

Price-setting and incentives in the housing market

<https://housinglab.oslomet.no/>

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Introduction

- The estimated market value of your house is 4.1 million. How do you set the ask price?
 - ◊ One line of reasoning: If the market value is 4.1, I should ask for 4.1
 - ◊ Another line of reasoning: Ask for less, say 3.9 million, since it may:
 - 1 Attract more **viewers** \Rightarrow More bidders \Rightarrow Higher bids \Rightarrow Higher sell price
 - 2 But, it may also serve as an **anchor** and curb bids \Rightarrow Lower sell price

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What do people do?

Ask relative to appraisal

Number of observations	Less	Equal	More
79,380	50.1	46.2	3.7

Distribution of ask-appraisal spreads

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Research question(s)

Does offering a low ask result in a higher sell price?

- A If yes, why doesn't everyone do it?
- B If no, why does anyone do it?

Related literature

- **The role of ask prices:** Horowitz (1992), Taylor (1999), Herrin et al. (2004), Haurin et al. (2014) and Guren (2018)
- **Anchoring:** Tversky and Kahnemann (1974), Northcraft and Neale (1987), Beggs and Graddy (2009), Simonsohn and Ariely (2007), Bucchianeri and Minson (2013), Pownall and Wolk (2013)
- **Bidding behavior:** Ku et al. (2006), Han and Strange (2014, 2016), Repetto and Solis (2019)
- **Real estate agents' incentives:** Rutherford et al. (2005), Levitt and Syverson (2008), Agarwal et al. (2015), and Barwick et al. (2017)

Brief overview of the institutional setting in Norway

- Ascending bid auctions
- All bids and acceptances are legally binding
- All bids can be declined, and the ask is not binding
- Typically involving a realtor (only the seller)

Selling process

Buying process

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Skeleton model I

Decision to attend open house:

$$D_{b,h} = \begin{cases} 1, & g(\tilde{M}_{b,h}; I_b) \geq \phi(A_h) \\ 0, & \text{otherwise} \end{cases}$$

Number of visitors to house h :

$$V_h(A_h) = \sum_{b=1}^{N_B} D_{b,h}$$

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Skeleton model II

Willingness to pay:

$$WTP_{b,h} = \omega_b \left(\underbrace{PV_{b,h}}_{\text{Privat value}}, \underbrace{\tilde{C}V_{b,h}(A_h, V_h(A_h))}_{\text{Common value}}; I_b \right)$$

$$\frac{\partial WTP}{\partial A} = \underbrace{\frac{\partial WTP}{\partial \tilde{C}V}}_{+} \left(\underbrace{\frac{\partial \tilde{C}V}{\partial A}}_{+} + \underbrace{\frac{\partial \tilde{C}V}{\partial V}}_{+} \underbrace{\frac{\partial V}{\partial A}}_{-} \right)$$

Anchoring Herding

?

Auction data

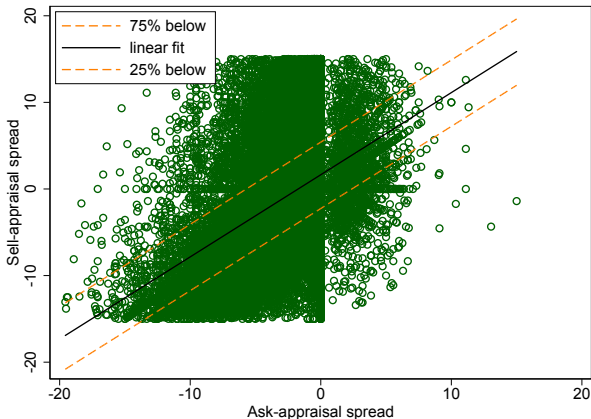
- Auction data for **all units sold by DNB-Eiendom** between Jan. 2007 and Dec. 2016
- **Unit specific data:**
 - Address \Rightarrow Repeat sales
 - Size, type, # of bedrooms, construction year, etc.
- **Transaction specific data:**
 - Ask price, appraisal price and sales price, time-on-market, exact date of accepted bid
- **Auction specific data:**
 - All bids in all auctions, bidder id, realtor id, realtor office, bid received time (at minute), bid expiry time (at minute), date ready for sale, etc.

Summary stats

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Ask-appraisal spread versus sell-appraisal spread



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Appraisal as a measure of market value

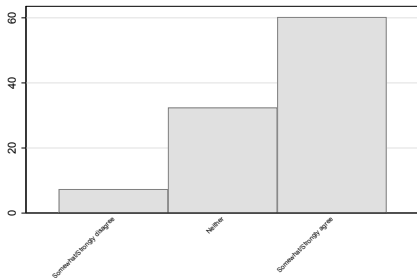
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Why do people still do it?

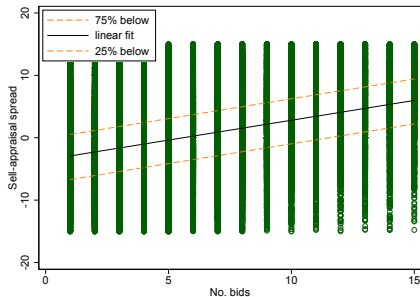
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Attract more bidders, resulting in a higher sell price...



Lower ask \Rightarrow More bids

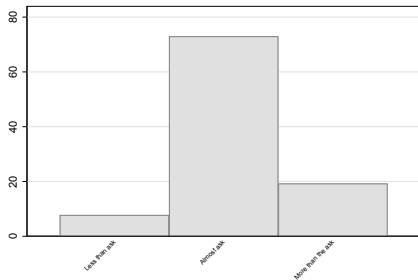


More bids \Rightarrow Higher sell

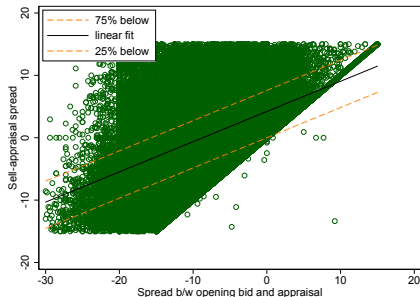
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And, they underestimate the anchoring effect....



Expected purchase price



Opening bid and sell

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Empirical results

	No. bidders	Op. bid	Sell-App.
$\frac{Ask_{i,t} - Appraisal_{i,t}}{Appraisal_{i,t}}$	0.033*** (0.010)	-0.846*** (0.043)	-0.760*** (0.048)
<i>N</i>	4,354	4,348	4,354
<i>R</i> ²	0.727	0.907	0.916
<i>Controls:</i>			
Common debt	✓	✓	✓
Appraisal	✓	✓	✓
Realtor FE	✓	✓	✓
Realtor office FE	✓	✓	✓
Year-by-month FE	✓	✓	✓
Unit FE	✓	✓	✓

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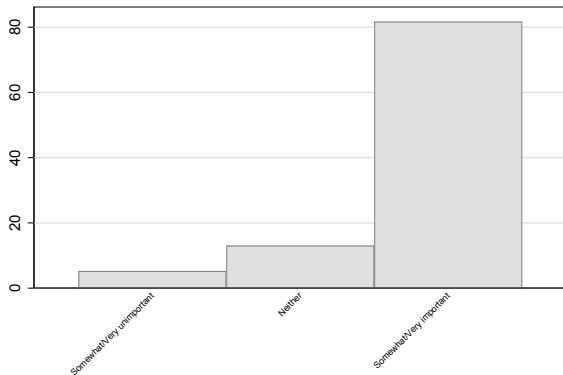
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Robustness exercises

- 1 Market value based on hedonic regression
- 2 Using full transaction level data set
- 3 Compositional bias
- 4 Time-variation
- 5 Non-linearities
- 6 Seller-selection (IV)
- 7 Nominal discounting strategies
- 8 TOM

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"How important is the realtor in deciding the ask price?"



Realtor incentives I

- *Present value of current and future profits:*

$$\pi = \pi_1(\underbrace{R(P_1(A_1, T))}_{\text{Revenue function}}) + \delta q \pi_2(R(P_2(A_2, \underbrace{T}_{\text{Realtor type}}))),$$

- *in which π_2^* is solved by backward induction. The probability of getting the contract in second period is determined by:*

$$q = q(\underbrace{SA_1(P_1(A_1, T), A_1, T)}_{\text{Sell-ask spread}})$$

Realtor incentives II

- Thus:

$$\pi(P_1, A_1, T) = \pi_1(R(P_1(A_1, T))) + \delta q(SA_1(P_1(A_1, T), A_1, T))\pi_2^*$$

- And we get:

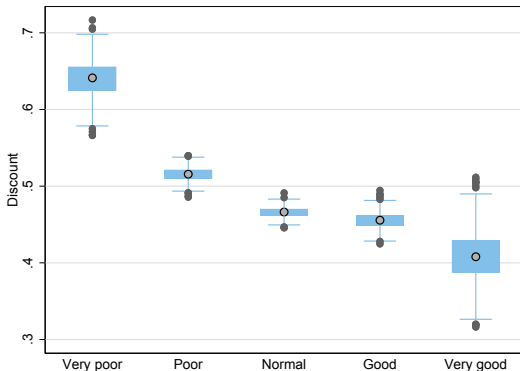
$$\frac{\partial \pi}{\partial A_1} = \underbrace{\left(\frac{\partial \pi_1}{\partial R} \frac{\partial R}{\partial P_1} \frac{\partial P_1}{\partial A_1} \right)}_{\substack{\text{First period profits} \\ \text{wrt first period ask}}} + \delta \underbrace{\frac{\partial q}{\partial SA_1}}_{+} \underbrace{\left(\frac{\partial SA_1}{\partial P_1} \frac{\partial P_1}{\partial A_1} + \frac{\partial SA_1}{\partial A_1} \right)}_{\substack{\text{Probability of} \\ \text{second period contract} \\ \text{wrt first period ask (?)}}}$$

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Realtor quality and probability of lowering the ask

$$P[Ask_{i,t} < Appraisal_{i,t} | TimeFE, Type_i] = \frac{e^{\beta_t + \gamma' Type_i}}{1 + e^{\beta_t + \gamma' Type_i}}$$



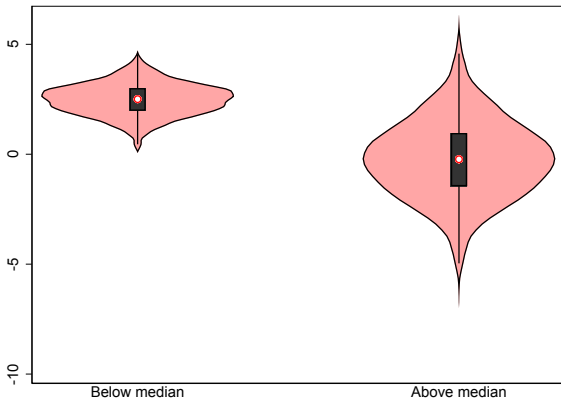
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Summary stats



Lesser skilled realtors profits from reducing the ask

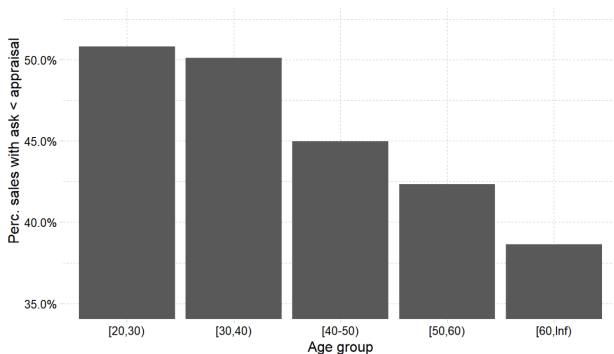
$$\Delta \text{Revenue}_{i,t}^k = \alpha^{k,m} + \beta_j^{k,m} + \eta_{l,t}^{k,m} + \gamma^{k,m} \left(\frac{-(\text{Ask}_i - \text{Appraisal}_i)}{\text{Appraisal}_i} \right)_{t-1}^{\text{Median}}$$



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Young sellers are over-represented



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And, there seems to be some learning among repeat sellers

<i>Dependent variable: $P[\text{Ask} < \text{Appraisal}]$</i>			
SS	0.324	0.321	0.279
SU	0.268	0.256	0.247
NS	-0.0316	-0.0362	-0.0534
Seller age			-0.00620
Month FE		YES	YES
Year FE		YES	YES
Unit type FE			YES
No. obs. 67,746			

The short story

- **Lower asks are punished** \Rightarrow Optimal to set ask equal to estimated market value
 - ◊ Get **more bids**, but also **anchor** the auction at a lower level
- Large ask-reductions are more **common among “low-skilled” real estate agents**
 - ◊ Low-skilled agents can **increase volume and sales by mimicking “high-skilled” agents**
- People are smart: Stop offering low ask when they realize it is a bad idea

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Summary stats for realtors

Variable	<u>Low-ask realtors</u>		<u>Non-low-ask realtors</u>	
	Mean	Std.	Mean	Std.
Sell-appraisal (in %)	1.28	18.29	1.92	55.9
No. sales	29.96	18.19	31.66	18.43
Revenue (mill. USD)	12.68	9.05	13.45	9.63
No. years active	5.4	1.75	5.46	1.82
No. realtors	351		307	
No. obs.	41844		38411	
No. realtors	351		307	
No. obs.	41,844		38,411	

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Summary stats auctions

Variable	Ask price \leq Appraisal value		Ask price \geq Appraisal value	
	Mean	Std.	Mean	Std.
Sell (thou. USD)	428.76	197.62	415.69	212.82
Ask (thou. USD)	417.99	195.04	405.05	206.21
Appraisal (thou. USD)	433.47	201.78	403.99	205.99
Square footage	1056.89	527.05	1126.66	518.53
Discount (in %)	3.59	4	-34	4.76
Sell-Appraisal (in %)	-68	9.52	3.11	9.56
Sell-Ask (in %)	2.97	8.35	2.79	8.69
TOM	36.3	37.42	27.69	26.74
No. bidders	2.41	1.7	2.25	1.5
No. interested	7.34	8.81	7.2	8.5
Opening bid-ask (in %)	-6.78	6.45	-7.02	6.59
Opening bid-appraisal (in %)	-10.1	7.49	-6.72	7.65
Opening bid-sell (in %)	-9.16	7.2	-9.21	7.35
Perc. owner-occupied	64.76		71.61	
Perc. apartment	59.53		49.29	
Perc. Oslo	32.52		21.27	
No. auctions	33,917		39,362	
No. bids	245,592		267,290	

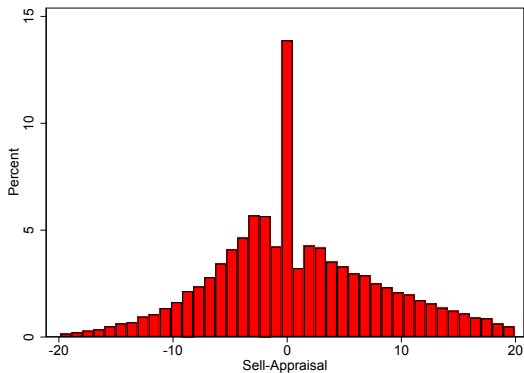
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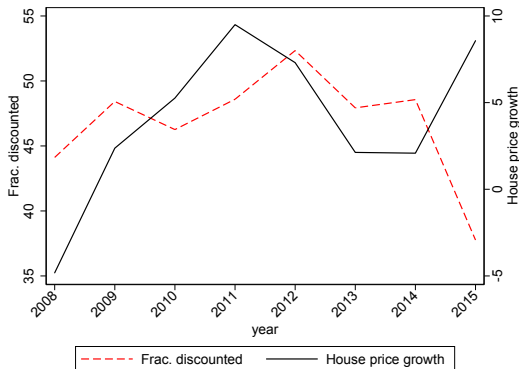
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Histogram of sell-appraisal spread



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Percent units advertised with discount versus house price growth



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Renovation frequencies around year of sale, discounted versus non-discounted units

	t-5	t-3	t-1	t	t+1	t+3	t+5
Discount	0.078*** (0.002)	0.092*** (0.003)	0.126*** (0.003)	0.153*** (0.003)	0.048*** (0.002)	0.022*** (0.001)	0.011*** (0.001)
No discount	0.078*** (0.002)	0.086*** (0.003)	0.120*** (0.003)	0.149*** (0.003)	0.059*** (0.002)	0.023*** (0.001)	0.012*** (0.001)
$p(H_0 : Disc. \leq Nodisc.)$	0.555	0.0437	0.0980	0.201	1.000	0.825	0.714
Observations	24,753	24,753	24,753	24,753	24,753	24,753	24,753

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Compositional bias

	No. obs.	No. viewers	No. bidders	Op. bid	Sell-App.	Sell-Ask.	TOM
Baseline	4354	0.041 (0.037)	0.033*** (0.010)	-0.846*** (0.043)	-0.760*** (0.048)	0.251*** (0.049)	0.922*** (0.176)
Norway ex. Oslo	2883	0.062* (0.037)	0.018 (0.011)	-0.806*** (0.052)	-0.822*** (0.056)	0.180*** (0.057)	0.784*** (0.232)
Owner occ.	2298	0.037 (0.055)	0.050*** (0.015)	-0.814*** (0.067)	-0.718*** (0.070)	0.279*** (0.071)	0.625** (0.298)
Appraisal \leq Median	2521	0.019 (0.059)	0.015 (0.018)	-0.778*** (0.076)	-0.733*** (0.083)	0.292*** (0.084)	1.377*** (0.265)
Size \leq Median	3060	0.064 (0.053)	0.017 (0.015)	-0.803*** (0.059)	-0.754*** (0.070)	0.275*** (0.071)	1.018*** (0.228)
TOM \leq Median	969	0.045 (0.267)	-0.121 (0.075)	-0.782*** (0.233)	-0.960** (0.379)	0.121 (0.382)	0.059 (0.156)

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Using hedonic model to estimate market valuation

	No. viewers	No. bidders	Op. bid	Sell-Pred.	Sell-Ask.	TOM
Discount	0.017*** (0.006)	0.006*** (0.002)	-0.894*** (0.008)	-0.978*** (0.009)	0.024*** (0.008)	0.061** (0.029)
<i>N</i>	4085	4085	4081	4085	4085	4085
<i>R</i> ²	0.832	0.728	0.996	0.996	0.757	0.736
<i>Controls:</i>						
Common debt	✓	✓	✓	✓	✓	✓
Appraisal	✓	✓	✓	✓	✓	✓
Realtor FE	✓	✓	✓	✓	✓	✓
Realtor office FE	✓	✓	✓	✓	✓	✓
Time FE	✓	✓	✓	✓	✓	✓
Unit FE	✓	✓	✓	✓	✓	✓

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An instrumental variable approach

	No. viewers	No. bidders	Op. bid	Sell-App.	Sell-Ask.	TOM
Discount	-0.002 (0.149)	0.035 (0.042)	-0.913*** (0.173)	-0.788*** (0.190)	0.200 (0.194)	1.451** (0.703)
<i>N</i>	4354	4354	4348	4354	4354	4354
R2	0.00781	0.0361	0.207	0.203	0.0421	0.0130
<i>Controls:</i>						
Common debt	✓	✓	✓	✓	✓	✓
Appraisal	✓	✓	✓	✓	✓	✓
Realtor FE	✓	✓	✓	✓	✓	✓
Realtor office FE	✓	✓	✓	✓	✓	✓
Time FE	✓	✓	✓	✓	✓	✓
Unit FE	✓	✓	✓	✓	✓	✓
<i>First stage results:</i>						
	Parsimonious	Fully specified				
Med. discount in mun.	1.005*** (0.006)	0.977*** (0.096)				
<i>N</i>	5009	4354				
R2	0.848	0.967				

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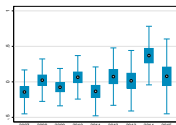
Using transaction data for all real estate companies

	Sell-App.	Sell-Ask	TOM
Discount	-0.670*** (0.005)	0.226*** (0.005)	0.769*** (0.014)
Observations	174834	174834	174834
R2	0.473	0.397	0.454
<i>Controls:</i>			
Common debt	✓	✓	✓
Appraisal	✓	✓	✓
Time FE	✓	✓	✓
Unit FE	✓	✓	✓

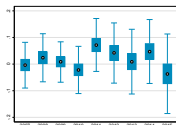
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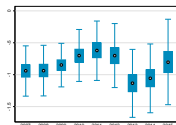
Time-variation in effect of discount on auction variables



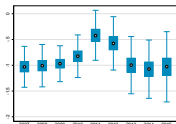
No. interested



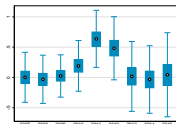
No. bidders



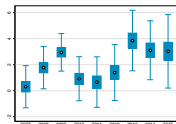
Opening bid



Sell-appraisal



Sell-ask



TOM

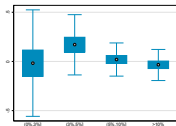
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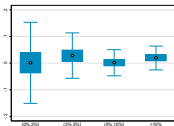


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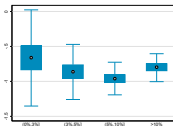
Non-linear effects of discount on auction variables



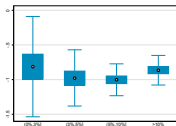
No. interested



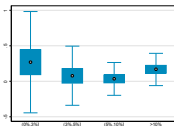
No. bidders



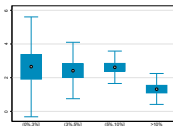
Opening bid



Sell-appraisal



Sell-ask

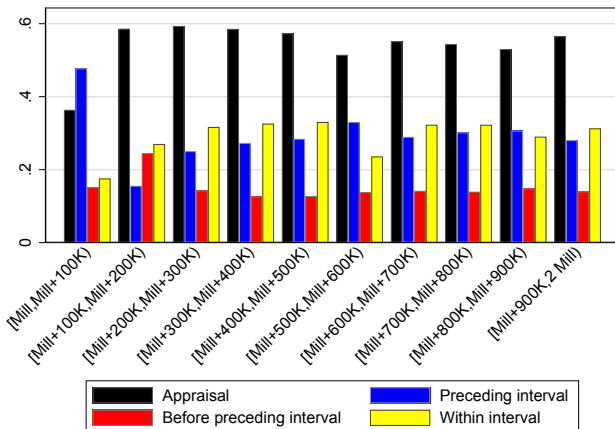


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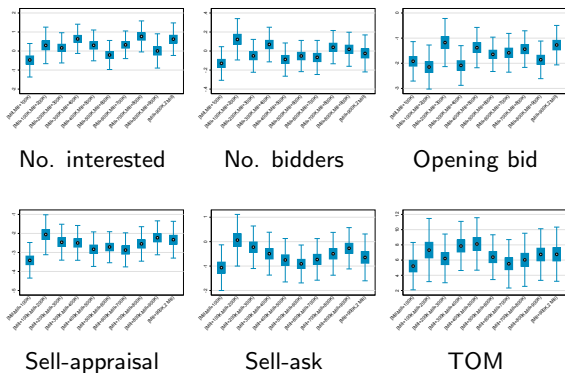
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Frequency of different strategies



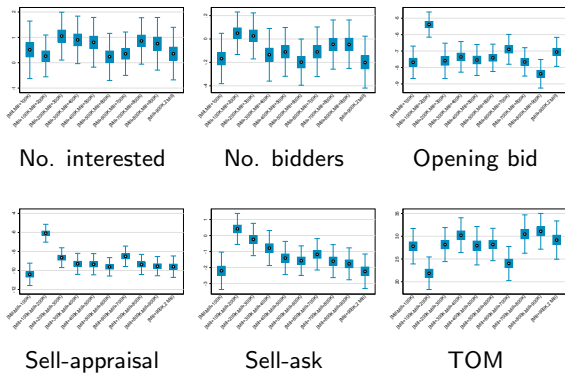
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Going up to 100K below interval. Effects relative to asking for appraisal



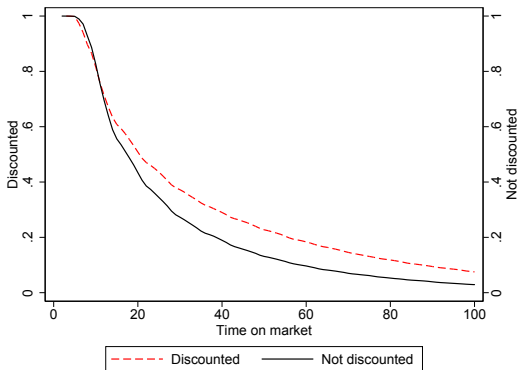
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Going more than 100K below interval. Effects relative to asking for appraisal



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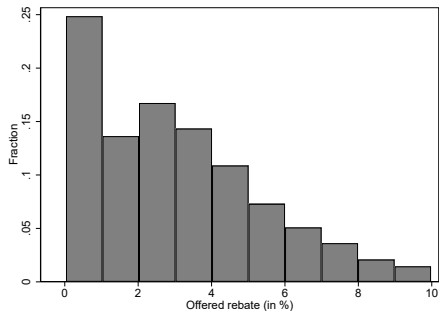
Survival rates after 100 days. Discounted versus Non-discounted



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How much do people lower the ask?

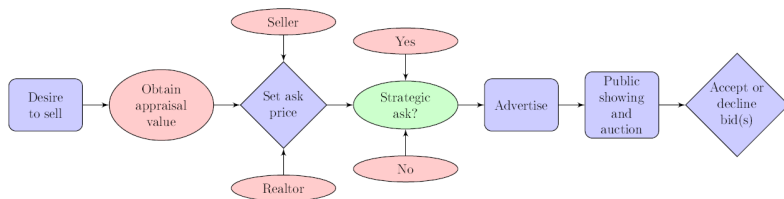


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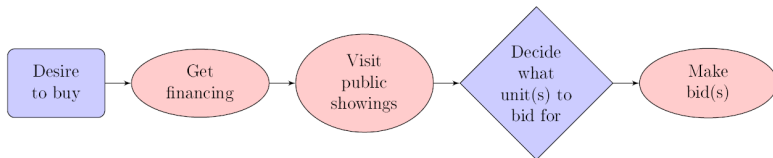
Selling process



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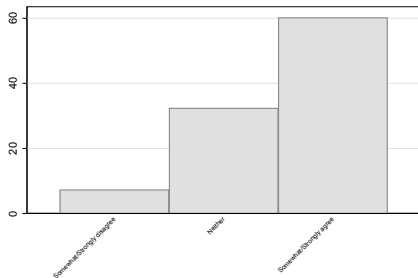
Buying process



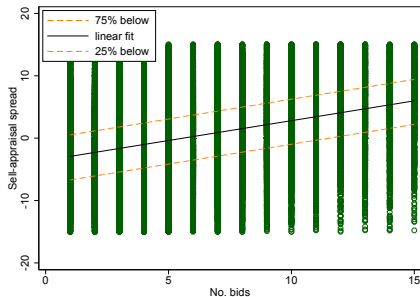
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Attract more bidders, resulting in a higher sell price...



Lower ask \Rightarrow More bids



More bids \Rightarrow Higher sell

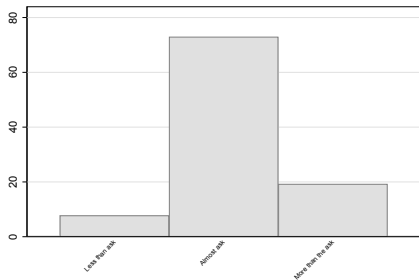
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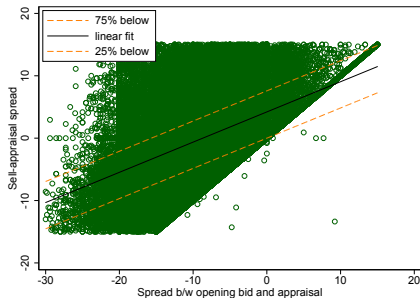


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And, they underestimate the anchoring effect....



Expected purchase price



Opening bid and sell

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