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“Buy-It-Now" or “Sell-It-Now" auctions: Effects of changing bargaining power in sequential trading mechanisms

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"Buy-It-Now" or "Sell-It-Now" auctions : Effects of changing bargaining power in sequential trading mechanisms*

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Abstract

We study experimentally the effect of bargaining power in sequential trading mechanisms that offer the possibility to trade at a fixed price before an auction. In the "Buy-It-Now" format, the seller offers a price prior to the auction; whereas in the "Sell-It-Now" format, it is the buyer. Both formats are extensively used in online and offline markets. Despite very different strategic implications for buyers and sellers, results from our experiment suggest no effects of bargaining power on aggregate outcomes. There is, however, substantial heterogeneity within sellers. Sellers who neglect the adverse selection effect of their own price offer in the *BIN* format could benefit from giving up bargaining power by using the "Sell-It-Now" format.

JEL classifications: C72, C91, D44, D82.
Keywords: Buy-It-Now price, Sell-It-Now price, private value auction, single item auction, sequential selling mechanism, fixed price, auction

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1 Introduction

Sequential mechanisms have become a pervasive method of exchange in online and offline markets. In such mechanisms, either the seller or a buyer offers the fixed price and an auction serves as outside option in case the price is rejected. For example, eBay.com offers a format where the seller states a price at which he is willing to sell the product before the auction. Other internet trading platforms (e.g., Hood.de) offer both types of mechanisms.[1] At many real estate markets, buyers can offer a price before the auction. Trade volumes of sequential mechanisms total billions of dollars per year. For instance, sales based on fixed prices in such combined mechanisms became the primary contributor to all fixed price sales on eBay.com, accounting for 28% of the gross merchandize volume in 2003 growing to 66% in 2012 (eBay, 2003, 2012). Hood.de ascribes 86% of the transaction volume to sales from combined mechanisms (Czyron, 2014). In the Melbourne housing market, 12% of properties listed to be auctioned off were sold in privately negotiated sales before the auction day (Quan (1994)). In Germany, 40% of scheduled foreclosure sale real estate auctions do not take place partly because interested buyers make price offers resulting in sales before the auction (Hammer, 2004).

Theoretically, who makes the price offer has different strategic implications. While the seller needs to take care of the adverse selection effect of his price offer, the format where buyers make the price offer constitutes a signaling game. However, maybe surprisingly, who has the bargaining power has no effect on how revenues are shared. Predicted final outcomes in both formats are the same: the price offer is always rejected and sales take place in the auction when agents are risk neutral (see Ivanova-Stenzel and Kröger (2008) –IK, hereafter–, Shunda, 2009, and Grebe (2008) –G, hereafter). The empirical evidence above shows, however, that a substantial part of the fixed sales ends before the auction. The question arises whether who has the power prior to the auction has an effect on the number of fixed sales, prices, profits and efficiency. The answer to this question is of practical interest for auctioneers (i.e., the market platform) as well as for sellers and buyers in case they can choose between formats.

2 Experimental design and risk neutral benchmark

In this article, we compare experimentally two formats that consist of a fixed price offer followed by a second-price sealed-bid auction, similar to those used in reality. The price offer is either made by the seller, the "Buy-It-Now" auction (*BIN* treatment hereafter), or by a buyer, the "Sell-It-Now" auction (*SIN* treatment hereafter). The item for sale is indivisible and offered in the bargaining phase to one of the two buyers (henceforth *first buyer*). If the price offer is rejected, the price is determined by a second–price sealed–bid auction without a reservation price with the *first buyer* and one additional buyer.[2] Both buyers place their bids simultaneously. Buyers' valuations for the good are private and iid $v_i \sim U[0,1]$ with $i = 1, 2$.[3] The seller values the object at 0. The seller's valuation and the distribution of buyer valuation were common knowledge.

The experiment was computerized and conducted with zTree (Fischbacher (2007)). Trading groups

[1] eBay and Hood.de name the format where the seller makes the price offer "*Buy It Now*" auction. Hood.de offers the format where the buyer makes the offer under the name "*Preis vorschlagen*" ("Make an offer").

[2] The additional buyer is not informed about the price offered at the bargaining stage.

[3] In the experiment, values were integers drawn from $[0, 100]$. For the ease of comparison to the theoretical predictions, all results are reported for normalized valuation in the $[0, 1]$ range.

were randomly rematched in every period. The roles of buyers and sellers were determined randomly and kept throughout the experiment. Each buyer was in the position of the *first buyer* in 16 out of 32 periods. We adopted a between subjects design with 10 sessions per treatment and a total of 210 participants (*BIN*: 90, *SIN*: 120).[4]

The risk neutral benchmark predicts for both formats no transactions to take place prior to the auction regardless of who has the bargaining power. For both formats one can derive a threshold price $\widetilde{p}(v_1) = (1 - (1 - v_1)^2)/2$ for the *first buyer* with valuation v_1 above which he does not accept any price in the *BIN* format and above which he will not make a price offer in the *SIN* format. Sellers need to condition on this threshold. For the *BIN* format, sellers need to take the adverse selection effect of their offer into account – low offers not only generate low profits in the bargaining stage but also in the auction stage as buyers who reject low offers are those who have low values.[5] It can be shown that offers of $p_{BIN} \geq 0.5$, that are high enough to avoid the selection effect, maximize expected profit. Given that the threshold is monotone in the *first buyer*'s valuation and that the maximum threshold is $\widetilde{p}(1) = 0.5$ for the highest possible valuation ($v_1 = 1$), price offers are always too high to be accepted $p_{BIN} \geq \widetilde{p}(v_1)\ \forall v_1$, and all trades end in the auction. For the *SIN* format, it can be shown that the expected revenue of the seller equals the *first buyer*'s threshold, $\widetilde{p}(v_1)$.[6] Thus, sellers would accept price offers of $p_{SIN} > \widetilde{p}(v_1)$. However, prices above the threshold will never be offered and in consequence the seller should always reject and all trades end in the auction.[7]

In summary, the risk neutral benchmark predicts *BIN* prices above 0.5 and *SIN* prices below $\widetilde{p}(v_1)$. Price offers are never accepted and all sales take place in the auction. Thus, bargaining power has no effect. Outcomes in both mechanisms are the same as in a second-price sealed-bid auction: seller revenues of 0.33, buyer profits of 0.16 and 100% efficiency (where efficient outcome is defined as one where the buyer with the highest valuation gets the object).

3 Results

In the experiment, we observe a total of 2 240 trades, (*BIN* : 30 sellers x 32 periods= 960; *SIN* : 40 sellers x 32 periods = 1 280). Columns (1)–(3) of Table 1 present descriptive statistics and test results for the key variables of interest for both formats. We find seller revenues and buyer profits close to the theoretical risk neutral benchmark prediction without significant differences between treatments. Efficiency rates do not differ across treatments and are with 85% (*BIN*) and 83% (*SIN*) comparable to results from other second-price sealed-bid auction experiments (e.g., Kagel and Levin (1993): 79%, Güth, Ivanova-Stenzel, and Wolfstetter (2005): 88%). Contrary to the risk neutral benchmark, we observe a substantial amount of agreements reached in the bargaining phase. The share of transactions at the fixed price comprises around one third in both treatments.

Altogether, we do not observe significant differences between the two treatments, suggesting that the bargaining power in the *BIN* and *SIN* format does not affect aggregate outcomes. These findings suggest

[4] Complete sets of the original (German) or translated instructions are available upon request to the authors.

[5] Seller's maximization problem in *BIN*: $\max_p \left(\Pr\{p \leq \widetilde{p}(v_1)\}p + (1 - \Pr\{p \leq \widetilde{p}(v_1)\})E[R_A|\widetilde{p}(v_1) < p]\right)$, with R_A expected revenue from the auction.

[6] Seller's expected auction revenue in *SIN*: $E[R_A|v_1] = (1 - v_1)v_1 + \int_0^{v_1}(x)dx = (1 - (1 - v_1)^2)/2 = \widetilde{p}(v_1)$.

[7] For details of the theoretical results, for $n > 2$ buyers and for asymmetric buyers, see IK and G.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	All Sellers			*BIN* sellers with :					
				$p_{BIN} < 0.5$			$p_{BIN} \geq 0.5$		
Format	BIN	SIN	p-value	BIN	SIN	p-value	BIN	SIN	p-value
Seller revenue	0.33	0.32	0.33 $^{MWU,}_{n=20}$	0.31	0.34	0.01 $^{SR,}_{n=18}$	0.36	0.34	0.04 $^{SR,}_{n=12}$
Bidder profit	0.15	0.15	1.00 $^{MWU,}_{n=20}$						
Efficiency	85%	83%	0.65 $^{MWU,}_{n=20}$						
Acceptance rate	0.33	0.37	0.12 $^{MWU,}_{n=20}$	0.39	0.25		0.24	0.08	
Nobs BIN	960			576			384		
Nobs SIN		1 280		737 280			491 520		
Nobs sessions	10	10		10					
Nobs sellers	30	40		18			12		

Table 1: Descriptive statistics for both treatments for all transactions, and separately for *BIN* sellers. P-values from two sided non-parametric tests of no difference (Mann-Whitney-U and Sign Rank) in columns (3), (6) and (9).

for market platforms, that usually earn a share of the sales price, there is no difference in their expected revenues between both formats.

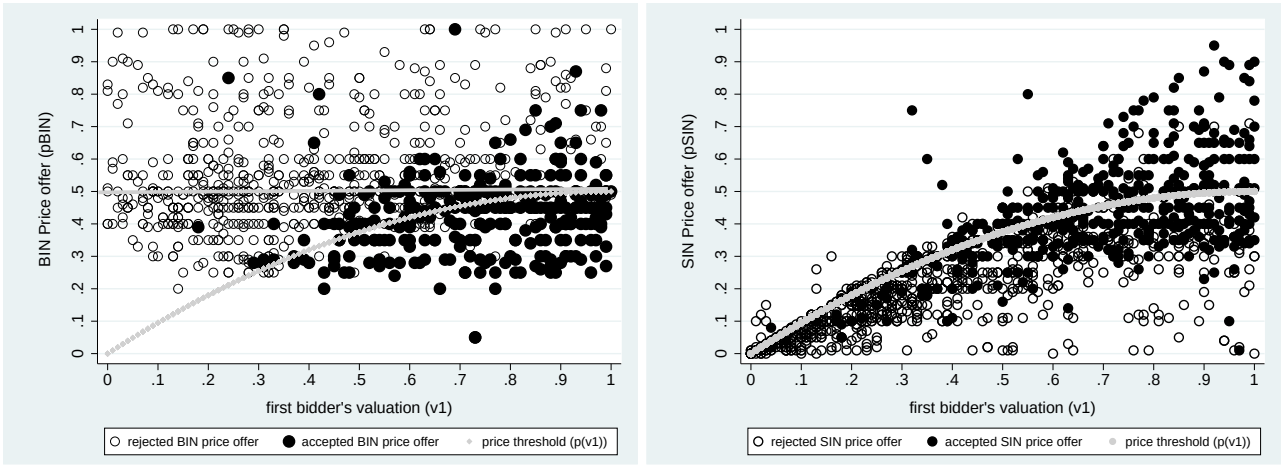

Figure 1: Scatter plot of accepted (solid circles) and rejected (empty circles) price offers, and threshold ($\widetilde{p}(v_1)$) in relation to the *first buyer*'s valuation for *BIN* (left panel) and *SIN* (right panel) treatment. Benchmark prediction for *BIN* at $p = 0.5$.

An analysis of behavior at the individual level for both treatments is presented in Figure 1. There, all individual price offers for both treatments (*BIN* – left panel and *SIN* – right panel) are shown relative to the valuation and price threshold ($\widetilde{p}(v_1)$) of the *first buyer*. Most accepted *BIN* prices and offered *SIN* prices are below the threshold (*SIN*: 70% and *BIN*: 57%). Those deviations from the risk neutral benchmark can be easily reconciled with risk aversion (G, IK, and Reynolds and Wooders (2009)). Also seller behavior seems similar between treatments. 52% of the *BIN* offers (left panel) and 67% of the accepted *SIN* prices (solid circles in right panel) are below 0.5. The debate is ongoing to what extent risk preferences or bounded rationality cause making and accepting such low price offers (Mathews and

Katzman (2006), G, and IK). If those deviations are not random, the question arises whether our result of no differences in aggregate profits for sellers and buyers also apply at the individual level.

We do not find differences in individual buyer behavior. Among sellers, however, we observe heterogeneity in behavior, that we summarize in the left panel of Figure 2 as *BIN* price offer quartiles. Of all *BIN* sellers, 27% behave according to the theoretical prediction (75% or more of their price offers $p_{BIN} \geq 0.5$), whereas 33% deviate substantially, i.e., hardly ever offer above 0.5 (75% or more of their price offers $p_{BIN} < 0.5$). A similar analysis in the *SIN* treatment reveals that only 8% of all *SIN* sellers never accept offers below 0.5.

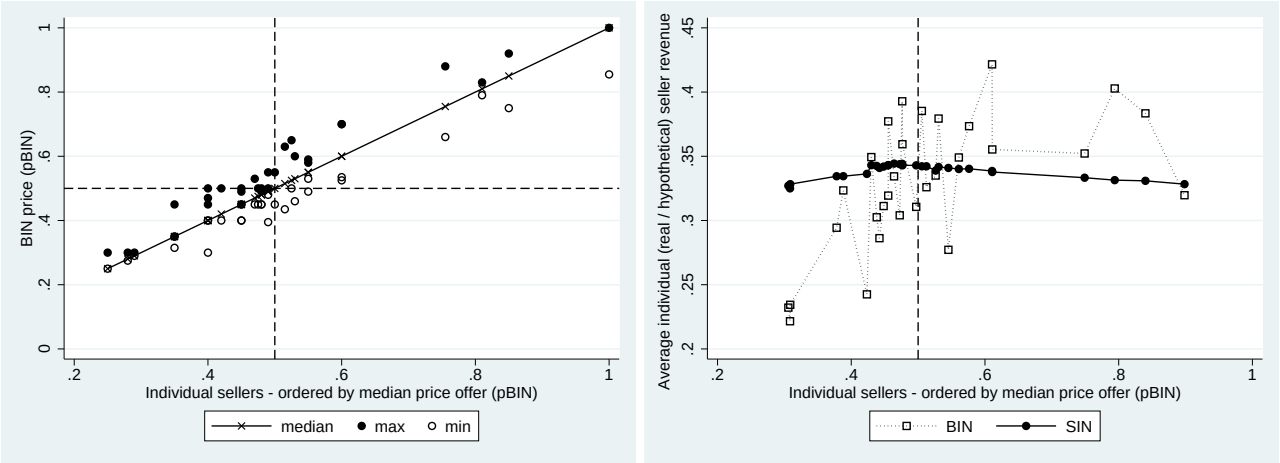

Figure 2: Scatter plots for each individual seller in the *BIN* treatment. Reference lines at 0.5.
Left panel: *BIN* prices (median, 25th percentile (min) and 75th percentile (max)).
Right panel: Average realized *BIN* profits and hypothetical *SIN* revenues.

To answer the question whether different seller types gain from one or the other format, we construct for *BIN* sellers a counterfactual *SIN* treatment by interpreting their *BIN* price as the minimal price they would have accepted in the *SIN* format. Then, we confront each observed *SIN* price offer with the *BIN* price and presume that a seller would accept the *SIN* price if it lays at or above his *BIN* price. Otherwise, an auction is held presuming both buyers bid their true values. The right panel of figure 2 presents for each seller the average (actual) revenue from the *BIN* treatment and the average (hypothetical) revenue in the counterfactual *SIN* treatment. Columns (4)–(9) of Table 1 report the corresponding average numbers for all sellers and results of testing for revenue equality. The results suggest that sellers can benefit from a particular format. Sellers who offer average *BIN* prices below the theoretical benchmark prediction, $p_{BIN} < 0.5$, would make a higher profit in the *SIN* format. This is due to the fact that *first buyers* with higher valuation offer prices in the *SIN* format that lay above the prices those sellers ask for in the *BIN* format. We also find that sellers offering prices in line with the theoretical benchmark prediction, $p_{BIN} \geq 0.5$, benefit from their bargaining power as they make higher profits in the *BIN* format compared to their profits in the counterfactual *SIN* format.

4 Conclusions

We study two sequential trading mechanisms with an auction as outside option when a negotiation fails to produce a sale. The mechanisms differ in who has the bargaining power - the seller (*BIN* auction) or a buyer (*SIN* auction). We do not find differences between the two formats in aggregate outcomes, i.e., seller revenue, buyer profit, acceptance rates, and efficiency. Hence, market makers whose profits usually comprise a share of seller revenues can freely choose between both formats.

An examination on the individual level reveals no advantages for buyers being in one or the other format. A counterfactual analysis suggests, however, that some sellers might benefit from either having or giving up their bargaining power. Sellers who make too low price offers in the *BIN* format would benefit and earn higher profits when they give up their bargaining power and let the buyer offer the price in the *SIN* format. Sellers who demand high *BIN* prices, in line with the risk neutral benchmark prediction, make larger profits in the *BIN* compared to the *SIN* format.

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