The Economic Effects of Social Networks: Evidence from the Housing Market

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Empirical Household Finance PhD Class

Motivation

- Growing sense that social dynamics might affect house prices:
  - Shiller (2008): *"People were excessively optimistic about housing investments; this optimism was part of a social epidemic."*
  - Little systematic empirical evidence for underlying mechanism.

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- **This Paper:** Provides empirical evidence for following story:

  1. Individuals discuss property investments with friends, and adjust their expectations based on house price experiences within social network.

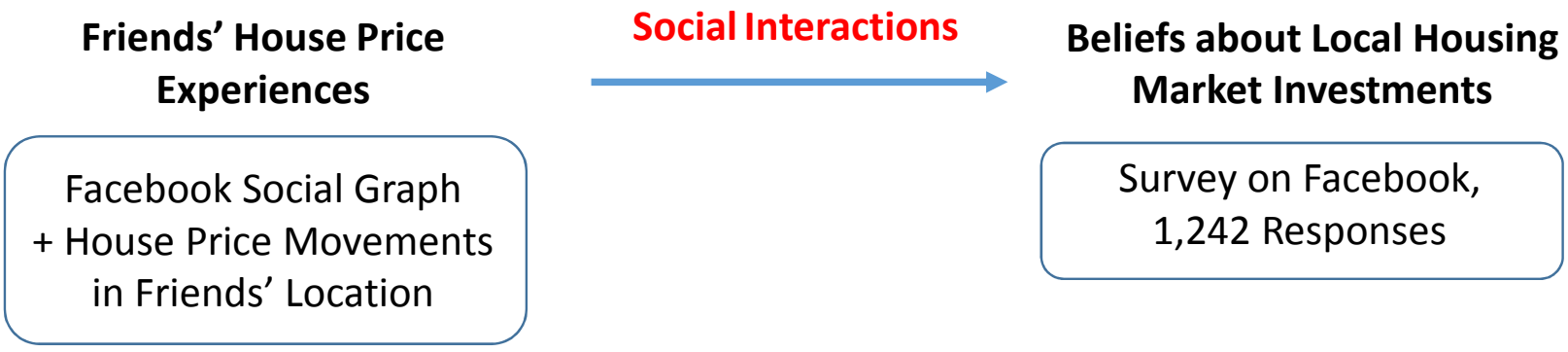
  2. By influencing expectations, social interactions have a large effect on individual-level housing investment decisions:
     - Extensive margin
     - Intensive margin
     - Willingness to pay

Social Network Data from Facebook

- Facebook largest global and U.S. online social network
  - $\sim$ 60% of U.S. adults regularly use Facebook.
- Observe anonymized snapshot of *social graph* of friendship links.
  - Average user in sample: 420 friendship links
  - $>$90% have met more than once in real life.
- Demographics, including county-level location.

Empirical Strategy and Data

Empirical Strategy and Data



Friends' House Price Experiences

$$FriendHPExp_{i,t,t-24m} = \sum_{c} ShareFriends_{i,c} \times \Delta HP_{c,t,t-24m}$$

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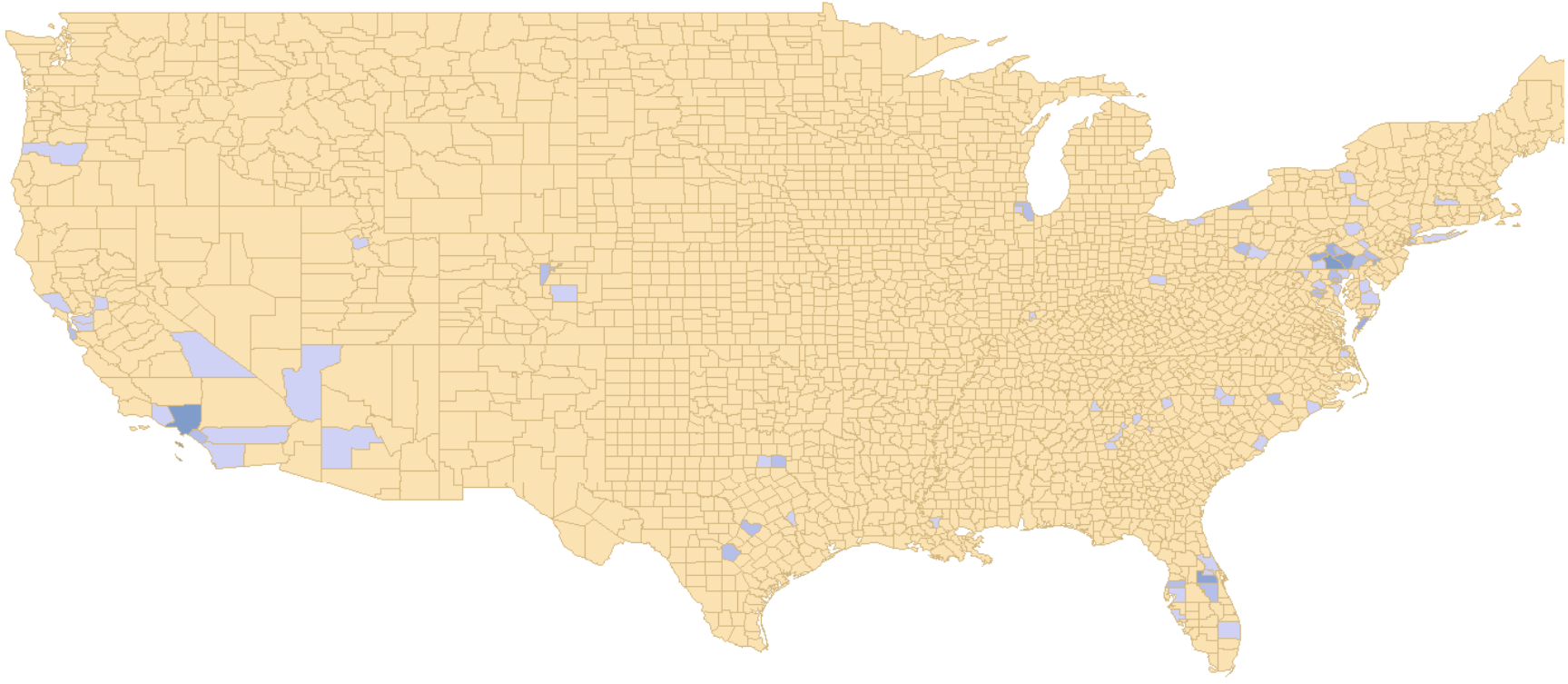
- Example: LA resident I



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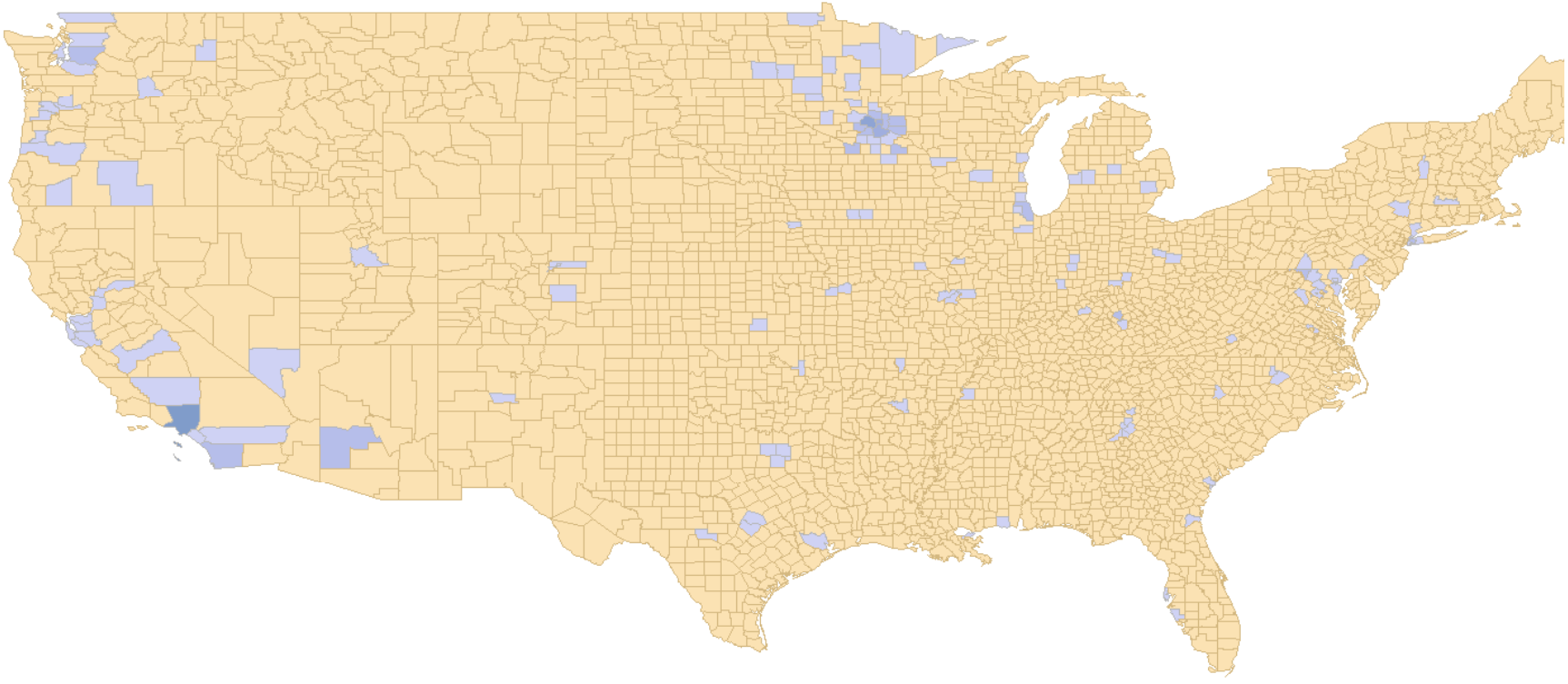
- Example: LA resident II



Friends' House Price Experiences

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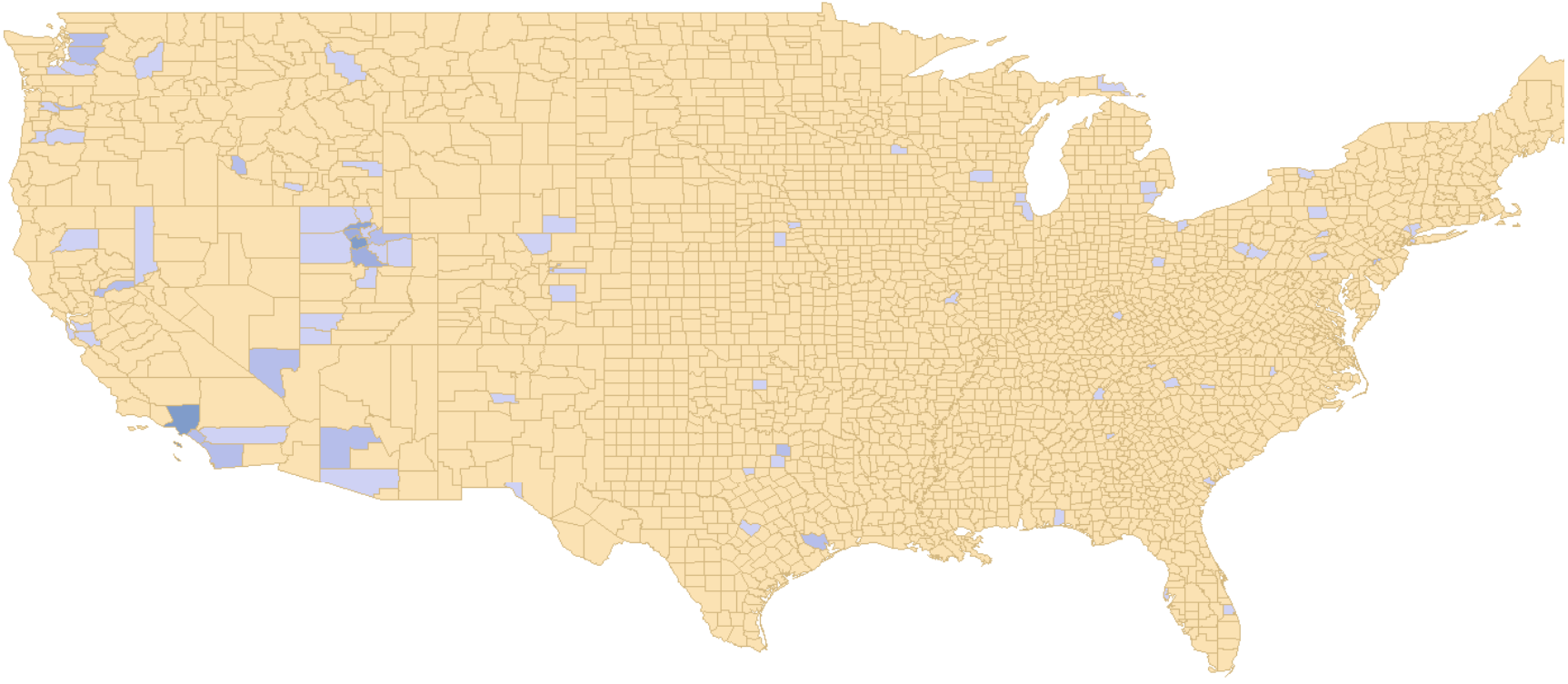
- Example: LA resident III



Friends' House Price Experiences

$$FriendHPExp_{i,t,t-24m} = \sum_{c} ShareFriends_{i,c} \times \Delta HP_{c,t,t-24m}$$

- Average user in Los Angeles has:
  - 420 total friends
  - 30% of U.S.-based friends living outside of California
  - 25% of friends living more than 500 miles away
  - Friends in 55 unique counties

Friends' House Price Experiences

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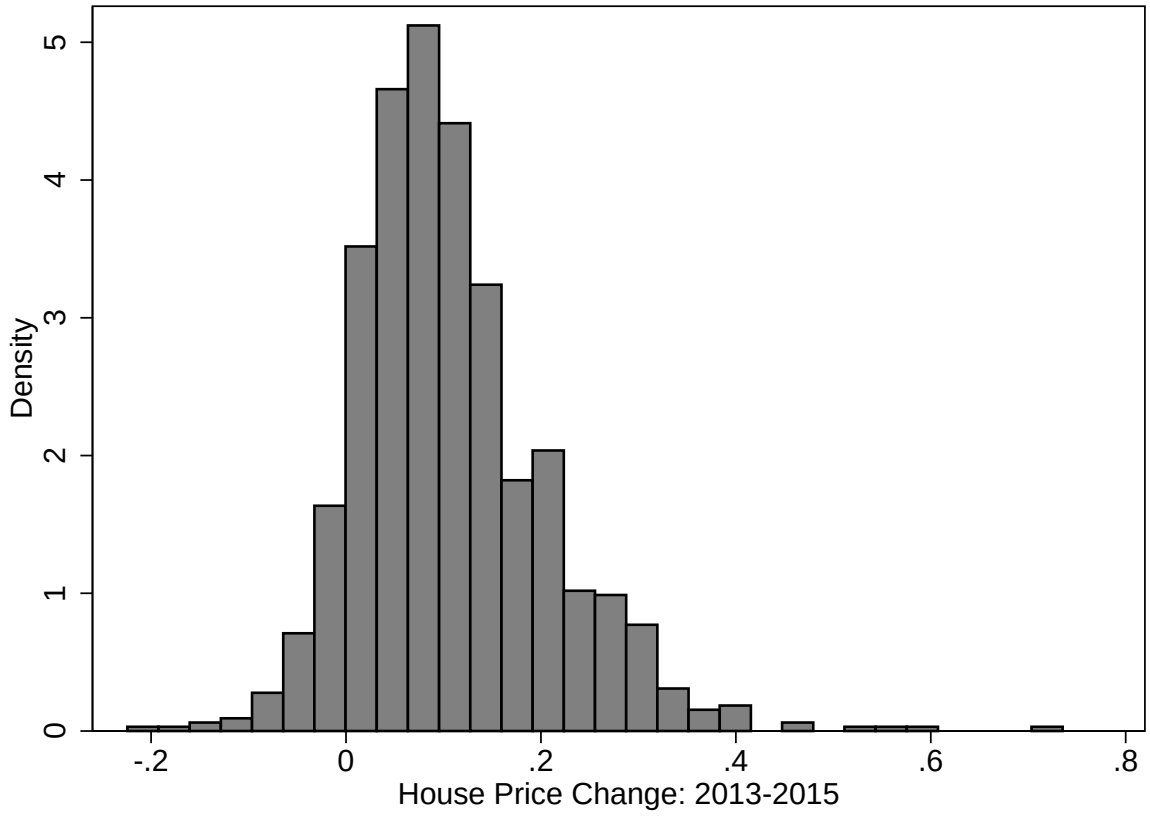

Interpretation of Friend Experiences

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- **Concern:** Own experiences and friend experiences might be correlated
  - Many local friends $\rightarrow$ might just extrapolate from own experience.
  - **Solution**: Instrument for $FriendHPExp_{i,t_1,t_2}$ with experiences of geographically-distant friends.

Friend Experiences and Housing Market Expectations

Geographically-Distant Friends' House Price Experiences

Facebook Social Graph
+ House Price Movements in Friends' Location

Social Interactions

Beliefs about Local Housing Market Investments

Survey on Facebook,
1,242 Responses

Housing Survey

- November 2015: Target FB users through newsfeed; 1,242 responses
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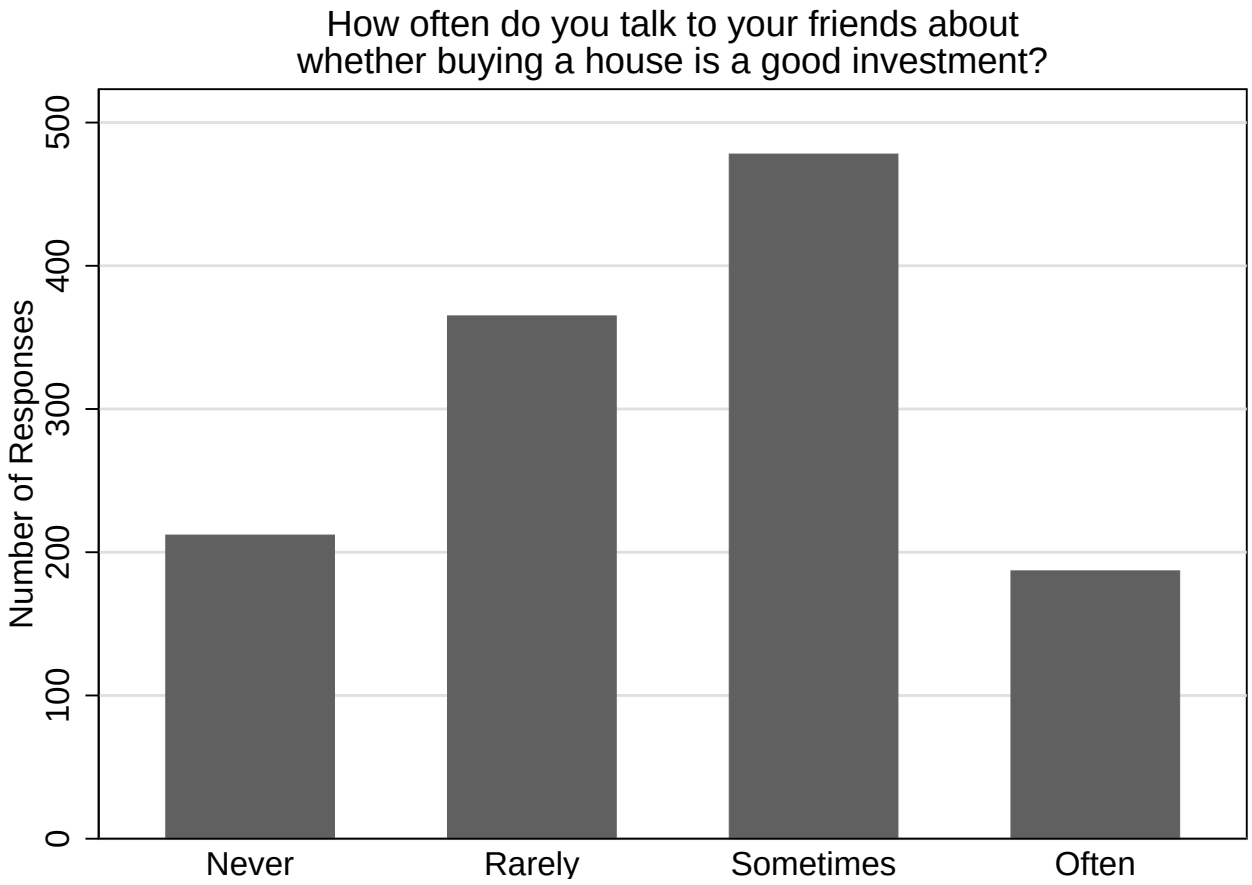

- Housing investment regularly topic of discussion within social network.

Housing Survey

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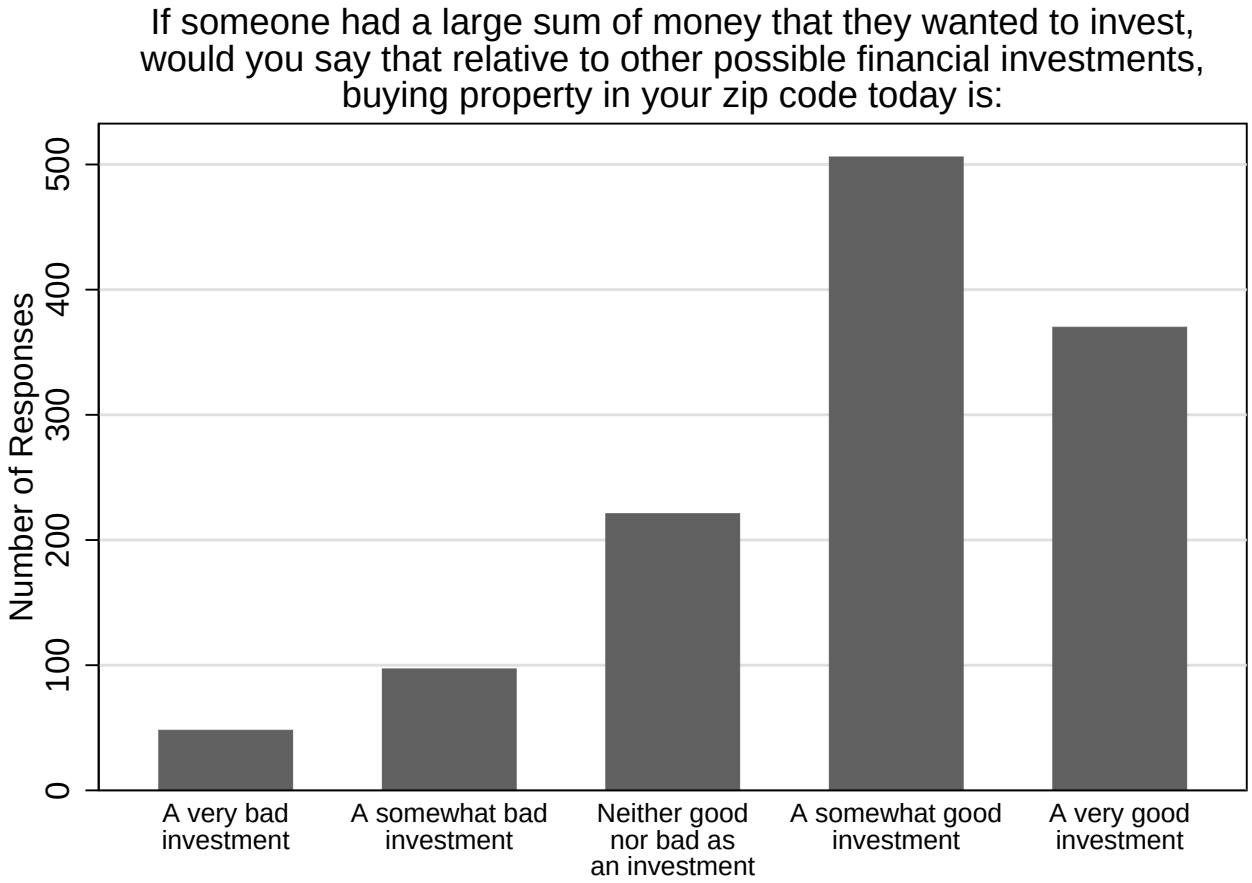
- Focus on a few LA zip codes; Fairly representative demographics



- Substantial dispersion in beliefs within the same housing market.

Housing Survey

$$SurveyExpectations_{i,t} = \alpha + \beta FriendHPExp_{i,t,t-24m} + \gamma \mathbf{X}_{i,t} + \epsilon_{i,t}$$

Housing Survey

$$SurveyExpectations_{i,t} = \alpha + \beta FriendHPExp_{i,t,t-24m} + \gamma \mathbf{X}_{i,t} + \epsilon_{i,t}$$

	(1)	(2)	(3)
	IV	IV	IV
All Friend Appreciation 2013-15 (%)	0.040**	0.036*	
	(0.017)	(0.019)	
Friend Appreciation 2013-15 (%) x			
Talk with Friend about Housing Investment			
Never			-0.050
			(0.038)
Rarely			0.001
			(0.028)
Sometimes			0.086***
			(0.027)
Often			0.096**
			(0.049)
Demographic Controls	Y	Y	Y
Zip Code Fixed Effects	Y	Y	Y
Sample		LA in 2012	
N	1,242	1,110	1,242

- Larger effect of friends' experiences when talking more about housing.

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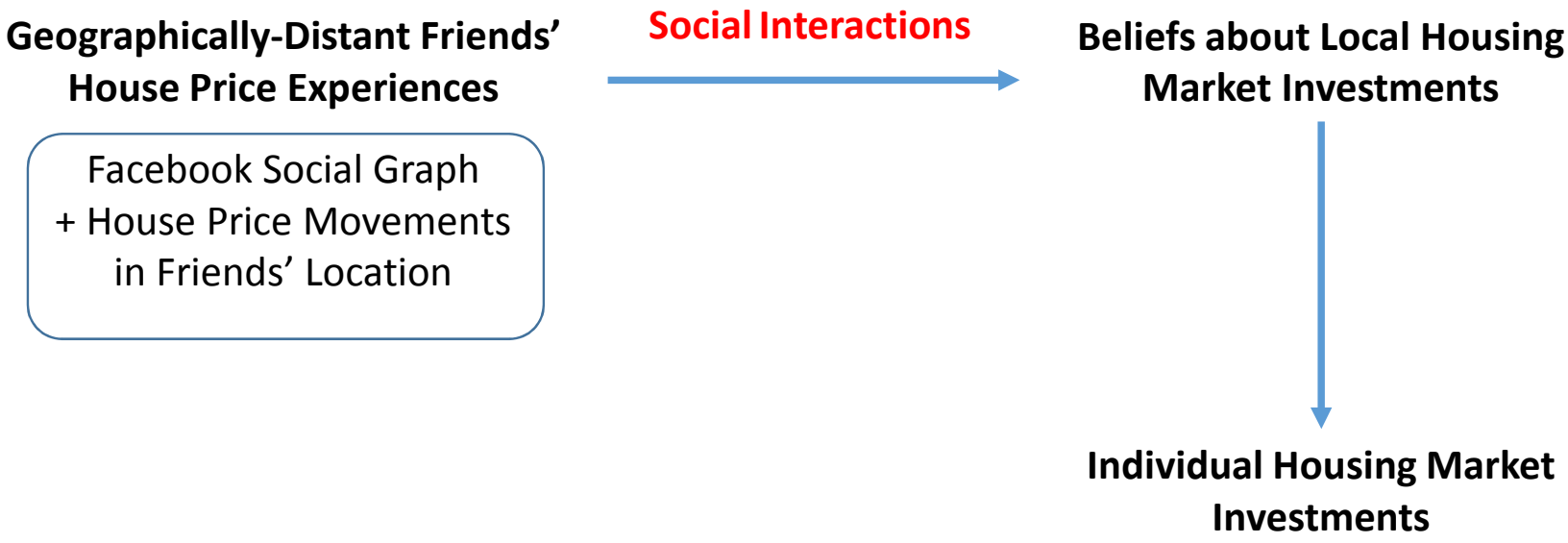

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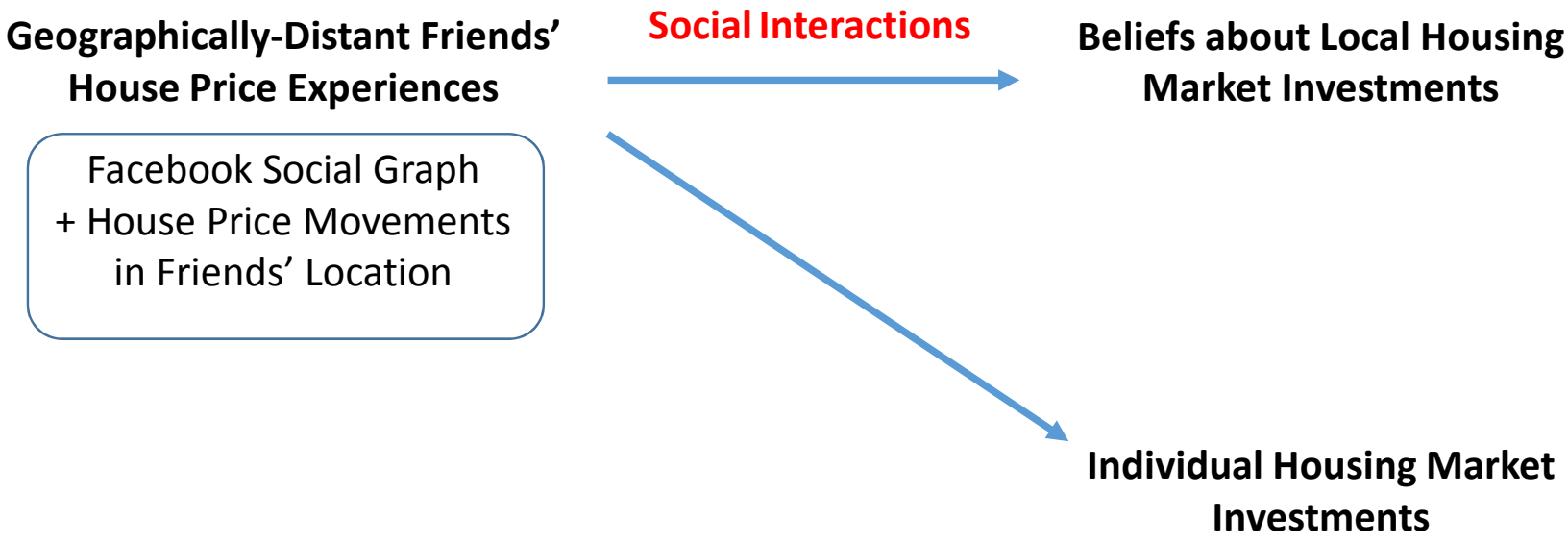

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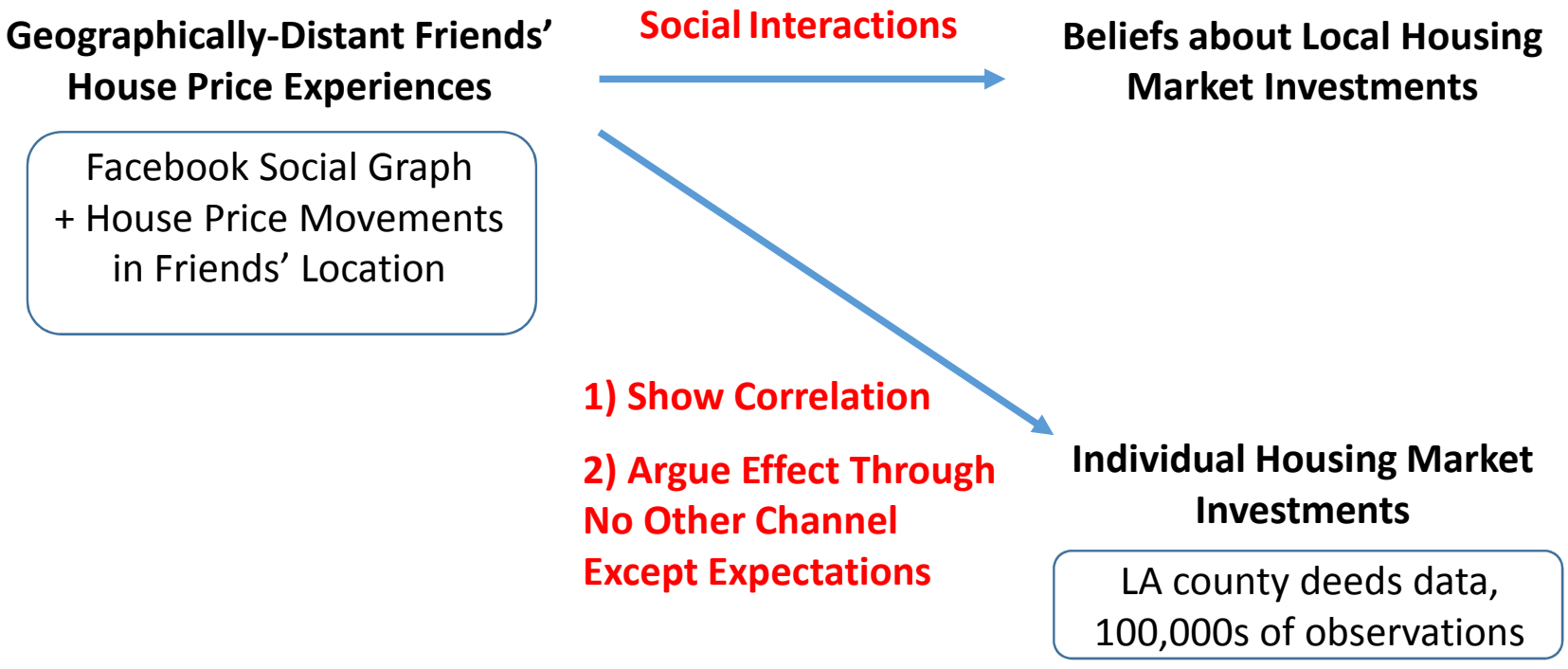

Measures of investment: Extensive Margin

$$Own_{i,2012} = \alpha + \beta FriendHPExp_{i,2008-10} + \gamma \mathbf{X}_{i,2010} + \psi_{zip_{2010},zip_{2012}} + \epsilon_i$$

- Panel of two population snapshots (renters and owners) from Acxiom: 2010 and 2012
- Focus on Los Angeles county
- Controls: Level & change in family size, income, marriage, occupation
- $\psi_{zip_{2010},zip_{2012}}$: Control for changes in geographic preferences

Measures of investment: Extensive Margin

	Dependent Variable: P(Owner in 2012) in %			
	IV: 2010 Renters		IV: 2010 Owners	
	(1)	(2)	(3)	(4)
Friend Appreciation 2008-10 (%)	0.608***	0.672***	0.201***	0.221***
	(0.042)	(0.043)	(0.015)	(0.016)
Friend Appreciation 2010-12 (%)		0.324***		0.095***
		(0.044)		(0.016)
Controls	Y	Y	Y	Y
N	433,836	433,836	1,035,523	1,035,523
R-Squared	0.434	0.463	0.564	0.564
Mean Dependent Variable	17.8	17.8	93.5	93.5

- Renters: $\uparrow$ 5 ppt $FriendHPExp_{i,2008-10} \rightarrow \uparrow$ 3.0 ppt $P(Owner_{i,2012})$
- More than 50% of the effect size of adding family member.

Measures of investment: Intensive Margin + Price Paid

- Match friend experience data to buyers in ca. 520,000 transactions since 1994:

1. Intensive Margin:

$$log(PropSize_{i,t}) = \alpha + \beta FriendHPExp_{i,t,t-24m} + \gamma \mathbf{X}_i + \psi_t + \epsilon_{i,t}$$

   - Control for transaction quarter and buyer characteristics.

Measures of investment: Intensive Margin + Price Paid

	IV: log(Prop Size)
	(1)
Buyer Friend Appreciation	0.310***
Last 24 Months (%)	(0.053)
Seller Friend Appreciation	
Last 24 Months (%)	
Controls	Y
Other Fixed Effects	
N	526,594
R-Squared	0.194

- $\uparrow$ 5 ppt $FriendHPExp_{i,t,t-24m} \rightarrow \uparrow$ 1.6% SQFT

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   - Control for transaction quarter and buyer characteristics.

2. Transaction Price:

$$log(Price_{i,t}) = \alpha + \beta FriendHPExp_{i,t,t-24m} + \gamma \mathbf{X}_i + \phi_{zip} + \psi_t + \epsilon_{i,t}$$

   - Control for property and buyer characteristics, transaction quarter, and zip code

Measures of investment: Intensive Margin + Price Paid

	IV: log(Prop Size)	IV: log(Price)			
	(1)	(2)	(3)	(4)	(5)
Buyer Friend Appreciation	0.310***	0.452***	0.486***	0.408***	0.445***
Last 24 Months (%)	(0.053)	(0.015)	(0.050)	(0.076)	(0.015)
Seller Friend Appreciation					0.233***
Last 24 Months (%)					(0.059)
Controls	Y	Y	Y	Y	Y
Other Fixed Effects			Property FE	Buyer FE	
N	526,594	523,299	34,732	32,226	523,299
R-Squared	0.194	0.808	0.950	0.948	0.809

- $\uparrow$ 5 ppt $FriendHPExp_{i,t,t-24m} \rightarrow \uparrow$ 2.26% transaction price

Empirical Approach & Identification

$$HousingInvestment_{i,t} = \alpha + \beta FriendHPExp_{i,t,t-24m} + \gamma \mathbf{X}_{i,t} + \psi_{t_2} + \epsilon_{i,t}$$

- Want to argue that β due to effect of "social interactions" on beliefs.

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- Want to argue that β due to effect of "social interactions" on beliefs.
- Challenges:
  1. Geographic distribution of social network not random
     - $FriendHPExp_{i,t_1,t_2}$ essentially uncorrelated with $\mathbf{X}_{i,t_2}$.
     - Within-individual variation in $FriendHPExp_{i,t_1,t_2}$.

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- Challenges:
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  2. Common shocks to individual and her friends
     - $FriendHPExp_{i,t_1,t_2}$ does not depend on behavior of friends.
     - Robust to only looking at non-geographically clustered professions (teachers, doctors, etc.)
     - Directly control for economic conditions in social network.

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- Challenges:
  1. Geographic distribution of social network not random
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  3. Consumption externalities - "Keeping up with the Joneses"
     - Directly control for housing turnover in geography social network.
     - Robust to only looking at experience of friends that are renters.

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  4. Bequest and wealth effects

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  4. Bequest and wealth effects
     - Restrict to people with LA hometown or out-of-US hometown.
     - Restrict to non-family friends (e.g., college, work colleagues)
     - Cannot explain many results (e.g., sellers' friends' experience and price).

Rational Behavior?

- For the message of the paper it doesn't matter. We show that:
  - Social interactions affect housing market expectations.
  - Through affecting expectations, social interactions affect investments.

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- For the message of the paper it doesn't matter. We show that:
  - Social interactions affect housing market expectations.
  - Through affecting expectations, social interactions affect investments.
- Hard to rule out fully rational expectations, but four thoughts:
  1. Effect is (weakly) declining in education levels.
  2. Effect is independent of the true informativeness of network house price experience for future LA house prices.
  3. Effect is independent of how many counties the friend experience is based on.
  4. House prices across the country available for free and in real time.

Story I hope to have convinced you of

1. Individuals discuss property investments with friends, and adjust their expectations based on house price experiences within social network.

2. By influencing expectations, social interactions have a large effect on individual-level housing investment decisions:
   - Extensive & intensive margin
   - Willingness to pay

$\rightarrow$ Empirical support for models of expectation heterogeneity

$\rightarrow$ New methodology to analyze role of expectations in housing markets

Contribution

- How do individuals form expectations in financial markets?
  - Existing evidence that individuals extrapolate from own past experience:
    Vissing-Jorgensen, 2003; Kaustia & Knuepfer, 2008; Greenwood & Shleifer, 2014; Malmendier & Nagel, 2015; Kuchler & Zafar, 2015
  - **Our Contribution**: Individuals' expectations are also affected by the recent experiences in their social networks.
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- View that social dynamics might influence financial decisions not new:
  - **Theory:** Shiller, 1984, 2015; Akerlof & Shiller, 2013; Angeletos & La'O, 2013; Burnside, Eichenbaum & Rebelo, 2015

    Empirics: Hong, Kubik & Stein, 2004; Hirshleifer & Teoh, 2009; Heimer & Simon, 2012; Beshears, Choi, Laibson, Madrian & Milkman, 2015
  - **Our Contribution**: Empirical evidence for the quantitative importance of social dynamics in housing markets.

Contribution

- **New methodology** to analyze role of expectations in housing markets
  - Use house price experiences in individuals' social networks as plausibly exogenous shifters of their expectations
  - Can be calculated at arbitrary frequency, only need geographic distribution of friendship networks.

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- **Empirical support for models** in which expectation heterogeneity influences asset valuation and motivates individuals to trade.
  - **General Theories:** Miller, 1977; Harrison & Kreps, 1978; Varian, 1989; Hong & Stein, 1999, 2007; Scheinkman & Xiong, 2003; Geanakoplos, 2009; Simsek, 2013a,b; Brunnermeier, Simsek & Xiong, 2014; Barberis, Greenwood, Jin & Shleifer, 2015
  - **Applied to Housing Markets:** Piazzesi & Schneider, 2009; Akerlof & Shiller, 2013; Nathanson & Zwick, 2014; Burnside, Eichenbaum & Rebelo, 2015; Glaeser & Nathanson, 2015; Shiller, 2015