Inflation expectations and the housing market: insights from real estate agents

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Motivation

▶ Developments in the **housing sector** can affect broader economic activity (Iacoviello and Neri 2010), inequality, and the transmission of policy interventions like monetary policy (Bluwestein et al. 2020, Adam and Woodford 2021, Adam et al. 2024)

▶ At the same time a rapidly growing literature underscores the importance of agents' expectations in shaping aggregate outcomes (Weber et al. 2022)

▶ **Main contribution**: first paper looking at the role of inflation expectations on the behavior of intermediaries in the housing market

This paper

1. How do real estate agents' inflation expectations influence housing prices?

2. Is this effect heterogeneous across markets/agents?

This paper

Research question(s)

1. How do real estate agents' inflation expectations influence housing prices?

2. Is this effect heterogeneous across markets/agents?

What we do

▶ Leverage an exogenous upward shift in real estate agents' inflation expectations generated by a **randomized control trial embedded within the Italian Housing Market Survey** (IHMS) in 2022q4–2023q2: half of the surveyed agents were provided with information on consumer price inflation in the previous month

▶ Investigate the **causal impact** of inflation expectations on **property listing prices** using a rich dataset of online housing sales ads

▶ Exploit **variation in prices at the product (i.e. house) level** under different market conditions

Related literature

▶ Relationship between consumer price inflation and housing values:
Fama and Schwert (1977), Anari and Kolari (2002), Jordà et al. (2019), Fehrle (2023)

▶ Impact of macroeconomic expectations on agents' behavior:
Coibion et al. (2019), Ropele et al. (2024), and Rosolia (2024); Bottan and Perez-Truglia (2024),
Kuchler et al. (2023), Chopra et al. (2023)

▶ Implications for housing markets and monetary policy
Glaeser and Nathanson (2017), Schmitt and Westerhoff (2019); Adam and Woodford (2021),
Adam et al. (2024)

▶ Intermediaries in the housing market:
Levitt and Syverson (2008), Agarwal et al. (2019), Gilbukh and Goldsmith-Pinkham (2023)

Outline

THE DATA

The data

- **Italian Housing Market Survey (IHMS):**
  - conducted quarterly by the Bank of Italy, the Italian Tax Revenue Agency and Tecnoborsa on a rotating representative panel of 1500 Italian real estate agents
  - the standard questionnaire gathers agents' opinions on the state of the housing market
  - includes a question on 1-year-ahead inflation expectations with randomized information treatment in the surveys conducted in 2022q4, 2023q1 and 2023q2 Question

The data

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  - the standard questionnaire gathers agents' opinions on the state of the housing market
  - includes a question on 1-year-ahead inflation expectations with randomized information treatment in the surveys conducted in 2022q4, 2023q1 and 2023q2 [Question]

- **Immobiliare.it**:
 - most popular web portal for real estate services in Italy (like Zillow in the US)
  - universe of online housing listings with full country coverage; details about dwellings characteristics, location and asking prices (no transaction prices); real estate agent name and address

[Summary statistics]

First stage: impact of the information treatment on inflation expectations

Inflation expectations: descriptive evidence
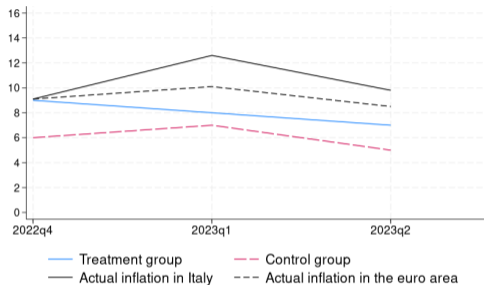
(a) Median
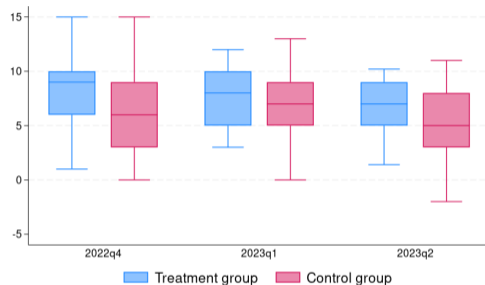
(b) Distribution

Note: Panel (a) represents the median of real estate agents' inflation expectations in IHMS; the solid (dashed) black line represents the actual value of the Italian (euro area) consumer price inflation provided to the treatment group at the moment of the interview. Panel (b) is the boxplot of agents' inflation expectations. Data are winsorized at the bottom and top 5%.

Identification strategies

1. Time-varying treatment (Coibion et al, 2020)
   - ▶ Define a time-varying measure of the treatment $T_t^i = t_t^i \times \tilde{\pi}_t$, where t_t^i is a dummy variable equal to 1 if agent i is treated and 0 otherwise and $\tilde{\pi}_t$ is the inflation rate provided as treatment.
   - ▶ Estimate:
   $$F_t^i \pi = \alpha_l + \beta T_t^i + \theta_t^i + \varepsilon_t^i \tag{1}$$

2. Dummy treatment: combine location and time fixed effects with just the dummy t_t^i:

   $$F_t^i \pi = \alpha_l + \gamma_t + \beta t_t^i + \theta_t^i + \varepsilon_t^i \tag{2}$$

Results

	Time-varying treatment		Dummy treatment			
			2022q4-2023q2	2022q4	2023q1	2023q2
	(1)	(2)	(3)	(4)	(5)	(6)
Time-varying treatment	0.16***	0.15***				
	(0.01)	(0.01)				
Dummy treatment			1.67***	1.88***	1.28***	1.67***
			(0.15)	(0.29)	(0.24)	(0.26)
FE location	Yes	Yes	Yes	Yes	Yes	Yes
FE time	No	No	Yes	No	No	No
Other controls	No	Yes	Yes	Yes	Yes	Yes
Mean Y	6.93	6.95	6.95	7.29	7.32	6.16
SD Y	3.31	3.31	3.31	3.70	2.99	3.07
Obs.	2395	2338	2338	791	822	725

Dynamic treatment   Quantile regressions

Second stage: impact of inflation expectations on housing listings

Econometric specification

$$p_{jlt}^i = \beta F_t^i \pi + \zeta_j + \theta_t^i + \alpha_l + \gamma_t + \varepsilon_{jt} \tag{3}$$

► p_{jt}^i: log(price/mq2) of property j posted by agent i on Immobiliare.it at time t

► ζ_j: controls regarding the characteristics of the house for sale

► θ_t^i: characteristics and the opinions of the agent

► α_l: location fixed effects

► γ_t: time fixed effects

Baseline results: listing prices

	OLS	IV TIME-VARYING TREATMENT	IV DUMMY TREATMENT			
			2022q4-2023q2	2022q4	2023q1	2023q2
	(1)	(2)	(3)	(4)	(5)	(6)
Inflation expectations	-0.000	0.011***	0.012***	0.008**	0.009*	0.011***
	(0.000)	(0.002)	(0.002)	(0.003)	(0.005)	(0.004)
FE location	Yes	Yes	Yes	Yes	Yes	Yes
FE time	No	No	Yes	No	No	No
Other controls	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	49662	49662	49662	15582	17050	12834

Note: The dependent variable is the log of the price/m2 posted on Immobiliare.it from 2022q4 to 2023q2. 'Other controls' include: i) dwelling characteristics drawn from Immobiliare.it: size, high floor, garden, terrace, garage, elevator, renovation status; ii) agent's characteristics and opinions from IHMS: number of employees, assessment and expectations on the local housing market; iii) agent-specific controls computed on the overall sample of online housing ads: the average number of new ads posted each quarter, the number of local housing markets where the agents operates and the standard deviation of the size of the properties posted by the agents. Location FE refer to local housing markets (OMI zones). Inflation expectations are winsorized at the bottom and top 5%. All estimates use Huber-White robust standard errors. *, **, and *** denote significance at the 10%, 5% and 1% levels, respectively.

Baseline results: time-on-market

	OLS	IV time-varying treatment	IV dummy treatment			
			2022q4-2023q2	2022q4	2023q1	2023q2
	(1)	(2)	(3)	(4)	(5)	(6)
Inflation expectations	-0.000	0.022***	0.038***	0.022	0.037*	0.038**
	(0.002)	(0.008)	(0.008)	(0.015)	(0.020)	(0.016)
FE location	Yes	Yes	Yes	Yes	Yes	Yes
FE time	No	No	Yes	No	No	No
Other controls	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	47727	47727	47727	14787	16325	12411

Note: The dependent variable is the log of the time-on-market of the houses posted on Immobiliare.it from 2022q4 to 2023q2. 'Other controls' include: i) dwelling characteristics drawn from Immobiliare.it: size, high floor, garden, terrace, garage, elevator, renovation status; ii) agent's characteristics and opinions from IHMS: number of employees, assessment and expectations on the local housing market; iii) agent-specific controls computed on the overall sample of online housing ads: the average number of new ads posted each quarter,the number of local housing markets where the agents operates and the standard deviation of the size of the properties posted by the agents. Location FE refer to local housing markets (OMI zones). Inflation expectations are winsorized at the bottom and top 5%. All estimates use Huber-White robust standard errors. *, **, and *** denote significance at the 10%, 5% and 1% levels, respectively.

Heterogeneous effects of inflation expectations

Heterogeneity across markets

▶ Define the market-level characteristics:

1. Supply: for any location, average number of houses for sale in each quarter

2. Supply of comparable houses (listing level): for each listing, we identify the set of houses of similar size ($\pm$ 15%) put on sale previously in the same location

3. Market concentration (Herfindahl-Hirschmann-Index - HHI):

$$HHI_l = \sum_{i=1}^{I_l} (n_{il}/N_l)^2$$

4. Demand: for any location, average number of daily *clicks* per listing in the pre-sample

▶ Estimate:

$$p_{jlt}^i = \beta F_t^i \pi + \delta F_t^i \pi * x_l + \zeta_j + \theta_t^i + \alpha_l + \gamma_t + \varepsilon_{jt} \qquad (4)$$

Heterogeneous effects on listing prices across markets

	Supply	Supply (comparables)	HHI	Demand
	(1)	(2)	(3)	(4)
Inflation expectations	0.015***	0.015***	0.020***	0.015***
	(0.003)	(0.003)	(0.005)	(0.002)
Infl. exp * High supply of housing listings	-0.006*			
	(0.004)			
Infl. exp * High supply of comparable housing listings		-0.006**		
		(0.003)		
Infl. exp * Low market concentration (HHI)			-0.009*	
			(0.005)	
Infl. exp * Low avg. demand (clicks per ad)				-0.007*
				(0.004)
FE location	Yes	Yes	Yes	Yes
FE time	Yes	Yes	Yes	Yes
Other controls	Yes	Yes	Yes	Yes
Obs.	47970	47970	47970	47970

TOM

Heterogeneity across agents

▶ Define the real estate agents' characteristics/opinions:

  1. Business size: average number of properties listed for sale by an agent in a quarter

  2. Geographic scope: number of different neighborhoods where the agent operates

  3. Agents' opinions (from IHMS):

     ▶ *Mortgage challenges*: agents report that buyers are facing difficulties securing mortgages

     ▶ *Home price expectations*: agents' projections for property prices over the next 12 months

▶ Estimate

$$p_{jlt}^i = \beta F_t^i \pi + \delta F_t^i \pi * x^i + \zeta_j + \theta_t^i + \alpha_l + \gamma_t + \varepsilon_{jt} \tag{5}$$

Heterogeneous effects on listing prices across agents

	(1)	(2)	(3)	(4)
Inflation expectations	0.021***	0.015***	0.015***	0.017***
	(0.003)	(0.002)	(0.002)	(0.003)
Infl. exp * Low number of housing listings	-0.017***			
	(0.004)			
Infl. exp * Small operational area		-0.012***		
		(0.004)		
Infl. exp * Buyers have difficulties with mortgage			-0.009***	
			(0.003)	
Infl. exp * Expected decrease in property prices				-0.008***
				(0.003)
FE location	Yes	Yes	Yes	Yes
FE time	Yes	Yes	Yes	Yes
Other controls	Yes	Yes	Yes	Yes
Obs.	47970	47970	47425	45531

TOM

Conclusions

Conclusions

1. *Do real estate agents' inflation expectations matter?*

   Yes: agents with higher inflation expectations tend to post higher prices, negatively impacting housing market liquidity

   suggesting that

   i) real estate agents are not fully rational; ii) real estate agents believe in the hedging role of housing; iii) additional channel for monetary policy interventions and communication

Conclusions

1. *Do real estate agents' inflation expectations matter?*

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   suggesting that

   i) real estate agents are not fully rational; ii) real estate agents believe in the hedging role of housing; iii) additional channel for monetary policy interventions and communication

2. *Are effects heterogeneous across markets and agents?*

   Yes: the impact is weaker in more competitive and larger markets and among agents with smaller businesses and pessimistic market views

   suggesting that

   inflation expectations, by affecting relative housing prices, may have distributional consequences

THANKS FOR YOUR ATTENTION

Appendix

Question on inflation expectations in IHMS

▶ Half of the sample:
  What do you think consumer price inflation in Italy, measured by the 12-month change in the Harmonized Index of Consumer Prices, will be one year ahead?

▶ Other half of the sample:
  In the previous month, consumer price inflation measured by the 12-month change in the Harmonized Index of Consumer Prices was [X.X]% in Italy and [Y.Y]% in the euro area. What do you think it will be in Italy one year from now?

Summary statistics on housing listings Back

|	Observations	Mean	Std. Dev.	Minimum	Median	Maximum
PANEL A: HOUSING CHARACTERISTICS						
Price/mq2	60,324	2,150.90	1,531.59	201.61	1,739.13	14,772.73
Size	60,324	128.77	82.84	35.00	105.00	648.00
Floor	54,203	1.64	1.67	-1.00	1.00	21.00
Single-family homes (share)	60,324	0.25	0.43	0.00	0.00	1.00
New buildings (share)	58,784	0.11	0.32	0.00	0.00	1.00
Garden (share)	60,324	0.46	0.50	0.00	0.00	1.00
Terrace (share)	60,324	0.40	0.49	0.00	0.00	1.00
Garage (share)	60,324	0.45	0.50	0.00	0.00	1.00
Elevator (share)	60,324	0.39	0.49	0.00	0.00	1.00
Large city (share)	60,324	0.21	0.40	0.00	0.00	1.00
PANEL B: AGENTS' CHARACTERISTICS BY MARKET AND TIME						
Number of active ads	3,035	49.37	62.41	1.00	30.00	894.00
Number of real estate agents	3,035	3.37	2.65	1.00	3.00	49.00
Number of real estate agents responding to the Inflexp question	3,035	3.05	2.45	0.00	2.00	42.00
Share of agents receiving the information treatment	3,035	0.51	0.19	0.00	0.50	1.00

Summary statistics on real estate agents

	Observations	Mean	Std. Dev.	Minimum	Median	Maximum
Number of local housing markets covered by each agent	1,432	10.6	13.3	1.0	7.0	282.0
Avg. number of new ads posted by each agent every quarter	1,432	45.3	134.0	1.0	29.0	4,731.0
Avg. number of active ads by each agent every quarter	1,432	132.1	400.2	1.0	80.7	14,193.0
Avg. number of price revisions by each agent every quarter	1,432	2.1	7.9	0.0	1.0	278.0
Avg. time-on-market (weeks) of the ads posted by each agent	1,432	33.0	14.8	0.0	32.5	99.0
Standard deviation of floor area of homes advertised by each agent	1,383	65.7	36.4	0.0	59.8	302.6
Standard deviation of prices (/m2) of homes advertised by each agent	1,383	817.9	563.3	7.0	645.8	5,438.0

Information treatment and inflation expectations: quantile regressions

(a) 2022Q4   (b) 2023Q1   (c) 2023Q2
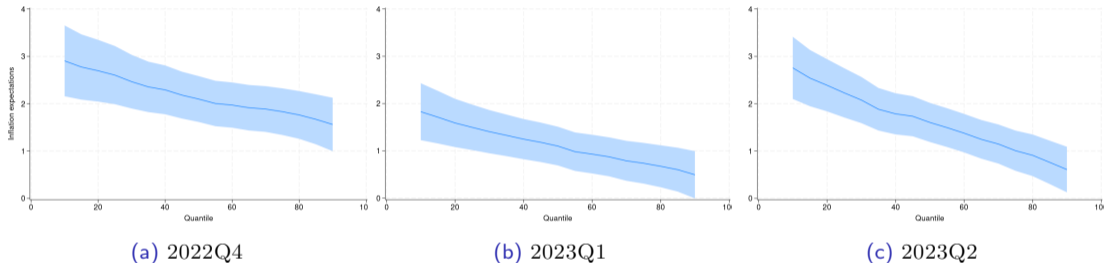
Note: The Figure shows the impact of the information treatment on inflation expectations in the IHMS at different quantiles of the distribution, including fixed effects for the strata (23 geographical areas).

Back

Time-varying impact of the information treatment on inflation expectations
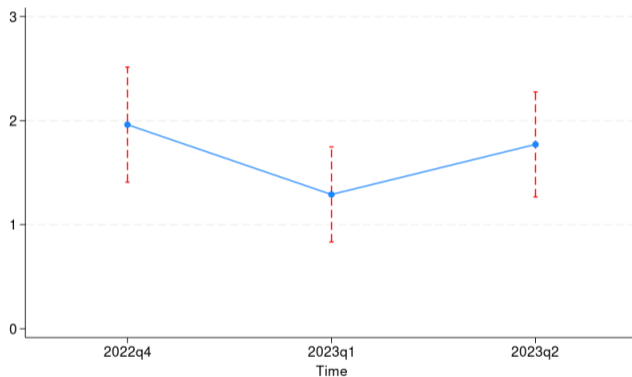
Note: The sample period is 2022Q4–2023Q2. The model includes location-time fixed effects (where location refers to 23 distinct geographical areas), time fixed effects and other controls. Inflation expectations are winsorized at the bottom and top 5%. All estimates use Huber-White standard errors. The vertical bars are 95%.

Back

	Supply (1)	Supply (comparables) (2)	HHI (3)	Demand (4)
Inflation expectations	0.005 (0.011)	0.019** (0.009)	0.098*** (0.019)	0.064*** (0.012)
Infl. exp * High supply of housing listings	0.062*** (0.015)			
Infl. exp * High supply of comparable housing listings		0.036*** (0.012)		
Infl. exp * Low market concentration (HHI)			-0.071*** (0.021)	
Infl. exp * Low avg. demand (clicks per ad)				-0.055*** (0.016)
FE location	Yes	Yes	Yes	Yes
FE time	Yes	Yes	Yes	Yes
Other controls	Yes	Yes	Yes	Yes
Obs.	46129	46129	46129	46129

Heterogeneous effects on TOM across agents Back

	(1)	(2)	(3)	(4)
Inflation expectations	0.013	0.058***	0.040***	0.039***
	(0.011)	(0.009)	(0.009)	(0.011)
Infl. exp * Low number of housing listings	0.045***			
	(0.015)			
Infl. exp * Small operational area		-0.082***		
		(0.019)		
Infl. exp * Buyers have difficulties with mortgage			-0.017	
			(0.012)	
Infl. exp * Expected decrease in prices				0.002
				(0.013)
FE location	Yes	Yes	Yes	Yes
FE time	Yes	Yes	Yes	Yes
Other controls	Yes	Yes	Yes	Yes
Obs.	46129	46129	45600	43724