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Market news and credibility cues improve house price predictions: An experiment on bounded rationality in real estate

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Abstract

We experimentally study bounded rationality in real estate markets by observing the effects of receiving market news and media credibility cues on incentivized measures of house price predictions. Potential market actors read actual news articles about recent house price trends from online news media sources varying in perceived trustworthiness and brand anonymity, and then predicted selling prices of apartments for monetary reward. Boundedly rational actors are expected to make (imperfect) use of public information and rely on contextual ques to infer information quality. Price predictions were in the opposite direction of market trends in a control condition, where no market news was provided. As hypothesized, (1) market news on house price trends increased the accuracy of price predictions, and (2) information from a more credible new medium had stronger effect on price predictions when its brand name and image were made visible. Systematic inaccuracies in price predictions, their improvement with market information, and reliance on credibility cues suggest that the property valuations of non-professional market actors are boundedly rational.

Keywords Bounded rationality; real estate markets; economic experiment; price predictions

JEL classification C90; R31; D84

1. Introduction

The rational expectations and the efficient market hypotheses have been widely studied in financial markets but not in real estate. According to these theories, expectations of market participants and asset prices should already fully reflect all available market information and be consistent with each other (Fama, 1970; Muth, 1961; Sargent, 1972). Research in behavioral finance has soundly rejected these theoretical predictions by documenting the "irrational exuberance" of market actors (Shiller, 2003, 2015). Such behavior can in part be attributed to our bounded rationality (Simon, 1979), the computational and memory constraints of our minds (Isler, 2020). Here, we experimentally study the implications of bounded rationality among non-professional real estate market actors by testing the effects of market news provision and information credibility cues on house price predictions.

1.1 Literature review

Most studies of informational efficiencies in real estate markets rely on correlational analyses that do not allow for causal inference (Herath & Maier, 2015)—a problem that can be remedied by the use of behavioral experiments (Salzman & Zwinkels, 2017). The small number of experimental studies on behavioral real estate found consistent evidence for the non-normative behavior of real estate market actors (Diaz, 1990), attributed to cognitive biases such as herd behavior (Seiler, Lane, & Harrison, 2014), anchoring (Diaz & Hansz, 1997; Diaz & Hansz, 2001), and money illusion (Raftery & Runeson, 1998). These experiments tend to be limited by their reliance on non-incentivized measures, which can introduce noise as well as bias in the measurement of economic valuations (Hertwig & Ortmann, 2001). Here, we present an economic experiment on real estate valuations by eliciting incentivized predictions of actual residential property transactions.

Behavioral real estate research, whether analyzing historical patterns in house prices (Case & Mayer, 1996; Case & Shiller, 1989, 1990) or assessing the predictability of returns to housing investments (Brown & Matysiak, 2000; Clayton, 1998; Quigley, 1999), supports the view that real estate markets tend to be less efficient than financial markets. Although these studies have focused mostly on professional real estate appraisers, developers, and investors (De Bruin & Flint-Hartle, 2003; Herath & Maier, 2015; Salzman & Zwinkels, 2017), non-professionals from the general public also play an important role in property valuations, especially in residential real estate. The economic expectations of these buyers and sellers can be substantially inaccurate due to inexperience and unfamiliarity (Brunnermeier & Julliard, 2008; Diaz & Hansz, 2001; Glaeser & Nathanson, 2015). On the other hand, the underutilization of market information provides room for news provision to improve their price predictions. Our experiment provides the first tests these features of bounded rationality among non-professionals in the Australian housing market.

Boundedly rational actors tend to rely on cognitive shortcuts or "heuristics" to reduce the complexity and difficulty of choice (Simon, 1979). Contextual cues that reliably signal information quality can be particularly useful for this purpose (Dias, Pennycook, & Rand, 2020; Simon, 1956; Vishwanath, 2004). However, trust in news media is eroding rapidly (Gallup, 2019) and nearly seven in ten people around the world worry about receiving news with false information (Edelman, 2019). While the cognitive underpinnings (e.g., Pennycook & Rand, 2019) as well as the political consequences (Dewenter, Linder, & Thomas, 2019) of declining trust in news media are receiving renewed scientific attention,

incentivized experimental measures are yet to be systematically employed in this topic. Therefore, we tested if contextual cues about news media credibility influence economic expectations about real estate.

1.2 Hypotheses

Rational expectations implies that house price predictions accurately reflect all available information and predicts that information that was already in the public domain (e.g., about average house price trends) will have no further effect on price predictions. Instead, bounded rationality implies that publicly available information is not fully utilized among non-professional market actors. For these irregular and boundedly rational actors, receiving accurate information (e.g., reading news about real estate market trends) should improve price predictions—at least up to a point. Based on previous empirical evidence in behavioral finance (e.g., Glaeser & Nathanson, 2015; Shiller, 2015), we expect the rational expectations view to be rejected and bounded rationality to be supported:

Hypothesis 1. *Receiving publicly available information about decreasing price trends in the real estate market will lower house price predictions compared to a control condition.*

Due to bounded rationality, these improvements are likely to be partial. For the same reason, the effect of providing accurate market information is likely to depend on the availability of contextual cues that signal additional information about media credibility. Accordingly, we conjectured that the effect of information depends on the perceived trustworthiness of the news medium as well as on salient contextual cues of trustworthiness such as the news medium brand :

Hypothesis 2. *The effect of market news on price predictions will be stronger for the news medium perceived to be more trustworthy, but only when the brand of the medium is also provided.*

1.3 Summary of results

We found evidence against informational efficiency and rational expectations about house price changes among non-professional market actors in Australia. As predicted, our results indicated bounded rationality among this group: although prior expectations were biased and indicative of incomplete use of the publicly available information, participants updated their expectations in the right direction based on the market news and the medium trustworthiness cues.

2. Methods

2.1 Overview

The study was preregistered at the Open Science Framework (link temporarily removed for anonymity), where the experimental materials, the dataset and the analysis code can also be found. Aiming to detect a small-to-medium effect ($d = 0.15$) in a one-way ANOVA model with $1 - \beta = 0.80$ and $\alpha = 0.05$, we planned to recruit at least 540 Australian residents from Prolific (www.prolific.co). Our dataset includes 539 unique and complete observations. The gender distribution was balanced (45.5% female) and participant ages ranged from 17 to 82, with an average of 32.2 ($SD = 11.7$). Most participants reported holding a bachelor's degree or higher (58.6%), whereas 23.4% reported having a high school degree or less (see Table 1).

Table 1
Participant demographics across experimental conditions

Condition	*n*	Age	Female	Higher education*
Control (C)	109	31.7	45.0%	76.2%
news.com.au without brand (T1)	109	31.8	45.0%	79.8%
news.com.au with brand (T2)	104	32.0	44.2%	78.8%
The Age without brand (T3)	106	32.6	45.3%	74.5%
The Age with brand (T4)	111	33.1	47.7%	73.9%
Overall	539	32.2	45.5%	76.6%

* Participants with educational attainments beyond high school.

2.2 Design

Our experimental protocol is designed to capture the effect of information provision on incentive-compatible measures of future house price expectations, which we use to test our hypotheses on the bounded rationality of real estate. For this purpose, we asked 539 Australian residents—non-professional and potential individual buyers and sellers in the housing markets—to read previously published news articles about house price trends and then to make price predictions about recently purchased apartment units in Sydney, Melbourne, and Brisbane. These predictions were rewarded for their accuracy and compared to a control condition that included an irrelevant news article about interior design.

We focus on the housing markets of the three most populated states of Australia to test our hypotheses. An overwhelming majority (91%) of the residents of these regions report receiving news from multiple news media (Fisher, Park, Lee, & Fuller, 2019), where news about housing price trends regularly draw national attention (e.g., Hewett, 2019). Therefore, Australia provides an appropriate context for testing whether individual investors in residential real estate markets, who are accustomed to regularly updating their expectations and acting on information they receive from the media about house price trends, achieve rational expectations and informational efficiency.

To study the role of trust, we compared two online Australian news sources—*The Age* and *news.com.au*—that substantially differed in perceived trustworthiness in a previous study as well as the present one (reference temporarily removed for anonymity). Participants read a news article on the same Australian Bureau of Statistics (ABS) report about declining house prices (2019) that was covered by either medium. Despite slight differences in their presentation, both articles included the same statistical information released by the ABS.

2.3 Procedures

After receiving informed consent, participants were randomly assigned to read one of five previously published news articles. The control condition (n = 109) included an article about interior decoration, while the experimental conditions included articles about an ABS media release on recent house price trends (ABS, 2019), covered either by *The Age* or *news.com.au* and either with or without the medium brand made visible to readers (*The Age*: n = 111 with and 106 without brand; *news.com.au*: n = 104 with and 109 without brand). The conditions with brand information displayed the official name and brand logo of the news medium. Participants were informed at the beginning of the study that reading the article may help them correctly answer questions that would come afterwards. To further promote reading of the news article, the continue button became available sixty seconds after the appearance of the article on the screen.

Participants then saw in randomized order generic advertisements for three actual apartments, each located in one of the three major Australian state capitals—Sydney, Melbourne and Brisbane. We chose apartments that were recently sold at least twice, once in 2018 and then again in 2019. The advertisements were constructed using publicly available information and included descriptions and photographs, the 2018 selling price as well as any available prior selling prices for the three apartments (see Table 2). Congruent with the news price articles on declining house price trends, the 2019 selling price was lower than the 2018 selling price in all three examples. At the bottom of each advertisement screen, participants were asked to predict the 2019 selling prices of the apartment using a slider. The middle value on each slider showed the 2018 selling price, which would indicate no change in selling prices between 2018 and 2019 if selected, and the sliders ranged from minus to plus 50% of this value to restrict the range of predictions. Although price predictions are likely to be influenced by the previous selling prices shown in the advertisements as well by prior expectations, the comparisons of experimental conditions control for these influences by design.

Table 2
House selling prices shown in advertisements.

Year	Sydney	Melbourne	Brisbane	Average
Older transactions*	415 (2011)	1,000 (2012) 1,000 (2017)	95 (1995) 145 (2000)	
2018	693	940	417	683
2019	675	875	388	646

Note. Prices denoted in thousands of Australian dollars. * Transaction year in parenthesis.

Monetary incentives were used to motivate accuracy in predictions. Participants were informed that at the end of the study one of their three predictions would be randomly chosen for determining their additional earnings. Specifically, in addition to $1.80 (AUD) participation fee, each participant earned $1 bonus if their prediction was within 5% or $5 bonus if their prediction was within 2% of the actual selling price of the apartment. The study concluded with a brief survey.

One of the survey questions asked participants to rate the trustworthiness of a list of Australian news media brands, including *The Age* and *news.com.au*. Responses were elicited using a scale ranging from 1 (“not trustworthy”) to 5 (“highly trustworthy”) and including the option “do not know”. Excluding those who selected “do not know”, the answers to this question was used to test the assumption that *The Age* was perceived to be more trustworthy than *news.com.au*. All hypothesis tests were conducted based on preregistered statistical models that use our key outcome variable—the average of the three predicted 2019 selling prices.

3. Results and Discussion

3.1 House price predictions

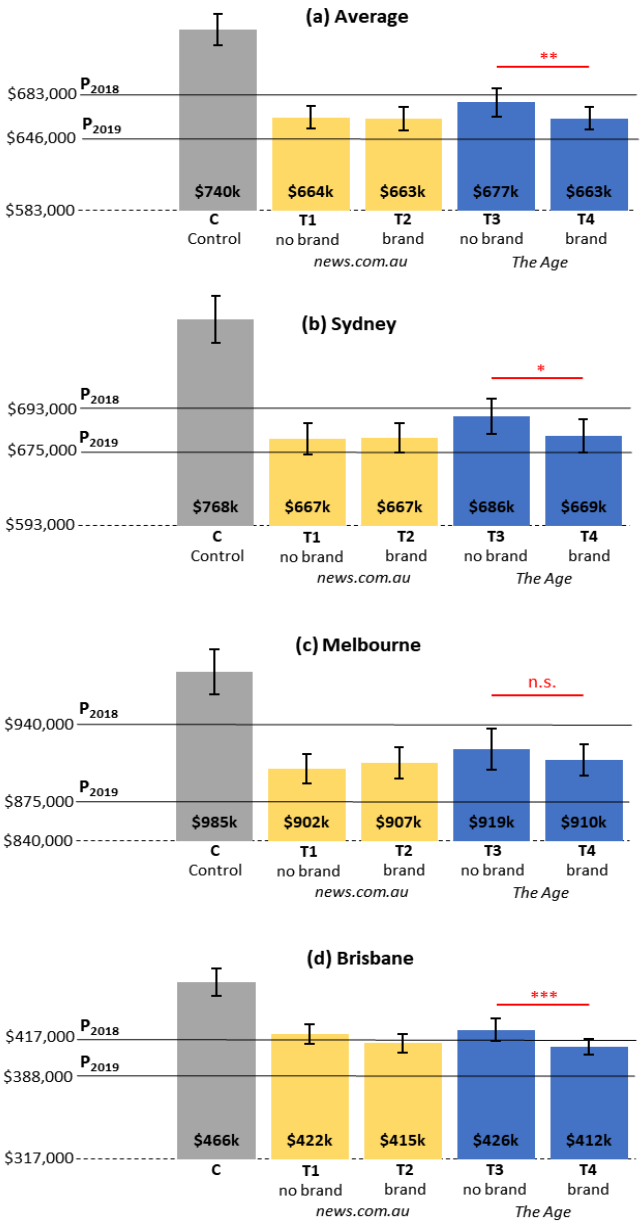

Fig 1. The 2019 house price predictions are depicted in three panels: (a) for the three apartments on average, and for individual apartments in (b) Sydney, (c) Melbourne and (d) Brisbane. Each panel displays average predicted price across the five experimental conditions: Control (C, n = 109), *news.com.au* without brand (T1, n = 109) or with brand (T2, n = 104), *The Age* without brand (T3, n = 106) or with brand (T4, n = 111). Horizontal lines labelled P_{2018} and P_{2019} denote actual house prices in 2018 and 2019, respectively. For clarity, the vertical axes start at $100,000 below P_{2018}. Prices are denoted in thousands (k) of Australian dollars ($). Error bars show 95% confidence intervals. n.s. $P \geq .10$, * $P < .10$, ** $P < .05$, *** $P < .01$.

Each panel on Fig. 1 depicts either the average (a) or individual property (b to d) price predictions made by the study participants for three apartment flats sold in 2019. The two horizontal lines in each panel mark the actual selling prices of these properties in 2018 (i.e., what the participants observe in the advertisements) and 2019 (what they are then asked to predict). Consistent with the overall market trends, these lines indicate the price decreases observed for each property in this period. The bars show participants' predictions of the 2019 selling price for these properties. The gray bars show the control conditions, where participants made predictions without receiving information about the declining

house prices, whereas the colored bars show the treatment conditions that included the market news articles.

Visual and statistical comparisons of the 2019 price predictions in the control conditions with the 2018 transaction prices indicate that study participants on average expected the prices to increase for all three properties from the time they were bought in 2018 to the time they were sold again in 2019 (one sample *t*-tests: all *P*s < .001). These predictions are in the opposite direction of the actual price changes between 2018 and 2019, when the prices of these three properties and the Australian real estate markets in general have declined. The directional error in these baseline predictions is consistent with bounded rationality, but this evidence is suggestive since the property transaction histories in the advertisements (showing a positive price trend for the properties in Sydney and Brisbane) could have influenced the expectations in the control conditions. Nevertheless, the same directional error was observed for the Melbourne property as well, for which the advertisement indicated a negatively trending price history.

Compared to these baseline expectations, and confirming our first hypothesis, receiving information about declining house prices substantially improved the accuracy of economic expectations by reversing predictions to the correct direction. The one-way ANOVA model on the average of price predictions showed a significant main effect of information provision, $F(4, 534) = 34.54$, $P < .001$. As compared to the control condition, average predicted prices were significantly lower in each of the experimental conditions that received housing market news (two-sample *t*-tests: all *P*s < .001). Although the experimental conditions increased the accuracy of predictions, they were still biased in their inaccuracy because participants overestimated the average 2019 prices in all four experimental conditions (one-tailed one sample *t*-tests: all *P*s < .001). These findings support the bounded rationality view.

3.2 Visibility of credibility cues

Based on the survey question that asked participants to rate various news media in Australia, we replicated in our sample of participants the previous finding that *The Age* was perceived as more trustworthy ($M = 3.62$) than *news.com.au* ($M = 2.96$), $t(521) = 9.75$, $P < .001$. In line with our second hypothesis, visibility of information credibility cues tended to strengthen the effect of reading news about declining house prices when the information came from a trustworthy medium. Specifically, readers of *The Age* article predicted significantly lower prices on average when the brand was visible (T4) as compared to the condition without brand (T3), according to a one-tailed *t*-test, $t(215) = 1.71$, $P = .044$. Individual level analysis supports these findings, showing 11 pp decrease in positive price predictions due to brand visibility of the trustworthy medium (see Supplementary Materials).

On the other hand, predicted prices in the condition where participants saw *The Age* brand (T4) were not lower than either of the two *news.com.au* conditions (T1 & T2), as no difference was found between T4 and T1, $t(218) = 0.05$, $P = .961$, or between T4 and T2, $t(213) = 0.06$, $P = .956$. However, in contrast to the test of difference between T4 and T3 that isolates the effect of branding in the more trustworthy medium, the comparisons of T4 with T1 and T4 with T2 may have also been influenced by the slight differences in presentation between *The Age* and *news.com.au* articles. Overall, these findings suggest that boundedly rational participants rely on information quality cues such as brand names of the news media to evaluate the quality of the information they receive.

4. Conclusion

We experimentally studied bounded rationality in real estate through a novel application of incentive-compatible house price predictions. We found evidence supporting the idea that non-professional real estate actors in Australia exhibit bounded rationality: they exhibit substantial inaccuracies in their economic expectations, make (imperfect) use of market information and rely on information credibility cues in their housing market price predictions. Since our focus on non-professional market actors limit the generalizability of our findings, our experimental protocol should be tested in future studies among more experienced and professional actors such as corporate investors and real estate appraisers.

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