

# THE EFFECT OF ANCHORING BIAS ON THE ESTIMATION OF ASKING AND TRANSACTION PRICES IN THE HOUSING MARKET

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ARTICLE INFO	ABSTRACT
<b>Keywords:</b> anchoring, behavioral real estate, housing, experiment, Poland	This paper investigates the anchoring bias in the real estate market, focusing on the impact of uninformative random values on price estimations. Through a randomized controlled trial, the study examines whether selective accessibility contributes to the anchoring effect and to what extent the bias is transmitted from estimated asking prices to transaction prices on the primary housing market. The study was conducted in 2023 among Krakow University of Economics students on the example of the Krakow housing market in Poland. A multiple regression model indicates that randomly assigned numbers serve as cues affecting price estimations, with potential differences of up to 10.5% of the asking price offered by a developer. Additionally, gender and decision-making competencies influence estimation patterns, suggesting varying attitudes towards price-setting strategies that can be implemented by developers. These findings contribute to understanding the complexities of decision-making in real estate markets and highlight avenues for further research.
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## 1. Introduction

Anomalies in economic behavior in the real estate market have been recently gaining interest in the fields of theoretical inquiry and experimental analysis. In the paper, we focus on one of the most recognized behavioral anomalies, namely anchoring bias.

Anchoring bias is a cognitive bias where individuals rely heavily on the first piece of information they receive (the anchor) when making subsequent judgments or decisions. This can lead to systematic errors in judgment and decision-making, as individuals may be influenced by irrelevant or arbitrary anchors.

Over the past decades, research found that different mechanisms appear to account for the anchoring effect under different contexts (Furnham & Boo, 2011). The anchoring heuristic and adjustment mechanism was first described by Tversky and Kahneman (1974). Further, Englich et al. (2006) used a selective accessibility model and demonstrated that

uninformative value to the estimates may also exert an impact on judgmental decisions.

Conducted studies have proven that an anchor effect is more or less persistent in appraisals for both professional and non-professionals in the real estate market. Most of the studies have focused primarily on the adjustment mechanism. It seems that examining selective accessibility mechanisms still requires similar attention.

Thus, regarding the growing interest in the field of personal cognitive behaviors, we investigate the impact of uninformative random values on the estimated prices in the housing market. In particular, our aim is twofold. First, we investigate whether selective accessibility contributes to the anchoring effect. Secondly, we would like to know how the anchor effect is transmitted from the estimated asking price to the estimated transaction price.

The plan of the paper is as follows. The following section provides a background and literature review. Section 3 provides a brief description of the research

methodology, while Section 4 describes the data and presents the empirical models. Finally, Section 5 provides a discussion, whereas Section 6 concludes with final remarks.

## 2. Literature review

Traditional economic theory assumes that individuals are perfectly rational, have perfect memory, have limitless computational abilities, and do not act under emotions. However, these assumptions have been getting weaker over time (Costa, et al., 2017). One important milestone in this process has been laid by Simon (1957) and his cognitive revolution on bounded rationality. Further changes came from the revolutionary heuristics and biases approach, popularized by psychologists Tversky and Kahneman (1974). Under this approach, individuals tend to reduce the complex tasks of assessing probabilities and predicting values to simpler judgmental operations. The novelty of this approach has its origins in a more detailed way of understanding how decisions deviate from rational solutions (Hochman & Ariely, 2015).

Since then, a wide range of research has confirmed that, when individuals make decisions, they draw upon a wide range of heuristics to help them resolve the decision problem. Many of these studies have tackled the issue and focused on the housing market. In general, housing markets are populated by two groups, namely typical homeowners or tenants without adequate knowledge or experience in real estate transactions but with emotional attachment to a property, and professionals (Salzman & Zwinkels, 2017). As research suggests, both groups are prone to using heuristics while making decisions. Among the most common psychological biases attributed to homeowners, we can distinguish the over-optimism bias; households assume that buying a house does not involve a great deal of risk and that house prices will steadily increase (Salzman & Zwinkels, 2017). Another heuristic that plays a crucial role in analyzing homeowners' decisions is herd behavior, which rests on the observation that individuals tend to give in to social pressure. This behavior has proved to be a source of mispricing and speculative bubbles (Shiller, 2015). Moreover, individual investors are observed to reveal "home bias" which means that they prefer properties that are located in proximity to their current address. Several lines of research support the notion that psychological biases also play an important part in the professionals' behavior in the

real estate market. This usually leads to mispricing problems. Most commonly, the issue is addressed by examining the availability heuristic, and confirmation bias (Salzman & Zwinkels, 2017). Following the availability heuristic, real estate surveyors prefer to utilize their experience and human capital over available macroeconomic-, market-, and property-specific data when valuing property. Under confirmation bias, valuers tend to adjust more to evidence that supports their existing view than to negative evidence.

Considering the anchoring heuristic, the conducted literature review suggests that this psychological bias applies equally to both professionals and non-professionals. An anchoring effect occurs when individuals consider a particular value for an unknown quantity before estimating that quantity and, as a result, the estimated value is close to the number considered – the "anchor" (Kahneman, 2011).

Originally, the eliciting of the anchoring bias has been explained by adjusting to the given anchor. Following that assumption, a broad spectrum of studies has demonstrated that the initial starting value of the property can serve as an anchor during the appraisal or negotiation process in the real estate market, e.g. Da Silva, et al. (2019), Brzezicka (2016). However, it has been argued that anchoring bias may be induced by different mechanisms. For example, numeric priming also accounts for the anchoring effect (Jacowitz & Kahneman, 1995). Furnham and Boo (2011) have demonstrated that values being uninformative to further estimates also yield an effect on judgment decisions. In another study conducted by Critcher and Gilovich's (2008) participants' estimates of how much they would spend at a restaurant were influenced by whether the restaurant was named "Studio 17" or "Studio 97". This means that focusing attention on the anchor value increases its accessibility so that it comes to mind easily when the final estimate is generated. As a consequence, this value is included in the final judgment.

Because the psychological phenomena that may affect the process of property price estimation are becoming the core of research interest in the field of the real estate market, many studies turned to investigate them in more detail. The negotiation process is no less important because it may involve both specialists and inexperienced first-time buyers. A summary of the research on the anchoring effect in the real estate market is given in Table 1.

**Table 1**

## Anchoring effect in the real estate market - selected research

Authors	Aim	Research sample	Research method	Conclusions
(Simonsohn & Loewenstein, 2006)	Does the subjective perception of nominal prices as cheap or expensive influence how much a household decides to spend?	928 observations: 650 renters and 278 buyers	Estimation of standard housing demand equations for movers between cities using data from the Panel Study of Income Dynamics (PSID).	Migrants coming from more expensive cities spend more on rent in their new city than those coming from cheaper cities. As people stay in their new city they get used to the new prices and readjust their housing expenditures countering the initial impact of previous prices.
(Scott & Lizieri, 2012)	To understand the extent to which individual perceptions of value in housing can be biased through the use of arbitrary anchors delivered at the start of the valuation process.	139 student volunteers	An arbitrary anchor was delivered individually based on Ariely et al. (2003), involving a mobile telephone number. Students estimate the value of houses recently sold in their local area based on the given information.	(1) The valuation of a property is reliably influenced by the arbitrary anchor given before making the judgment (2) valuation judgment of subsequent properties is strongly influenced by the most recently valued property because that valuation serves as an anchor for the next.
(Brzezicka, 2016)	Whether anchoring and adjustment to the given price negatively affect market transparency?	90 students in 15 groups in 3 series	Experiment; the participants were divided into 3 series. Members of each group were to convince the manager to accept that the price of the property (1) is lower than PLN 3,500/m <sup>2</sup> ; (2) exceeds PLN 5,500/m <sup>2</sup> ; (3) is lower than PLN 5,500/m <sup>2</sup> .	Managers were anchored to the price given by participants and not to the real price of the estimated property.
(Cardella & Seiler, 2016)	How rounded, just below, and precise list prices impact the negotiation behavior of the buyer and seller and the final sale price of the home?	132 undergraduate students (66 negotiating pairs)	Experiment; the manipulation of high/low original purchase price conditions was done between groups: four sessions of high purchase price and four sessions of low purchase price.	A high precise price generates the highest final sale price, the smallest percentage discount off the list price, and the largest fraction of the surplus to the seller, while just below pricing leads to the lowest final price, the largest percentage discount, and the smallest fraction of the surplus to the seller.
(Da Silva, et al., 2019)	To revisit the issue of anchoring effects in real estate markets.	90 professional real estate agents and 90 amateur students	30% of the participants were asked to estimate the list price based only on the description of the apartment and the pictures; 30% were told the owner's list price was R\$410,000 (the high anchor); 30% were told the owner had a list price of R\$310,000 (the low anchor).	An anchoring index of 67 % for real estate agents, and 87% larger anchoring index for undergraduates.
(Palm & Andersson, 2021)	To evaluate the impact of theoretical knowledge related to financial behavior and especially anchor effects.	Part 1: 115 students Part 2: 115 students	An experiment divided into two parts, before and after the development of the course curriculum for the course introducing behavioral finance for undergraduate real estate students	The anchoring effect is persistent also after introducing theoretical knowledge regarding financial behavior and anchor effects.

Source: own study.

Each of these papers has significantly contributed to our understanding of the anchoring effect in the estimation of property value.

Starting with Simonsohn and Loewenstein (2006), the authors proved that individuals use previous prices to make future choices. They examined rent paid by respondents who were moving into the city. They found that new citizens were fixed on prices from

the city they moved out of, though this relation was stronger for movers coming from more expensive cities. It was observed that they spend more on housing in the destination city than movers to the same city coming from cheaper cities. However, the effect was found to gradually get weaker because individuals readjusted the amount spent on housing. As it was suggested by the authors, the effect of

gradual readjustment needs further examination because of the unobserved wealth differences.

Scott and Lizeri (2012) took another approach to measure the existence and strength of arbitrary anchors, and focused on a student group that shares similarities with first-time buyers likely to enter the housing market in the coming years. Their experiment assumed the existence of arbitrary anchors based on the three last digits of phone numbers and then given as a price in thousands of pounds. According to the authors, this procedure ensured that each participant had a transparently random number serving as an anchor. They followed the procedure developed by Ariely et al. (2003), who used digits of US Social Security Numbers to produce an anchor and showed that asking subjects whether their price estimation is above or below an anchor value influences subsequently stated price estimations. In the Scott and Lizeri (2012) experiment, respondents were then asked to appraise the value of four sequentially presented properties. Their research proved the existence of an anchor effect on the first appraised property, but the results for the following properties proved to be ambiguous.

Brzezicka (2016) also followed an experimental procedure. In her study conducted on the Polish housing market, she investigated how anchoring bias disorders the process of price and value creation.

In another study which set out to determine the effect of a listing price strategy on negotiations, Cardella and Seiler (2016) found that a high precise asking price creates the highest final sale price, and smallest percentage discount, whereas just below pricing leads to the lowest transaction price and largest percentage discount. Additionally, these effects generally fade along with gaining negotiating experience.

Da Silva et al. (2019) explored the impact of list price strategies on final sale prices. They identified the causal effect of various list price strategies on the negotiation process. The authors nuanced their research on anchoring by considering the differences in decisions taken by professional real estate agents and amateur students. They expected that experts would be less prone to cognitive biases.

Palm and Andersson went further in their research (2021). They aimed to evaluate how the theoretical knowledge in behavioral finance and the anchoring heuristic reduce anchor bias in a situation where a property is to be appraised. Their research led to the conclusion that being informed and having theoretical

knowledge about the risk for anchor effects in the appraisal process does not automatically mitigate the anchor effect.

To sum up, several studies show that the behavior of the agents acting on the housing market deviates from the prescribed normative process. While the existence of anchoring bias is no longer under discussion, we still have to learn how this heuristic affects individuals' choices. So far, the research has primarily focused on the adjustment mechanism that affects susceptibility to the influence of the applied informative anchor (Brzezicka, 2016). However, different mechanisms come into play when assessing the anchoring effect (Furnham & Boo, 2011). These aspects require further attention. To fill the identified research gap, we focused our research on an uninformative anchor and its effect on estimated values.

### 3. Material and methods

The anchoring effect can be easily triggered in the laboratory as well as in the classroom (Epley & Gilovich, 2006). As conducted literature review suggests, many studies investigating anchoring effects are designed as an experiment involving a questionnaire survey. We have thus followed this approach, as well as designing the experiment as randomized controlled trials. The main purpose of conducting this kind of experiment is to demonstrate causality (Marczyk, et al., 2010). In its basic form, this kind of experiment is composed of two groups or two levels of an independent variable. While the first group is given a treatment, the control group provides estimates of a set of uncertain quantities (Jacowitz & Kahneman, 1995).

Considering the type of anchor, evidence indicates that people adjust their judgements to informational relevant anchors as well as to uninformative values. In our research, we followed the second approach and decided to apply the uninformative value of an anchor, and for that purpose, we asked students to write down the three last digits of their phone numbers. However, in contrast to Scott and Lizeri (2012), these numbers did not serve to create a possible price for the property. The reason for that was to explore whether the randomly selected number could serve as a cue to attitude change rather than a reference point to which a subject might have adjusted.

The experiment was conducted in June 2023 at the Krakow University of Economics among students

attending courses in Real Estate and Investment. The students were given the following task: to act as independent experts and to estimate the expected asking price and transaction price of the appraised property. The experiment followed a three-stage procedure.

- 1) First, the examined population was given a set of information on three similar properties which were offered for sale on the primary market in Krakow (see Appendix 1) These properties were chosen after a thorough examination of developers' offers, considering the type of building, its standard, and the standard of the apartments, as well as the location and access to main facilities. We focused on a particular district in Krakow. The market search revealed that, in this location, there were three similar developments at that time, and we analyzed these offers to choose the most suitable apartments that meet the initial requirements..
- 2) In the next step, the subjects were asked to calculate the expected asking price and transaction price of the appraised property, which had been recently listed by real-estate developers on the market in Krakow. Prior to the estimation, some of the subjects (treated group) was asked to write down the three last digits of their phone numbers. This served to draw subjects' attention to the anchor just before making the judgment. The second group (control group) proceeded to the calculation without writing down the three last digits of the phone number.
- 3) In the third stage, once estimates had been completed, respondents were asked to fill out a questionnaire. The questionnaire served to elicit subject-level information on gender, age, and decision-making competencies, which we then used to explore possible anchoring effects. The questionnaire contained, among others, a set of eight statements on the attitude towards the decision-making process:
  - a) I evaluate the risks associated with each alternative before making a decision.
  - b) If I have doubts about my decision, I go back and recheck my assumptions and my process.
  - c) I only make decisions quickly when I feel the pressure of time.
  - d) I tend to have a strong "good instinct" and I rely on it in decision-making.

- e) I make rational decisions, and I rarely follow intuition.
- f) Before I make a purchase, I check all parameters carefully and compare available products.
- g) I don't understand people who make decisions on the spur of the moment, without thinking it through.
- h) The first thought is the best.

Respondents chose the most suitable answer on a 1-4 scale. Questions (d) and (h) were formulated as control questions, and the scale for them was then reversed. Based on the given set of questions, a latent variable representing decision-making competencies was calculated and normalized on the scale  $\langle 0;1 \rangle$ .

## 4. Results

### 4.1. Basic research premises

The subject pool consisted of undergraduate students attending the courses on Real Estate and Investments. We distributed 110 questionnaires. Each student was randomly assigned to either the survey containing the question (71 questionnaires; 66%) about the anchor or to the survey without the question (38 questionnaires; 34%). We received 107 valid responses because we excluded three questionnaires (the assessments were extremely low, or the estimations were missing). Out of the remaining questionnaires, 61 (57%) were completed by female participants, while 46 (43%) were completed by male participants. The average age of respondents was 22 years.

With regard to detecting possible differences between the treated group (with the anchor) and the control group (without the anchor), we conducted ANOVA tests (Table 2).

ANOVA tests confirm the existence of significant differences between the two groups in estimating the expected asking price (*exp\_ask*) and expected transaction price (*exp\_tr*). Considering decision-making competencies (*dec*), both groups do not reveal statistically significant differences. The obtained results justify further analysis. Detected differences may have their source in exogenous factors, e.g. the effect of anchoring; however, to confirm this, we need to control for other parameters describing both groups, e.g. gender.

Regarding possible gender influence, similar statistical tests revealed significant differences in estimating expected transaction price ( $F=3.94, p=.05$ ). Based on this observation the respondents' expected asking price and transaction price segmented by gender were compared (Figure 1).

Table 2

	ANOVA tests for treated and control group						ANOVA	
	Treated group (anchor)			Control group (no anchor)			F	p
	no	mean	sd	no	mean	sd		
exp_ask	71	567.02	50.79	38	544.66	53.99	4.59	0.034
exp_tr	71	550.08	52.17	38	526.09	50.91	5.32	0.023
(exp_tr-exp_ask)	71	-16.94	14.36	38	-18.57	17.69	0.24	0.626
dec	71	0.61	0.13	38	0.58	0.13	1.09	0.299

Source: own study.

Logically, the valuation of the expected transaction price is strongly correlated with the estimates of the expected asking price. What is interesting, the asking price seems to appeal as a reference point more strongly to women than men. As data suggest, the expected transaction price is likely to be relatively lower compared to the expected asking price, among the male respondents than among women. The repeated measures ANOVA test confirms a significant effect of gender ( $p = .025$ ). However, there is a need for further investigation of these relations.

The experiment assumed that the price asked by the developer on a primary market (PLN 570 000) would not be disclosed to respondents. Additionally, it is plausible to assume that, with growing decision

competencies, the estimations of the asking price will become more accurate and approach the price asked by the developer. As no specific procedure for estimating the value of the examined apartment was given in the survey, it is not possible - similar to a real real-life situation - to discuss the correctness and accuracy of the conducted calculations. However, some statistical tests involving decision-making competencies can be provided. To do this, the set of respondents was divided into three proportional groups based on their decision-making competencies, namely: Low ( $0.5 >$ ), Medium ( $0.5; 0.66 >$ ), and High ( $0.66; 1 >$ ). Figure 2 reports the relation between the estimated expected price, decision-making competencies and gender.

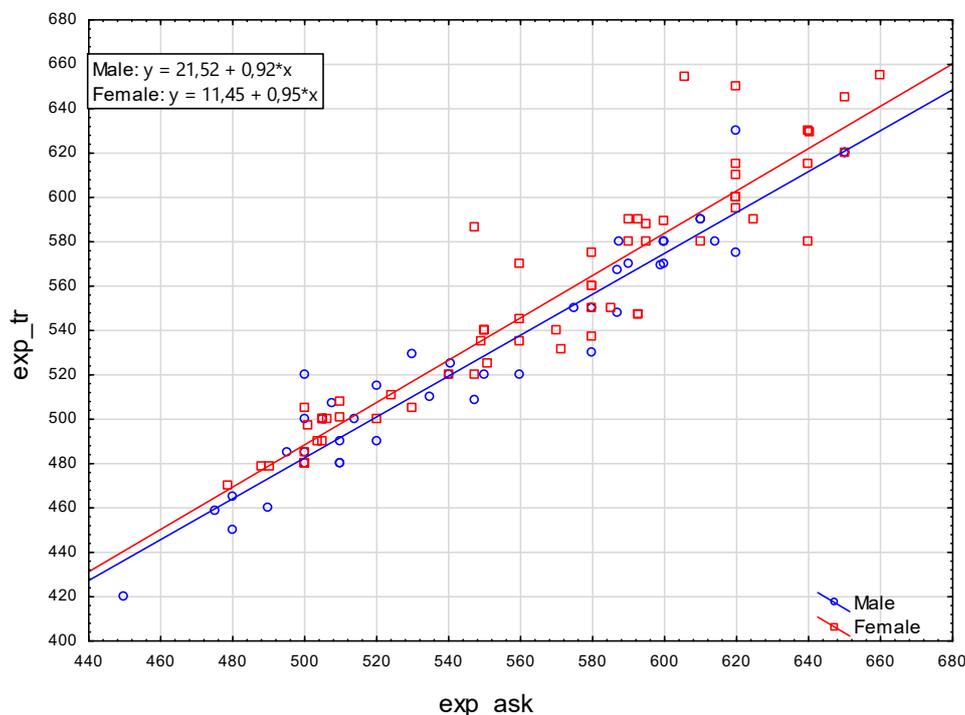
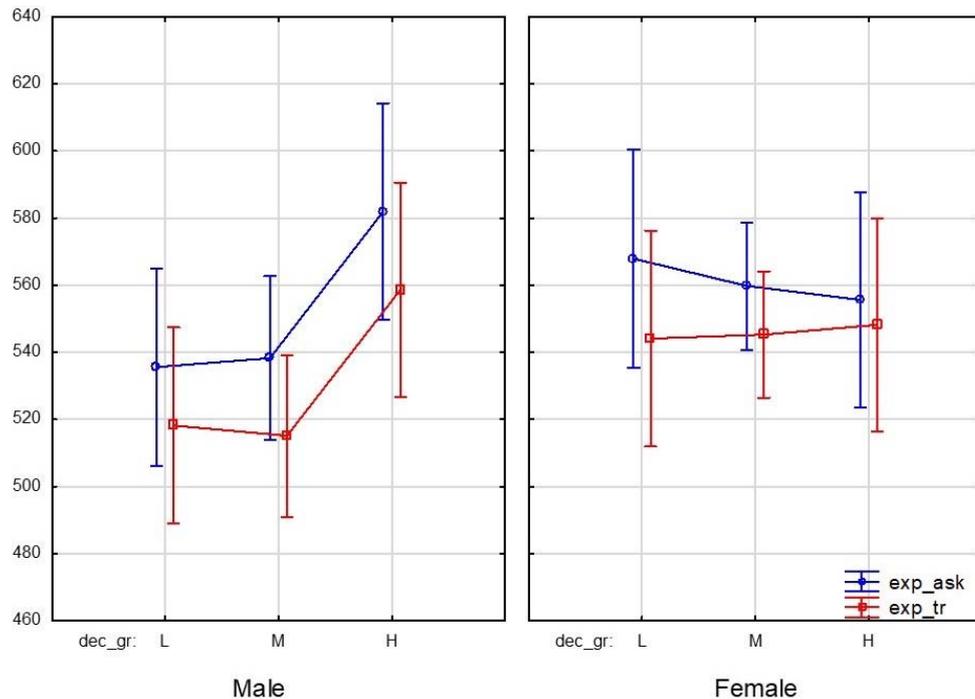


Fig. 1. Scatterplot of expected asking price against expected offer price categorized by gender. Source: own study.



**Fig. 2.** ANOVA results for expected asking price ( $exp\_ask$ ) and transaction price ( $exp\_tr$ ) in decision-making competencies and gender groups; Wilks lambda=0.920,  $F(4, 188)=2.005$ ,  $p=0.096$ . Source: own study.

Considering the fact, that the real asking price was set at PLN 570 000, one would expect that estimations made by respondents with the best decision-making competencies to be in proximity to this value. Interestingly, the data only partially confirms the evidence of the relation, mainly in a group of male respondents (see Fig. 2). When considering female respondents, the estimations are on a similar level among the three defined groups. Additionally, the ANOVA test did not confirm the existence of statistically significant differences (at  $p$  level 0.05) between all groups.

When taken together, the data suggests that decision-making competencies, the implemented anchor, and gender affect the final assessment of the expected asking and transaction price. It is worth assessing the strength of these relationships.

#### 4.2. Modelling anchoring effect

A way to consider the relationship between the anchoring bias and the valuation of the asking and expected price is to use a multiple regression model. Apart from its predictive application, in some situations, multiple regression analysis can also be used to infer causal relationships between the independent and dependent variables.

In the simplest case, we would like to know if applying an anchor in the treatment group causes an

effect on the price estimation compared to the control group (model M1). Thus, we used a binary variable *anchor*, where  $anchor=1$  means a subject had an anchor;  $anchor=0$  means a subject did not. In model M2 we incorporated two more variables into our analysis: a quantitative variable representing decision-making competencies (*dec*), and a dummy variable for gender (*gender*;  $Female=0$ ). Finally, in model M3, we interacted the dummy variable (*gender*) with decision-making competencies.

A least squares regression of the relationship between the expected asking price and independent variables is reported in Table 3.

All models suggest that there is no difference in average estimations between subjects having an anchor and those without an anchor, thus we can conclude that there is no constant treatment effect of implementing an anchor. In the conducted study, randomly assigned numbers ranging from 0 to 999 (the three last digits of the phone number) were used as the anchor. Not surprisingly, on average, the variation of responses in both groups proved to be indifferent. Estimated coefficients for the phone number ( $ph\_num\_3$ ) indicate that the randomly assigned number had a positive effect on calculating the expected asking price in the treatment group. An increase of the three last digits of a phone number by 1 increases the estimated asking price by 60 PLN

holding other factors fixed. The effect remains significant while controlling for other variables in the model. In our case, the estimates based on extreme anchor values could differ by nearly PLN 60 000 (model M3) and this accounts for approximately 10.5% of the asking price of the property set by the developer.

**Table 3**

Modelling the expected asking price			
Level of effect	Expected asking price		
	M1	M2	M3
Intercept	544.67 (0.000)	511.60 (0.000)	577.67 (0.000)
anchor Y=1	-4.67 (0.756)	-6.23 (0.670)	-12.32 (0.392)
ph_num_3	<b>0.05</b> <b>(0.015)</b>	<b>0.05</b> <b>(0.017)</b>	<b>0.06</b> <b>(0.006)</b>
dec	-	<b>66.61</b> <b>(0.069)</b>	-39.66 (0.458)
gender M=1	-	-9.30 (0.340)	<b>124.22</b> <b>(0.006)</b>
dec*gender M=1	-	-	<b>189.34</b> <b>(0.009)</b>
R2	0.093	0.138	0.194
R2 adjusted	0.076	0.104	0.155
Number of cases	107	107	107

*p-value in brackets*  
*Source: own study.*

Model M3 also reports that while considering lower levels of decision competencies, women estimate asking price higher than men (for a reference point  $dec=0$  and holding other factors fixed, the difference reaches 124.22), however, this relation becomes reversed with gaining decision competencies.

A similar procedure was conducted to model the relationship between the expected transaction price and independent variables (Table 4).

Considering transaction prices, all models suggest that randomly assigned numbers had a positive effect on calculating the expected transaction price in the treatment group. However, the increase of the three last digits of a phone number by 1 increases the estimated transaction price by 40 PLN holding other factors fixed, and the estimates based on extreme anchor values could differ only by PLN 40 000 (similar values in models M4, M5 and M6) This would suggest that the anchoring effect becomes weaker during the process of estimating the second value which is, in our case, the expected transaction price.

**Table 4**

Modelling the expected transaction price			
Level of effect	Expected transaction price		
	M4	M5	M6
Intercept	526.09 (0.000)	483.66 (0.000)	520.87 (0.000)
anchor Y=1	0.58 (0.969)	-6.23 (0.670)	-4.55 (0.753)
ph_num_3	<b>0.04</b> <b>(0.036)</b>	<b>0.04</b> <b>(0.046)</b>	<b>0.04</b> <b>(0.030)</b>
dec	-	<b>88.41</b> <b>(0.015)</b>	28.56 (0.595)
gender M=1	-	-16.54 (0.086)	<b>-81.26</b> <b>(0.071)</b>
dec*gender M=1	-	-	106.63 (0.139)
R2	0.086	0.168	0.186
R2 adjusted	0.069	0.136	0.146
Number of cases	107	107	107

*p-value in brackets*  
*Source: own study.*

Models M5 and M6 also indicate that the effect of decision-making competencies and gender is not as straightforward as in previous models (M2 and M3). It implies that a more precise analysis requires controlling for other variables that were not included in our modeling.

## 5. Discussion

The paper aimed to investigate (1) whether selective accessibility contributes to the anchoring effect and (2) find out to what extent the anchoring bias is transmitted from the estimated asking price to the estimated transaction price.

To achieve those goals, a randomized controlled trials experiment was conducted. Subjects were asked to act as independent experts on the real estate market. They were divided into two random groups, the treatment and the control group. Statistical tests proved that there is no difference in the decision-making competencies between these two groups. Thus, referring to the first research aim, it was assumed that the price assessments rest on the applied anchor. The obtained results confirm this relation and also extend the findings of Levy and Frethey-Bentham (2010) and Scott and Lizeri (2012). However, in these studies, the main stress was laid on modelling the anchoring and adjustment mechanism. We took another approach and indicated that even an uninformative value can exert an impact on the estimates made by subjects. Additionally, we estimated that, in our case, the effect can even stand for as much as 10.5% of the asking price set by the

developer.

Referring to the second research aim, several studies have investigated the transition of the anchoring effect. For example, Scott and Lizeri (2012) tested how the anchoring effect is transmitted on sequentially estimated properties. We took another approach and modelled the transition of anchoring bias from the asking price to the transition price, and indicated that the effect can be weaker by 30% when compared to the asking price. Looking for a plausible explanation of this relation, we turned to the price strategies that can be applied by the offering party. An important role in this strategy is setting the asking price (Han & Strange, 2016). Usually, potential buyers decide whether to accept the asking price or to negotiate. The rate at which the asking price accepted is strongly influenced by the market situation and the phase of the business cycle (Han & Strange, 2016). The authors indicated in the example of selected cities that, over the period when the housing market was on the boom, the share of below-list sales was about 57%, while the share of acceptance sales was close to 30%. In our case, the predominant part of respondents (90%) estimated transaction prices below or just below the asking price. This suggests that asking prices may also play an important role as an "additional anchor". This notion aligns with research by Bucchianeri and Minson (2013) who, using market data, showed that the relationship between listing prices and selling prices does not simply arise from objective dwelling qualities. That is why we also incorporated control variables, such as gender and decision-making competencies, into our analysis.

We found out that females and males reveal different attitudes towards estimating asking and transaction prices. Primarily, estimates of the expected transaction price made by male respondents are lower compared to the estimates made by women (Figure 1). This would suggest that the effect of an asking price as a potential anchor is stronger for women than men. However, these notions still require more detailed investigation.

Similarly, one intriguing area of research pertains to the impact of the variable "decision-making competencies" on the ultimate assessments. The obtained results indicate that this variable interacts with gender, suggesting that females and males are prone to accepting two different strategies for setting the asking price. According to Dittmann (2015) housing developers in Poland usually follow two main strategies which are (1) setting the property price at

the level of estimated market value and treating it as nonnegotiable, and (2) overpricing by listing the property at a level decidedly higher than the estimated market value to let for individual price negotiations and the possibility of significant discounts. The revealed two patterns of estimating asking and transaction prices seem to suggest that women tend to follow the first strategy and men the second. It is worth adding that obtained estimations present only static relations. Looking at a wider context, and referring to a dynamic situation in the Polish real estate market, another possible explanation emerges. The housing prices in Poland have been rising steadily for many years with a steep rise during the last two years and that probably has disrupted consumer perception regarding the value of housing (Brzezicka & Tomal, 2023). Though the price anticipations were out of the core of the survey, it is worth pointing out that better-informed decision-makers could have adjusted their estimates to market trends. Because the final results on possible influence of gender are still ambiguous, obtained results open new avenues for further research.

Finally, several important limitations need to be considered. Because we had no access to the information on the final transaction price, it was not possible to measure the anchoring effect on the expected transaction price. Regression analysis suggests that the effect can be weaker by 30% when compared to the asking price.

Another limitation of the study is that we investigated the price estimates only for one case located in Krakow, Poland. The size and attractiveness of the Krakow housing market also encourage potential buyers from other regions of Poland, and that is why the scope of the study exceeds its local context, though it would be interesting to verify the obtained results for other cities.

## 6. Conclusions

It can be concluded that estimating asking and transaction prices requires processing large amounts of information, from these on market conditions, property characteristics, and buyers' preferences as well as the ability to determine to what degree the offered property fulfils the preferences of buyers. It also appears that some knowledge of behavioural economics and psychology is beneficial, particularly in light of the potential influence of cognitive biases on the decision process.

These aspects seem to be particularly important in

the Polish housing market. Purchasing a house is usually the most significant financial transaction undertaken by the average household. These types of decisions are necessarily made with little market experience (Scott & Lizieri, 2012). On the other hand, developers search for various pricing strategies. In Polish conditions, a common approach implemented by developers is not to reveal the asking price on the market until the individual contact from the client side. Concealing the price in the advertisement aims to provide the buyer with the sense that the transaction is unique (Dittmann, 2015) and subsequently inclines the client to focus on his or her emotions and personal judgments. This may have an adverse effect on buyers' spending and lead to suboptimal decisions. Thus, the reported results in the paper extend our knowledge of consumer behavior in an important direction, both from a practical and academic point of view.

To sum up, in this paper, we focus very specifically on the influence of the anchoring bias on the asking and transaction prices. In addition, it would be interesting to explore the effect of decision-making competencies and their interactions with price expectations, the effect of gender, and to what extent gender corresponds with the ability to respond to different price strategies in more detail.

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**Appendices**

**Study of psychological determinants of decisions in the real estate market**

Your task is to put yourself in the role of an expert in the real estate market.  
  
Indicate the most probable offering and transaction price of the appraised property based on the data provided.  
  
Then complete a short online survey.

Location - **district Prądnik Czerwony, Krakow**



**Data on the compared properties:**

**Property 1:**  
**Offering price 613 950 PLN**  
Area 40, 93 sqm+balconies  
2nd floor  
The building has an elevator  
Possibility to buy a parking space  
Distance to public transport 200 m  
Distance to the store 150 m  
Distance to school 800 m

**Property 2:**  
**Offering price 694 840 PLN**  
Area 55, 12 sqm + loggia  
1st floor  
The building has an elevator  
Possibility to buy a parking space  
Distance to public transport 1 minute walk  
Supermarkets, Water Park 5 minutes by car

**Property 3:**  
**Offering price 508 750 PLN**  
Area 46,25 sqm + balcony  
1st floor  
The building has an elevator  
Possibility to buy a parking space  
Distance to public transport 1 minute walk  
Supermarkets, Water Park 5 minutes by car

**Make a decision regarding the anticipated offering and transaction price of the appraised property:**

**Property 4:**  
Area 45,60sqm+balcony  
1st floor  
No elevator  
Possibility to buy a parking space  
5 min walk to supermarket  
3 min to the bus stop  
10 min elementary school

Enter the last 3 digits of your phone number here:

.....

**My answer:**

Anticipated offering price of the property: .....

Anticipated transaction price of the property: .....



Complete a short survey:



**Fig. A.1.** Example of information given to subjects about a valued property. (the data were retrieved from developers on-line offers in May 2023).