Heuristics and Behavioral Biases in Residential Real Estate Markets

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September 30, 2020

Abstract

Behavioral economics has provided numerous insights into typical consumer markets and policy intervention, but a unique market to explore is that of residential real estate. The structure of the housing market presents various behavioral implications to consumers, many of which are premised on reference points from prospect theory. This paper investigates heuristics and biases on both sides of housing transactions. Specifically, the presence and impact of the anchoring heuristic and status quo bias are analyzed for buyers, while loss aversion and endowment effect are discussed for sellers. A hypothetical website is proposed as a solution to combat irrational behaviors in order to improve market efficiency and economic impacts.

1 Introduction

The structural components of the real estate market make individuals highly susceptible to heuristics highlighted by behavioral economics. Systematic biases occur in decision-making as a result of the market's built-in complexity, high stakes and involvement, scale, subjective valuation, lack of feedback, and tremendous uncertainty [W$^+$14] [D$^+$03]. The majority of consumers are uncertain of their housing preferences and have little opportunity to reverse decisions or learn from experience [TS08]. Adding to the consumer burden is the vast difference between the market for real estate and product markets, where goods are homogeneous [W$^+$14]. In addition, unlike real estate for financial investment, interactions between buyers and sellers in residential housing markets involve significant emotional attachment and an intuitive basis that underlies the choices of the decision-maker.

Both parties face heuristics that alter the perceived value of property. Buyers anchor to the asking price, which harms their positions in negotiations. The status quo bias, or preference for the current state, leads to decreased demand and suboptimal decisions. Meanwhile, sellers experience loss aversion and the

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endowment effect, causing them to overvalue their properties and resulting in negative economic implications.

2 The Real Estate Context

This paper primarily focuses on the American residential real estate market in metropolitan areas. However, findings and evidence interconnect with international settings. Metropolitan areas are popular amongst consumers and first-time buyers.[1] According to data provided by the Zillow Group's Consumer Housing Trends Report, first-time buyers constitute 46% of homebuyers, a substantial portion of demand. In this group, 43% prefer suburbs, 40% choose urban areas, and only 17% select rural areas. Of repeat buyers, 52% prefer suburbs, 22% choose urban areas, and 25% select rural areas [zil18]. The high composition of inexperienced buyers in metropolitan markets enables a clearer realization of the influence of heuristics.

To carefully analyze behavioral biases in the residential housing market, I begin by substantiating unique characteristics of the context, consumer, and reference points. These will provide greater insight into the mechanisms that oppose assumptions by neoclassical economics.

2.1 Complex and Inefficient

Residential real estate is distinct from other marketplaces as a result of several notable factors. Its complexity arises from heterogeneity amongst homes considering both internal and external elements of property, with several academics exploring this concept [SL06] [W$^+$14]. Real estate also requires high involvement and high stakes, as it is the single largest expenditure in consumer budgets [SZ13].[2]

A large majority of partakers are amateurs, amplifying inbuilt uncertainty. Case and Shiller quantified inaccuracy in market predictions by surveying individuals in various US metropolitan cities, "On average, how much do you expect the value of property prices to appreciate over the next year?" Respondents predicted a growth of 38% in real terms, though the actual rise was only 5.7% [CS03]. Impractical forecasts of future capital appreciation and price rise exemplify that individuals navigate the complex housing market with great uncertainty.

Numerous papers have analyzed inefficiencies resulting from biases in the housing market. One issue occurs due to rising prices and excessive public optimism regarding future price increases. For instance, households purchase property with hopes of compensating their savings with the expected increase

[1] A metropolitan area is a "core area containing a large population nucleus, together with adjacent communities that have a high degree of economic and social integration with that core" [Cen18].

[2] Furthermore, impacts from this immense aggregate market spill over to the rest of the economy, as exemplified by the 2008 financial crisis [SL06].

in prices. Meanwhile, first-time buyers may purchase fearing a lack of affordability in the near future [CS03] [W$^+$14]. These irrational behaviors form bubbles, periods where the market value of an asset greatly exceeds the intrinsic value [GM01b]. According to the Efficient Market Hypothesis from neoclassical economics, bubbles cannot exist because the laws of supply and demand account for factors like risk to correct market price.[3] Inefficiencies like bubbles prove irrationality in decision-making, and understanding heuristics is key to comprehending economic implications.

2.2 Consumer Behavior

Integration of consumer behavior and heuristics can improve market predictions and consumer utility [GN03].[4] The need for residential mobility is formulated by dissatisfaction arising from changes in an individual's income, job, commute, or family structure. As a result, the consumer searches for alternatives to the status quo while considering different property attributes. Complex decision-making in real estate transactions causes consumers to form intuitive beliefs and emotional associations during evaluation of the consideration set, or available satisfactory options [SZ13]. To choose between alternatives, consumers integrate several decision rules. Common processes include a non-compensatory rule, which is a cutoff funneling the consideration set, as well as complex compensatory rules, or comparative weighing of attributes [GN03]. Consumer rankings regarding the importance of various attributes reveal values and expectations, which serve as reference points.

2.3 Reference Points

The biases discussed in this paper are based on the concept of reference points from prospect theory, as opposed to the standard expected utility model. Individuals are more sensitive to losses than to equivalent gains by a coefficient of 2, which the hypothetical individual value function reflects [C$^+$04] [Kah11]. Because the impacts associated to losses are steeper than equivalent gains, people seek risk to avoid losses and become risk averse in the gain domain [KT79] [GM01b] [BG16]. Behavioral economics argues that for indifference curves, the utility derived from a particular state depends on one's initial reference point. This is formed by previous experience, history, and adjustable tastes [Kah11]. The value function is determined by changes to the reference point, or status quo, in wealth or condition. This is because humans judge situations based on difference. For example, response to stimuli like temperature is formulated in re-

[3] The theoretical neoclassical argument is that rational agents should know when prices are rising and sell before the visible bubble burst. Yet since all rational agents would already predict the burst, a bubble could not occur [Sti90].

[4] Many papers argue for the incorporation of consumer search behavior into financial analysis of the housing market. For instance, several scholars argue that to produce accurate valuations and avoid confirmation of bid price, appraisers should account for prominent buyer preferences, such as the economic sustainability of property assets [D$^+$03] [B$^+$03].

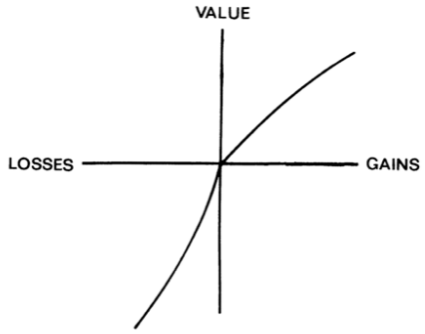

Figure 1: The hypothetical individual value function

lation to the current reference point for that attribute. This basis of perception also pertains to economic stimuli [KT79].

Reference points are especially dynamic and important in the housing market.[5] An interesting instance is observed in out-of-town buyers. Individuals from more expensive areas bid higher and rent more costly properties than those from cities with a lower cost of living. Nevertheless, individuals eventually adapt their reference points to the norms of local pricing [SL06]. Another demonstration of reference points is on the seller's side. Homeowners estimate their property value based on purchase price, a number reflecting the economic context of the past [PC11].

Based on research by Paraschiv and Chenavaz in reference points of real estate transactions, general assumptions underlie heuristics analyzed by this paper. One, recent information significantly influences buyers in both loss and gain domains [PC11]. Two, sellers rely more on past purchase price than future price expectations. Between buyers and sellers, arbitrary reference points are substantially different. As a result, biases stemming from value gaps see an intensification of economic outcomes [BG16] [W$^+$14].

3 Heuristics and Biases of Home Buyers

Developing expectations, emotional attachment, and reference points simultaneously influence buyers' decisions. To begin, I examine the effect of the anchoring heuristic and status quo bias on buyer behavior in the residential real estate market.

[5] Bao and Gong argue that reference points vary throughout economic intervals in the property market, which affects the extent of heuristics during different time periods [BG16].

3.1 Anchoring

When presented an initial starting point, humans compute estimates to a given context by using the provided value, which is formulated either by the problem or by partial computation. People subsequently adjust the anchor accordingly in order to produce the final judgment. However, determinations are biased because adjustments to the anchor are insufficient, and individuals deny the influence of an anchor on their judgments. This builds the basis of the anchoring-and-adjustment heuristic discovered by Kahneman and Tversky [KT79].

This heuristic is present in the residential housing market, as "the fair market value (FMV) of a piece of property is not objectively determinable" [NN87]. Placing an offer for a house involves a great deal of uncertainty for the buyer due to the guesswork required to determine the seller's reservation point and target point in negotiation. The reservation point is where the seller is indifferent about accepting or rejecting the offer, and the target point is the seller's most preferred outcome. As a result, buyers resort to the anchoring-and-adjustment heuristic unconsciously. The asking price serves as the anchor and first offer which the entire negotiation is premised upon [GM01a]). An anchor benefiting a particular party results in better negotiation outcomes for that party. In the residential housing market, sellers always present the anchor through asking prices. Buyers are unable to form independent objective evaluations of properties and attributes. Instead, they communicate their perceptions of value through differences or partial computational adjustments to the listing price. Insufficient adjustment creates distorted valuations. Due to anchoring, buyers fail to produce optimal and advantageous offers, resulting in less favorable transaction outcomes.

To analyze the anchoring heuristic in the residential real estate market, Northcraft and Neale conducted a between-subjects field experiment with actual property listings. Subjects included expert real estate agents and undergraduate business students. Since participants were local, they were well aware of proximity and quality of amenities in the area. During the experiment, subjects toured and received information about the residential property to be evaluated. They also received listing and transaction information about similar properties in the neighborhood. Northcraft and Neale configured the listing price for the property whose value was to be determined. They found that when the listing price was higher, subjects valued the property more. The results showcase a causal relationship between listing price and anchoring. Intriguingly, experts and amateurs experienced the heuristic to a similar extent. However, experts were more likely to deny usage of listing price as a factor in decision-making [NN87].

Other academics reiterate that the factor responsible for anchoring is asking price. Black et al. argues that even when contradicting market data is available, property students and experts excessively depend on asking price and produce inaccurate valuations. The results are replicated using treatment dimensions of incentives. In addition, using property professionals as subjects, a study questioned the importance of asking price versus seller's initial purchase price to buyers. Buyer property pricing was influenced substantially more by compara-

tively higher asking prices than the seller's initial purchase price [B+03].

The anchoring heuristic has tremendous economic implications for buyers, contributing to an inefficient residential real estate market. Sellers are able to exploit the anchoring heuristic to manipulate buyers' valuations, reservation points, and negotiation outcomes. Even if buyers are made aware of the anchor, they do not know how it restricts and influences their judgments. People cannot re-imagine the outcomes of duplicate scenarios without the anchor [Kah11]. If buyers unknowingly conform their offers towards the seller's asking price, then the transaction price departs from the true value. Market equilibrium is not taken into account during negotiation. For reasons explored further in this paper, sellers overvalue their properties, so buyers unconsciously pay more than they would if there was no anchor. Because the price elasticity of demand for property is altered, the equilibrium between supply and demand is distorted. Therefore, even if the buyer and seller manage to transact in the market, the final transaction does not reflect the intrinsic value of the property. Buyer utility is not maximized, which opposes a criterion for efficient markets. Within a fixed budget constraint, the buyer pays extra for the same amount of utility, reducing marginal utility per dollar. The trade-off regards money that potentially goes towards savings or alternate investments. Decreased marginal utility for the home purchase creates imbalance in opportunity cost computations. The most optimal combination, or adaptation of market basket, is not chosen. In fact, decreased marginal utility per dollar is exacerbated by buyer regret, or realization that the purchase was not a good bargain.

On the aggregate scope, scarcity is not handled efficiently. It is crucial to design strategies that generate greater buyer satisfaction on an individual level while preventing macroeconomic anomalies. Clearly, expertise and experience do not overcome the anchoring heuristic [NN87]. However, a promising strategy for real estate decision-making is "'considering the opposite.'" Individuals should actively search for information that is inconsistent with their current beliefs [GM01a]. Normally the intuitive system rejects information that does not comply with existing knowledge, since opposing warrants eliminate associative coherence and ease. However, because the intuitive system ignores crucial information against the anchor, a solution must induce buyers to intentionally search for evidence contradicting the listing price [Kah11]. For instance, sellers are too optimistic about their reservation points, or best alternatives to accepting a negotiation. Buyers need to preempt this behavior and identify what they can realistically gain, as this information is inconsistent with the anchor.

Another process-oriented principle is joint evaluation of properties. Although buyers have specific criteria, they should look at homes of varying styles and price ranges in the neighborhood of interest. Unlike single evaluation, different characteristics become more salient during joint evaluation [Kah11]. Some homes will highly comply or contradict with the buyer's requirements, serving as extremes in the decision-making process. Through more variance, evaluation becomes multidimensional and allows for a broader perspective. The buyer can then evaluate properties accurately through comparison of attributes rather than anchors.

I propose a residential real estate website, hypothetically named *NoBiasHomes.com*, as a solution that combines these two strategies to prevent the anchoring effect. This platform is designed to correct buyer thinking right from the preliminary search, which starts online. The website would act similar to those such as Zillow, Redfin, Trulia, and Zoopla UK. However, by default, it would not immediately display asking prices of listed homes. Instead, *NoBiasHomes.com* would require buyers to input pure estimates of home prices during the online search. After an evaluation is submitted, the listing price of the home would instantly appear. This feature prevents buyers from anchoring to seller listing prices, as they are not presented until the buyer evaluates the home solely based on its appearance, attributes, and other common factors. In addition, when a buyer sees discrepancy between the pure estimated value and listing price, one intuitively seeks associative coherence to fill in contradictions or gaps. Due to seller's biases discussed in later sections, the buyer's assessment is lower than the seller's asking price. This results in an implementation of considering the opposite, as the buyer validates one's original estimate. This mitigates anchoring because it prompts the individual to actively account for information against the anchor.

Another critical function of the proposed website is to collect the pure value estimates that each and every buyer submits. The average of the aggregated online evaluations provides key insight about how much other prospective buyers value a property. This metric is free from interference of an anchor that disrupts market value. Like the asking price, this information is presented after one submits a quick estimate for the selected home on the website. Aggregated averages of a wide audience add credible information to searching buyers, increasing joint evaluation in pricing. This is especially useful for new buyers who are unaware of the pricing dynamics of the market. By observing the majority view on a home's price, they learn and implement more effective and accurate pricing strategies. The hidden nature of the asking price, aggregated estimates, and algorithmic predictions prompts buyers to spend extra time examining homes in various styles and budgets, paving more holistic decisions.

A possible issue is that viewers of online property have different tastes and preferences, so an average of their pure estimates may not apply to authentic prospective buyers. However, the market value is derived from a majority. The metric contributes an additional viewpoint in the strategically induced joint evaluation. Buyers are directly aware of the characteristics, popularity, and value of the areas they are interested in. *NoBiasHomes.com* incites comparison in the buyer mindset, which allows them to correctly pinpoint how much they are willing to pay for their needs. The website on a large scale will correct market distortion and make buyers less susceptible to the anchoring heuristic.

3.2 Status Quo Bias

As per earlier discussion, behavioral economics uses the status quo as the reference point to which all other options are evaluated in accordance with [PC11]. Advantages of alternatives are considered gains while disadvantages are losses.

People weigh losses more than gains, inciting a preference for inertia in maintaining the status quo or default option [K+91]. This phenomenon is called the status quo bias. It is reinforced when many complex choices are available due to the cognitive costs of evaluating each one [Kah11]. In the housing market, the default choice is to stay because the status quo encompasses the current features of one's neighborhood and residence.

The status quo bias is prominent in residential community preferences. For example, Pew Research Center's Social and Demographic Trends Project finds that 63% of US adults were unlikely to relocate to another community if given the chance. Meanwhile, those who would relocate indicated that they would move to a very similar community. In fact, 64% of suburban individuals and 69% of urban dwellers in this group preferred staying in metropolitan areas [H+18]. Even when retention of the status quo is impossible, individuals still demonstrate effects of the bias which contaminate decision-making between the other options. For instance, consider the following question by Tversky and Kahneman [TK91].

Imagine that as part of your professional training you were assigned to a part-time job. The training is now ending, and you must look for employment. You consider two possibilities. They are like your training job in most respects except for the amount of social contact and the convenience of commuting to and from work. To compare the two jobs to each other and to the present one, you have made up the following table:

	Social contact	Daily travel time
Present job	isolated for long stretches	10 min.
Job *x*	limited contact with others	20 min.
Job *y*	moderately sociable	60 min.

Figure 2: The Status Quo Bias Scenario

In version 1 of this experiment, the current job was inferior in terms of social contact and better in commute. Because Job X had better commute than Job Y, 70% of subjects selected Job X. In version 2, Job X and Job Y were still the same. However, the present job was construed as "'much pleasant social interaction and 80 minutes of daily commuting time.'" The relative favorability of the reference points was reversed, so preference for Job X significantly plunged. Only 33% of participants chose Job X in version 2 because social contact for Job Y was substantially better. This experiment demonstrates that consumer preferences are dependent on the status quo because "subjects are more sensitive to the dimension in which they are losing relative to their reference point" [K+91] [TK91]. Individuals prefer as minimal change as possible.

Although this phenomenon is not directly quantified in real estate, it is highly transferable and applicable to the residential housing market. Jobs mirror property in that they encompass multidimensional factors involving complex, dynamic, long-term, and high stakes components that must be assessed.

In the job market, prospective job applicants consider diverse elements including salary, commute, social interaction, benefits, and workplace environment. Likewise, buyers in residential real estate markets must evaluate extensive characteristics such as location, amenities, property condition, and financial factors. In addition, both jobs and homes foster personal identity and self-esteem among individuals [Fry06] [GN03]. The similarities in attachment and magnitude between choices regarding jobs and homes indicate that properties are judged with respect to the status quo. In fact, inertia to move is largely magnified by the endowment effect, or the tendency to overvalue one's current position, as explained later.

The status quo bias indicates that people prefer familiar choices [S$^+$08]. This preference is partially derived by rational explanation, regarding the cognitive costs associated with analyzing alternative options. However the primary reason is avoidance of regret [SZ13] [SZ88]. Seiler et al. argues that familiarity with current position leads individuals to falsely interpret the status quo as a safe choice. Meanwhile, other options are seen through a lens of worse-case scenario. As a result, the status quo appears more favorable [S$^+$08]. For example, a prospective buyer may delay purchase fearing the pain of losing current features like proximity to amenities and neighborhood atmosphere. Anticipation of emotional burden and financial worries of market turns induce buyers to prefer the status quo.

Buying a house is an irreversible decision with tremendous implications extending to finances, social life, and self identity. As a result, regret is magnified. Regret is the emotion of "wanting to undo one's mistakes" when an action deviates from the status quo or norm [Kah11]. Consider a question posed for an analogous, less binding context:

Paul owns shares in Company A. During the past year he considered switching to stock in Company B, but he decided against it. He now finds that he would have been better off by $1,200 if he had switched to the stock of Company B. George owned shares in Company B. During the past year he switched to stock in Company A. He now finds that he would have been better off by $1,200 if he had kept his stock in Company B. Who feels greater regret?

A whopping 92% of participants answer George [Kah11]. Even though both Paul and George are now in identical positions, George feels more regret because he intentionally acted away from his status quo. Homebuyers experience similar regret and emotional responses when they make decisions against inaction, which is the default option [SZ88]. Fear of regret amplifies the status quo bias [Kah11]

The status quo bias has clear economic implications in the market. A preference for the status quo means that the residential housing market experiences lower demand. Even when utility for a buyer would be maximized elsewhere, the individual sticks to the current residence. This occurs because the status quo appears safer and due to avoidance of regret [SZ88] [S$^+$08]. Unwillingness to change to maximize utility reduces transactions and creates a void between buyers and sellers. To solve this void, I suggest expansion of functionality on the hypothetical website *NoBiasHomes.com*. Two types of solutions will minimize

the status quo bias when implemented, including default options and conformity.

The hypothetical website assumes that a user visiting the website is potentially interested in purchasing property, and it occasionally shows a window asking the user for their search intention. The question posed would be "Is your current residence meeting enough of your needs?" The answer choices would be "A new home will be an upgrade to my existing residence" and "I am just browsing/unsure." The default option on the website is the first choice, and people would only need to click once to change the selection. The information on the site is the same regardless of which option is chosen. Rather, the purpose of the window is to nudge indecisive buyers to confront the status quo bias.

This mechanism is similar to the popularly cited organ donation experiment. Respondents decide whether they want to be organ donors, and a single click allows them to make the decision in an experimental questionnaire. Results show that even with as minimal cognitive effort as a single click, individuals strongly stick to the default option. The influence of defaults is clear in the wide gap of organ donation consent rates between countries where donating is the default option, as compared to where it is not [JG03]. People feel that "default options come with an implicit endorsement from the default setter" [TS08]. The application of this perception helps uncertain buyers commit to purchasing and choosing optimally. Some may argue that this is a trivial nudge because pop-up windows may be ignored. A complementary algorithmic suggestion is implemented to help the user decide whether a purchase is recommended. The website would request the current address and other optional objective information requirements. While users can input travel time on websites like Zoopla UK, *NoBiasHomes.com* would expand the concept. Buyers could input more details, such as the number of kids, number of family members, commute, job opportunities, and other consumer values. The algorithm would compare different aspects based on the user's situation to produce a cursory recommendation. Consider a situation in which the buyer has several kids. In this case, the algorithm would calculate the average square foot per capita in the area and would compare if the current space is sufficient. This would be combined with information regarding the quality of school districts and green space, like local parks and amenities. A possible recommendation might be a larger home in an alternative neighborhood. Even though an algorithm cannot produce a perfect recommendation, the system allows users to consider additional advantages of alternatives or disadvantages of the status quo that were previously overlooked.

Another applied tool is social conformity to prevent borderline buyers from sticking to the status quo. Thaler and Sunstein discuss conformity as a solution to tax compliance, environmental policy, and energy consumption [TS08]. Replication in the real estate context would benefit buyers. Social and cultural norms nudge people towards decisions against the status quo bias. An experiment found that people actually adjust their values to fit into society. Given the options of "'economic recession, educational facilities, subversive activities, mental health, and crime and corruption,'" participants were asked, "'Which one of the following do you feel is the most important problem facing our country today?'" Only 12% selected subversive activities when asked

individually. However, in a group with an unanimous consensus, 48% of people followed suit [TS08]. Implementing social conformity would encourage buyers to consider different values as they search in different locations, since the housing market is heterogeneous.

The buyer inputs the current zip code on *NoBiasHomes.com*, which the website uses to display testimonials from other individuals who moved away to substantially different neighborhoods or environments. This setup is similar to that of Trulia, another real estate website. Testimonials exhibit the promising features of other environments, which are overlooked during the decision-making process due to the status quo bias. By explicitly highlighting beneficial values of alternative options and creating positive scenarios, the neighborhood testimonials prompt buyers to compare the status quo to alternatives with a unique perspective. Since salient aspects are highlighted, this principle exploits the representativeness bias [TK74]. It induces buyers to compare options on the same scale, minimizing flawed intensity matching [Kah11]). This design works through the mechanism of conformity, which makes buyers more willing to change their position.

4 Heuristics and Biases of Residential Property Sellers

Homeowners of residential property experience different heuristics and biases from buyers due to the opposite position in negotiation and distinct reference points. I focus on sellers that directly consume their properties.

4.1 Loss Aversion

Loss aversion describes how displeasure associated with loss is more extreme than pleasure from equivalent gain [Del09] [K$^+$91]. For sellers, the effect stems from a very salient initial purchase price, inducing the sunk cost bias. Owners hook to the price paid in the past instead of the current market value [PC11]. This behavior counters assumptions of rationality from standard economic theory, which states that individuals ignore the sunk cost and focus on the present value. Loss aversion is observable through seller inflexibility in dropping home prices. An experiment found that while buyers are willing to spend an average of 4.3% more than the mean market value, sellers will only budge 1.8% below the average market price. The narrow range of satisfactory pricing exhibits aversion towards lowering prices and facing losses [PC11]. Sellers anchor on the original purchase cost when setting an asking price for their property. To avoid nominal losses, they become more risk-seeking in the loss domain. People are extremely sensitized to nominal differences over real differences, which are prices adjusted for inflation. Loss aversion incites an overvalued asking price from sellers, as they attempt to seal their mental accounts with nominal gains, with the risk of not transacting [Del09] [E$^+$08].

Genoseve and Mayer explore loss aversion in an observational study of sellers of Boston condominiums. When the nominal expected selling price was lower than the initial purchase price, the homeowner felt a loss in the mental account for housing. As a result, the seller's asking price surpassed other listings by 25% to 35% of the difference between the purchase price and expected selling price [GM01b]. Due to the diminishing sensitivity in prospect theory, sellers with a comparatively smaller loss marginally increased their asking prices more. Another study conducted in Finland found similar results. Sellers facing losses generally transact exactly at their purchase price to break even in their mental accounts [E$^+$08]. Owner-occupant sellers display twice as much nominal price loss aversion as investors [GM01b]. The impact is that these sellers keep their homes on the market significantly longer and contribute to inefficient property liquidation [Kau11] [PC11]. For example, according to Zoopla UK, homes in London that were overpriced took 71 days to sell. This is 3.5 times as long as fairly valued homes, which took 19 days [Lew20]. Not only did this occur in London, a metropolis, but also other cities, with respective data shown below.

Increase in time to sell by city

City	Overvalued by	Increase in time to sell *(compared to market average)*
Sheffield	**12.7%**	**35 weeks**
Huddersfield	5.6%	21 weeks
Rotherham	4.9%	26 weeks
Barnsley	4.6%	17 weeks
Chesterfield	4.2%	26 weeks

Figure 3: UK Cities Valuations and Time to Sell

As length of time on the market increases, transaction outcomes become less favorable for the seller because the home loses its perceived value to prospective buyers. Hence, when sellers overvalue their homes and wait longer for a sale, they harm their ability to capitalize on a transaction. In fact, fairly valued homes yielded nearly $25,000 more than overvalued homes in several regions of the UK [Lew20]. This difference demonstrates that unrealistically priced property results in a lower selling price. Although some cases have shown that pricing property above market value may result in higher selling prices, the risk of no transaction is significant. Sellers take this gamble due to loss aversion, as they seek risk to avoid nominal losses. Instances of overvalued properties selling for higher prices solely stem from interaction with buyer heuristics. Specifically, a new buyer may anchor to the asking price of a loss-averse seller and pay more than equilibrium.

Loss aversion explains why major price falls are rare in metropolitan residen-

tial real estate markets due to price stickiness. When housing economies face declines or stagnation, more sellers face potential losses. However most tend to be loss averse in lowering prices [GM01b]. This negatively impacts transactions because even though supply is abundant and demand is constant, behavioral biases prevent market equilibrium from being achieved. Loss aversion consequently harms transaction volume. Framing the loss scenario differently can solve this issue. Nominal loss can be rephrased from a negative mental account to a cost for guaranteeing a certain gain or transaction outcome [TK85]. In addition, broad framing reflects clarity and practicality to sellers by accounting for external market data. Different features become salient, which reduces focus on past purchase price. Further research is needed regarding framing in the residential real estate market. Solutions to loss aversion along with endowment effect are detailed in Section 4.3.

4.2 Endowment Effect

Owner-occupant sellers are emotionally attached to their properties due to long-term connection and consumption. In fact, residential homes exhibit self concept, the idea that consumers purchase goods that they believe are consistent with their ideal selves [GN03] [SZ13].

The endowment effect highlights the reluctance to give up a good or asset after consumption and perceived ownership [Kah11] [K$^+$91]. Standard economic theory assumes that the willingness to pay (WTP) is equivalent to the willingness to accept (WTA). In other words, the amount that one would pay to acquire an item should be equivalent to the amount one would accept to give up the item after possessing it. However, the endowment effect shows that WTA is higher than buyer WTP [BG16]. This phenomenon results from loss aversion and the varying reference points for buyers and sellers. When evaluating an item, buyers focus on the pricing aspect of what they forego. In the real estate market, they also stress lost social connections and moving costs. Meanwhile, owners feel the loss of their property's benefits. Positive features are more salient for the seller during the valuation, which elicits an endowment effect [CA00].

A famous example of the endowment effect is the university mug experiment with 44 students. Half the students were randomly given mugs and became sellers, while the other half of students were buyers. Based on neoclassical economics, about 50% of the possible transactions should have occurred, or in this case, 11 trades. However, mug-owners substantially valued their endowed mugs more than buyers. The WTA exceeded the WTP, respectively \$5.25 to \$2.75. In a subsequent setup, people were divided into three groups, Sellers, Buyers, and Choosers. Sellers were given a mug and stated their minimum selling price. Buyers stated their maximum buying price for a mug. Choosers decided between receiving a certain amount of money or a mug. The median prices were respectively \$7.12, \$2.87, and \$3.12. Although the Choosers were essentially in the same position as Sellers, their prices resembled those of Buyers. This reveals that the low volume of trade is caused by the seller's endowment effect, manifested in an overvaluation of what they already possess [K$^+$91].

Mugs do not equate to property, however, the endowment effect in this experiment translates to the housing market. Individuals are far more attached to their homes, which are connected to identity, than to easily replaceable commodities. Higher stakes, more commitment, and longer consumption periods amplify the endowment effect in the residential housing market.

Indeed, endowment effect has been discovered directly in the housing market as well. A field experiment conducted in China found that WTA was greater than WTP. Sellers exhibited an endowment effect even though 68% of participants had previous experience in the market. These results are very relevant for this paper, as my focus is first-time participants with little experience [BG16]. As demonstrated with the mug experiment, this results in a lower volume of trade, which threatens the economic principles and functioning of the market.

The rational Coase Theorem states that if individuals and firms are free to bargain without immense transaction costs, then the final allocation of resources should be independent of initial property rights. Resources should end up to their most effective use regardless of the starting point. However, the endowment effect contradicts this theorem. If endowment affects the marginal rate of substitution between goods, then an individual with assigned property rights to a good will be more likely to retain it. The economic impacts of contradiction to the Coase Theorem are market deterioration, under-trading, and inefficient allocations. If scarcity is not managed efficiently, then resources are not optimized and utility cannot be maximized.

Many neoclassical economists argue that experimental results from behavioral economics do not maintain external validity. However, external validity is enhanced in economic decisions regarding housing purchases, since anonymity is imperfect and experience is extremely limited [Del09]). In fact, consumers lack the opportunity to learn from immediate feedback. There is no practice to improve outcomes— the real estate market does not serve as the perfect economic environment [TS08]. Thus, the endowment effect, which can be cured by experience in a market, is difficult to mitigate in residential real estate. The gap between WTP and WTA fundamentally affects liquidity of property transactions and housing cycles.

The endowment effect is substantial, and people face egocentric empathy gaps. Even when encouraged to take the other side's perspective in negotiation, people overestimate the similarity between their own valuation and the other party's estimate. In the home negotiation process, sellers overestimate buyer's maximum purchase price due to their view being contaminated by the endowment effect. Meanwhile buyers are unable to comprehend the endowment effect and underestimate the seller's lowest possible selling price. As a result of the large gaps in estimated WTP and WTA, negotiations result in no consensus and loss of profitable transactions. Experimental efforts find that perspective-taking, even from agents who must settle transactions, often yields difficult bargaining [B$^+$00]. Hence, an effort to prevent sellers from experiencing the endowment effect is necessary.

4.3 Inhibiting Biased Behavior in Sellers

Both behaviors for sellers occur due to a lack of experience in the residential housing market [TS08]. With increased functionality, *NoBiasHomes.com* can counteract loss aversion and the endowment effect. The solution I propose is composed of three complementary parts that highlight key pricing and market information to sellers.

Imagine Sara Seller, a metropolitan homeowner listing her property on *NoBiasHomes.com*. In a process similar to popular property websites, she enters her address and other relevant information, including her home's characteristics and amenities. The website then uses her property location to extract the price trends of homes in her area over a period of one year. This graphical data is a visual tool for Sara Seller to clearly contextualize her local housing market.[6]

"A picture is worth a thousand words" is vital in the economics of residential real estate in establishing market context for individuals. The seller mathematically and intuitively observes price movements and market behavior that fill in gaps of uncertainty. This link is especially crucial in down markets, where more sellers face losses to their anchors of initial purchase price. In addition, the visualization tool presents forecasts of market behavior over the next 3 months, guiding sellers in deciding when and at what price to sell. When the pricing trend is declining, sellers who realize that their losses will almost certainly worsen would be more willing to sell immediately. This is because the graphical presentation portrays approximate forecasts of home prices, instead of probabilities of market health.

The difference is crucial. When making gambles involving probabilities, individuals in the loss domain are risk-seeking. Sellers avoid selling when losing relative to initial purchase price. They gamble with probabilities of the market turning for the better. However, the visualization tool does not present market health and trends in terms of probabilities. Instead, it conclusively displays the market trending upwards or downwards using algorithmic estimations based on market data. Essentially, the expected value is reported. This creates the impression that the market behavior is more certain than in the former probabilities situation. As a result, when market prices are declining, the seller is choosing between the current loss or a larger future loss. This stops the seller from waiting for losses to recover for too long, preventing the disposition effect. Thus, the website implements a visual that reports estimates resembling expected value as opposed to pure probabilities. This portion of the solution eliminates risk-seeking behavior observed through loss aversion and endowment effect.

Once the design integrates market trends into Sara Seller's mindset, the website gives her an opportunity to try pricing homes in her local market. Using her address, the website provides five recently sold properties within a 2-mile radius of her home with similar attributes. All property information is presented as it would be on the website if the homes were on the market. However,

[6]The metrics replicate those from Zoopla UK's Local Market Insights Report, including performance comparison, search volume, time on market, and achievement of asking price.

details regarding price are hidden. Sara Seller must analyze the information and estimate the selling price of each home. Once she inputs her estimate, the website displays the actual selling price of the home. The transaction price that the algorithm predicted when the home was on the market is also reported. Sara Seller can then compare her prediction of the transaction price with that of the algorithmic estimate and actual selling price. This allows her to deduce the precision or validity of the algorithmic estimate in relation to the actual transaction price.

In addition, the comparison reveals the effectiveness and flaws of her own pricing prediction strategy against the actual transaction price. This is invaluable information to consider before pricing one's own home. As Sara Seller repeats this evaluation for each home that is presented, the website simulates the learning that is impossible in the residential real estate market. By analyzing her tendencies and comparing the actual transaction price, her personal estimation, and algorithmic prediction, Sara Seller learns and betters her future evaluations. Feedback and experience are crucial to eliminate the endowment effect. Additionally, since Sara Seller gains knowledge about how actual selling prices of homes differ from her estimates, she gains a better understanding of recent local market trends. In down markets, when she observes other homeowners transacting at losses, Sara Seller will feel less regret and loss aversion when she sells. This continues to mitigate the disposition effect.

After Sara Seller understands the extent of her personal deviations from the algorithmic estimate, the website finally asks her to input a listing price for her home. The algorithmic prediction is provided as well, so Sara's estimate will directly build on top of the more rational algorithmic projection.[7] Using her experience from the experimental evaluation of homes, Sara Seller will accept the algorithmic projection to conform to a reasonable selling price. Based on the pattern between actual selling price and algorithmic projection from the previous feedback, Sara Seller will maintain a similar deviation from the algorithmic estimate. This taste of market experience and subsequent adjustment allows Sara Seller to mitigate the endowment effect, creating unity with a realistic market value.

5 Conclusion

Heuristics in buyers and sellers formulate inefficiencies in the residential real estate market. This paper examined the mechanisms of anchoring and the status quo bias amongst buyers, and explored loss aversion and endowment effect on seller's valuations of their properties.

When buyers explore different properties of interest, they are unconsciously anchored to the listing price. This anchor results in transactions that negatively harm buyers in the negotiation process. Strategies to mitigate the heuristic included consideration of evidence opposing the anchor and joint evaluation across

[7] In addition, the algorithmic estimate would provide how confident it is in the valuation estimate, a special feature used on Zoopla UK.

a broad spectrum. Buyers also show a greater preference for the status quo and fear regret in the real estate market. Defaults and social conformity play an important role in mitigating this effect. These strategies to prevent buyer biases were incorporated into a novel hypothetical website, *NoBiasHomes.com*, that induces an improved decision-making process for consumers. Simple transformations significantly impact buyer mindset and perception during the initial search on online platforms. If implemented widely, solutions like this could improve buyer wealth and utility by providing more favorable negotiation outcomes.

Numerous studies consistently showed that loss aversion substantially impacts seller behavior in home pricing. Sellers excessively focus on sunk costs like initial purchase price. Owners are loss averse and try to close their mental accounts with an avoidance of nominal loss, even if that risks transaction. Meanwhile, the endowment effect influences sellers to overvalue their homes from the intrinsic market value due to the pain of giving up a consumption commodity of extensive identity attachment. Their willingness to accept is significantly higher than the willingness to pay. Buyers and sellers misunderstand each other due to the lack of accurate perspective for the other party, or egocentric empathy gaps. These implications result in reduced transactions and market inefficiency. *NoBiasHomes.com* applies techniques like framing to increase seller acceptance of local market data and to prevent the disposition effect. The solution provides sellers experience in the market, which counters the effects of the biases. The website relies on user engagement during the valuation process to create accurate pricing strategies for one's home.

More research into behavioral biases in the residential real estate market is needed for aggregate restoration of efficiency. Many qualitative biases are likely present but may be harder to measure. However, behavioral economists can achieve significant impact on policy-makers and institutions if research into other biases and potential solutions of correction in contexts such as this are explored.

References

[B+00] Leaf Van Boven et al. Egocentric empathy gaps between owners and buyers: Misperceptions of the endowment effect. *Journal of Personality and Social Psychology*, 2000.

[B+03] Roy Black et al. Behavioral research in real estate: A search for the boundaries. *Journal of Real Estate Practice and Education*, 2003.

[BG16] Helen X. H. Bao and Cynthia M. Gong. Endowment effect and housing decisions. *International Journal of Strategic Property Management*, 2016.

[C+04] Colin F. Camerer et al. Advances in behavioral economics. *Princeton University Press*, 2004.

[CA00] Ziv Carmon and Dan Ariely. Focusing on the forgone: How value can appear so different to buyers and sellers. *Journal of Consumer Research*, 2000.

[Cen18] US Census. Metropolitan areas. *Census.gov*, 2018.

[CS03] Karl E. Case and Robert J. Shiller. Is there a bubble in the housing market? *Brookings Institution*, 2003.

[D+03] Jacqui Daly et al. Consumer behaviour in the valuation of residential property. *Property Management*, 2003.

[Del09] Stefano Dellavigna. Psychology and economics: Evidence from the field. *Journal of Economic Literature*, 2009.

[E+08] Mikko Einiö et al. Price setting and the reluctance to realize losses in apartment markets. *Journal of Economic Psychology*, 2008.

[Fry06] Tom Fryers. Work, identity and health. *Clinical Practice and Epidemiology in Mental Health*, 2006.

[GM01a] Adam D. Galinsky and Thomas Mussweiler. First offers as anchors: The role of perspective-taking and negotiator focus. *Journal of Personality and Social Psychology*, 2001.

[GM01b] David Genesove and Christopher Mayer. Loss aversion and seller behavior: Evidence from the housing market. *Quarterly Journal of Economics*, 2001.

[GN03] Karen Gibler and Susan Nelson. Consumer behavior applications to real estate education. *Journal of Real Estate Practice and Education*, 2003.

[H+18] Juliana M. Horowitz et al. Similarities and differences between urban, suburban and rural communities in america. *Pew Research Center's Social and Demographic Trends Project, Pew Research Center*, 2018.

[JG03] Eric J. Johnson and Daniel Goldstein. Do defaults save lives? *Science*, 2003.

[K+91] Daniel Kahneman et al. Anomalies: The endowment effect, loss aversion, and status quo bias. *Journal of Economic Perspectives*, 1991.

[Kah11] Daniel Kahneman. Thinking fast and slow. *Farrar, Straus and Giroux*, 2011.

[Kau11] Markku Kaustia. Disposition effect. *Behavioral Finance*, 2011.

[KT79] Daniel Kahneman and Amos Tversky. Prospect theory: An analysis of decision under risk. *Econometrica*, 1979.

[Lew20] Nigel Lewis. The effects of over-valuing property. *Zoopla Advantage, Zoopla UK*, 2020.

[NN87] Gregory B. Northcraft and Margaret A. Neale. Experts, amateurs, and real estate: An anchoring-and-adjustment perspective on property pricing decisions. *Organizational Behavior and Human Decision Processes*, 1987.

[PC11] Corina Paraschiv and Regis Chenavaz. Sellers' and buyers' reference point dynamics in the housing market. *Housing Studies*, 2011.

[S+08] Vicky Seiler et al. Familiarity bias and the status quo alternative. *Journal of Housing Research*, 2008.

[SL06] Uri Simonsohn and George Loewenstein. Mistake #37: The effect of previously encountered prices on current housing demand. *The Economic Journal*, 2006.

[Sti90] Joseph E. Stiglitz. Symposium on bubbles. *Journal of Economic Perspectives*, 1990.

[SZ88] William Samuelson and Richard Zeckhauser. Status quo bias in decision making. *Journal of Risk and Uncertainty*, 1988.

[SZ13] Diego A. Salzman and Remco C.J. Zwinkels. Behavioural real estate. *SSRN Electronic Journal*, 2013.

[TK74] Amos Tversky and Daniel Kahneman. Judgment under uncertainty: Heuristics and biases. *Science*, 1974.

[TK85] Amos Tversky and Daniel Kahneman. The framing of decisions and the psychology of choice. *Behavioral Decision Making*, 1985.

[TK91] Amos Tversky and Daniel Kahneman. Loss aversion in riskless choice: A reference-dependent model. *The Quarterly Journal of Economics*, 1991.

[TS08] Richard H. Thaler and Cass R. Sunstein. Nudge: Improving decisions about health, wealth, and happiness. *Yale University Press*, 2008.

[W+14] Richard Whittle et al. Behavioural economics and house prices: A literature review. *Business and Management Horizons*, 2014.

[zil18] The typical american home buyer. *Zillow*, 2018.