"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 two sequential mechanisms that offer the possibility to trade at a fixed price before an auction. In the "Buy-It-Now" format, the seller has the bargaining power and 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 ask for high prices not only benefit from having the bargaining power but also earn revenue above those expected in the auction.

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

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 a fixed price followed by an auction in case the fixed 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 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).

Previous research has almost exclusively considered sequential mechanisms in which sellers make the price offer and mainly paid attention to buyer behavior (e.g., Shunda (2009)). This paper provides an experimental comparison of both types of mechanisms. We focus on the effect of bargaining power, i.e., who makes the "take-it-or-leave-it" price offer, and seller behavior. Who makes the price offer implies different strategic considerations in a sequential mechanism. While the (uninformed) seller needs to take into account the adverse selection effect of his price offer, the format where (informed) buyers make the price offer constitutes a signaling game.[2] However, theoretically, when all parties are risk neutral, who has the bargaining power has no effect on how profits are shared and predicted final outcomes in both formats are the same: the price offer is always rejected and sales take place in the auction (e.g., Ivanova-Stenzel and Kröger (2008) –IK, hereafter– Grebe (2008) –G, hereafter).

Empirical evidence shows, however, that a substantial part of the fixed sales ends in the bargaining stage. While risk aversion, non-expected utility or bounded rationality provides possible theoretical explanations for successful trades prior to the auction (G, IK, Shunda (2009)), the question arises whether who has the bargaining power in a combined mechanism matters and affects the number of sales at the fixed price, profits, or efficiency. This study adds to the current literature on combined mechanisms and bargaining with asymmetric information, but also provides practical insights for auctioneers (e.g., market platforms) as well as for sellers and buyers in case they can choose between such formats.

2 Experimental design and risk neutral benchmark

We compare two formats where 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 at the bargaining stage to one of the two buyers (henceforth *first-*

[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] In a similar vain, Kübler, Müller, and Normann (2008) study the effect of the order of moves of the informed and the uninformed party by comparing a signaling and a screening variant of a job-market game.

buyer). If the price offer is rejected, the price is determined by a second–price sealed–bid auction without a reservation price and with two bidders, the *first-buyer* and one additional buyer. Both buyers place their bids simultaneously. It is common knowledge that buyers' valuations for the good are private and iid $v_i \sim U[0, 100]$, $i = 1, 2$, and that the seller values the object at 0.

Roles of buyers and sellers were determined randomly and kept throughout the experiment. Trading groups were randomly rematched in every period. Each buyer was in the position of the *first-buyer* in 16 out of 32 periods. There were 10 sessions per treatment (between subjects design) and a total of 210 participants (*BIN*: 90, *SIN*: 120).[3]

In the risk neutral benchmark, the *first-buyer* has a threshold price $\widetilde{p}(v_1) = 100 \cdot (1-(1-v_1/100)^2)/2$, above which he will neither accept (*BIN*) nor make (*SIN*) any price offer (p_{BIN}, resp. p_{SIN}). Sellers in the *BIN* format should condition on this threshold and 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.[4] It can be shown that all trades end in the auction: the threshold $\widetilde{p}(v_1)$ increases in v_1 and $\widetilde{p}(100) = 50$ for the highest possible valuation ($v_1 = 100$); only offers of $p_{BIN} \geq 50$ avoid the selection effect and maximize expected profit, but are always too high to be accepted, $p_{BIN} \geq \widetilde{p}(v_1)$, $\forall v_1$. For the *SIN* format, it can be shown that the expected revenue of the seller equals the *first-buyer*'s threshold, $\widetilde{p}(v_1)$.[5] Thus, sellers would accept price offers $p_{SIN} > \widetilde{p}(v_1)$. However, prices above $\widetilde{p}(v_1)$ will never be offered and in consequence the seller should always reject and all trades end in the auction.[6] In summary, the risk neutral benchmark predicts (1) *BIN*-prices above 50 and *SIN*-prices below $\widetilde{p}(v_1)$, (2) price offers are never accepted and all sales take place in the auction. Thus, bargaining power has no effect when agents are risk neutral and outcomes in both mechanisms are predicted to be the same as in a second-price sealed-bid auction: seller revenue of 33, buyer profits of 16 and 100% efficiency.[7]

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).[8] Columns (1)–(3) of Table 1 present descriptive statistics and test results for the key variables of interest for both formats. We did the analysis separately for the first and second half of the experiment (columns (4) - (9)) and find no differences over time (columns (10) - (11)). Contrary to the risk neutral benchmark and in line with other empirical evidence, we observe for both treatments a substantial amount of agreements reached in the bargaining stage (*BIN*: 33%; *SIN*: 37%). Therefore, the question arises whether and to what extent who has the bargaining power affects the outcomes.

On the aggregate level, we find seller revenue and buyer profits close to the risk neutral benchmark prediction without significant differences between treatments. Acceptance and efficiency rates do not

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

[4] 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.

[5] *SIN*-sellers' expected auction revenue: $E[R_A|v_1] = (1-v_1/100)v_1/100 + \int_0^{v_1/100}(x)dx = 100 \cdot (1-(1-v_1/100)^2)/2 = \widetilde{p}(v_1)$.

[6] When $p = \widetilde{p}(v_1)$, we assume sellers prefer an auction.

[7] For more details on the theoretical predictions, for $n > 2$ buyers, for asymmetric buyers, and for the case of risk aversion of buyers and/or sellers see IK for *BIN* and G for *SIN*.

[8] For the *BIN*-treatment, we use the data from IK.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
	All data			1st Half			2nd Half			1st vs 2nd	
Format	BIN	SIN	p-value	BIN	SIN	p-value	BIN	SIN	p-value	BIN	SIN
Seller revenue	33	32	0.33	33	33	0.55	34	32	0.26	0.80	0.33
Bidder profit	15	15	0.94	15	15	0.69	16	16	0.62	0.28	0.11
Efficiency	85%	83%	0.65	87%	83%	0.59	83%	83%	0.22	0.15	0.88
Acceptance rate	33%	37%	0.12	35%	37%	0.42	32%	39%	0.09	0.68	0.68
Nobs BIN	960			480			480			2x480	
Nobs SIN		1 280			640			640			2x640
N sessions	10	10		10	10		10	10		10	10
N sellers	30	40		30	40		30	40		30	40
N buyers	60	80		60	80		60	80		60	80

Table 1: Means values over individual transactions for whole experiment (32 periods) ((1),(2)) and separately for first and last 16 periods ((5),(6) and (8),(9)) with p-values from two-sided non-parametric tests of no difference on 20 session averages (Mann-Whitney-U (3), (6), (9) and between first and second half (signed-rank-test (10),(11)).

differ significantly across treatments. The latter 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%).[9] Despite some slight tendency to overbid (*BIN*: 22%, *SIN*: 17%) and to underbid (*BIN*: 29%, *SIN*: 37%), we find neither any significant differences between observed and predicted bids nor significant changes of bid deviations over time.[10]

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 indicate for market platforms, that usually earn a share of the sales price, similar expected revenue for both formats.

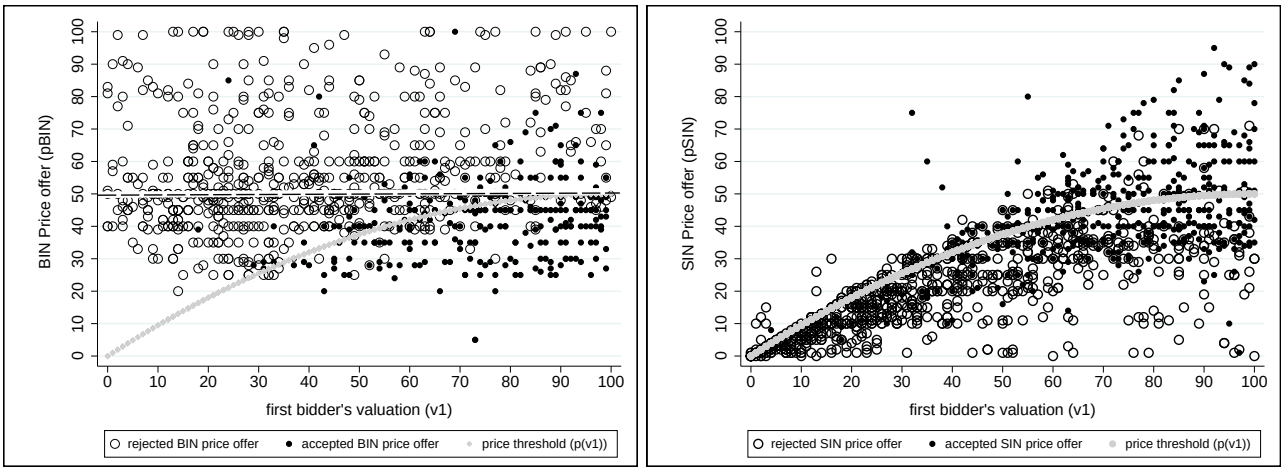

Figure 1: Scatter plot of accepted (solid circles) and rejected (empty circles) price offers, and threshold ($\widetilde{p}(v_1)$) in relation to the *first-buyer*'s valuation for *BIN* (left panel) and *SIN* (right panel) treatment.

[9] An allocation is efficient when the buyer with the highest valuation gets the object.

[10] Similarly, Garratt, Walker, and Wooders (2012) find in laboratory second-price auctions that highly experienced eBay bidders are just as likely to underbid as to overbid. However, they do not find auction revenue to be significantly different from theoretical predictions.

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 and *SIN* – right panel) are shown relative to *first buyers*' valuations and price thresholds, $\widetilde{p}(v_1)$. Most accepted *BIN*-prices and offered *SIN*-prices are below the threshold (*SIN*: 70% and *BIN*: 57%). Deviations from the risk neutral benchmark can be easily reconciled with risk aversion (G, IK, and Shahriar and Wooders (2011)). Seller behavior seems also similar between treatments. 52% of the *BIN* offers (left panel) and 67% of the accepted *SIN*-prices (solid circles in right panel) are below 50. The debate is ongoing to what extent risk preferences or bounded rationality cause sellers to make such low price offers (IK) or to accept them (G).[11] If those deviations are not random, the question arises whether our result of no differences in aggregate seller revenue also applies at the individual level and the original question resurfaces regarding the effect of bargaining power for different seller types.

We observe substantial heterogeneity in seller behavior. Of all *BIN*-sellers, 27% behave according to the theoretical prediction (75% or more of their $p_{BIN} \geq 50$), whereas 33% deviate substantially, i.e., hardly ever offer prices above 50 (75% or more of their $p_{BIN} < 50$). A similar analysis in the *SIN*-treatment reveals that only 8% of all *SIN*-sellers never accept price offers below 50. Figure 2 presents for each seller separately the median ($\overline{p}_{BIN}, \overline{p}_{acc.SIN}$), 10th and 90th percentile of their offered *BIN*, respectively accepted *SIN* prices, and the relation of those prices to the average individual seller revenue. The left panel indicates that sellers who ask for low *BIN*-prices ($\overline{p}_{BIN} < 50$) obtain lower revenue compared to sellers who offer $\overline{p}_{BIN} \geq 50$ (on average 31 vs. 36, $p - value = 0.003$, median-test). In contrast, sellers in *SIN* who accept relatively low price offers ($\overline{p}_{acc.SIN} < 50$) do not make significantly less money compared to those whose median accepted offer is above 50 (31 vs. 32, $p - value = 0.72$). This might be due to the fact that sellers are randomly exposed to buyers, hence, also *SIN*-sellers, who are willing to accept rather low prices, receive occasionally high price offers, increasing their revenue. Support for such reasoning can be found in the wider dispersion of accepted price offers for each seller in the *SIN* compared to the *BIN* format.

There are no significant differences in earnings for sellers with $\overline{p}_{BIN} < 50$ in *BIN* compared to sellers who accept such low prices in *SIN* ($\overline{p}_{acc.SIN} < 50$) (31 vs. 31, $p - value = 0.76$). However, high price sellers in *BIN* ($\overline{p}_{BIN} \geq 50$) earn more compared to sellers in *SIN* who accept only high prices ($\overline{p}_{acc.SIN} \geq 50$) (36 vs. 32, $p - value = 0.001$). These two results indicate that bargaining power in sequential mechanisms is only beneficial for sellers who ask for high prices. Note that those sellers obtain in the *BIN* format profits even above 33, i.e., what they would expect from a standard second-price sealed-bid auction.

4 Conclusions

We study two sequential trading mechanisms that start with a fixed price offer and continue with an auction in case the price offer is rejected. Both mechanisms differ in who has the bargaining power and can make the price offer - the seller (*BIN* format) or a buyer (*SIN* format). We do not find significant differences between the two formats for aggregate outcomes (seller revenue, buyer profit, acceptance rates, efficiency). Hence, market makers whose profits usually comprise a share of seller revenue can freely choose

[11] Similar phenomena were observed in the literature on bargaining with asymmetric information (Samuelson and Bazerman (1985)).

between both formats.

An examination on the individual level reveals that not all seller types benefit from having the bargaining power. Bargaining power is irrelevant for sellers who ask for low prices (*BIN*) or who accept them (*SIN*). However, sellers who demand high prices are better off when they have the bargaining power. Moreover, high price offers in the *BIN* format tend to raise revenue above what sellers would obtain in a standard auction.

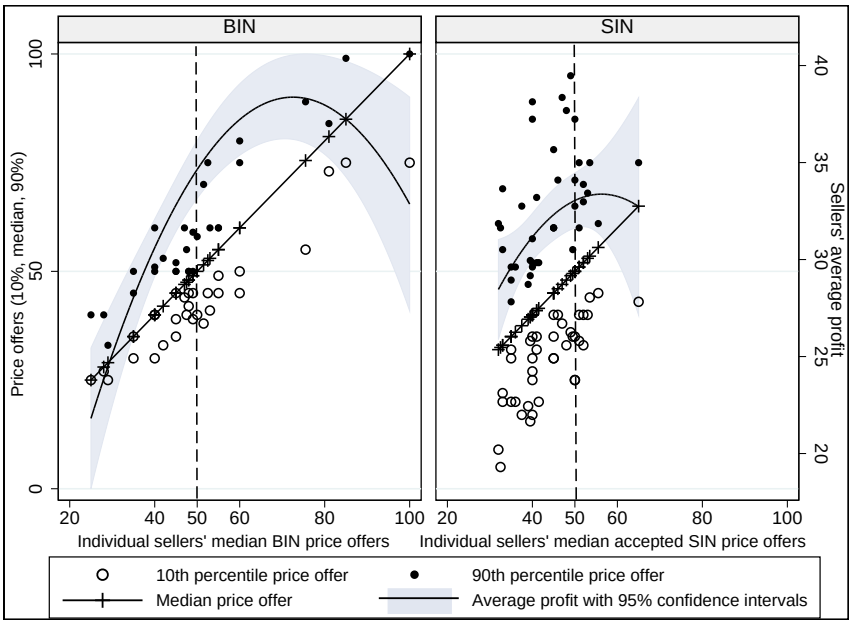

Figure 2: Scatter plots per seller in the *BIN* and *SIN*-treatments. Median, 10th, 90th percentile of *BIN*-prices (left panel), *accepted SIN*-prices (right panel) and average realized profits.

5 Acknowledgements

We thank Henning Philippsen for research assistance and an anonymous referee for helpful comments. Financial support by the *Social Sciences and Humanities Research Council*, *Deutsche Forschungsgemeinschaft,* SFB 649, "Economic of Risk" as well as support by the Berlin Centre for Consumer Policies (BCCP) is gratefully acknowledged.

References

Czyron, S. (2014): "for Hood.de GmbH in email conversation with Henning Philippsen," email in German and available upon request.

eBay Inc. (1999): "Internet presentation," `http://eBay.com`, accessed last time: 2015-06-19.

——— (2003): "Fourth Quarter and Full Year 2003 Financial Results," `http://investor.ebay.com/news/Q403/EBAY012104-712351.pdf`, accessed last time: 2004-08-10.

——— (2012): "Annual report 2011," `http://investor.ebayinc.com/secfiling.cfm?filingID=1065088-12-6\&CIK=1065088`, accessed last time : 2015-06-19.

Garratt, R. J., M. Walker, and J. Wooders (2012): "Behavior in Second-Price Auctions by Highly Experienced eBay Buyers and Sellers," *Experimental Economics*, 15, 44 – 57.

Grebe, T. (2008): *Four Essays on Auction Mechanisms,*chap. 4, pp. 52 – 76.

Güth, W., R. Ivanova-Stenzel, and E. Wolfstetter (2005): "Bidding Behavior in Asymmetric Auctions: An Experimental Study," *European Economic Review*, 4, 1891 – 1913.

Hammer, T. (2004): "Wenn sich das Traumhaus als Mogelpackung entpuppt," *Süddeutsche Zeitung*, 2004-05-25, p. 25; article in German and available upon request.

Hood.de (1999): "Internet presentation," `http://www.hood.de/`, accessed last time: 2015-06-19.

Ivanova-Stenzel, R., and S. Kröger (2008): "Price Formation in a Sequential Selling Mechanism," *Journal of Economic Behavior and Organization*, 67(3-4), 832–843.

Kagel, J. H., and D. Levin (1993): "Independent private value auctions: Bidder behavior in first-, second- and third-price auctions with varying numbers of bidders," *Economic Journal*, 103, 868 – 879.

Kübler, D., W. Müller, and H.-T. Normann (2008): "Job-market Signaling and Screening: An Experimental Comparison," *Games and Economic Behavior*, 64, 219 – 236.

Quan, D. (1994): "Real Estate Auctions: A Survey of Theory and Practice," *Journal of Real Estate Finance and Economics*, 9, 23 – 49.

Samuelson, W. F., and M. H. Bazerman (1985): *The winner's curse in bilateral negotiations*chap. 3, pp. 105 – 137. JAI Press Inc.

Shahriar, Q., and J. Wooders (2011): "An Experimental Study of Auctions with a Buy Price Under Private and Common Values," *Games and Economic Behavior*, 558-573(2), 72.

Shunda, N. (2009): "Auctions with a buy price: The case of reference-dependent preferences," *Games and Economic Behavior*, 67(2), 645–664.