

# Did Social Interactions Fuel or Suppress the US Housing Bubble?

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# Social Influence in Finance



AP / Peter Morgan, 1987

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- Social interactions can lead to imperfect information aggregation (Cao, Han, and Hirshleifer, 2011), increased firm volatility (Massa and Simonov 2005), and overinvestment in costly active portfolio management (Han, Hirshleifer, and Walden, 2017).
- Social influence can lead to bubbles (Levine, 2014; DeMarzo, Kaniel, and Kremer, 2008). "Contagion" bubbles mechanism (e.g., Shiller, 2015; Pearson, Yang, and Zhang, 2017) posits that new investors are drawn into ascending markets - fueling demand and prices.



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- Ambuehl, et al. (2017) conclude that communication can improve decision making in an experimental setting.
- Beneficial information can flow through social networks between investors (Shive, 2010) and institutions (Hong and Xu, 2017; Cohen, Frazzini, and Malloy, 2008; Engelberg, Gao, and Parsons 2012; Cohen, Frazzini, and Malloy 2010).

## Our Analysis

We examine the effect of social interactions on pricing in financial markets.

- We develop a model of the housing market and find that social interactions can spread financial sophistication (mania) and suppress (fuel) bubbles when sophisticated (sentiment-based) investors exert high social influence.
- We conduct empirical analysis across US regions during the 2000s housing bubble. Consistent with our model, we find that social interactions spread financial sophistication and suppress bubbles, particularly when sophisticated real estate professionals exert high social influence.

## Agents and Beliefs

There are three types of investors:

Type	Expected Home Values ( $D_H > D_L$ )	Measure (Time $t$ )	Entropy of Beliefs
Optimistic	$D_H$	$o_t$	$e^o$
Sophisticated	$D_H$ or $D_L$	$s_t$	$e^s$
Vulnerable	$D_L$	$v_t$	$e^v > \max\{e^o, e^s\}$

- *Optimistic* and *vulnerable* investors have optimistic and pessimistic sentiment-based beliefs, respectively. *Sophisticated* investors have rational beliefs based on fundamentals.
- Vulnerable investors have lower certainty (i.e., higher entropy) in their beliefs than both optimists and sophisticates.

## Social Influence

Agents can interact with one another and influence each other's view of home values:

- Sociability ( $\alpha$ ) is the probability that one agent randomly interacts with another.
- Investors with higher certainty (lower entropy) in their beliefs can influence those with lower certainty (higher entropy), but not vice versa.
- The probability that agent  $i$  adopts the beliefs of agent  $j$  is  $\gamma^{ji} = \max\{1 - e^j/e^i, 0\}$ .

Type 1	Direction of Influence	Type 2
optimists	$\implies$	vulnerable ( $e^v > e^o$ )
sophisticates	$\implies$	vulnerable ( $e^v > e^s$ )
sophisticates	??	optimists ( $e^o ?? e^s$ )



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$$o_2 = o_1 + \alpha(\gamma^{ov} o_1 v_1 + \gamma^{os} o_1 s_1)$$

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- **Case Two:** sophisticates have most influence, i.e.,  $e^s < e^o$

$$o_2 = o_1 + \alpha(\gamma^{ov} o_1 v_1 - \gamma^{so} o_1 s_1)$$

Sociability ( $\alpha$ ) *decreases* optimists and likelihood of bubble iff  $\gamma^{ov} v_1 < \gamma^{so} s_1$ , i.e., sophisticates are sufficiently dominant.

The likelihood of a bubble decreases with the interaction between sociability ( $\alpha$ ) and sophistication ( $s_1$ ).

## Social and Demographic Data

County-level social and demographic data:

- Sociability measured using “civic engagement” of county residents (Rupasingha et al., 2006), i.e., per capita aggregate number of:
  - religious, political, professional and labor organizations
  - civic, business, and social associations
  - sports and fitness facilities
- Basic demographic data from 2000 Census

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- We focus on an ex-post measure of bubbles: average home-price decline in the county from 2007 till 2010.
- The five counties with the largest real estate bubbles were:
  - Merced County, CA, Stanislaus County, CA
  - Nye County, NV, Clark County, NV
  - St. Lucie, FL.

## Sample Characteristics

- On average, house prices declined by 7.6% from 2007-2010.
- However, there is a significant variation across counties - some experienced a modest increase, while a large group dropped  $\approx 50\%$ .

	Mean	Standard Deviation	P1	Median	P99
Sociability	0.000	1.393	-2.577	-0.232	4.071
Drop in 2007-2010	0.076	0.103	-0.094	0.054	0.432
Num. mortgage applications (log)	5.986	1.870	1.674	5.910	10.298
% Declined Applications	0.233	0.098	0.082	0.212	0.541
% Subprime Loans	0.144	0.059	0.049	0.132	0.350
Averagespread (log)	1.614	0.076	1.368	1.624	1.768
Num. Originators (log)	3.621	1.178	0.405	3.784	5.729
Fraction in Real Estate	0.023	0.009	0.009	0.022	0.054
County population (mil.)	0.065	0.205	0.001	0.017	0.815
Home ownership	0.781	0.065	0.568	0.790	0.902
Income (mil.)	0.061	0.014	0.043	0.058	0.113
Age	49.907	2.346	43.793	50.143	54.588
Education	0.193	0.074	0.100	0.173	0.456
Female	0.517	0.021	0.453	0.518	0.567
White	0.864	0.139	0.428	0.925	0.990



## Mortgage Professionals and Sophistication

We include the following two proxies for sophisticated residents in the real estate market in a county: 1.) the number of mortgage originators; 2.) the number of professionals in real estate and banking per capita.

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- In experimental settings: 1.) professional experts can provide more accurate estimates and tighter confidence intervals than novices (McKenzie, Liersch, and Yaniv 2008); 2.) CBOT traders are less prone to herding and cascades than novice investors (Alevy, Haigh, and List 2007).

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- Therefore, mortgage professionals are likely to have more accurate views about local home values and stronger convictions than non-professional homebuyers.

# Bubbles Findings

All models include state fixed effects; p-values account for clustering at the state level.

		K = 1	K = 2
SOCL	-0.014*** 0.0002	0.032** 0.0133	0.000 0.9518
FIN.SOPH (K)		0.037*** <.0001	1.363*** <.0001
SOCL * FIN.SOPH (K)		-0.011*** 0.0022	-0.599*** 0.0037
County population	0.019 0.2941	-0.020* 0.0651	0.006 0.7163
Home ownership	0.000 0.9969	-0.021 0.6005	-0.005 0.879
Average income	2.693*** <.0001	2.010*** <.0001	2.225*** <.0001
Age	0.001 0.6389	0.004** 0.0129	0.001 0.5385
Education	-0.226*** 0.0034	-0.222*** 0.0007	-0.248*** 0.0005
Female	0.108 0.2424	-0.160** 0.0364	0.061 0.4793
White	0.023 0.1967	0.008 0.6233	0.014 0.3833
Intercept	-0.206** 0.0375	-0.300*** 0.0005	-0.175* 0.053

## Sociability and Bubbles

- We find that more sociable counties were associated with smaller house price declines during the 2007-2010 period (or large declines conditional on large expansion during 2003-2006).
- This finding is again consistent with our model when sophisticated consumers exert high social influence. It stands in contrast to the Shiller contagion mechanism for bubbles, i.e., that social interaction fuels mania by drawing in new investors.

## Sophistication and Bubbles

Consistent with our model, we find that:

- The interaction term of the number of mortgage originators and local sociability is negatively related to bubble-formation, i.e., sociability reduces the likelihood of bubbles in areas with more sophisticated residents.
- Sociability does not exhibit a positive effect on bubble formation in counties with less sophisticated residents.

## Originators: Personal versus Professional Behavior

- These findings indicate that real estate and mortgage professionals helped fuel housing demand by making credit and intermediation available.
- However, real estate and mortgage professionals appear to have advised friends and associates more conservatively in social environments. Other research corroborates the view that altruistic motives can improve the quality of advice on the part of advisors and intermediaries (e.g., Gneezy 2005)



## Summary

We develop both theory and empirics, which support the idea that social interactions have the potential to spread financial sophistication:

- Our model predicts that sociability can either fuel or suppress bubbles, depending on the relative influence of sophisticated versus sentiment-based investors.
- Consistent with the model, we find that sociability promotes more conservative demand for housing and more stable real estate prices when the number of sophisticates increases.

## Future research

- Our findings challenge the view that social interactions are harmful and destabilizing.
- Ambuehl, et al. (2017) also find that social interactions can spread financial sophistication between individuals.
- Further research can address the question of whether such effects might exist in other financial market settings.