CIRANO
Knowledge into action

RISK, REWARD AND UNCERTAINTY IN BUYER-SELLER TRANSACTIONS

– THE SELLER'S VIEW ON COMBINING POSTED PRICES AND AUCTIONS –

RADOSVETA **IVANOVA-STENZEL**
SABINE **KRÖGER**

2023s-13
WORKING PAPER
CS

CIRANO
Knowledge into action

Center for Interuniversity Research and Analysis on Organizations

The purpose of the **Working Papers** is to disseminate the results of research conducted by CIRANO research members in order to solicit exchanges and comments. These reports are written in the style of scientific publications. The ideas and opinions expressed in these documents are solely those of the authors.

Les cahiers de la série scientifique visent à rendre accessibles les résultats des recherches effectuées par des chercheurs membres du CIRANO afin de susciter échanges et commentaires. Ces cahiers sont rédigés dans le style des publications scientifiques et n'engagent que leurs auteurs.

CIRANO is a private non-profit organization incorporated under the Quebec Companies Act. Its infrastructure and research activities are funded through fees paid by member organizations, an infrastructure grant from the government of Quebec, and grants and research mandates obtained by its research teams.

Le CIRANO est un organisme sans but lucratif constitué en vertu de la Loi des compagnies du Québec. Le financement de son infrastructure et de ses activités de recherche provient des cotisations de ses organisations-membres, d'une subvention d'infrastructure du gouvernement du Québec, de même que des subventions et mandats obtenus par ses équipes de recherche.

ISSN 2292-0838 (online version)

Risk, Reward and Uncertainty in Buyer-Seller Transactions

– The Seller's View on Combining Posted Prices and Auctions – [*]

Radosveta Ivanova-Stenzel[†] and Sabine Kröger[‡]

June 3, 2023

Abstract/Résumé

In Buy-It-Now auctions, sellers can post a take-it-or-leave-it price offer prior to an auction. While the literature almost exclusively looks at buyers in such combined mechanisms, the current paper summarizes results from the sellers' point of view. Buy-It-Now auctions are complex mechanisms and therefore quite challenging for sellers. The paper discusses the seller's curse, a bias that sellers might fall prey to in such combined mechanisms, and how experience counterbalances this bias. Furthermore, the paper explores the role of information and bargaining power on behavior and profit prospects in Buy-It-Now auctions.

Dans les enchères de type "Achat immédiat", les vendeurs peuvent publier une offre de prix à prendre ou à laisser avant l'enchère. Alors que la littérature s'intéresse presque exclusivement aux acheteurs dans ces mécanismes combinés, le présent document résume les résultats du point de vue des vendeurs. Les enchères de type "Achat immédiat" sont des mécanismes complexes et posent un grand défi pour les vendeurs. Dans l'article, nous traitons de la malédiction du vendeur, un biais dont les vendeurs peuvent être victimes dans ces mécanismes combinés. Nous présenterons également comment l'expérience que les vendeurs ont avec le mécanisme contrebalance ce biais. En outre, nous explorons le rôle de l'information et du pouvoir de négociation sur le comportement des vendeurs et leurs perspectives de profit dans les enchères de type "Achat immédiat".

Keywords/Mots-clés: asymmetric information; laboratory experiment; field experiment; auction; BIN-auction; Buy-It-Now auction; BIN-price; Buy-It-Now price; combined mechanism / information asymétrique ; expérience en laboratoire ; expérience sur le terrain ; enchère ; enchère BIN ; enchère Buy-It-Now ; prix BIN ; prix Buy-It-Now ; mécanisme combiné ; enchère de type "Achat immédiat" ; prix "Achat immédiat"

JEL Codes/Codes JEL: C72, C91, D44, D82, L1

Pour citer ce document / To quote this document
Ivanova-Stenzel, R., & Kröger, S. (2023). Risk, Reward and Uncertainty in Buyer-Seller Transactions (2023s-13, Working Papers, CIRANO.) https://doi.org/10.54932/UQNH8875

---

[*] A modified version of this paper appears in the volume Precision Retailing edited by: Laurette Dube, Maxime Cohen, Nathan Yang, and Bassem Monla. We thank John J. Han and the co-editors of the book Precision Retailing, Laurette Dubé and Bassem Monla, for the helpful comments. We gratefully acknowledge financial support from the Social Sciences and Humanities Research Council, Canada, through 435-2015-1622, Deutsche Forschungsgemeinschaft, through CRC TRR 190 "Rationality and Competition," as well as support by the Berlin Centre for Consumer Policies (BCCP). The authors declare that they have no relevant or material financial interests that relate to the research described in this paper.

[†] Technische Universität Berlin, Faculty of Economics and Management, Str. des 17. Juni 135, 10623 Berlin, Germany. Email: ivanova-stenzel@tu-berlin.de Phone: +49-30-314 29009.

[‡] Laval University, Department of Economics, 1025 Avenue des Sciences Humaines, Qu´ebec, (QC), G1R 0A6, Canada and CIRANO. Email: sabine.kroger@ecn.ulaval.ca Phone: +1-418-656 2131

1 Introduction

An essential but often neglected part of retailing is the choice of the selling format. Posted prices and auctions are the most commonly known and used formats. The key difference between the two formats is the way the price is determined: whereas posted prices are set by the retailers, prices in auctions are determined by the competition between buyers.

Posted prices and auctions have mostly been studied in isolation, even though, in reality, they are often combined in sequential order. For example, in real estate markets, house owners who do not succeed in selling their house for an announced price might try to sell it in an auction. Producers who fail to buy at their standard vendors might call a procurement auction to acquire the missing pieces. Retailers who auction off used cars offer the owners of the cars to post a price at which they are willing to sell the car before the auction.

Such concatenation of trading mechanisms had largely been ignored by the literature in the past, probably because of lacking empirical evidence. The increased use of combined mechanisms in online market platforms has filled part of this void and now provides ample empirical evidence. In order to attract traders, C2C and B2C platforms offer a combination of auctions and posted prices in the form of a single sequential trading mechanism, in addition to each of the two selling formats separately. For example, eBay offers the so-called "Buy-It-Now auction," a combined mechanism allowing sellers to post pre-auction price offers before their auction starts.[1] Under the name "Best offer", eBay also allows buyers to make a price offer to the seller before the auction.

Combined mechanisms in online markets have attracted the attention of numerous scholars leading to an emerging and rapidly growing literature (see, e.g., the overviews in Hasker and Sickles, 2010). This literature demonstrates that combined mechanisms affect the strategic behavior of transaction partners and have important implications for their expected outcomes. A notable aspect of combined mechanisms is that their dynamic structure increases the complexity of the decision environment. The increased complexity can result in judgment failures and sub-optimal decisions.

The existing surveys on combined mechanisms in private value environments have mainly paid attention to buyer behavior (see, e.g., Hasker and Sickles, 2010; Kagel and Levin, 2016). The present chapter offers insights into the seller's view and behavior. More precisely, it is organized around three questions that originate from the nature of combined mechanisms: (i) do sellers account for the adverse selection problem inherent to the environment; (ii) does experience with the market institution enables traders to better deal with the complexity of combined mechanisms, and (iii) does it matter who makes the pre-auction price offer. In section 2, we briefly describe the strategic aspects of transaction environments where the seller has no information on the value that buyers attach to the item for sale. Section 3 summarizes the results of the experimental research on seller behavior in combined mechanisms. Finally, section 4 concludes and offers takeaways.

[1] Other online auction platforms that offer the option to post a pre-auction price are, for example, Yahoo!Japan and the South African auction platform, bidorbuy.co.za .

2 Buyer-seller transactions under uncertainty

Buyer-seller transactions are generally subject to risk and strategic uncertainty. For example, the seller might be unaware of how much the item for sale is worth to the buyer and thus might be uncertain about the buyer's maximum willingness to pay. Buyers, on the other hand, might be uncertain about the quality of the item and the production costs for the seller. And for strategic reasons, it might be either not in the interest of the informed party to truthfully reveal the relevant information or the information cannot be credibly communicated.

These information asymmetries have strategic implications for the behavior of market participants and negatively affect market outcomes. Strategic behavior requires that market participants consider the behavior of their opponents and understand its informational content. For example, the economic literature documents that (human) buyers often ignore the effect of their price offers on the sellers: only sellers who value their item less than the offered price will accept the offer, leading to a selection of lower average quality items for sale at the offered price (Akerlof, 1970). This ignorance results in buyers paying prices that are too high compared to the quality of the item, a judgmental failure that has been referred to in the bargaining literature (Samuelson and Bazerman, 1985) as the "winner's curse." Buyers might also suffer from the winner's curse when they compete against each other for an item with unknown quality. Kagel and Levine (2002; 2016) report empirical evidence that buyers who win such competition are very likely to have overestimated the item's value.

On the other side of the market, a seller faces strategic uncertainty, too. The seller's information on the buyers' maximum willingness to pay for the item is usually incomplete. This complicates the seller's choice of the "right" posted price. When asking for a price that is too high, a seller cannot sell the item. And when the price is too low, the seller leaves money on the table. From a seller's point of view, auctions have the advantage of exploiting the competition between buyers to sell the item to the buyer who values it most. Auctions have thus the potential to extract the most profit given the information asymmetry. This result holds in expectation for all auction types, and in particular for the second-price auctions, one of the most commonly used auction formats in real-world online auctions (e.g., eBay) as well as offline auctions (e.g., public English Art auctions).

In second-price auctions, the bidder with the highest bid wins the auction and pays the second-highest bid as a price. Therefore, it is not the winning buyer's bid that determines the price but the highest bid of the losing bidders. Consequently, bidding the own maximum willingness to pay is optimal in second-price auctions.[2] Besides, this bidding strategy is not affected by buyers' risk tolerance. In the real world, however, sellers not only rely on one price mechanism but combine auctions and posted prices to ensure a sale.

[2]Submitting a bid below the own maximum willingness to pay is not advantageous because of the possibility of being outbid by another bidder and thus missing a profitable opportunity. It is also not beneficial to the buyer to submit a bid higher than the own maximum willingness to pay, because the winning buyer might end up paying a price above this amount, thus making a loss. See William Vickrey (1961), who provides the first theoretic analysis of the second-price auction. True value bidding in second-price auctions is not only theoretically an optimal strategy but also recommended to bidders by platforms offering auctions with this pricing rule, such as eBay (http://pages.ebay.com/help/buy/outbid-ov.html).

This real-world evidence is at odds with results in economic theory demonstrating that combined mechanisms are inferior to auctions when both market sides are neutral to the risk they face. In that case, it does not matter who makes the pre-auction price offer, the seller or the buyer: the optimal pre-auction price offer is always rejected and sales take place in the auction (e.g., Bulow and Klemperer, 1996; Ivanova-Stenzel and Kröger, 2008; Grebe, 2009).

The assumption of risk neutrality is restrictive as traders are often willing to pay a premium and give up part of their profit to reduce the uncertainty in buyer-seller transactions. Recent results from theoretical research suggest that risk aversion of sellers or buyers or both market sides can explain why it may be beneficial for sellers to use combined mechanisms (Mathews and Katzman, 2006; Ivanova-Stenzel and Kröger, 2008; Reynolds and Wooders, 2009; Chen et al., 2013; Grebe et al., 2016).[3] For example, risk-averse buyers would prefer to reach an agreement at the pre-auction price instead of going to the auction. In the auction, they face competition, uncertainty about the auction price, and the risk of not winning the item. Hence, risk-averse buyers would accept to pay a premium compared to the price they expect to pay in the auction. Similarly, risk-averse sellers might be willing to post a lower pre-auction price to avoid the more volatile outcome of the auction.

Consider the following combined mechanism as discussed in Ivanova-Stenzel and Kröger (2008) and Grebe et al. (2016, 2021). A seller wants to sell an item and offers it first at a certain price to one of the potential buyers. If the buyer rejects this offer, a second-price auction takes place with this buyer and one additional buyer as bidders. This setting captures the main features of the combined mechanism offered on eBay, the "Buy-It-Now" auction, where the pre-auction price offer is temporary and disappears once a bid is submitted. In such an interaction, the seller needs to form expectations about the auction price when deciding on the pre-auction price offer. In particular, the seller needs to account for the adverse selection into the auction caused by low pre-auction prices. Low pre-auction price offers will be accepted by buyers with a high willingness to pay but cannot be afforded by buyers with a low willingness to pay, who will select into the auction more often. Thus, low pre-auction price offers not only generate low profits when they are accepted but also lead to low auction profits.

Figure 1 illustrates the theoretical predictions in this setting for two scenarios that differ regarding the traders' risk tolerance. The left-hand column presents the outcomes when all traders are risk-neutral. The right-hand column presents the outcomes when buyers and sellers have different levels of risk tolerance.[4] For illustration purposes, the graphs present a situation in which the seller's valuation for the item is commonly known to be 0. Each buyer's maximum willingness to pay for the item is private information and can be between 0 and 100 with all values drawn independently and being equally likely. The two top panels present the relation between posted pre-auction prices and the expected seller profit in the combined mechanism. The horizontal dashed line indicates

[3]Other explanations include, for example, impatience (Mathews, 2004; Gallien and Gupta, 2007) and reference dependence (Shunda, 2009).

[4]The simulations in the right-hand column are based on the elicited levels of risk tolerance of eBay traders, see Grebe et al. (2021) for details.

the expected seller profit in an auction without a posted price offer. The two bottom panels show the distribution of the pre-auction price offers posted by the seller.

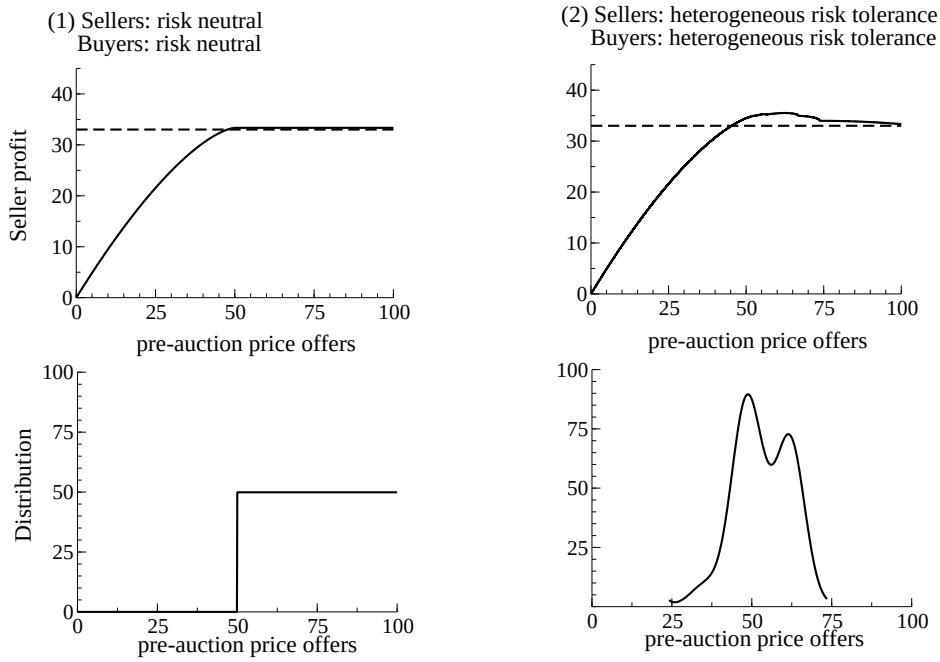

Figure 1: Simulated relation of profit and pre-auction price (top panels), distribution of predicted pre-auction price offers (bottom panels) for the case of risk-neutral traders (left-hand side) and traders with heterogeneous risk preferences (right-hand side) from Grebe et al. (2021). The horizontal dashed lines in the top panels indicate the expected profit from auctions without pre-auction price offers.

The scenario with risk-neutral traders serves as a benchmark. Risk-neutral traders will always reach an agreement in the auction. When offered a pre-auction price at or above a certain threshold, a risk-neutral buyer prefers the auction outcome and will reject such an offer.[5] As illustrated in the top left panel of Figure 1, it is indeed optimal for the seller to sell in the auction: the seller's expected profit rises with the posted pre-auction price offer and reaches its maximum at and above this threshold. Taking the behavior of the buyer into account, the seller can achieve selling in the auction with any pre-auction price offer at or above this threshold, as shown in the bottom left panel.

When traders vary in their risk tolerance, transactions will also take place at the pre-auction price. Sellers who are less tolerant towards risk are willing to offer pre-auction prices below this threshold to avoid the volatile outcome in the auction. Contrary to the

[5]Given the distribution assumptions of buyers' willingness to pay in our simulation example, the threshold equals 50.

risk-neutral case, risk-averse buyers are willing to accept pre-auction price offers at or above the threshold to avoid the auction. Thus, it is profitable for sellers to offer pre-auction prices that are high yet affordable for risk-averse buyers. Both effects are illustrated in the bottom right panel in Figure 1. A comparison between the expected seller profit in the combined mechanism (solid line in the top right panel) and in an auction without a pre-auction price offer (dashed line) reveals that posting a price before the auction might be beneficial for the seller. Thus, the theory predicts that if buyers are risk-averse, there is a window of opportunity for sellers to improve their profit when they offer a pre-auction price.

3 Combining posted prices and auctions: experimental evidence on seller behavior

This section provides insights into seller behavior in combined mechanisms based on results from laboratory experiments. The main advantage of laboratory experiments is the control the researcher has over the market environment and the information that traders possess. This allows to conduct a reliable test of the validity of the theoretical predictions and to observe aspects of behavior that are not easily available in data collected in the field.[6]

3.1 The seller's curse

When posting a pre-auction price, traders face a cognitively demanding decision task due to the adverse selection problem inherent to the environment. In Ivanova-Stenzel and Kröger (2008), we offer experimental evidence on how sellers and buyers behave in such an environment. In the experiment, the seller posts a price before a second-price sealed-bid auction. One of two potential buyers observes and then accepts or rejects this price. In case of a rejection, the auction takes place with both potential buyers as bidders.

The left-hand column of Figure 2 summarizes the behavior observed in the experiment.[7] The top left panel in Figure 2 shows the relation between the average posted pre-auction price offer and a non-parametric estimate of the realized seller profits. The horizontal dashed line indicates the auction profit without a pre-auction price offer.[8] In the combined mechanism, the seller profit increases with the posted pre-auction price offer up to a certain price and then converges to the profit in the auction without a pre-auction price offer.

[6] As an alternative to experimental studies, empirical studies on combined mechanisms collect data, mainly on outcomes, such as the number of bidders and sales as well as final prices. They relate these data to other observable variables such as the posted pre-auction prices and traders' background characteristics (e.g., Anderson et al., 2008; Durham et al., 2004; Bauner, 2015; Einav et al., 2018). The advantage of those studies is that they observe the real behavior of traders with real consequences. The main drawback is the lack of control, for example, on the variation of certain characteristics, and on how much sellers and buyers value the item.

[7] For the theoretical predictions see Figure 1 and the discussion in the previous section.

[8] The profit from an auction without a pre-auction price offer is simulated based on the behavior of buyers in the auction.

Ivanova-Stenzel and Kröger observe substantial variation in seller behavior, as shown in the bottom left panel in Figure 2 that displays the distribution of the observed posted pre-auction price offers. A majority of sellers post below-average pre-auction prices and make below-average profits. The dotted vertical line in the bottom left panel in Figure 2 indicates the lower bound of the interval within which posted pre-auction prices can be rationalized by relaxing the assumption of risk neutrality. Only a fraction of the low pre-auction price offers are above this line and can thus be explained by sellers' risk aversion.

The sizable number of pre-auction price offers that are too low, i.e., below this line, suggests that sellers forgo profit-making opportunities more than justified by any risk premium.

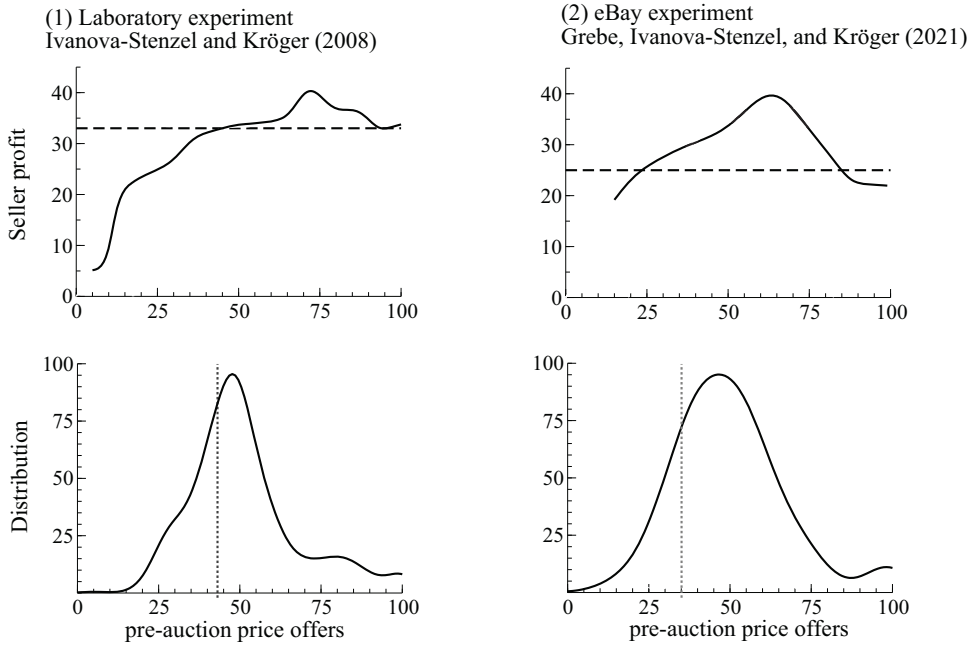

Figure 2: Relation of seller profit and pre-auction price offers (top panels), distributions of price offers posted before the auction (bottom panels) for data from experiments in Ivanova-Stenzel and Kröger (2008) (left-hand side) and in Grebe et al. (2021) (right-hand side). The horizontal dashed lines in the top panels indicate the expected profit from auctions without pre-auction price offers. The vertical dotted line indicates the lower bound of the range of pre-auction price offers that can be explained by heterogeneous risk preferences.

Inspired by the well-documented "winner's curse" observed in the bargaining literature, Ivanova-Stenzel and Kröger (2008) conjecture that sellers in the combined mechanism

might fall prey to a "seller's curse". Similar to the winner's curse, the seller's curse happens if the (uninformed) seller does not condition their behavior on the strategic reaction of the (informed) buyer when posting their pre-auction price. More precisely, the seller's curse refers to the judgmental failure resulting in forgone profit opportunities for the seller. This failure results from a seller's ignorance of the adverse selection effect that the posted pre-auction price imposes on the auction price. Posting too low pre-auction prices leads to low final profits from the combined mechanism for the seller. This happens for two reasons: first, buyers with a high valuation for the item accept such low pre-auction prices, and second, buyers with low valuations, who cannot afford even these low pre-auction prices, select into the auction resulting in low auction prices.

The observed pre-auction price offers, displayed in the bottom left panel in Figure 2, suggest that a substantial proportion of sellers appear to ignore the effect of pre-auction price offers on auction prices. Such ignorance has been recently identified in the literature as "correlation neglect" (Enke and Zimmermann, 2019). Ivanova-Stenzel and Kröger (2008) note that sellers do not appear to learn to set higher pre-auction prices in the course of the laboratory experiment. Indeed, this is not surprising as it is difficult for those sellers who suffer from the seller's curse to learn from their mistake: Low auction prices just reinforce the decision to post low pre-auction prices. Sellers can neither learn nor update their beliefs about the true relationship between pre-auction price offers and final profits in the combined mechanism if they always offer pre-auction prices that are too low or do not vary enough.

3.2 Does traders' experience matter?

In order to form correct experience-based beliefs, sellers need to learn about the relation between pre-auction price offers and final profits. Could sellers invest their resources (e.g., time, several items for sale, or money) in experimenting with various pre-auction price offers, they would realize that higher posted pre-auction prices imply higher expected final profits in the combined mechanism, even if the sale takes place in the auction.[9] Another way for sellers to learn is by observing the behavior of other traders and the resulting market outcomes. Both approaches are possible on online market platforms.

Based on these considerations, Grebe, Ivanova-Stenzel, and Kröger (2021) conjecture that experience matters and that sellers, who offered their goods on online market platforms, had more opportunities to learn about the relation of pre-auction prices and profits and might therefore be less prone to the seller's curse. In order to test this conjecture, they conduct a "field-in-the-lab" experiment. In the experiment, they used the same setup as in Ivanova-Stenzel and Kröger (2008), but the experiment was conducted on eBay with eBay traders. The use of the eBay platform and eBay traders allows for studying behavior in an online market that is very popular among traders and ensures that participants in the experiment possess sufficient experience with the market institution.

[9]The psychology literature highlights the importance of experimenting for optimal decision-making, e.g., Einhorn and Hoghart (1981).

The right-hand column in Figure 2 summarizes the behavior observed in the eBay experiment. The combined mechanism generates profits (solid black line, top right panel) that are substantially above those of a standard eBay auction, i.e., where sellers cannot post a price before the auction (horizontal dashed line, top right panel).[10] The distribution of the pre-auction price offers is displayed in the bottom right panel. The vertical dotted line indicates the lower bound of the range of pre-auction price offers that can be explained with risk aversion. A large majority of pre-auction price offers in the eBay experiment are above this line. The still considerable number of pre-auction price offers below this line provides empirical support for the seller's curse.

To investigate whether experience matters for the sellers' decisions on their pre-auction prices, Grebe, Ivanova-Stenzel, and Kröger (2021) relate the observed pre-auction price offers to the information on traders' characteristics and their behavior available on the eBay platform. As discussed in sections 2 and 3.1, the sellers need to form expectations about the auction price when deciding on their pre-auction price offer. Sellers on eBay can form their expectations based on their understanding of the combined mechanism and their own experience but also by observing the behavior of the buyers they interact with. If sellers use the publicly available information on eBay to update their beliefs, an empirical analysis could detect the determinants of seller behavior and shed light on how sellers set their pre-auction price offers. The information of the eBay traders in the experiment contains past bidding histories, such as the number of bids, the presence of last-minute bids, auction prices, and the experience that traders have with the eBay platform. The results of this analysis reveal that, first, the information available on eBay about buyers' experience and their bidding behavior correlates with the auction price, and second, the sellers consider this information strategically when deciding on their posted pre-auction price offers. For example, the sellers increase their pre-auction price offers when they deal with buyers who have completed more sales on eBay or when they observe in their past transactions a higher number of bids or less last-minute bidding from at least one bidder. Furthermore, sellers who have completed more sales on eBay post higher pre-auction prices before the auction. Taken together, these results indicate that sellers respond in a sophisticated way to strategic uncertainty. They also highlight two aspects that are important to overcome judgmental failures in combined mechanisms: strategical response to information collected in markets as well as experience based on accumulated knowledge from own past transactions.

Results from both studies, Ivanova-Stenzel and Kröger (2008) and Grebe et al. (2021), suggest that combined mechanisms can benefit sellers. For example, pre-auction price offers that are not too low, avoiding the seller's curse, and not too high, enabling buyers to conclude a sale at the posted pre-auction price, leading to profits above those from auctions or posted prices alone.

[10] In the eBay experiment, standard eBay auction prices (horizontal dashed line, top right panel) are substantially below those expected in second-price auctions. The empirical analysis reveals that the observed price deviations can be explained by the specific features of the eBay auction format that trigger the use of certain bidding strategies such as multiple and last-minute bidding, see Grebe et al. (2021) for more details.

3.3 Does bargaining power matter?

Sor far, the discussion of seller behavior considered combined mechanisms, where the seller makes the pre-auction price offer and thus has the bargaining power. The economic bargaining literature acknowledges the strategic advantage of bargaining power under complete information (e.g., Ståhl, 1972; Binmore, 1987; Sjöström, 1991). However, as discussed above, sellers do not always have complete information on buyers' willingness to pay. Thus, when there is uncertainty about the stakes in bargaining (Binmore et al., 1985; Mitzkewitz and Nagel, 1993; Krasteva and Yildirim, 2012), the question arises whether having the bargaining power benefits sellers in combined mechanisms. This is an important question, as sellers can choose the market platform for their transactions and often also the details of the combined mechanism, in particular, who should make the pre-auction price offer. Indeed, while in many real-world markets, sellers can post pre-auction price offers, in some markets, sellers can allow buyers to offer posted prices before an auction, for example, on online trading platforms (e.g., eBay and Hood.de) but also in real estate and car markets as well as in forced sales (e.g., in Germany and UK).[11]

Grebe, Ivanova-Stenzel, and Kröger (2016) investigate whether a seller can benefit from giving up the bargaining power. The study reports the results from an experimental comparison between two combined mechanisms: one where the pre-auction price is offered by the seller, and another one, where a buyer offers the pre-auction price. The strategic considerations in combined mechanisms conditional on who makes the pre-auction price offer are straightforward. The seller who has the bargaining power needs to form beliefs about the auction price and to take into account the adverse selection effect of the pre-auction price offer (see sections 2 and 3.1). When a buyer makes the pre-auction price offer, the interaction becomes a signaling game. The seller can use this pre-auction price offer to infer about the buyer's willingness to pay.

Despite very different strategic implications for sellers depending on who has the bargaining power, the experimental results suggest no effects of bargaining power on average seller profits.[12] The analysis of individual behavior reveals, however, that only sellers who demand high pre-auction prices benefit from having bargaining power. Bargaining power is irrelevant for sellers who post or who accept low pre-auction prices, i.e., who suffer from the seller's curse and fail to adjust their expectations about the auction price.[13] Indeed, Grebe (2009) reports that elicited sellers' beliefs about the buyers' maximum willingness to pay are systematically biased when the buyer makes the pre-auction price offer. This suggests that sellers fail to condition their beliefs on the buyer's pre-auction price offer.

[11] See, e.g., Hammer (2004), www.adesa.com; www.uknetguide.co.uk

[12] Theoretically, when both market sides are risk-neutral, it does not matter who has the bargaining power in the combined mechanism. In any case, as shown in Grebe (2009), all transactions are completed in the auction as all pre-auction price offers will be rejected - they will be either too high in the case when the seller makes the offer, or too low in the case when the buyer makes the offer.

[13] One possible explanation is that those sellers simply compare the ex-ante expected profit from an auction without a pre-auction price offer to the profit they would realize if their pre-auction price offer is accepted or if they accept the buyer's pre-auction price offer.

4 Summary and Takeaways

Sequentially combining posted prices and auctions gives sellers two chances for a sale. If the first chance fails, i.e., the posted pre-auction price is not accepted, they have a second chance to achieve the sale in the auction. Along with posted prices and auctions, such combined mechanisms are commonly adopted selling formats in the (online) retail sector. The results from the theoretical and experimental research on seller behavior in private value environments point out why retailers might be interested in using such mechanisms.

In the following, we summarize the main takeaways:

- Combining posted prices and auctions may generate higher sale prices than each of the two selling formats alone when sellers face uncertainty about buyers' willingness to pay.
- The complexity of the decision problem in combined mechanisms augments the probability that traders make mistakes. For example, when sellers decide on their pre-auction price offer, they might fall prey to the seller's curse, a judgmental failure that results in forgone profit opportunities.
- Sellers suffer from the seller's curse if they ignore the adverse selection effect that the posted pre-auction price has on buyers with different valuations and, thus, on the auction price.
- Information available on online market platforms helps sellers to adjust their pre-auction price offers. As a result, experienced sellers seem to better account for the adverse selection effect of their pre-auction price offer and to avoid the seller's curse.
- Possessing the bargaining power in combined mechanisms benefits only sellers who demand high prices.

References

Akerlof, G. A. (1970). The market for "lemons": Quality uncertainty and the market mechanism. *The Quarterly Journal of Economics*, 84(3):488–500.

Anderson, S. T., Friedman, D., Milam, G. H., and Singh, N. (2008). Buy it now: A hybrid internet market institution. *Journal of Electronic Commerce Research*, 9(2):137–153.

Bauner, C. (2015). Mechanism choice and the buy-it-now auction: A structural model of competing buyers and sellers. *International Journal of Industrial Organization*, 38:19–31.

Binmore, K. G. (1987). *Perfect equilibria in bargaining model*. Blackwell, Oxford.

Binmore, K. G., Shaked, A., and Sutton, J. (1985). Testing noncooperative bargaining theory: A preliminary study. *American Economic Review*, 75:1178–1180.

Bulow, J. and Klemperer, P. (1996). Auctions Versus Negotiations. *American Economic Review*, pages 180–194.

Chen, J.-R., Chen, K.-P., Chou, C.-F., and Huang, C.-I. (2013). A dynamic model of auctions with buy-it-now: Theory and evidence. *The Journal of Industrial Economics*, LXI(2):393–429.

Durham, Y., Roelofs, M. R., and Standifird, S. S. (2004). ebay's buy-it-now function: Who, when, and how. *Topics in Economic Analysis & Policy*, 4(1).

Einav, L., Farronato, C., Levin, J., and Sundaresan, N. (2018). Auctions versus posted prices in online markets. *Journal of Political Economy*, 126(1):178–215.

Einhorn, H. and Hoghart, R. (1981). Behavioral decision theory: processes of judgment and choice. *Journal of Accounting Research*, 19:1–31.

Enke, B. and Zimmermann, F. (2019). Correlation neglect in belief formation. *Review of Economic Studies*, 86(1):313–332.

Gallien, J. and Gupta, S. (2007). Temporary and permanent buyout prices in online auctions. *Management Science*, 53(5):814–833.

Grebe, T. (2009). *Four Essays on Auction Mechanisms*, chapter 4, pages 52–76. Shaker Verlag GmbH.

Grebe, T., Ivanova-Stenzel, R., and Kröger, S. (2016). "buy-it-now" or "sell-it-now" auctions: Effects of changing bargaining power in sequential trading mechanism. *Economics Letters*, 142:27–30.

Grebe, T., Ivanova-Stenzel, R., and Kröger, S. (2021). How do sellers benefit from buy-it-now prices in ebay auctions? *Journal of Economic Behavior & Organization*, 183:189–205.

Hammer, T. (2004). Wenn sich das Traumhaus als Mogelpackung entpuppt. *Süddeutsche Zeitung*. 2004-05-25, p. 25.

Hasker, K. and Sickles, R. (2010). ebay in the economic literature: Analysis of an auction marketplace. *Review of Industrial Organization*, 37:3–42.

Ivanova-Stenzel, R. and Kröger, S. (2008). Price formation in a sequential selling mechanism. *Journal of Economic Behavior & Organization*, 67(3-4):832–843.

Kagel, J. and Levin, D. (2002). *Common Value Auctions and the Winner's Curse*. Princeton University Press.

Kagel, J. and Levin, D. (2016). *Auctions: A Survey of Experimental Research*, pages 563–629. Princeton University Press.

Krasteva, S. and Yildirim, H. (2012). Payoff uncertainty, bargaining power, and the strategic sequencing of bilateral negotiations. *The RAND Journal of Economics*, 43(3):514–536.

Mathews, T. (2004). The impact of discounting on an auction with a buyout option: A theoretical analysis motivated by ebay's buy-it-now feature. *Journal of Economics (Zeitschrift für Nationalökonomie)*, 81:25 – 52.

Mathews, T. and Katzman, B. (2006). The role of varying risk attitudes in an auction with a buyout option. *Economic Theory*, 6(3):597 – 613.

Mitzkewitz, M. and Nagel, R. (1993). Experimental results on ultimatum games with incomplete information. *International Journal of Game Theory*, 22:171 – 198.

Reynolds, S. and Wooders, J. (2009). Auctions with a buy price. *Economic Theory*, 38(1):9–39.

Samuelson, W. and Bazerman, M. H. (1985). The Winner's Curse in Bilateral Negotiations. In Smith, V., editor, *Research in Experimental Economics*, pages 105–137. JAI Press, Greenwich.

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

Sjöström, T. (1991). Ståhl's bargaining model. *Economics Letters*, 36:153–157.

Ståhl, I. (1972). Bargaining theory. *Stockholm School of Economics*.

Vickrey, W. (1961). Counterspeculation, auctions, and competitive sealed tenders. *The Journal of Finance*, 16(1):8–37.