

Learning about Housing Cost

Survey Evidence from the German House Price Boom

Monika Piazzesi

joint with

Julia Le Blanc, Fabian Kindermann and Martin Schneider

Bundesbank & Banque de France, September 2019

What explains asset price booms and busts?

- ▶ Important question, affects many households
dot-com, foreclosure crisis, affordability crisis, inequality
- ▶ Conventional research agenda
 - ▶ Agents live in stationary worlds, observe recurring patterns
 - ▶ Rational expectations is most natural assumption
 - ▶ Puzzles with conventional utility functions & dynamics
 - ▶ Reverse-engineering of utility functions & dynamics
- ▶ After half a century, still looking for answers

Promising new research

- ▶ Belief formation in **changing environments**
Ninja & no-doc mortgages, a decade of zero interest rates, urbanization
- ▶ How do people **learn?** what explains their **heterogeneity?**
- ▶ Missing piece: **direct observations of beliefs & choices**
Michigan Survey, Bluechips, UBS/Gallup etc. few questions & people
- ▶ Stefan Ried, Tobias Schmidt & Online Pilot Survey Team

Thank you!

This paper

- ▶ Study German house price boom 2010–now
- ▶ Rich new data
 - ▶ survey expectations
 - ▶ household characteristics and choices
 - ▶ regional disaggregation
- ▶ Stylized facts on expectations:
 - ▶ forecasts lower than realized price growth
 - ▶ forecasts in line with local housing market conditions
 - ▶ cross section of forecasts: only region & tenure matter
 - ▶ renters always expect higher price growth than owners!

An explanation: learning about housing cost

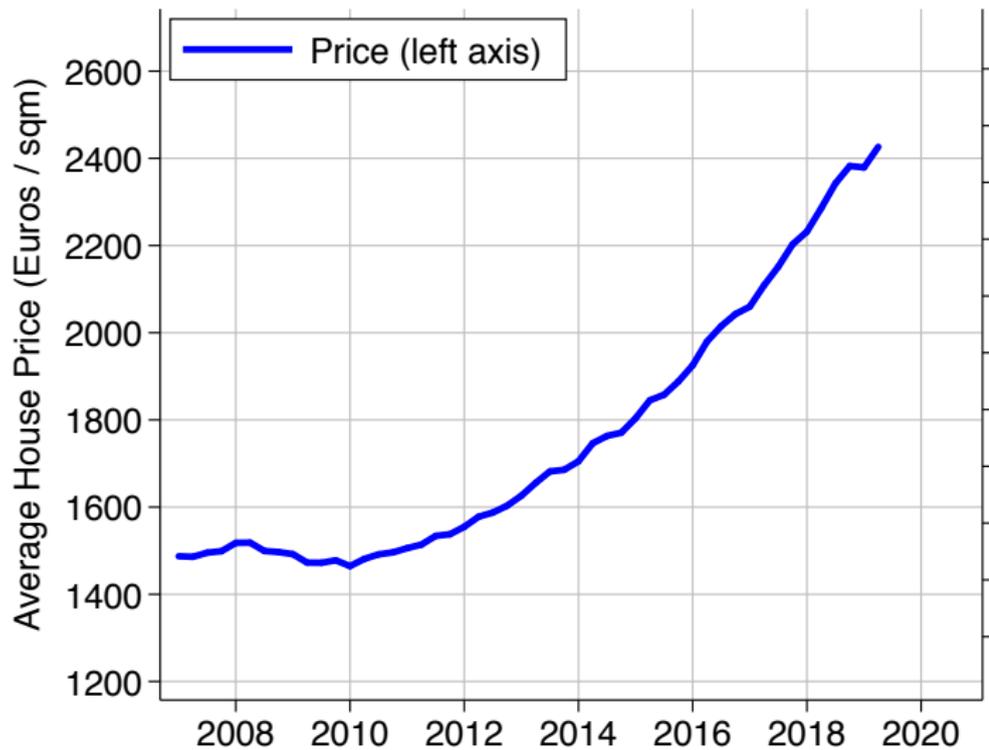
- ▶ Special feature of housing as an asset
 - ▶ non-owners (= renters) pay rent, talk to renter neighbors
→ receive cheap signals of dividend
 - ▶ owners consume dividend directly, as do owner neighbors
→ need not know dividend
- ▶ Model of asset valuation & learning from prices
 - ▶ renters better informed about rents than owners
→ booms with renters who expect higher price growth
- ▶ Direct evidence on learning mechanism
 - ▶ new data on rent forecasts and long-term expectations
 - ▶ signals about housing markets are cheap
 - ▶ renters look more to rents, owners more to prices

Stylized Facts

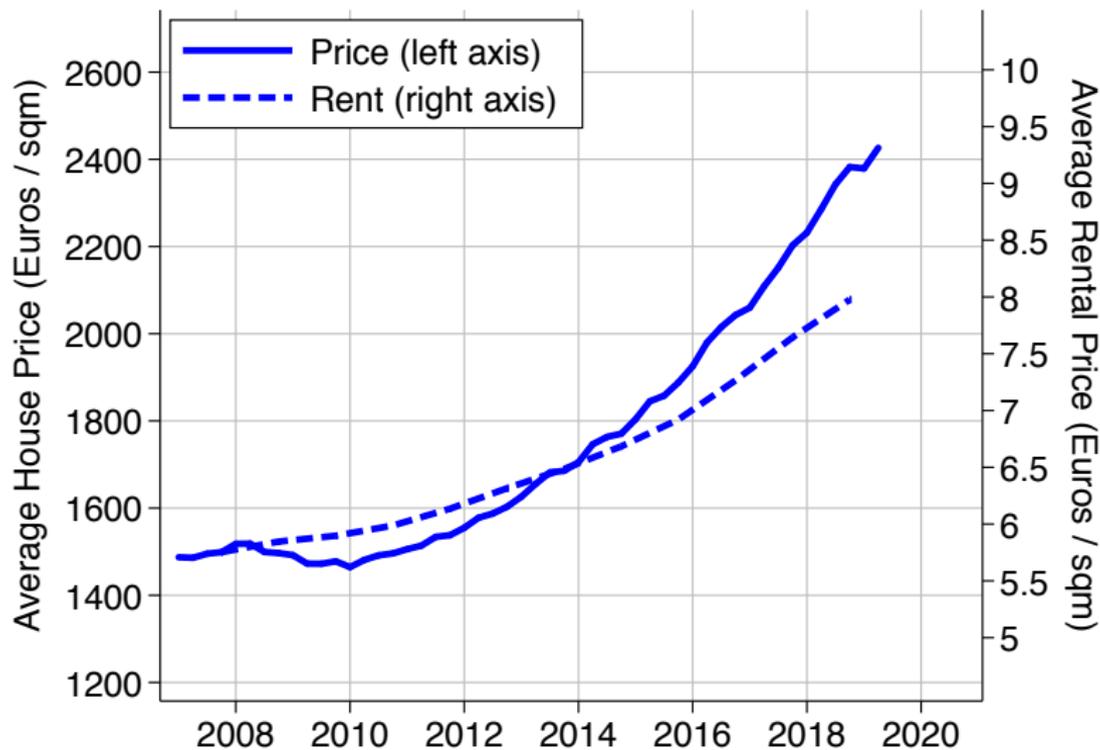
Primary data sources

- ▶ We merge three data sources
- ▶ Panel on Household Finances (PHF)
 - ▶ Detailed data on household characteristics and portfolios
 - ▶ Asks households to make forecasts of future prices
 - ▶ House price expectations in 2014 and 2017
- ▶ Online Survey of Consumer Expectations (SCE)
 - ▶ House price and rent expectations 2019
- ▶ House price data
 - ▶ bulwiengesa AG / destatis / vdp
 - ▶ data on sqm house prices and rents (transaction prices)
 - ▶ on detailed regional level (Kreise/counties)

The German house price boom

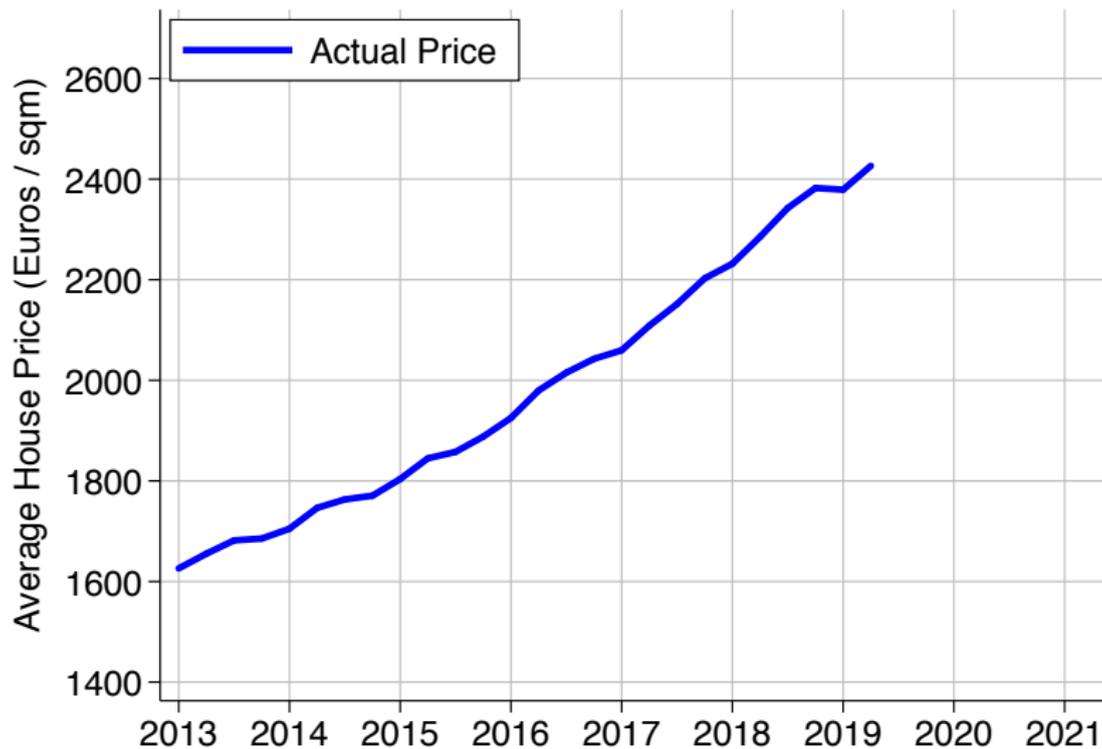


The German house price boom

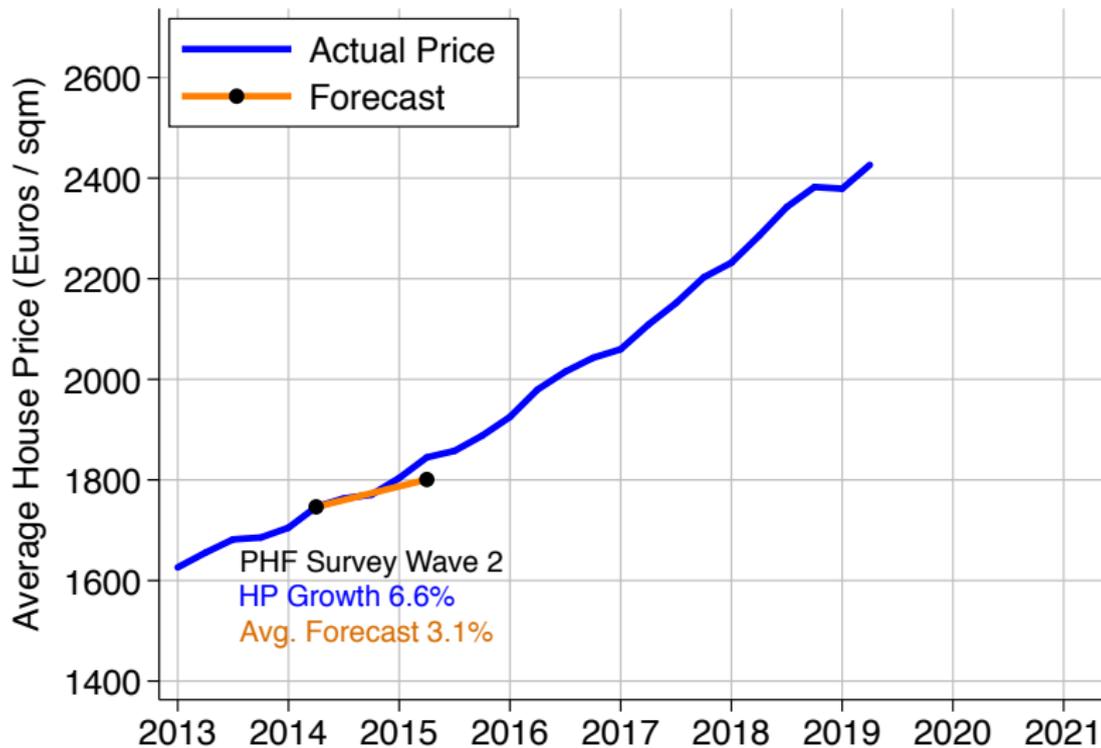


► Rents grow before prices

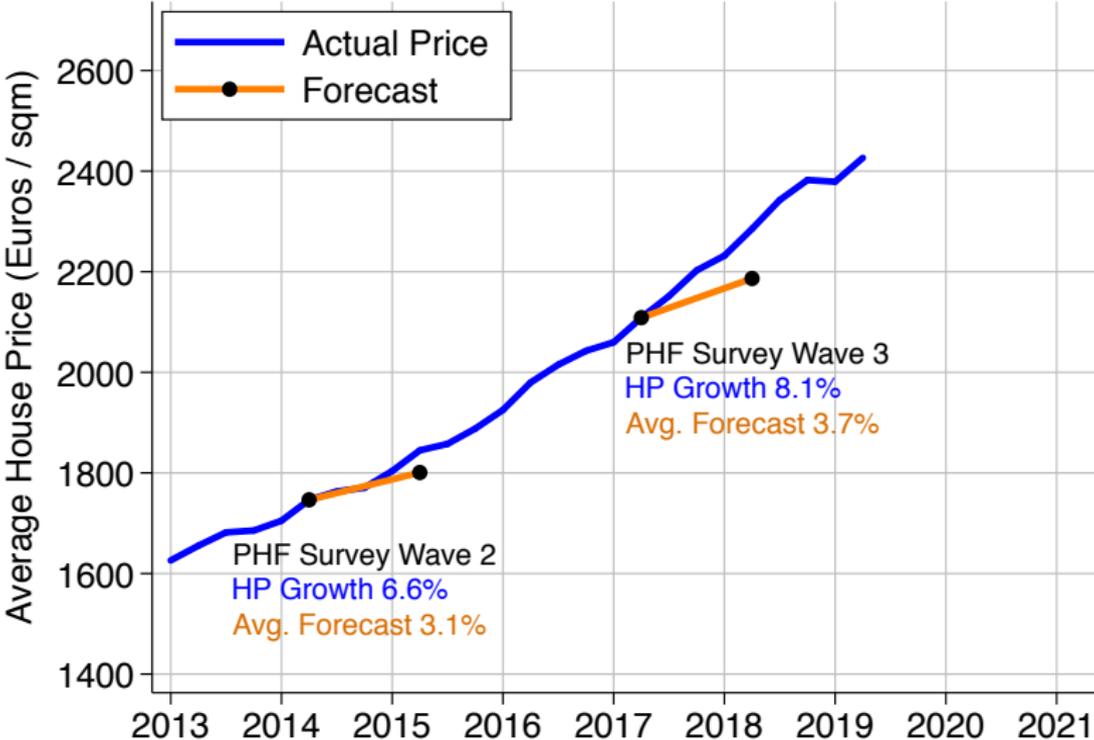
Prices and forecasts



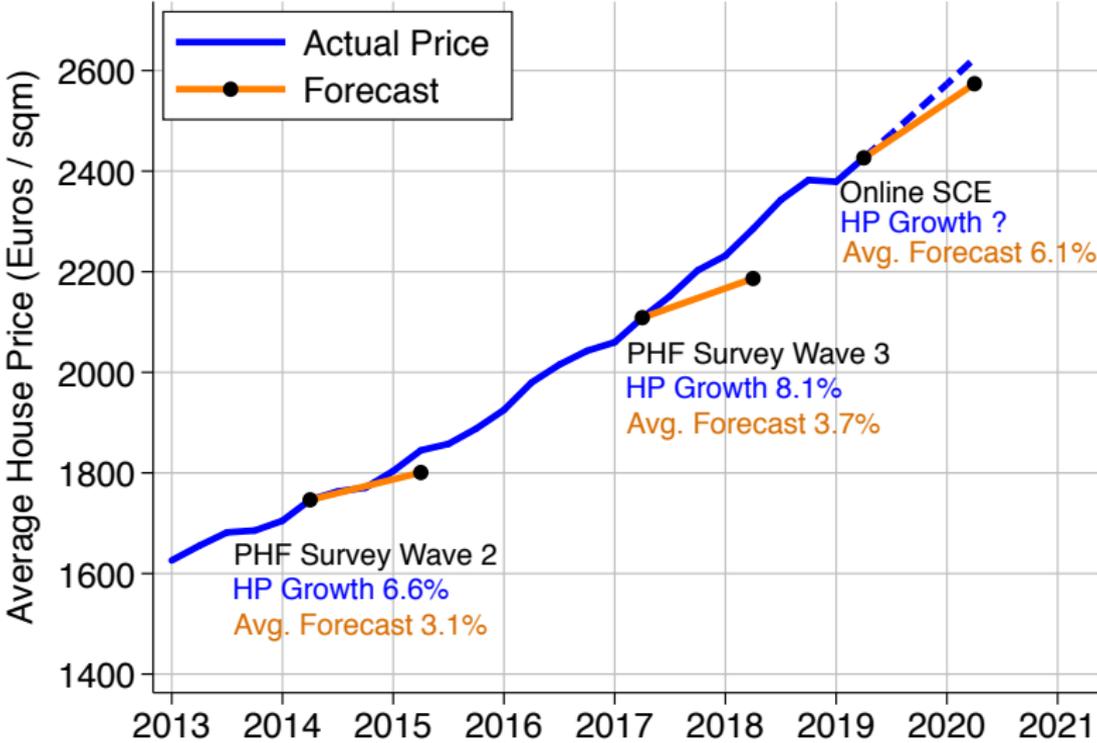
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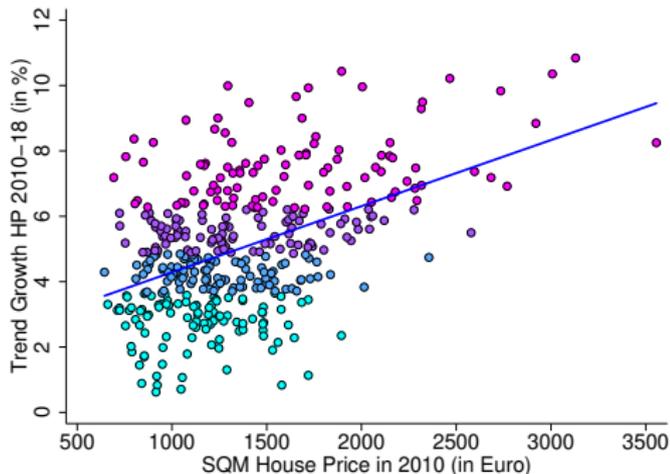
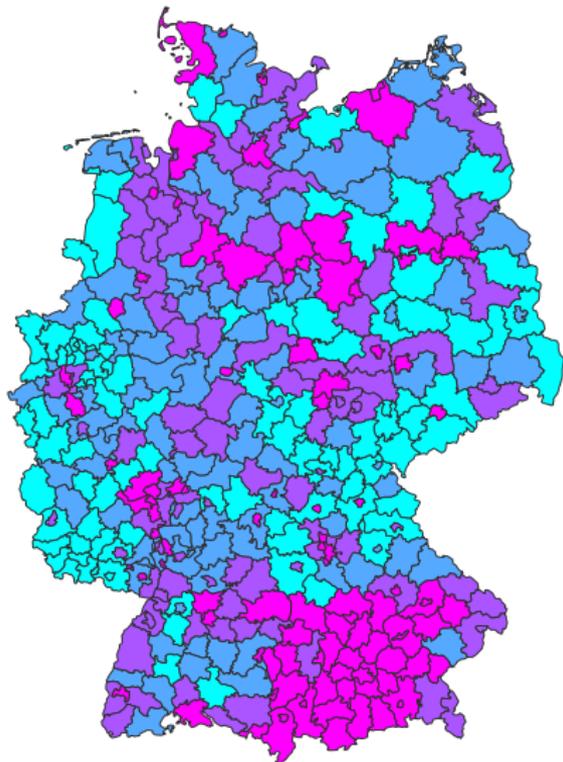
Prices and forecasts



Prices and forecasts



Regional heterogeneity (growth regions)



 low growth  medium low growth  medium high growth  high growth

[Details](#)

What predicts house price forecasts?

1. Demographics, wealth and income:
 - ▶ Age, household composition
 - ▶ Wealth and income quartiles
2. Behavioral traits:
 - ▶ Financial literacy, risk aversion, patience
3. Tenure:
 - ▶ Being an owner or a renter
4. Regional and housing characteristics:
 - ▶ Local house price growth
 - ▶ City center vs. outskirts, house size

Predicting house price forecasts

Demogr., Inc., Wealth

Age Group 40–49

5+ HH members

Wealth Q3

Wealth Q4

Behavioral Traits

Tenure

Renter

Growth Region

Medium Low

Medium High

High

Housing and Regional

Sqm size/100

$(\text{Sqm size}/100)^2$

Number of Cases

R-Square

Predicting house price forecasts

Demogr., Inc., Wealth

Age Group 40–49	-1.348**
5+ HH members	-0.436
Wealth Q3	-1.830***
Wealth Q4	-1.569**

Behavioral Traits

Tenure

Renter

Growth Region

Medium Low
Medium High
High

Housing and Regional

Sqm size/100
(Sqm size/100)²

Number of Cases	3647
R-Square	0.037

Predicting house price forecasts

Demogr., Inc., Wealth		
Age Group 40–49	-1.348**	-1.348**
5+ HH members	-0.436	-0.388
Wealth Q3	-1.830***	-1.840***
Wealth Q4	-1.569**	-1.545

Behavioral Traits	yes	
--------------------------	-----	--

Tenure		
Renter		

Growth Region		
Medium Low		
Medium High		
High		

Housing and Regional		
Sqm size/100		
(Sqm size/100) ²		

Number of Cases	3647	3647
R-Square	0.037	0.041

Predicting house price forecasts

Demogr., Inc., Wealth			
Age Group 40–49	-1.348**	-1.348**	-0.898
5+ HH members	-0.436	-0.388	0.317
Wealth Q3	-1.830***	-1.840***	-0.022
Wealth Q4	-1.569**	-1.545	0.517

Behavioral Traits	yes	yes	
--------------------------	-----	-----	--

Tenure			
Renter			2.488***

Growth Region			
Medium Low			
Medium High			
High			

Housing and Regional			
Sqm size/100			
(Sqm size/100) ²			

Number of Cases	3647	3647	3647
R-Square	0.037	0.041	0.064

Predicting house price forecasts

Demogr., Inc., Wealth				
Age Group 40–49	-1.348**	-1.348**	-0.898	-0.773
5+ HH members	-0.436	-0.388	0.317	0.679**
Wealth Q3	-1.830***	-1.840***	-0.022	0.064
Wealth Q4	-1.569**	-1.545	0.517	0.213

Behavioral Traits		yes	yes	yes
--------------------------	--	-----	-----	-----

Tenure				
Renter			2.488***	2.372***

Growth Region				
Medium Low				0.826***
Medium High				1.795***
High				3.631***

Housing and Regional				
Sqm size/100				
(Sqm size/100) ²				
Number of Cases	3647	3647	3647	3647
R-Square	0.037	0.041	0.064	0.121

Predicting house price forecasts

Demogr., Inc., Wealth					
Age Group 40–49	-1.348**	-1.348**	-0.898	-0.773	-0.454
5+ HH members	-0.436	-0.388	0.317	0.679**	1.245**
Wealth Q3	-1.830***	-1.840***	-0.022	0.064	0.390
Wealth Q4	-1.569**	-1.545	0.517	0.213	0.486
Behavioral Traits		yes	yes	yes	yes
Tenure					
Renter			2.488***	2.372***	2.071***
Growth Region					
Medium Low				0.826***	0.685**
Medium High				1.795***	1.309***
High				3.631***	2.903***
Housing and Regional					
Sqm size/100					-1.801**
(Sqm size/100) ²					0.469***
Number of Cases	3647	3647	3647	3647	3598
R-Square	0.037	0.041	0.064	0.121	0.145

Predicting house price forecasts

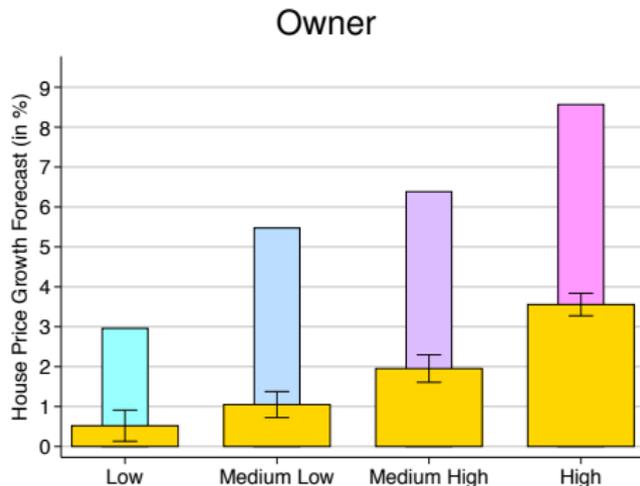
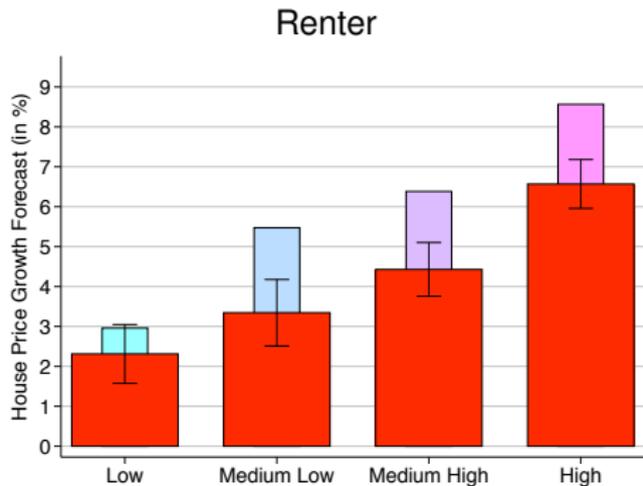
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Stylized fact

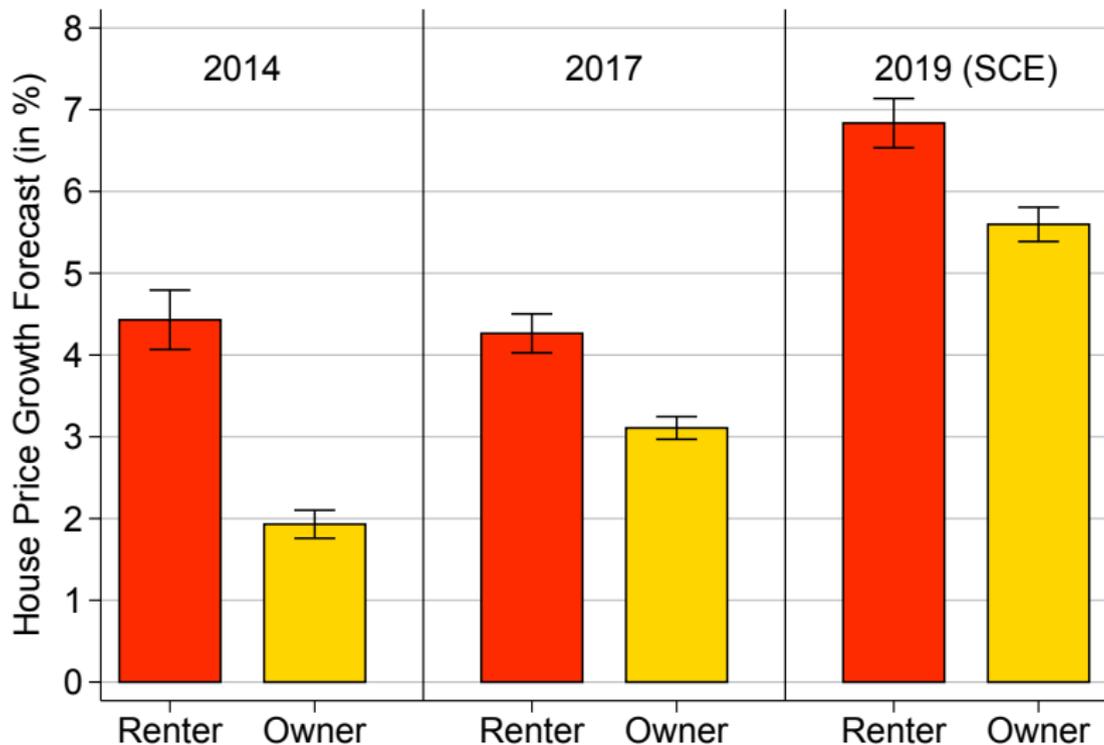
- ▶ Central determinants of house price forecasts
 - ▶ tenure
 - ▶ local house price growth

Stylized fact

- ▶ Central determinants of house price forecasts
 - ▶ tenure
 - ▶ local house price growth



Difference persists over time



A Model of Learning About Housing Cost

Prices, rents & forecasts: a simple framework

▶ Developers

- ▶ active in both house and rental markets
- ▶ value houses at price $P_t =$ present value of rents R_t :

$$P_t = E_t [M_{t+1} (P_{t+1} + R_{t+1})]$$

- ▶ stochastic discount factor M_{t+1}
→ may capture financial frictions faced by developers

▶ Two types of households

- ▶ renters observe (histories of) both rent & price
- ▶ owners observe only price

▶ In equilibrium

- ▶ pricing equation of developer holds
- ▶ evaluate equation using info set of renters and owners

Functional forms

- ▶ Valuation equation of developer

$$P_t = E_t [M_{t+1} (P_{t+1} + R_{t+1})]$$

- ▶ Rewrite with $V_t = P_t/R_t$ and $G_t = R_t/R_{t-1}$

$$V_t = E_t [M_{t+1} (V_{t+1} + 1) G_{t+1}]$$

- ▶ Price dynamics

- ▶ iid log rent growth: $g_{t+1} = \log G_{t+1} = \bar{g} + \epsilon_{t+1}^g$
- ▶ mean-reverting log price/rent: $v_{t+1} = (1 - \alpha)\bar{v} + \alpha v_t + \epsilon_{t+1}^v$
- ▶ orthogonal normally distributed shocks $\epsilon_{t+1}^v, \epsilon_{t+1}^g$

When do renters make higher price forecasts?

- ▶ Household forecasts of log price $p_t = \log P_t = v_t + r_t$
 - ▶ renter knows price & rent, hence also v_t :

$$E_t[p_{t+1}] = (1 - \alpha) \bar{v} + \alpha v_t + r_t + \bar{g}$$

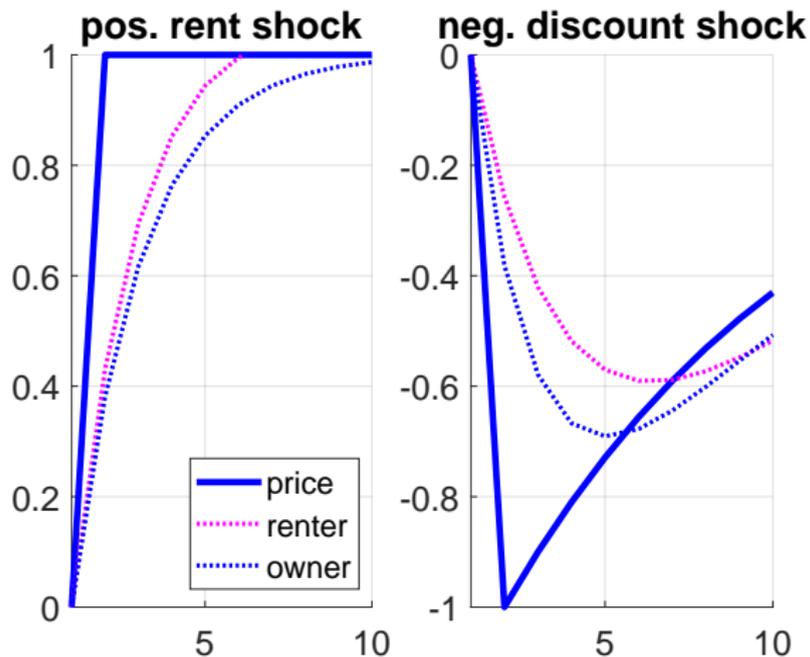
- ▶ owner relies only on price history

$$E_t[p_{t+1}] = E_{t-1}[p_t] + \kappa (v_t + r_t - E_{t-1}[p_t]) + \bar{g}$$

- ▶ owner compromises, adjusts by $\kappa \in (\alpha, 1)$
- ▶ Positive shock to rents
 - ▶ renter responds 1-1, owner underreacts since $\kappa < 1$
 - ▶ renter has higher forecast, owner gradually catches up
- ▶ Negative shock to price-rent ratio
 - ▶ renter responds by α , owner overreacts since $\kappa > \alpha$
 - ▶ again renter has higher forecast in "boom" as price recovers

Impulse responses

- Generalize by adding noise to observation of rents, prices
Everybody observes rents & prices, but with different precision



Direct Evidence for Modeling Assumptions

Direct evidence for modeling assumptions

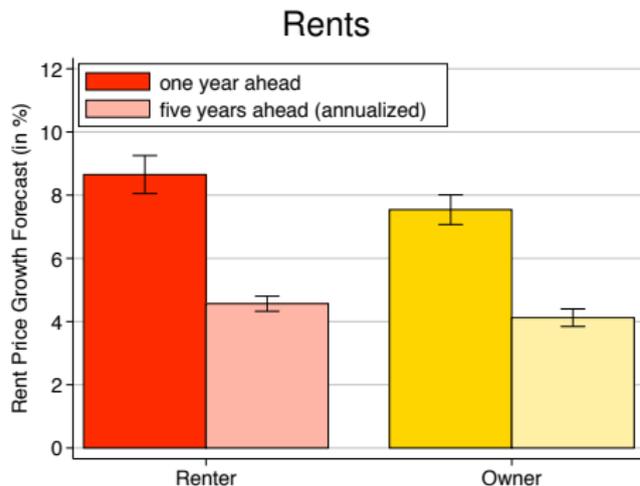
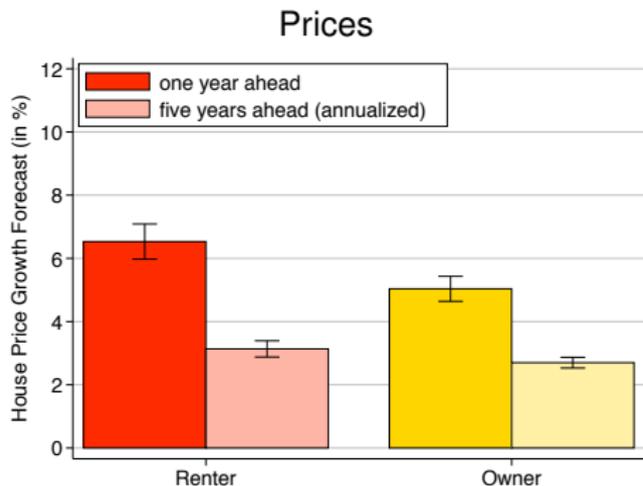
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 - ▶ Strong mean reversion in 5yr ahead forecasts
 - ▶ Rent forecasts strongly correlate with price forecasts
2. Signals about housing markets are cheap
 - ▶ Do non-owners of asset have opinion about future price?
 - ▶ Yes for housing, no for stocks
 - ▶ Owners are aware of past price movements
3. Survey evidence on households' information sources
 - ▶ Renters look more to rents, owners more to prices
 - ▶ Quality of forecasts independent of incentives

Rent Forecasts and Long-Term Expectations

Puriya Abbassi and Johannes Beutel

Thank you!

House price and rent growth forecasts in 2019



House price and rent growth forecasts in 2019

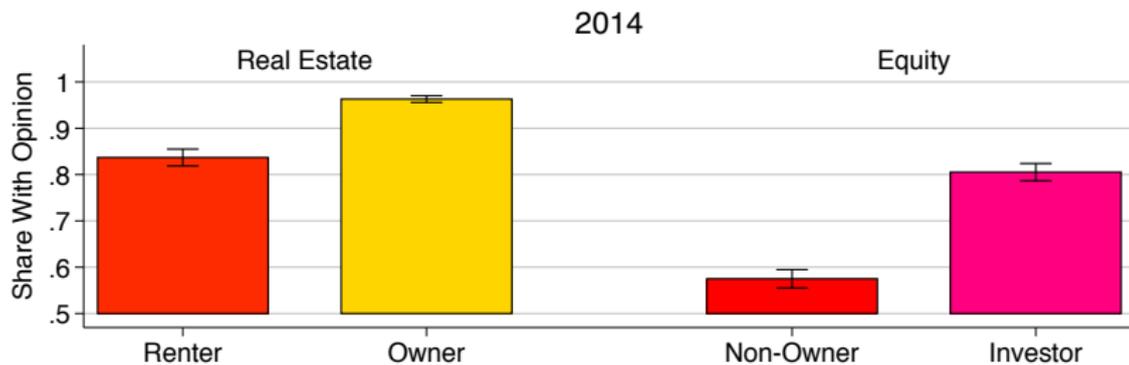
	Annualized House Price Growth Forecast	
	one year	five years
Tenure		
Renter	1.470*	1.193
Growth Region		
Medium Low	0.914***	0.561***
Medium High	0.294***	0.397***
High	1.811***	1.844***
Rent Forecast		
one year		0.342**
5 years		-0.073
Number of Cases	1768	1658
R-Square	0.021	0.130

House price and rent growth forecasts in 2019

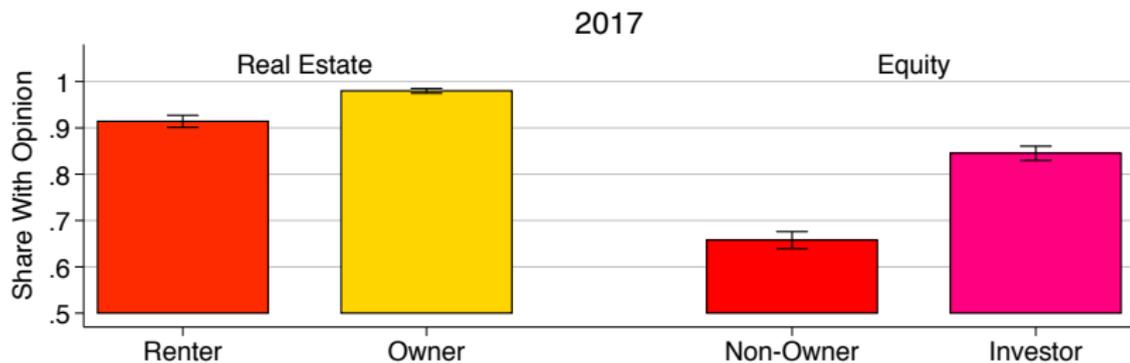
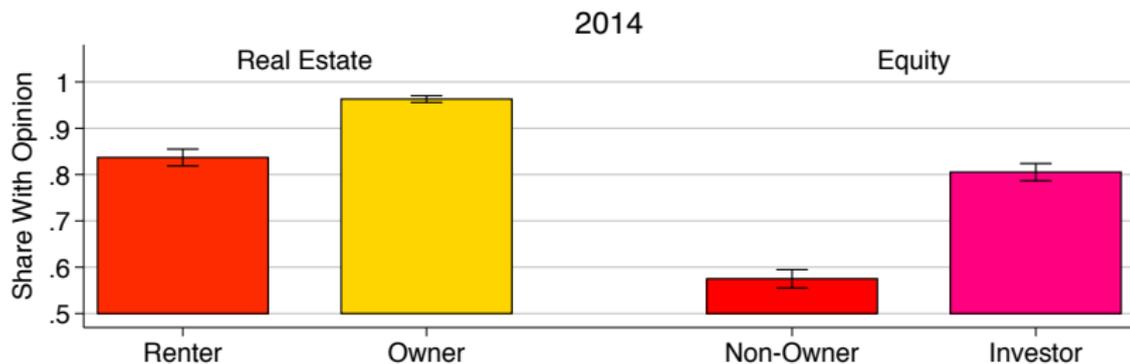
	Annualized House Price Growth Forecast			
	one year		five years	
Tenure				
Renter	1.470*	1.193	0.438***	0.328**
Growth Region				
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High	1.811***	1.844***	0.559***	0.434***
Rent Forecast				
one year		0.342**		0.016
5 years		-0.073		0.422***
Number of Cases	1768	1658	1743	1637
R-Square	0.021	0.130	0.014	0.170

Signals About Housing Markets are Cheap

Households with opinion about house prices



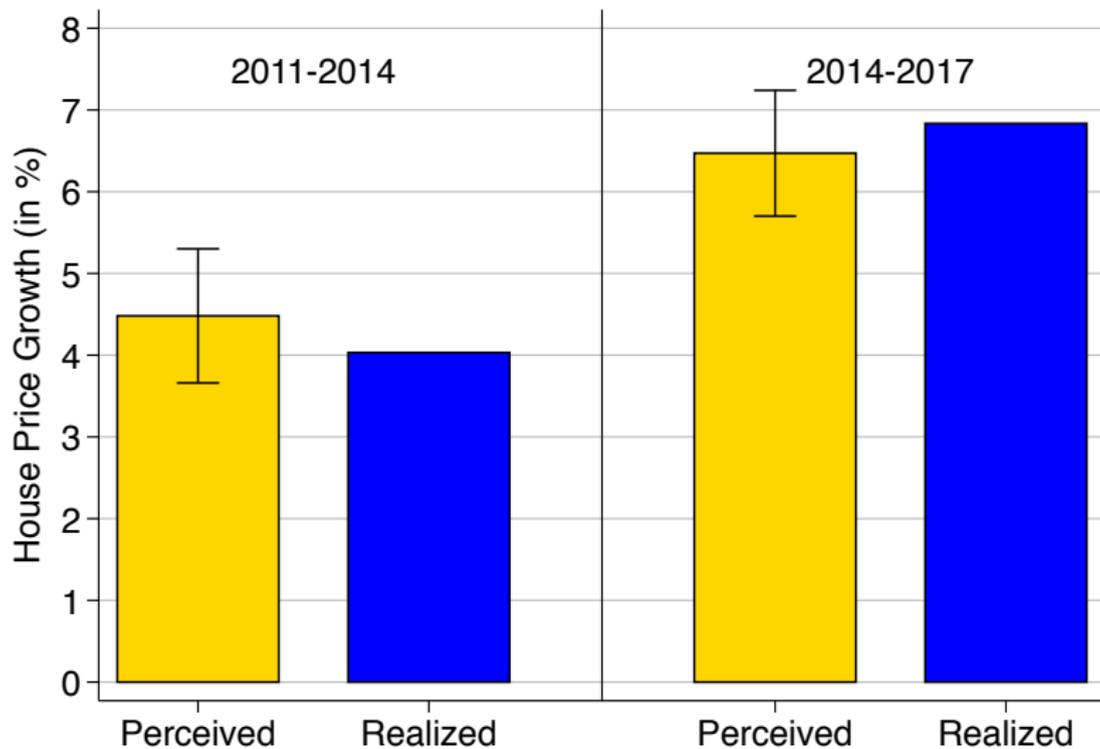
Households with opinion about house prices



Price perceptions of owners

- ▶ Exploit panel dimension of the PHF
- ▶ Evaluate how homeowners quantify **value of their house**
- ▶ Number of panel homeowners
 - ▶ 1,043 from 2010 to 2014
 - ▶ 1,620 from 2014 to 2017
- ▶ Calculate **perceived price growth**
- ▶ Contrast with **realized price growth**

Owners know what is going on



Renters Look More to Rents,
Owners More to Prices

Information sources

- ▶ Online Survey of Consumer Expectations (2019)
- ▶ *"How important are each of the following sources of information for you to evaluate future house prices?"*
 - ▶ Direct observations of rents in your neighborhood
 - ▶ Direct observations of house prices in your neighborhood
 - ▶ Online real estate platforms
 - ▶ Financial Consultants
 - ▶ Relatives, Friends and Neighbors
 - ▶ Classical Media (newspapers, tv, etc.)
 - ▶ Social Media (like Facebook and Twitter)

Information sources

Source	Renters	Owners	Difference
Direct obs. rents	71.9	69.5	-2.45**
Direct obs. prices	65.9	69.9	3.99***
Classical Media	60.3	60.4	0.12
Online Real Estate Portals	57.9	55.4	-2.47**
Friends	52.7	48.1	-4.68***
Financial Advisors	44.7	45.6	0.90
Social Media	23.8	21.0	-2.77***

- ▶ Primary source of information is price observations

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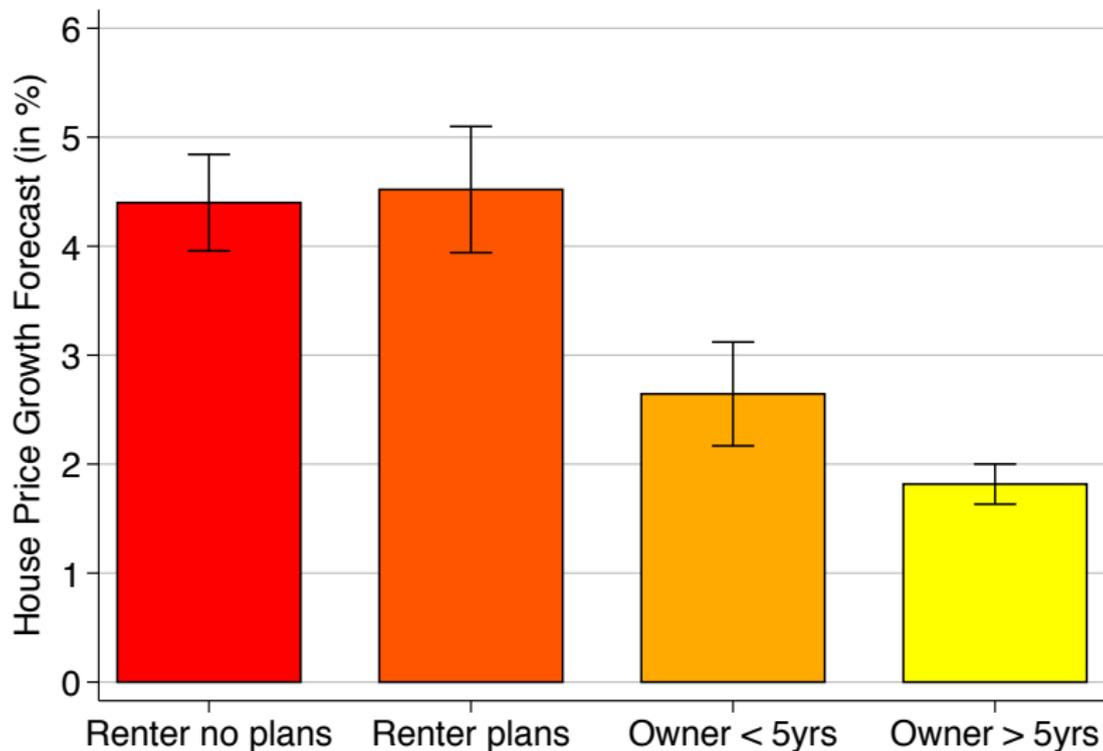
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- ▶ Primary source of information is price observations
- ▶ Owners look more to house prices
- ▶ Renters more to rents, online and through social channels

Forecasts and incentives



Conclusion

Summary

- ▶ New mechanism for German boom:
 - ▶ Learning about housing cost
- ▶ Stylized facts on expectations:
 - ▶ forecasts lower than realized price growth
 - ▶ forecasts in line with local housing market conditions
 - ▶ cross section of forecasts: only region & tenure matter
 - ▶ renters have higher price forecasts than owners!
- ▶ “Standard” learning model explains stylized facts

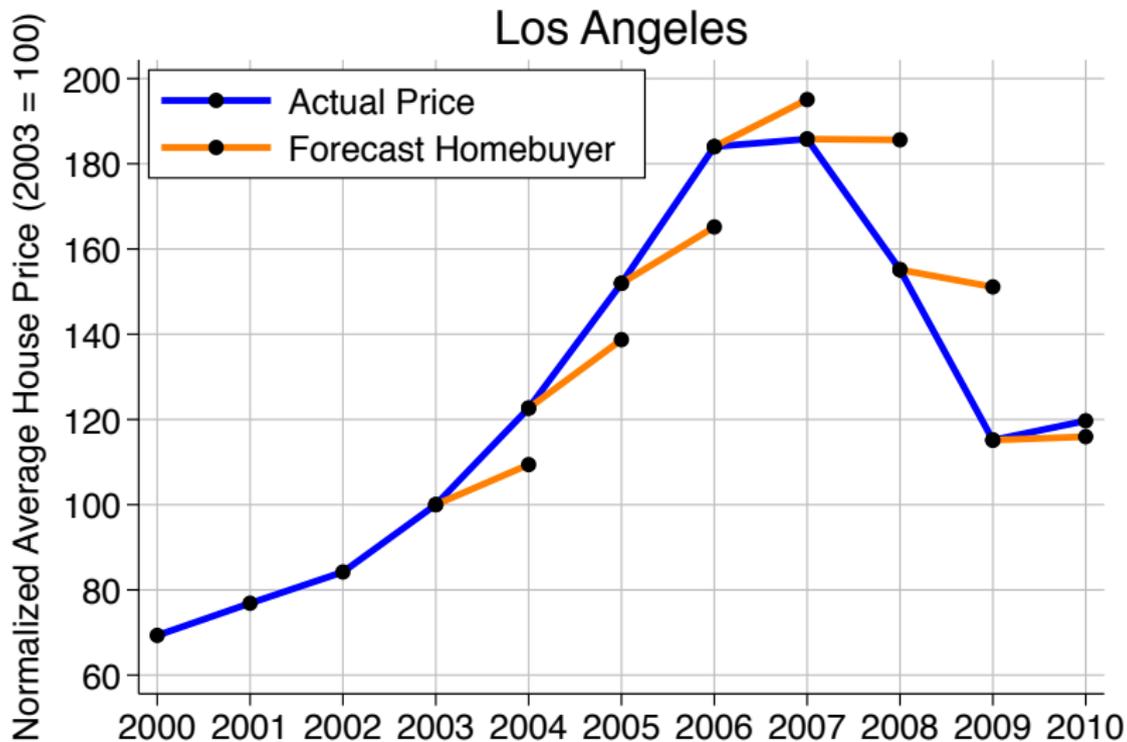
Summary

Direct evidence for learning mechanism

1. New data on rent forecasts and long-term expectations
 - ▶ Strong mean reversion in 5yr ahead forecasts
 - ▶ Rent forecasts strongly correlate with price forecasts
2. Signals about housing markets are cheap
 - ▶ Do non-owners of asset have opinion about future price?
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3. Survey evidence on households' information sources
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 - ▶ Quality of forecasts independent of incentives

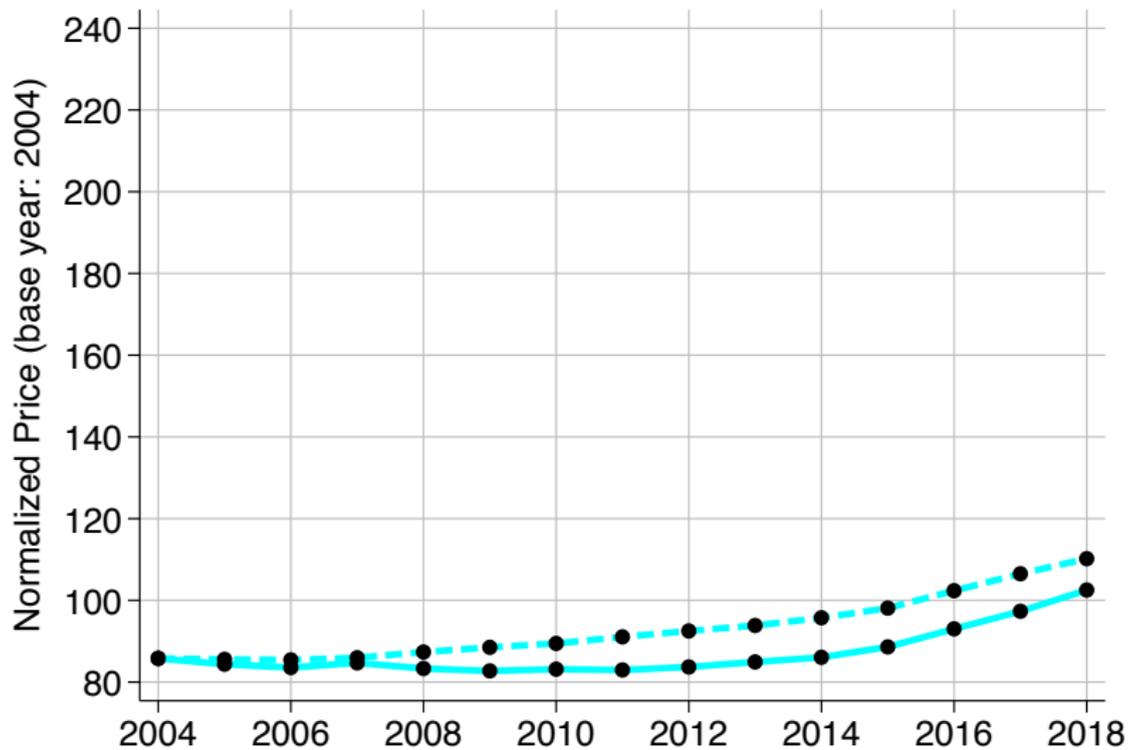
Appendix

Expectations of Homebuyers

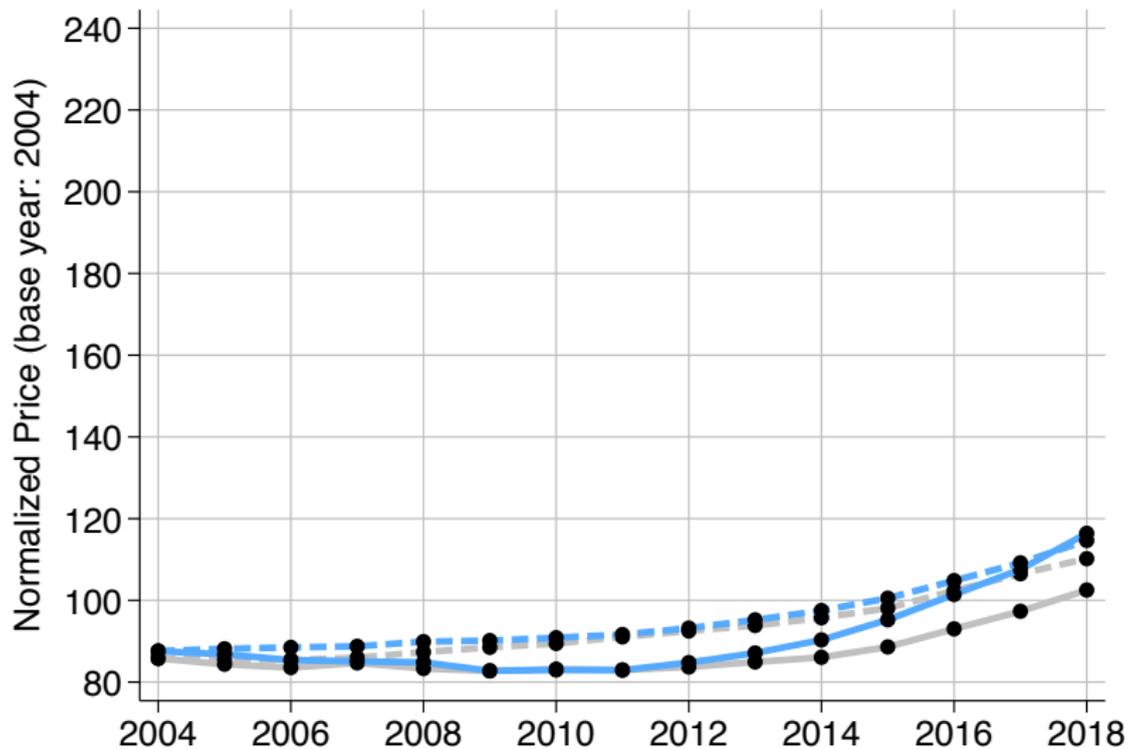


Source: Case-Shiller-Thompson (Brookings Papers, 2012)

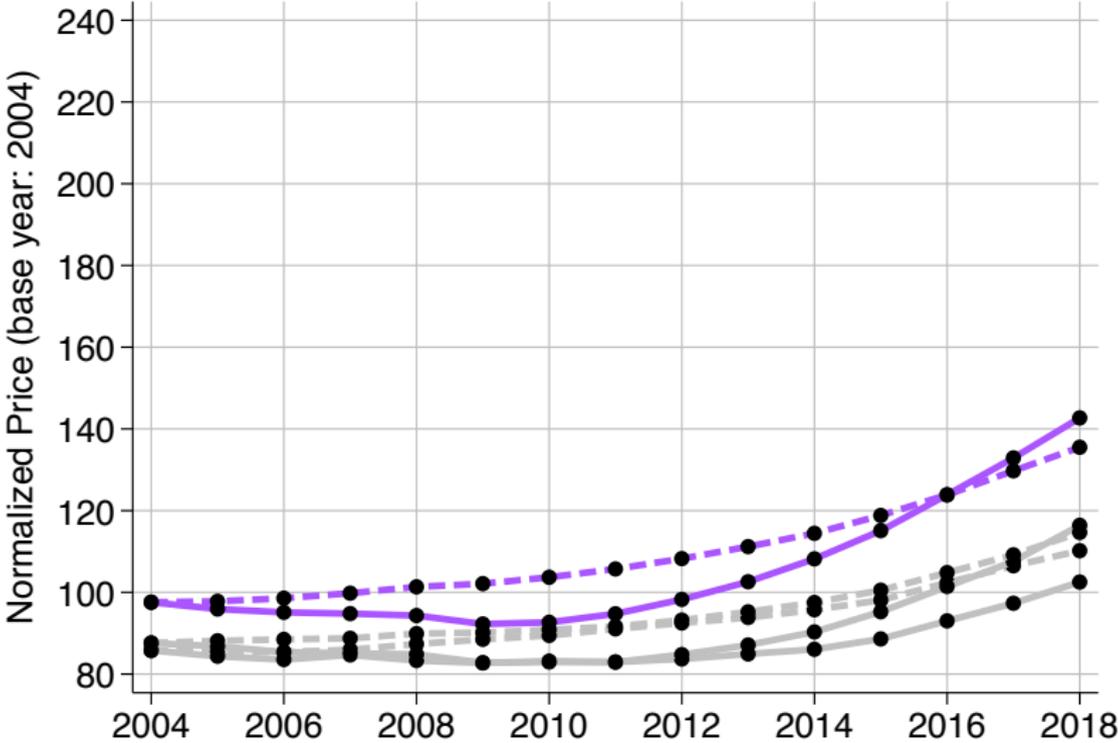
Regional Heterogeneity (Growth Regions)



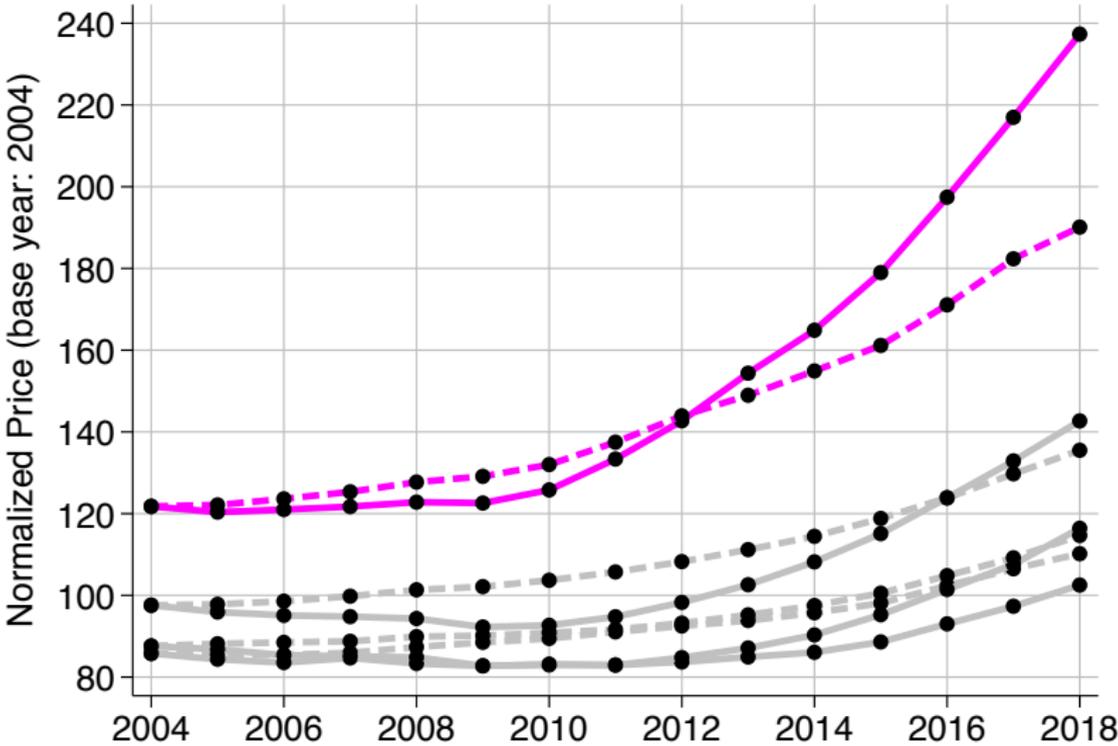
Regional Heterogeneity (Growth Regions)



Regional Heterogeneity (Growth Regions)



Regional Heterogeneity (Growth Regions)



Additional Details and Robustness

- ▶ Forecasts by growth region over time
- ▶ Reweighting and Aggregation
- ▶ Extreme observations

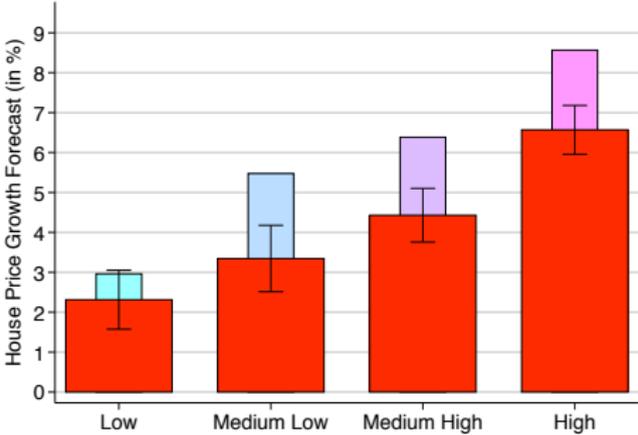
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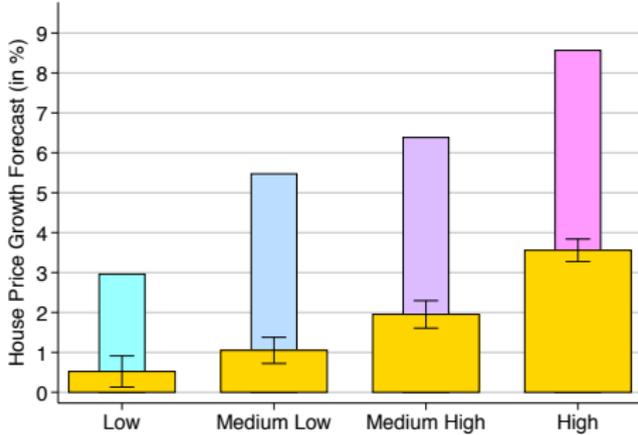
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Forecasts By Growth Region Over Time (2014)

Renter

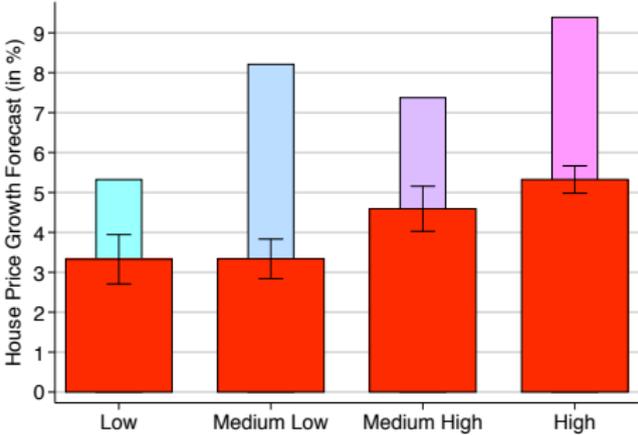


Owner

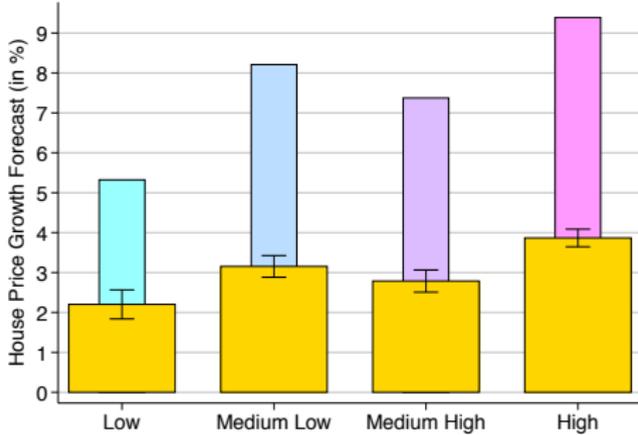


Forecasts By Growth Region Over Time (2017)

Renter

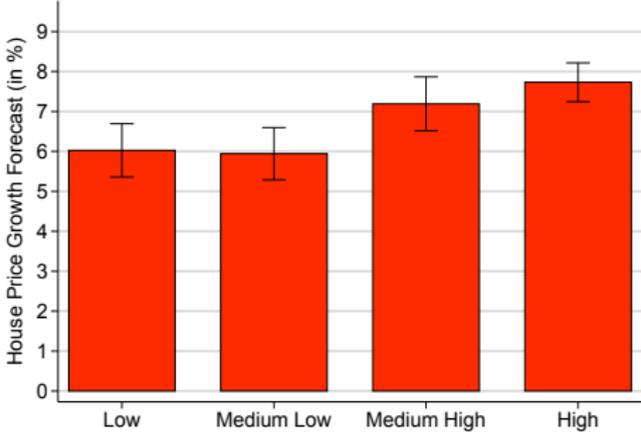


Owner

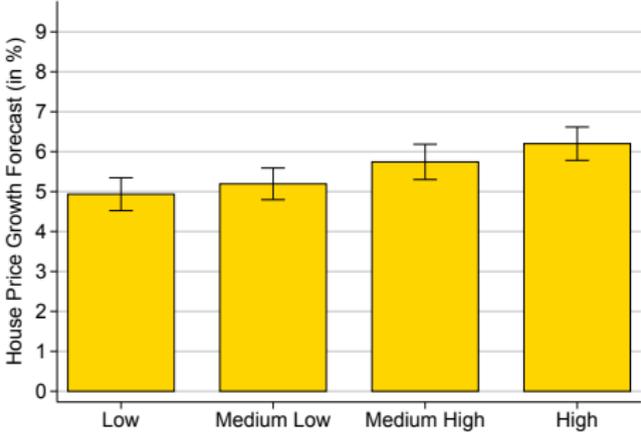


Forecasts By Growth Region Over Time (2019)

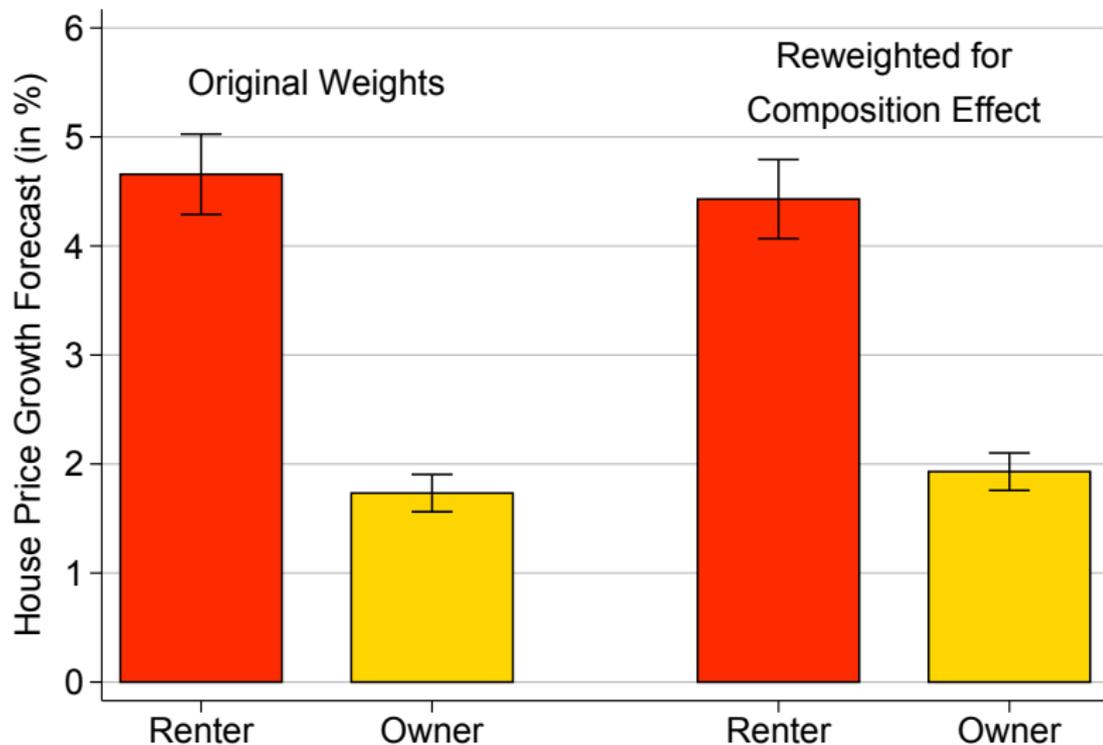
Renter



Owner



Aggregation Across Tenure Types

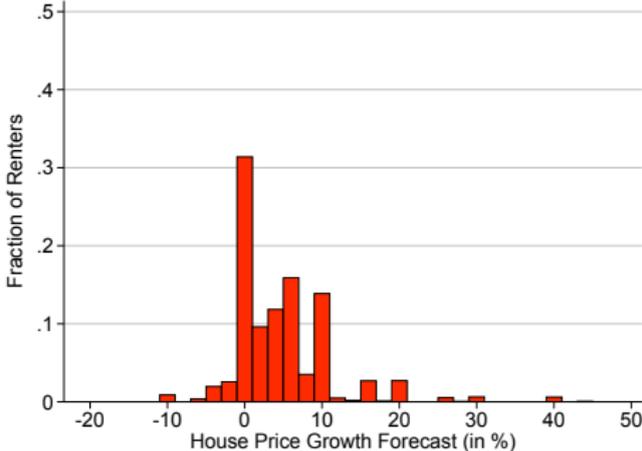


Aggregation Across Tenure Types

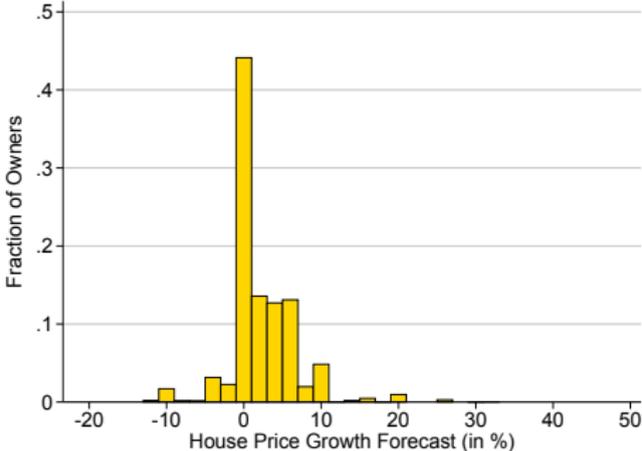
Growth Region	<i>Original Weights</i>		Total	<i>Reweighted for Composition Effect</i>	
	Renter	Owner		Renter	Owner
Low Growth	17.45	21.14	19.23	19.23	19.23
Medium Low Growth	20.44	28.92	24.51	24.51	24.51
Medium High Growth	24.90	28.79	26.77	26.77	26.77
High Growth	37.21	21.15	29.49	29.49	29.49
Sample Share	51.95	48.05	100.00	51.95	48.05

Extreme Observations?

Renter

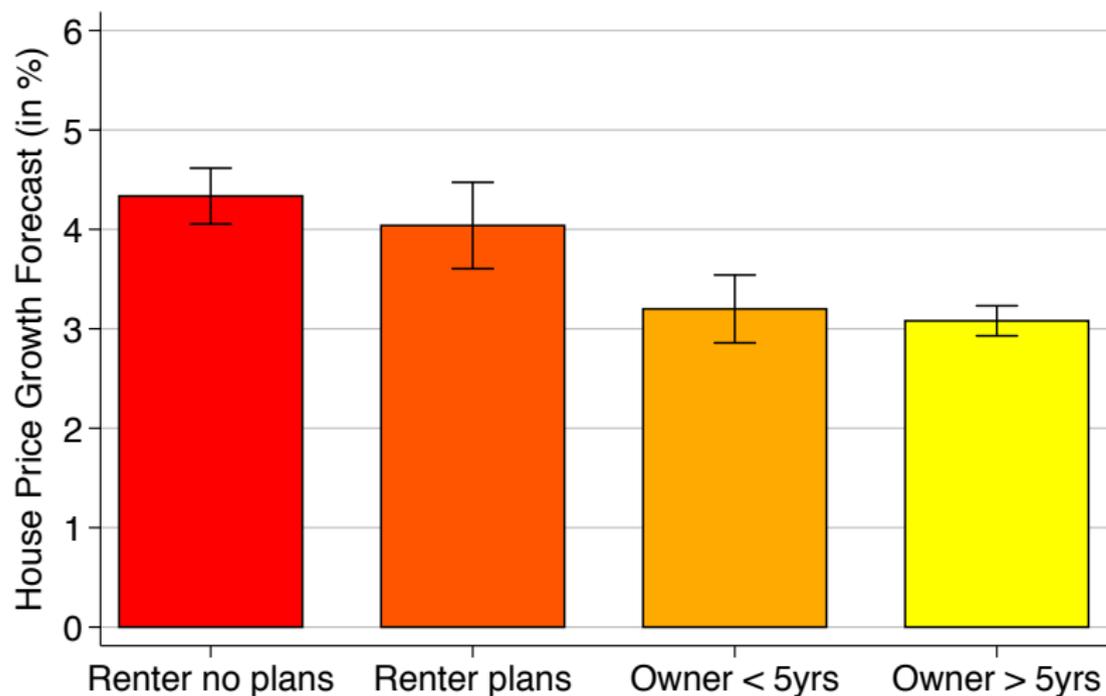


Owner

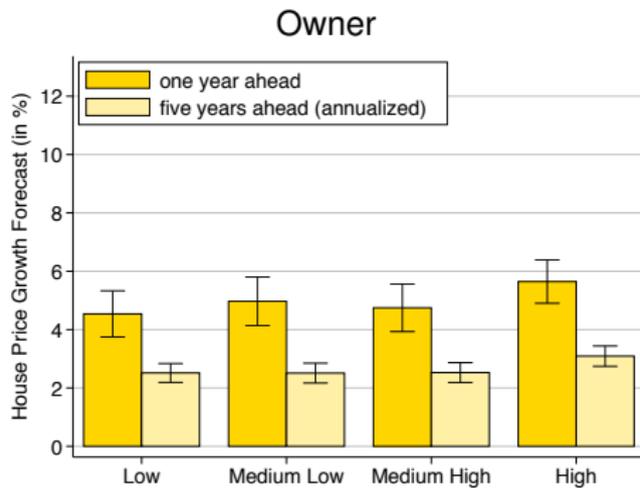
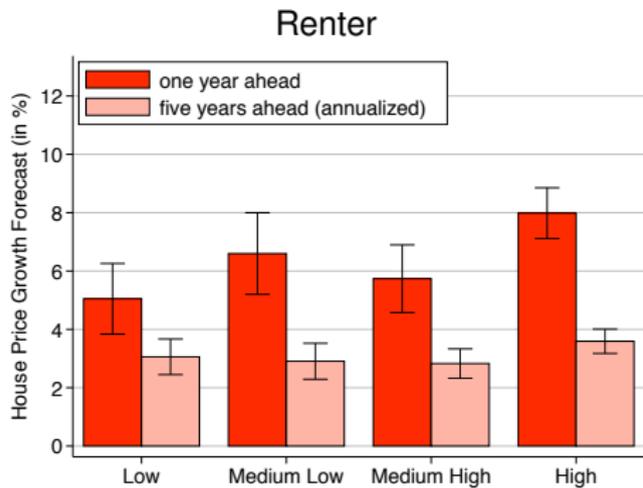


Forecasts and incentives

2017

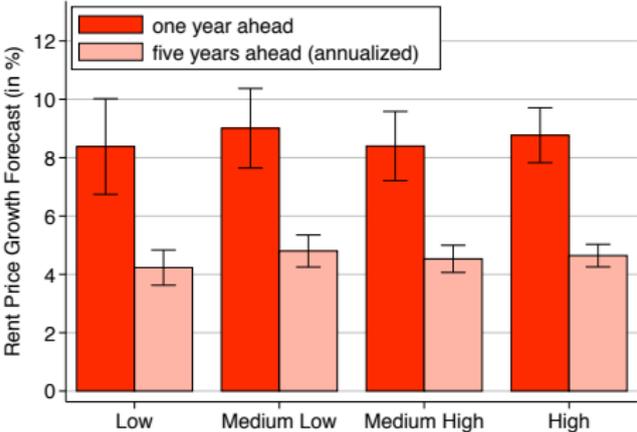


House Price Growth Forecasts in 2019



Rent Price Growth Forecasts in 2019

Renter



Owner

