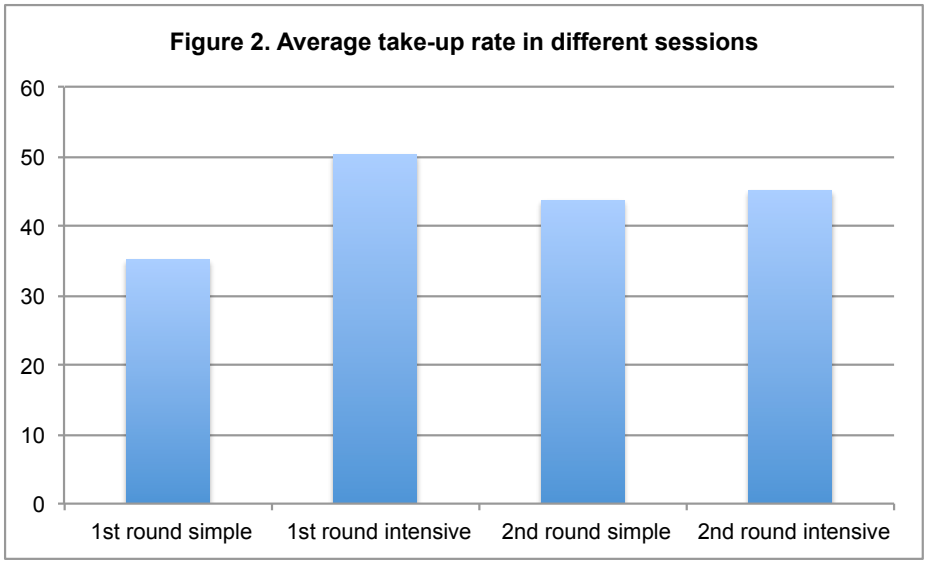
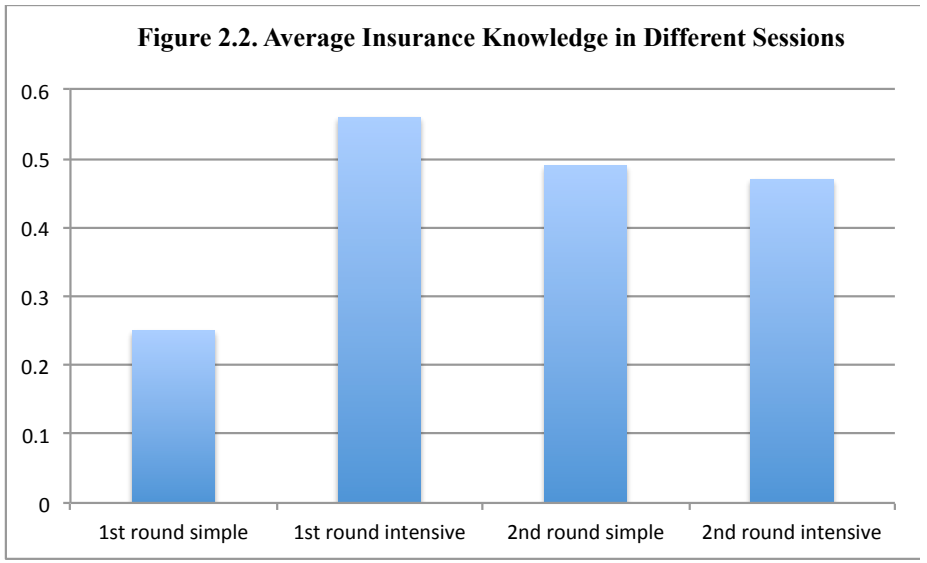
- Strategy B: Test the effect of social networks on improving insurance knowledge

$$\text{Knowledge}_{ij} = \lambda_0 + \lambda_1 \text{Network}_{ij} + \lambda_2 \text{X}_{ij} + \eta_j + \epsilon_{ij} \tag{10}$$

II.4 Mechanisms: Diffusion of Insurance Knowledge I

- Financial education effect is large and significant in the first round, but it makes no difference in the second round





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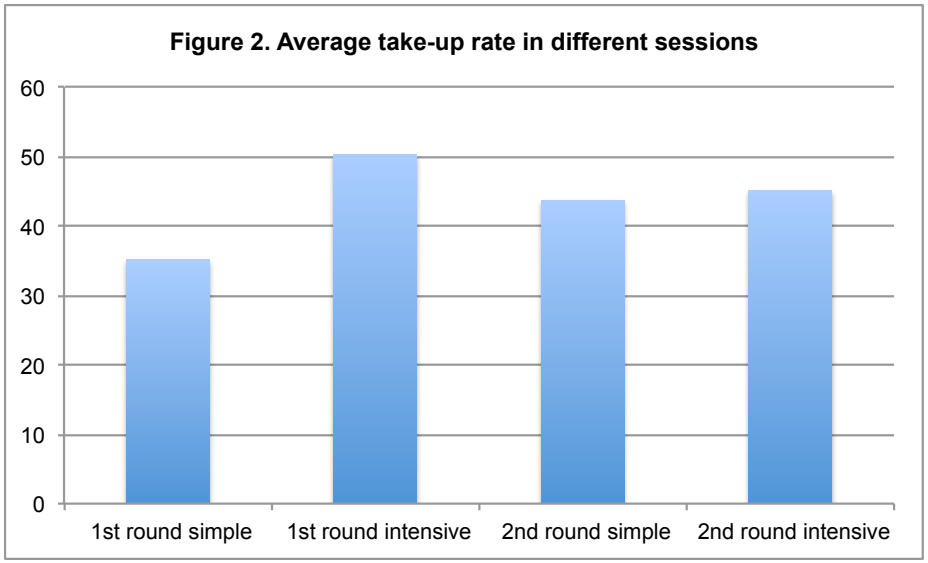
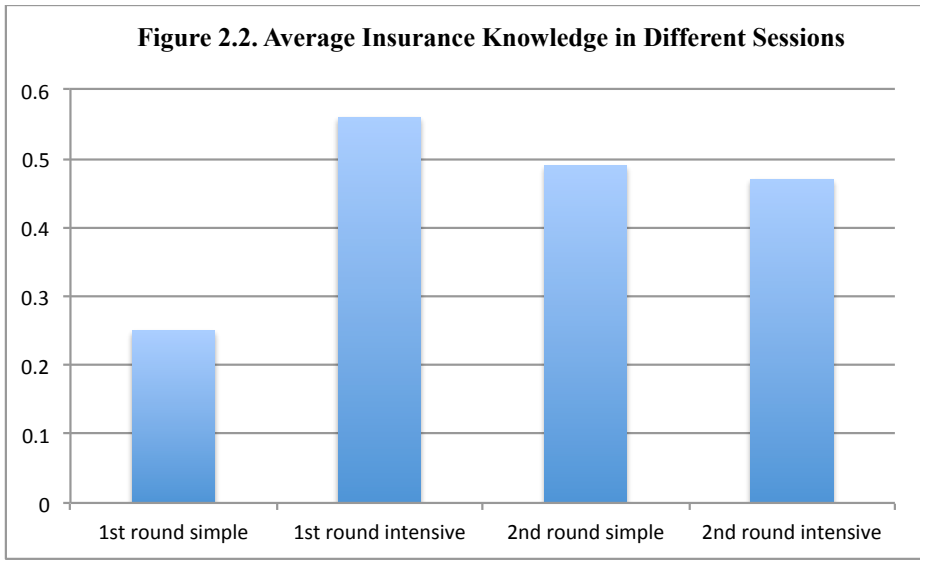
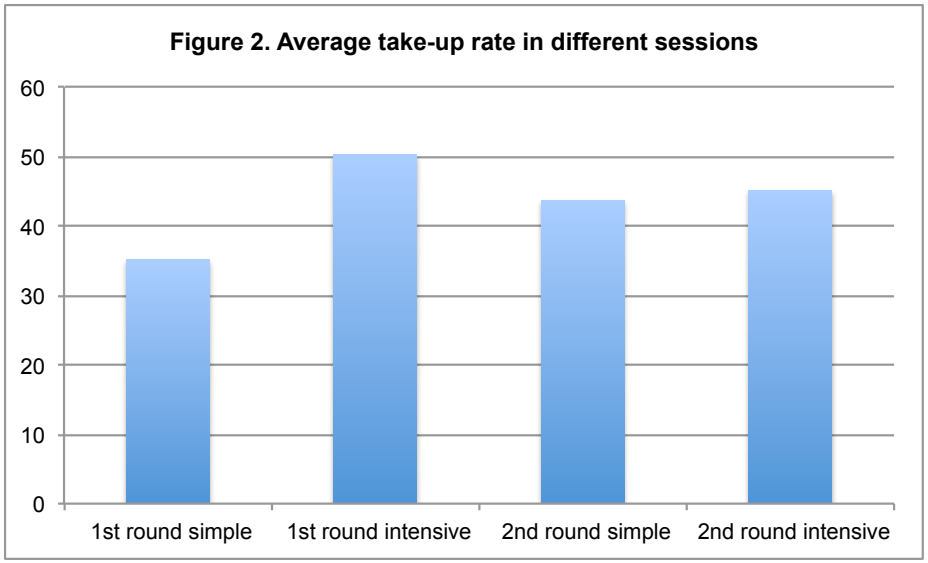
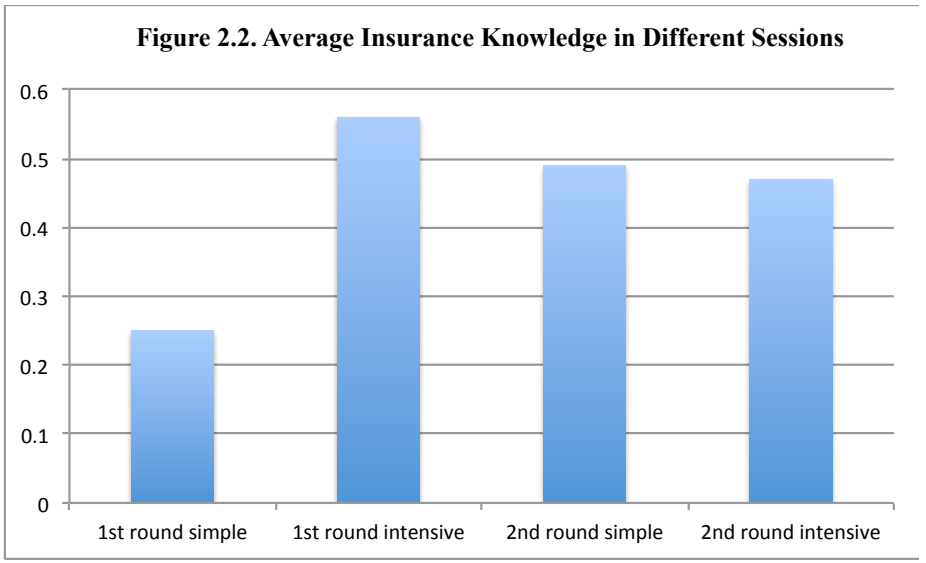




II.4 Mechanisms: Diffusion of Insurance Knowledge I

- Financial education effect is large and significant in the first round, but it makes no difference in the second round
- Second round intensive session has a lower take-up and level of insurance knowledge than first round intensive session:
  - Learning from friends is less effective than formal financial education
  - Less attention in the second round





II.4 Mechanisms: Diffusion of Insurance Knowledge II

- Diffusion of insurance knowledge is more effective when friends better understand financial education materials

Table 7. Did Social Networks Convey Insurance Knowledge?

	Strategy A				Strategy B
VARIABLES	Insurance Take-up (1 = Yes, 0 = No)		Insurance Knowledge (0 - 1)		
	(1)	(2)	(3)	(4)	(5)
Intensive Financial Education Session	0.141***		0.314***		-0.00129
(1 = Yes, 0 = No)	(0.0259)		(0.0120)		(0.0167)
Second Round (1 = Yes, 0 = No)	0.0901***		0.245***		
	(0.0309)		(0.0142)		
Intensive Financial Education Session *Second Round	-0.138***		-0.323***		
	(0.0422)		(0.0200)		
%Network Receiving 1st Round Financial Education		-0.106		0.128	0.356***
		(0.167)		(0.103)	(0.0475)
%Network Receiving 1st Round Financial Education		0.621***		0.312**	
*Average Network Insurance Knowledge		(0.209)		(0.122)	
No. of Observation	3,433	1,255	3,259	1,255	1,255
Village Fixed Effects and Household Characteristics	Yes	Yes	Yes	Yes	Yes
R-Squared	0.093	0.118	0.233	0.137	0.132

II.4 Mechanisms: Diffusion of Insurance Knowledge II

- Diffusion of insurance knowledge is more effective when friends better understand financial education materials
- Having one additional friend assigned to a 1^{st} round intensive session improves one's own insurance knowledge by 7.2 percentage points

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II.4 Social Network Mechanism II: Purchase Decisions

Do social networks diffuse peers' purchase decisions?

$$\text{Takeup}_{ij} = \delta_0 + \delta_1 \text{TakeupRate}_j + \delta_2 \text{TakeupRateNetwork}_{ij} + \gamma_3 \text{X}_{ij} + \epsilon_{ij} \quad (13)$$

- IV for 1^{st} round take-up rate: Default options

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- IV for 1^{st} round take-up rate: Default options
- IV for take-up rate of friends in social network: Default$\times$%Network in 1^{st} round sessions

II.4 Mechanisms: Diffusion of Peers' Decisions

- Friends' decisions do not have a significant effect if this info is not explicitly revealed. But if it is revealed, its effect becomes significant

Table 9. Effect of Peers' Decisions in 1st Round Sessions on 2nd Round Take-up (IV), Year One

	First Stage:		Insurance Take-up (1 = Yes, 0 = No)	
VARIABLES	1st round overall take-up%	Network 1st round take-up%	No Information Revealed	Revealed 1st Round Decision List
	(1)	(2)	(3)	(4)
Default	0.121***			
	(0.0326)			
Default * % Network in 1st Round Sessions		0.308***		
		(0.0593)		
1st Round Overall Take-up Rate			0.0711	0.460
(Village level)			(0.430)	(0.790)
1st Round Network's Take-up Rate			0.0996	0.969**
			(0.252)	(0.383)
No. of Observation	2,137	1,643	920	610
Village FE and Housheold Characteristics	No	Yes	Yes	Yes
R-Squared	0.120	0.163	0.115	

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- Only 9% of the households knew at least one of their friends' decisions
  - Reason 1: It takes time for decisions to be diffused
  - Reason 2: Disclosing purchase decisions carries the risk of "losing face" (Brown et al 2011; Qian et al 2007; Zhao et al 2005)

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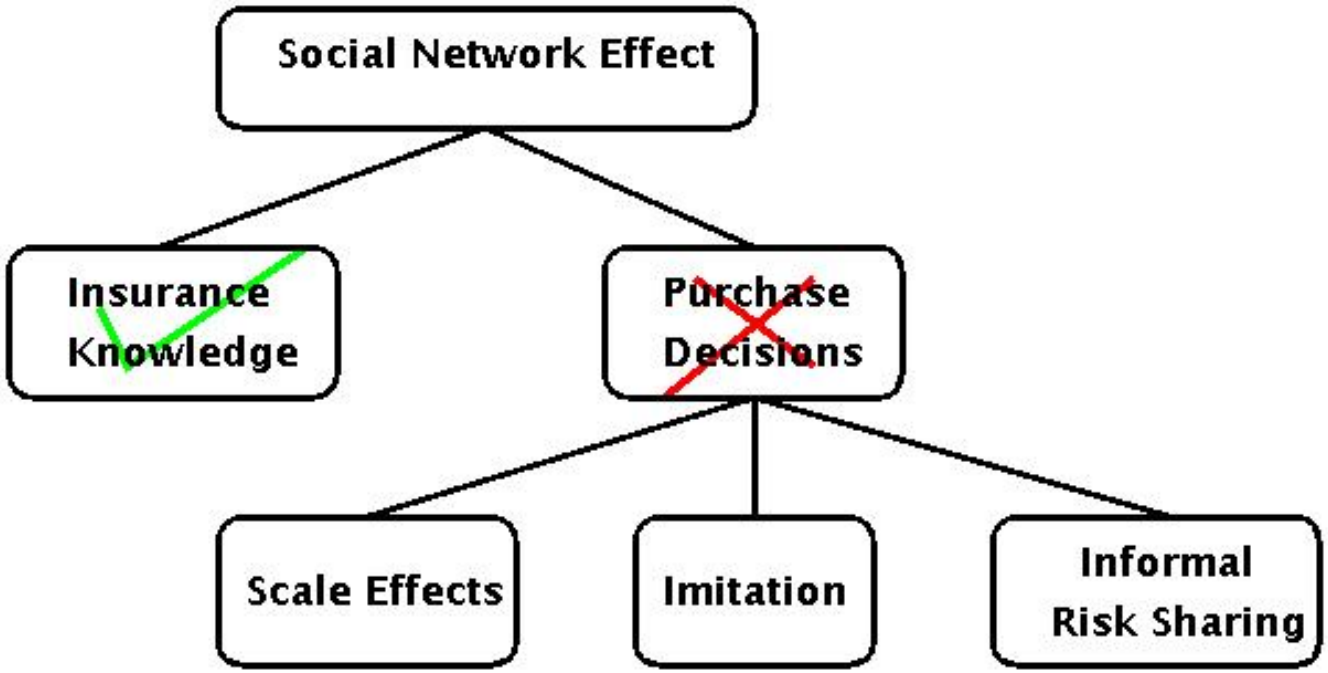
II.4 Mechanisms: Conclusion

- There is something special about social networks in rural communities:
  - They do not convey each other's purchase decisions, even though people do care about such information
  - They do effectively convey what other people know



II. Year One: Conclusion

- Social interactions have a large and significant effect on short-run demand for insurance

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- Social interactions have a large and significant effect on short-run demand for insurance
- The effect is mainly driven by social learning about insurance benefits, as opposed to scale effects, imitation, or informal risk-sharing

III. Year Two: Questions

- The development of insurance markets requires two conditions:
  1. Good initial participation rate
  2. Maintaining good take-up rates over time even with less subsidies

- I study the role of social networks in influencing insurance demand over time by following sample households one year after

III. Year Two: Experimental Design

- Followed a subsample (72 out of 185 villages, around 2000 households) of 1^{st} year households

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- Randomization: household level of subsidy
  8 different prices with subsidies ranging from 40% to 90%
- In each village, gather farmers with the same prices and hold meetings for different price groups simultaneously

III. Year Two: Experimental Design

- Followed a subsample (72 out of 185 villages, around 2000 households) of 1^{st} year households
- Randomization: household level of subsidy
  8 different prices with subsidies ranging from 40% to 90%
- In each village, gather farmers with the same prices and hold meetings for different price groups simultaneously
- During the meeting:
  Briefly repeat the contract
  Announce the payout list
  Request purchase decisions individually after meeting

III. Year Two: Estimation Strategies

- Social network effect over time:

$$\begin{aligned}\text{Takeup}_{ij2} =& \sigma_0 + \sigma_1 \text{Price}_{ij2} + \sigma_2 \text{NetworkTakeup}_{ij1} \\ &+ \sigma_3 \text{Price}_{ij2} \times \text{NetworkTakeup}_{ij1} + \sigma_4 \text{X}_{ij} + \eta_j + \epsilon_{ij} \quad (14)\end{aligned}$$

IV for social network take-up rate:

1. Default$\times$%Network in 1^{st} round sessions
2. %network in 1^{st} round intensive session

III. Year Two: Estimation Strategies

- Social network effect over time:

$$\begin{aligned}\text{Takeup}_{ij2} =& \sigma_0 + \sigma_1 \text{Price}_{ij2} + \sigma_2 \text{NetworkTakeup}_{ij1} \\ &+ \sigma_3 \text{Price}_{ij2} \times \text{NetworkTakeup}_{ij1} + \sigma_4 \text{X}_{ij} + \eta_j + \epsilon_{ij} \end{aligned} \quad (14)$$

  IV for social network take-up rate:

  1. Default$\times$%Network in 1^{st} round sessions
  2. %network in 1^{st} round intensive session

- Social learning of friend's experience:

$$\begin{aligned}\text{Takeup}_{ij2} =& \psi_0 + \psi_1 \text{Price}_{ij2} + \psi_2 \text{NetworkPayoutHigh}_{ij1} \\ &+ \psi_3 \text{Price}_{ij2} \times \text{NetworkPayoutHigh}_{ij1} + \psi_4 \text{X}_{ij} + \eta_j + \epsilon_{ij} \end{aligned} \quad (16)$$

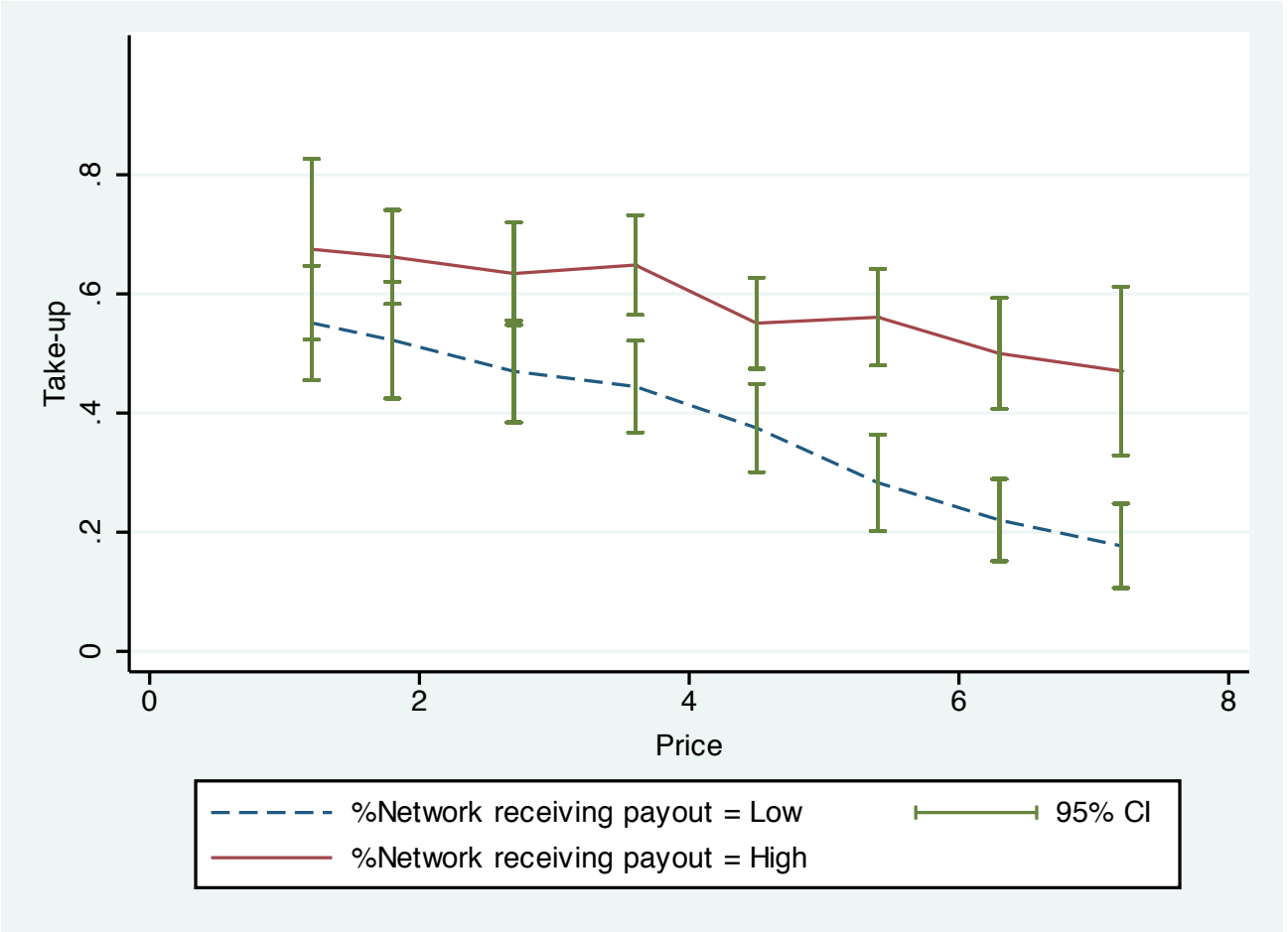
III. Year Two: Effect of Friends' Previous Year Decisions

- Households' take-up decisions over time are not influenced by their friends' behaviors in previous years

Table 10. Effect of Friends' Take-up Decisions in Year One on Second Year Insurance Demand Curve

VARIABLES	1st Stage: %Network Take-up (Year one)	2nd Stage: Insurance Take-up (Year two, 1 = Yes, 0 = No)	
	(1)	(2)	(3)
% Network in 1st Round Sessions * Default	0.148***		
(Year One)	(0.0346)		
%Network Receiving 1st Rround Financial Education	0.241***		
(Year One)	(0.0623)		
Price		-0.0539***	-0.00487
		(0.00765)	(0.0295)
%Network Take-up in Year One		0.125	0.636*
		(0.165)	(0.299)
Price * %Network Take-up in Year One			-0.135
			(0.0797)
Observations	1,783	1,741	1,741
Village Fixed Effects and Household Characteristics	Yes	Yes	Yes
R-Squared	0.142	0.130	0.120

III. Year Two: Learning from Friends' Experience I



III. Year Two: Learning from Friends' Experience II

- In the second year, observing an above-median share of friends receiving payouts improves insurance demand significantly
- The effect is equal to 54% of the impact of receiving payouts directly, and is equivalent to reducing the average insurance premium by 35%

Table 12. Effect of Observing Friends Receiving Payouts on Second Year Insurance Demand Curve

VARIABLES	Insurance Take-up (Year two, 1 = Yes, 0 = No)					
	All Sample		1st Year Take-up = Yes		1st Year Take-up = No	
	(1)	(2)	(3)	(4)	(5)	(6)
Price	-0.0499***	-0.0660***	-0.0512***	-0.0699***	-0.0464***	-0.0686***
	(0.00815)	(0.0106)	(0.0111)	(0.00999)	(0.0115)	(0.0179)
%NetworkPayout_High	0.217***	0.0816	0.0476	-0.109	0.224***	0.0407
(= 1 if % > median, and 0 otherwise)	(0.0266)	(0.0589)	(0.0317)	(0.0793)	(0.0400)	(0.0937)
Price * %NetworkPayout_High		0.0300**		0.0368*		0.0425**
		(0.0107)		(0.0177)		(0.0179)
Observations	1,642	1,603	671	654	971	949
Village FE and Household Characteristics	Yes	Yes	Yes	Yes	Yes	Yes
R-Squared	0.158	0.177	0.297	0.313	0.148	0.161

IV. Conclusion

- Social networks play important roles in improving insurance take-up

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- Potential policy interventions to improve take-up:

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- The main channel through which social networks affect insurance take-up is social learning about insurance benefits (learning from others) and learning from friends' experience (learning by witnessing)
- Potential policy interventions to improve take-up:
  - Combining subsidy policies with dissemination of peers' decisions

IV. Conclusion

- Social networks play important roles in improving insurance take-up
- The main channel through which social networks affect insurance take-up is social learning about insurance benefits (learning from others) and learning from friends' experience (learning by witnessing)
- Potential policy interventions to improve take-up:
  - Combining subsidy policies with dissemination of peers' decisions
  - Providing financial education to a subset of farmers and relying on social networks to multiply its effect on others
  - Disseminating information on payouts when they are made

Thank You!