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***Effects of Peers on Agricultural Productivity in Rural Northern India***

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# Effects of Peers on Agricultural Productivity in Rural Northern India

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## Introduction

### Research Question

- Do peer effects through social networks affect agricultural productivity?
- If so, what is the actual learning mechanism?
  - Oster and Thornton (2012)
    - Wanting to do like friends
    - Changing behavior from friends' positive benefits
    - Learning how to use a new technology from friends

### Previous Finding

- Personal relationships positively affect economic outcomes (Foster and Rosenzweig 1995, Conley and Udry 2010).
- A few recent RCT studies have shown either no (Duflo et al. 2008) or negative (Kremer and Miguel 2007) peer effects.

### Contributions

- Analysis of possible learning mechanisms through which peer effects take place
- Use of detailed social network information to estimate peer effects
- Instrumentation of endogenous peer effects using spatial 2SLS estimation

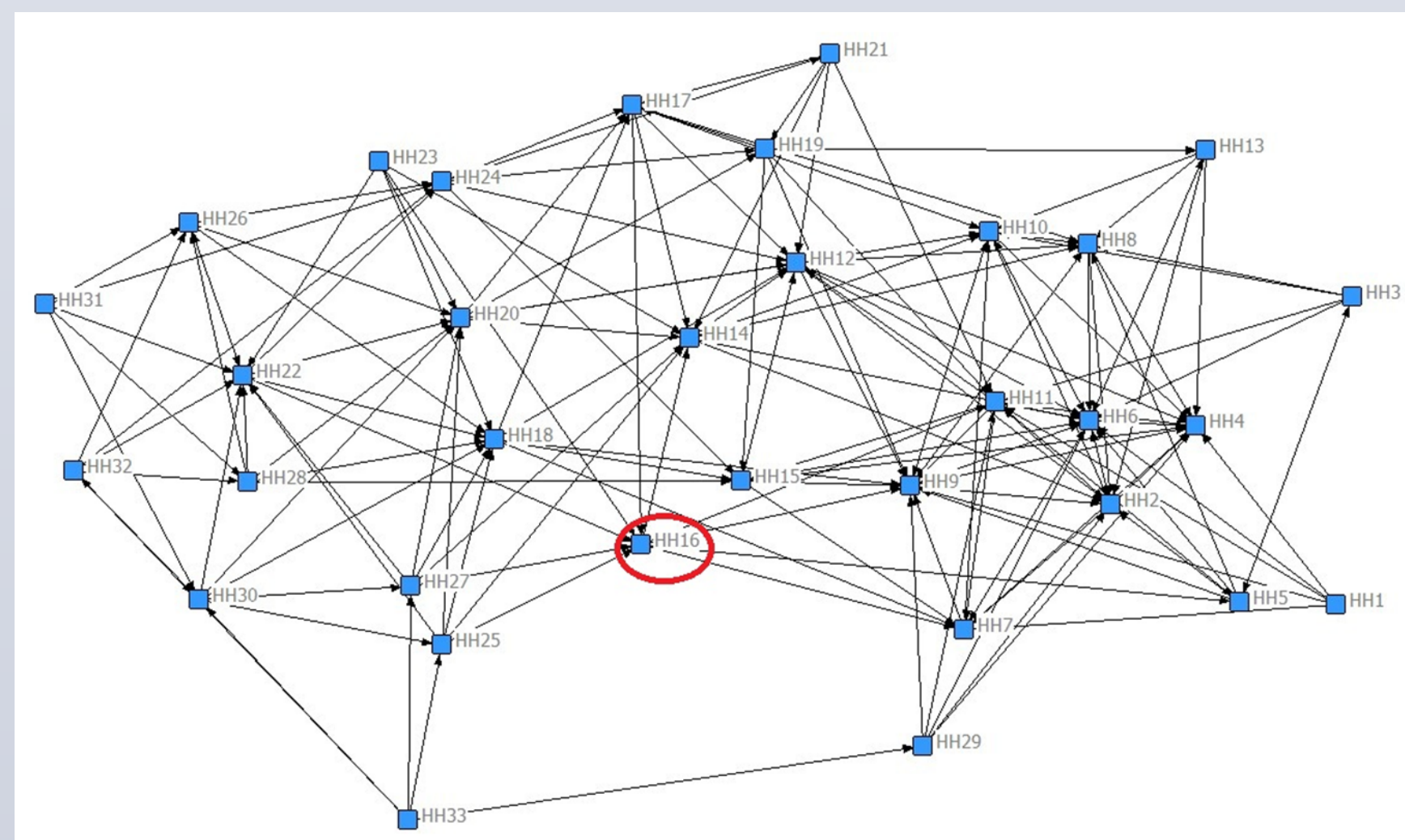
## Identification of Peer Effects

### Linear-in-means model

- Lee(2007), Bramoullé et al. (2009)

$$y_i = \alpha + \beta \frac{\sum_{j \in P_i} y_j}{n_i} + \gamma x_i + \delta \frac{\sum_{j \in P_i} x_j}{n_i} + \varepsilon_i$$

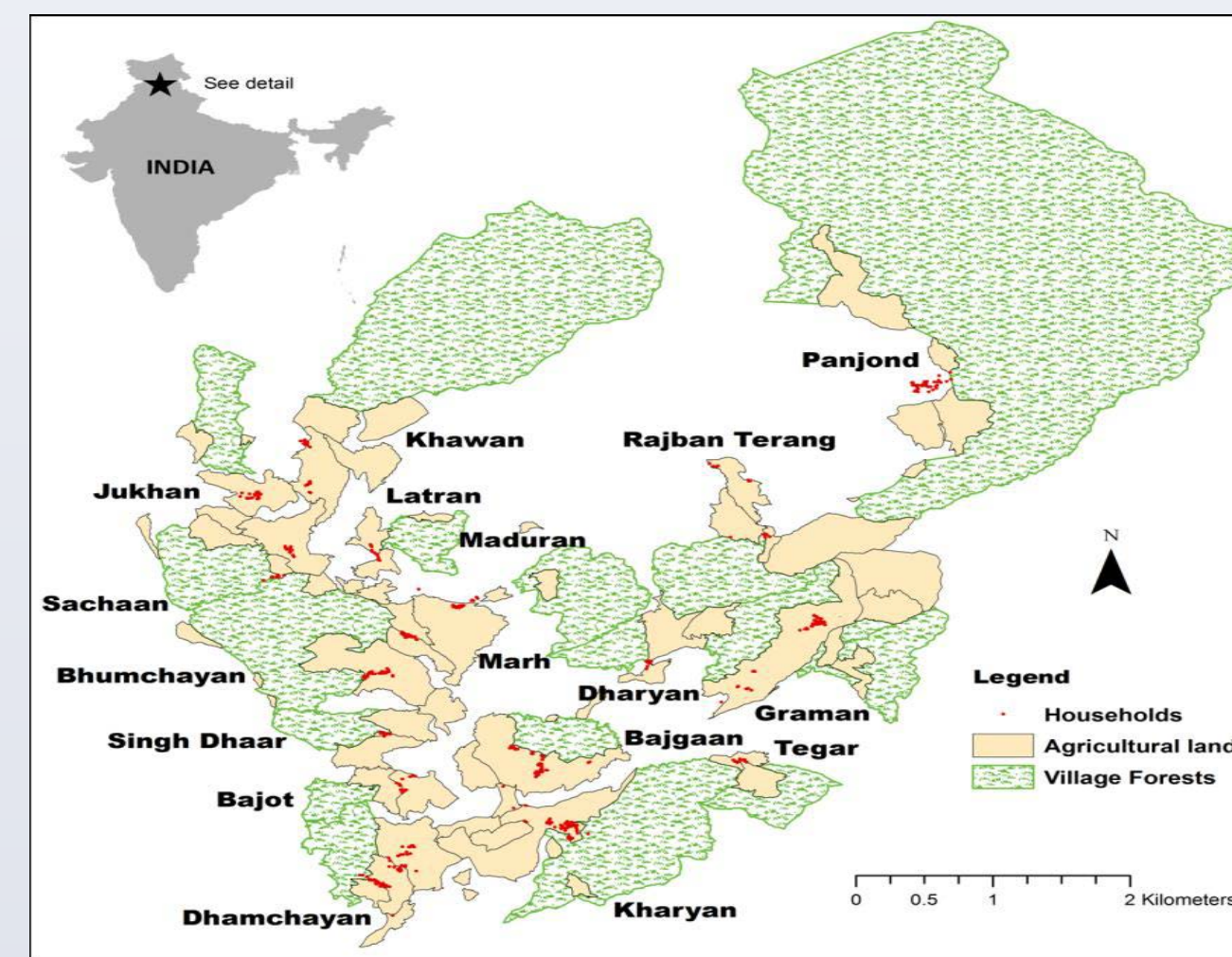
- $\beta$  - Endogenous peer effect estimate
  - Social interaction
  - Use exogenous characteristics of friends of friends (not in peer groups) as instrument for endogenous peer outcomes (Lee 2007)
- $\delta$  - Exogenous peer effect estimate
  - Friends' observed attributes



## Data

Household survey (2008) from Thaltukhod Valley, Himachal Pradesh, India

- 522 households total, 509 used
- Individual household characteristics
- GIS-derived geographical indicators
- Cropping pattern
- Complete stated social networks (up to 5 farm peers)
  - 3 general peers
  - 2 agricultural peers



## 2SLS Results

Effects	Variable	Spatial OLS	Spatial 2SLS
Own char.	Cash Crop Land	0.548* (0.286)	0.824*** (0.339)
	Livestock	0.091* (0.045)	0.083** (0.339)
	Total Land	0.060*** (0.006)	0.060** (0.007)
	Caste	0.029 (0.177)	0.029 (0.211)
	Labor force (15-60)	0.013 (0.012)	0.012 (0.012)
Exogenous social char.	Cash Crop Land	0.456 (0.296)	-0.393 (0.453)
	Livestock	0.119*** (0.040)	-0.393 (0.453)
	Total Land	0.001 (0.006)	-0.036*** (0.017)
	Caste	0.666*** (0.189)	0.337 (0.278)
	Labor force (15-60)	-0.019 (0.020)	-0.021 (0.023)
Endogenous social char.	Endogenous effect	-0.104 (0.089)	0.594** (0.286)
Village Fixed Effect	Dummy	Yes	Yes
Weak IV	Wal F-statistic	-	10.529
Obs.		509	509

## Discussions

### Results

- Individual household characteristics matter
- Exogenous peer characteristics matter
- Endogenous peer effects - IV
- Without IV - OLS underestimates peer effects
  - Due to limited/finite resources

### Robustness

- Test of confounding factors
  - Selection, geography, off-farm income, extension
- Farmers' common characteristics
- Top-coding
- Further instrumentation -  $G^3x$
- Network scramble
  - Modern input
  - New crop

## So what...?

### Causal Inferences

- More rigorous data collection
- Dynamics of network

### Policy Implications

- Randomly assigned farmers to networks
- Introduction of a new crop/technology
- Exogenous change in market information

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