

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

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- This paper studies the role of **social networks** in the diffusion of a new financial product: **weather insurance**
  - 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

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  - Use experimental designs to identify mechanisms of network effects
  - Estimate the monetary equivalence of social network effects
  - Test the influence of social networks in a previously unexplored field

## II. Insurance demand literature:

- Existing explanations for low insurance demand:
  - Cole et al. 2011: Liquidity constraint, Lack of trust
  - Tobacman et al 2011: Financial literacy
  - Bryan 2010: Ambiguity aversion
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- This paper:
  - Document that social networks have large effects on insurance demand
  - Provide policy implications on how to improve take-up

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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

- 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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  - 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

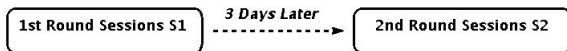
# I. Background: Experimental Sites

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



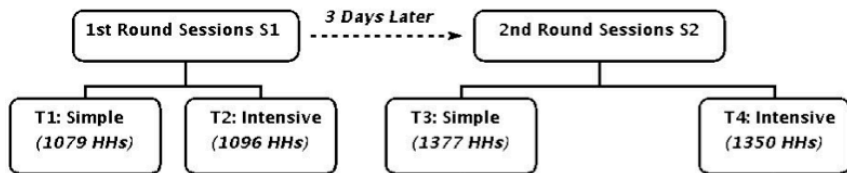
## II.1 Experimental Design: Within-village Randomization

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



## II.1 Experimental Design: Within-village Randomization

- *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

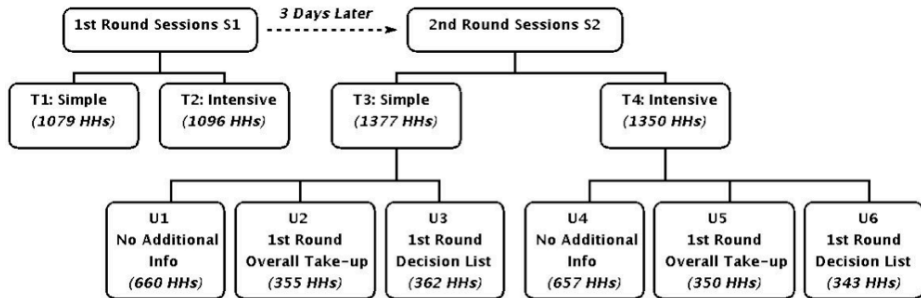


Definition of social network: the fraction of five friends (named in a social network census) who were invited to an early round intensive session



## II.1 Experimental Design: Within-village Randomization

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

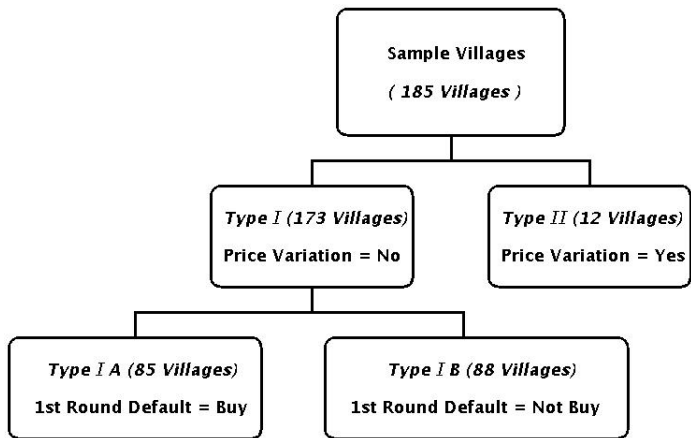


In all cases, households make decisions individually at the end of our visit

# A Sample Information Session



## II.1 Experimental Design: Village-level Randomization



## II.2 Estimation Strategy - Intensive Session Effect

- Effect of intensive session: Type I villages, 1st round sessions

$$\text{Takeup}_{ij} = \alpha_0 + \alpha_1 \text{Intensive}_{ij} + \alpha_2 \mathbf{X}_{ij} + \eta_j + \epsilon_{ij} \quad (2)$$

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$$\text{Takeup}_{ij} = \alpha_0 + \alpha_1 \text{Intensive}_{ij} + \alpha_2 X_{ij} + \eta_j + \epsilon_{ij} \quad (2)$$

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

**Table 1. Effect of Intensive Information Session on Insurance Take-up**

VARIABLES	Insurance Take-up (1 = Yes, 0 = No)	
	(1)	(2)
Intensive Information Session (1 = Yes, 0 = No)	0.149*** (0.0261)	0.140*** (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)

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

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

- Having one additional friend attending 1<sup>st</sup> round intensive session 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 2. Effect of Social Networks On Insurance Take-up**

VARIABLES	Insurance Take-up (1 = Yes, 0 = No)		
	(1)	(2)	(3)
Network Invited to 1st Round Intensive Session ([0, 1])	0.337*** (0.0810)		
Network Invited to 1st Round Intensive Session (Strong ties, mutually listed)		0.428** (0.182)	
Network Invited to 1st Round Intensive Session (Weak Ties, second order links)			0.0843 (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

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



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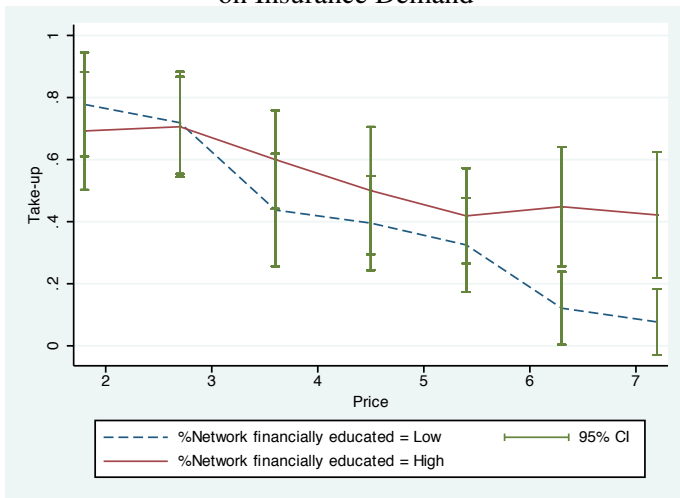
$$\text{Takeup}_{ij} = \gamma_0 + \gamma_1 \text{Price}_{ij} + \gamma_2 \text{Network}_{ij} + \gamma_3 \text{Price}_{ij} \times \text{Network}_{ij} \\ + \gamma_4 X_{ij} + \eta_j + \epsilon_{ij}$$

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

**Table 4. Monetary Value of the Social Network Effect on Insurance Take-up**

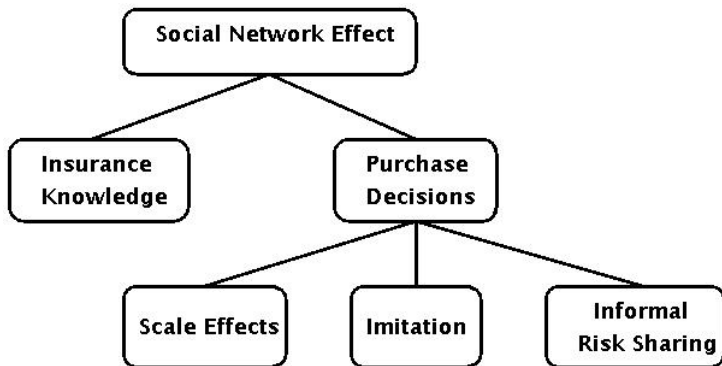
VARIABLES	Insurance Take-up (1 = Yes, 0 = No)	
	(1)	(2)
Price	-0.112*** (0.0162)	-0.151*** (0.0306)
Network Invited to 1st Round Intensive Session ([0, 1])	0.364*** (0.0979)	-0.241 (0.243)
Price * Network Invited to 1st Round Intensive Session		0.151** (0.0520)
Observations	429	429
Village Fixed Effects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

Figure 3. Effect of Having Friends Attending Intensive Information Session on Insurance Demand



## 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 intensive info session on both take-up and insurance knowledge between first and second round sessions

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

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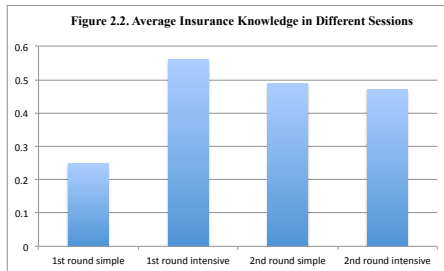
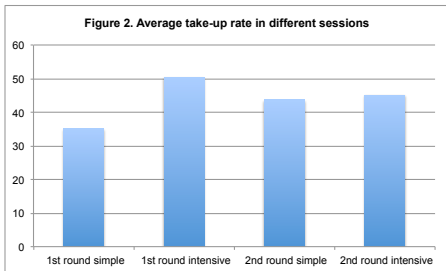
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- Strategy B: Test the effect of social networks on improving insurance knowledge

$$\text{Knowledge}_{ij} = \lambda_0 + \lambda_1 \text{Network}_{ij} + \lambda_2 \mathbf{X}_{ij} + \eta_j + \epsilon_{ij} \quad (10)$$

## II.4 Mechanisms: Diffusion of Insurance Knowledge I

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



## II.4 Mechanisms: Diffusion of Insurance Knowledge II

- Intensive session has a much smaller effect on take-up in the second round

**Table 5. Did Social Networks Convey Insurance Knowledge?**

VARIABLES	Strategy A			Strategy B		
	Insurance Take-up			Insurance Knowledge (0 - 1)		
	T1T2U1U 4	U1U4 no T2 friends	U1U4 with T2 friends			
Sample	(1)	(2)	(3)	(4)	(5)	
Intensive Information Session (1 = Yes, 0 = No)	0.141*** (0.0259)	0.0965** (0.0426)	-0.0291 (0.0437)	0.314*** (0.0120)		-0.00129 (0.0167)
Second Round (1 = Yes, 0 = No)	0.0834*** (0.0313)			0.245*** (0.0142)		
Intensive Information Session *Second Round	-0.115*** (0.0422)			-0.323*** (0.0200)		
Network Invited to 1st Round Intensive Session ([0, 1])					0.128 (0.103)	0.356*** (0.0475)
Network Invited to 1st Round Intensive Session *Average Network Insurance Knowledge					0.312** (0.122)	
No. of Observation	3,433	578	677	3,259	1,255	1,255
Village Fixed Effects and Household Characteristics	Yes	Yes	Yes	Yes	Yes	Yes
R-Squared	0.095	0.154	0.127	0.233	0.137	0.132

## II.4 Mechanisms: Diffusion of Insurance Knowledge II

- Intensive session has a much smaller effect on take-up in the second round
- In the second round, intensive session only influence farmers with no friend in the first round intensive session

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- Having one additional friend assigned to a 1<sup>st</sup> round intensive session improves one's own insurance knowledge by 7.2 percentage points

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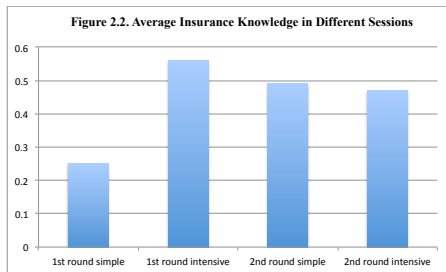
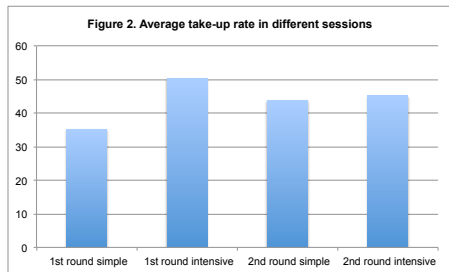
- Having one additional friend assigned to a 1<sup>st</sup> round intensive session improves one's own insurance knowledge by 7.2 percentage points
- Diffusion of insurance knowledge is more effective when friends learned insurance education materials better

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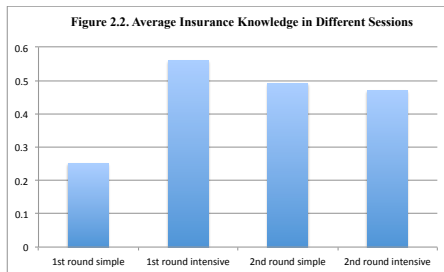
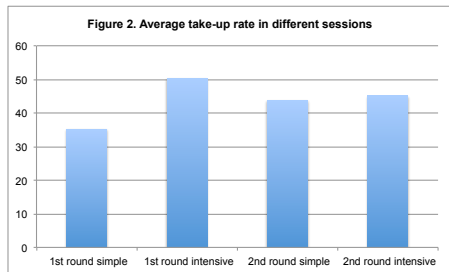
## II.4 Mechanisms: Diffusion of Insurance Knowledge I

- Second round intensive session has a lower take-up and level of insurance knowledge than first round intensive session:



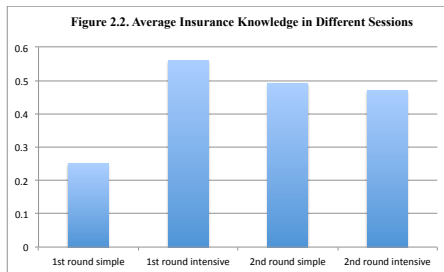
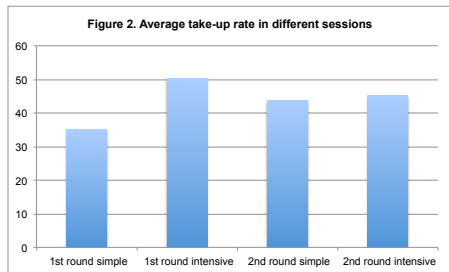
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- Second round intensive session has a lower take-up and level of insurance knowledge than first round intensive session:
  - Learning from friends is less effective than formal financial education, plus less attention in the second round



## II.4 Mechanisms: Diffusion of Insurance Knowledge I

- 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, plus less attention in the second round
  - The quality of the session may have changed as time evolved



**Do social networks diffuse peers' purchase decisions?**

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

- IV for 1<sup>st</sup> round take-up rate: Default options

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- IV for 1<sup>st</sup> round take-up rate: Default options
- IV for take-up rate of friends in social network:  
Default  $\times$  %Network in 1<sup>st</sup> 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 7. Effect of Peers' Decisions in 1st Round Sessions on 2nd Round Take-up (IV)**

VARIABLES	First Stage:		Insurance Take-up (1 = Yes, 0 = No)	
	1st round overall	Network 1st	No Information	Revealed 1st Round
	take-up%	round take-up%	Revealed	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 (Village level)			0.0225 (1.452)	0.691 (0.664)
1st Round Network's Take-up Rate			-0.0891 (1.456)	0.589** (0.28)
No. of Observation	2,137	1,643	983	660
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

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- Friends' decisions do not have a significant effect if this info is not explicitly revealed. But if it is revealed, its effect becomes significant
- Only 9% of the households knew at least one of their friends' decisions
  - Reason 1: It takes time for decisions to be diffused

**Table 7. Effect of Peers' Decisions in 1st Round Sessions on 2nd Round Take-up (IV)**

VARIABLES	First Stage:		Insurance Take-up (1 = Yes, 0 = No)	
	1st round overall	Network 1st	No Information	Revealed 1st Round
	take-up%	round take-up%	Revealed	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 (Village level)			0.0225 (1.452)	0.691 (0.664)
1st Round Network's Take-up Rate			-0.0891 (1.456)	0.589** (0.28)
No. of Observation	2,137	1,643	983	660
Village FE and Household Characteristics	No	Yes	Yes	Yes
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## II.4 Mechanisms: Diffusion of Peers' Decisions

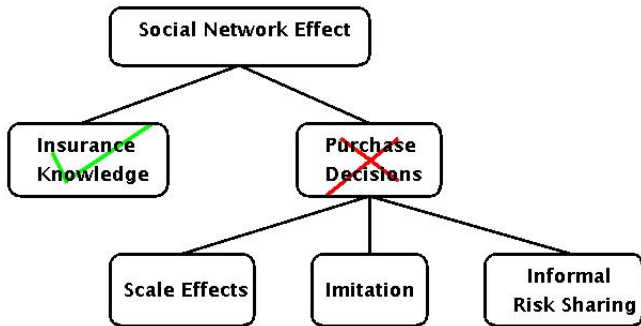
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- Only 9% of the households knew at least one of their friends' decisions
  - Reason 1: It takes time for decisions to be diffused
  - Reason 2: Disclosing purchase decisions carries the risk of "losing face" (Brown et al 2011; Qian et al 2007; Zhao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



# 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

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  1. Good initial participation rate
  2. Maintaining good take-up rates over time even with less subsidies
- We study the role of social networks in influencing insurance demand over time by following sample households one year after

### III. Year Two: Experimental Design

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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:

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

IV for social network take-up rate:

- 1 Default  $\times$  %Network in 1<sup>st</sup> round sessions
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- Social learning of friend's experience:

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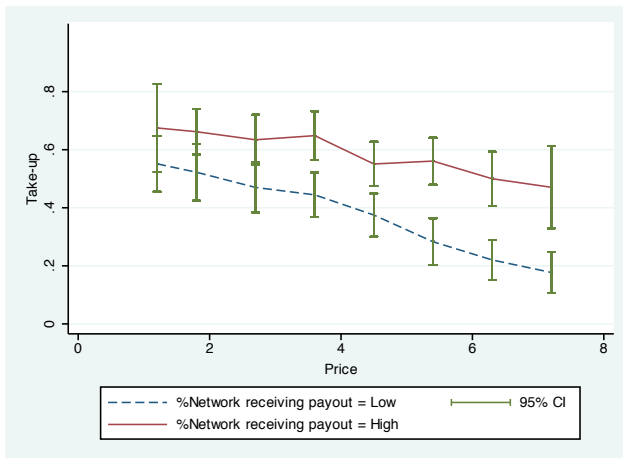
### III. Year Two: Effect of Friends' Previous Year Decisions

- 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:	2nd Stage:	
	%Network Take-up (Year one)	Insurance Take-up (Year two, 1 = Yes, 0 = No)	
	(1)	(2)	(3)
% Network in 1st Round Sessions * Default (Year One)	0.148*** (0.0346)		
%Network Receiving 1st Round Financial Education (Year One)	0.241*** (0.0623)		
Price		-0.0539*** (0.00765)	-0.00487 (0.0295)
%Network Take-up in Year One		0.125 (0.165)	0.636* (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*** (0.00815)	-0.0660*** (0.0106)	-0.0512*** (0.0111)	-0.0699*** (0.00999)	-0.0464*** (0.0115)	-0.0686*** (0.0179)
%NetworkPayout_High (= 1 if % > median, and 0 otherwise)	0.217*** (0.0266)	0.0816 (0.0589)	0.0476 (0.0317)	-0.109 (0.0793)	0.224*** (0.0400)	0.0407 (0.0937)
Price * %NetworkPayout_High		0.0300** (0.0107)		0.0368* (0.0177)		0.0425** (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

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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
  - 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!*