Dynamic Pricing in Bilateral Relationships: Experimental Evidence*

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Abstract

This paper presents experimental evidence on dynamic pricing in a large number of finite-horizon bilateral relationships, building on Hart and Tirole (1988). We examine four distinct treatments that vary the mode of trade and the seller's commitment ability. We find that theory accurately predicts average prices across relationships but falls short of capturing the diversity of individual price trajectories. We also find that commitment has less bite than theory predicts, with sellers leaving significant rents to buyers and frequently committing to changing or oscillating prices. Our analysis suggests that theory explains behavior under renting better than under selling.

Keywords: Durable goods, Coasian dynamics, rental goods, commitment, beliefs.
JEL classifications: C73, C91, D82, L11

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1 Introduction

Dynamic pricing in long-term relationships has intrigued economists for decades. How should a profit-maximizing seller set prices for a good that is offered repeatedly? How can a savvy buyer avoid high prices or benefit from low prices? What role does the widespread availability of individual consumer data play in dynamic pricing? Answering these questions is more difficult than it may appear.

A rich literature on the Coase (1972) conjecture has established that a monopoly seller of a durable good who cannot commit to future prices will gradually lower prices if high-valuation buyers purchase early and leave while low-valuation buyers remain in the market (negative selection), which induces forward-looking buyers to delay their purchases and benefit from lower prices in the future (Stokey, 1981; Bulow, 1982; Fudenberg et al., 1985; Gul et al., 1986). Nava and Schiraldi (2019) have extended the analysis to a setting with multiple durables. Yet, it is well known that pricing in long-term relationships is *not* always governed by Coasian dynamics.

For example, Hart and Tirole (1988) show that the monopoly pricing of a durable good depends not only on the seller's commitment ability but also on the mode of trade (i.e., whether the good is for sale or for rent) and the feasibility of long-term contracts. Acquisti and Varian (2005), Fudenberg and Villas-Boas (2006), Conitzer et al. (2012), Li (2018) and Buehler and Eschenbaum (2020) study behavior-based price discrimination when the seller can track individual consumers. Board and Pycia (2014) demonstrate the failure of the Coase conjecture when buyers have an additional outside option that clears the market, and Tirole (2016) shows that Coasian dynamics do not emerge if high-valuation (rather than low-valuation) buyers remain in the market (positive selection). While theoretical progress has been significant in analyzing dynamic monopoly pricing,[1] the empirical evidence remains limited due to a lack of clean field data and the challenges of replicating the complex theory in experimental settings.

[1] Classic textbook treatments are provided by Fudenberg and Tirole (1991, Chapter 10) and Bolton and Dewatripont (2005, Chapter 9).

This paper aims to bridge part of this gap by providing evidence from a laboratory experiment inspired by Hart and Tirole (1988). Specifically, we conduct an experiment on dynamic pricing in finite-horizon bilateral relationships in which the good becomes obsolete at the end of the relationship and the seller is facing a buyer whose valuation of the good is fixed and private information. For this environment, theory predicts that Coasian dynamics emerge without commitment if the good is for sale and the seller updates her beliefs about the buyer's valuation based on the rejection of previous price offers. If the good is for rent, in turn, theory predicts that prices are constant until close to the end of the horizon. With commitment, the monopoly solution for the sale model coincides with that for the rental model and involves constant consumption in every period (the seller charges the net present value of the constant per-period rental price in the sale model).

We study four treatments that vary in terms of the *mode of trade* and the seller's *commitment ability*: (i) Sale with commitment [SC]; (ii) Sale without commitment [SNC]; (iii) Rental with commitment [RC]; (iv) Rental without commitment [RNC]. We examine 1,410 bilateral buyer-seller relationships with a maximum duration of ten periods. Overall, we find that theory accurately predicts the *average* prices set by sellers across more than 1,400 bilateral relationships over time. However, it falls short of capturing the diversity of *individual* price trajectories within these relationships. More specifically, we find the following key results.

First, if the durable good is for sale, then the mean prices offered by sellers are gradually declining irrespective of commitment. This finding is in line with theory and shows that sellers do understand that the value of the durable good diminishes over time. However, there are two key differences to how prices should be set in theory: (i) In the SC treatment, sellers on average transfer roughly 30 percent of the maximum surplus to buyers, although they should not leave any surplus to buyers. (ii) In the SNC treatment, while prices are gradually declining, Coasian dynamics in the strict sense—which require that low-valuation buyers earn zero surplus and high-valuation buyers earn the present

discounted sum of the differences in valuation—do not emerge. In fact, the mean present discounted profit of sellers is not significantly lower than with commitment.

Second, if the durable good is for rent, then the mean prices offered are nearly constant with commitment and follow a price path that resembles a "hockey stick" without commitment. This finding is broadly in line with theory, again with two key differences: (i) In the RC treatment, sellers transfer roughly 35 percent of the maximum surplus to buyers, although they should not leave any surplus to buyers. (ii) In the RNC treatment, the mean prices offered by sellers are higher than those predicted by theory except for the periods toward the end of the horizon for which the predicted price switches from the low- to the high-valuation buyer's willingness to pay. That is, most sellers do not try to extract the maximum willingness to pay toward the end of the horizon.

Third, we uncover interesting pricing patterns at the individual level. Using cluster analysis, we identify five different pricing patterns under commitment: (i) *Change*; (ii) *High*; (iii) *Low*; (iv) *Oscillating*; (v) *Single*. We find that the *Change* pattern—prices exceeding a low-valuation buyer's total willingness to pay for a consecutive number of periods and then sticking with prices that do not exceed it for the remaining periods (or vice versa)—is adopted most often: 40 percent (30 percent) of the sellers are adopting it in the sale (rental) treatment with commitment. The *Oscillating* pattern, where sellers are adjusting their prices up and down throughout the relationship, is the second-most adopted pattern.[2] While sellers should consistently set high prices according to theory, we find that only 16 percent (21 percent) of the sellers do so in the sale (rental) treatment with commitment.

Without commitment, we find that 55 percent of the sellers in the SNC treatment become increasingly pessimistic when buyers reject their offers and progressively narrow the gap between the price offered and the maximum willingness to pay of a low-valuation buyer. Notably, we also find that 72 percent of the high-valuation buyers in the SNC

[2]The rational proposer hypothesis (Camerer and Ho, 2015, p.49) explains such pricing behavior by sellers holding idiosyncratic beliefs about the prices that buyers are willing to accept over time and making offers that maximize their expected surplus from the relationships (see Roth et al., 1991; Güth et al., 1982).

treatment strategically delay their purchase by rejecting prices above the maximum willingness to pay of a low-valuation buyer. In the RNC treatment, we find that only 39 percent of the high valuation buyers strategically reject offers that would reveal their high valuation. However, 90 percent of the sellers in the RNC treatment become more optimistic about the buyer's type following a price acceptance and increase their price offers accordingly—the ratchet effect.

This paper makes three contributions to the literature. *First*, we show that commitment has less bite than theory predicts. Sellers are not only willing to transfer around 30 percent of the maximum surplus to buyers under commitment but also frequently commit to changing or oscillating prices in both selling and renting scenarios, which is difficult to explain by fairness preferences.[3] *Second*, we find that theory explains behavior under renting better than under selling. While up to 99% of the expected surplus is realized under renting, only about a third of the equilibrium surplus is realized under selling, even with commitment. *Third*, we find that while the majority of sellers and high-value buyers is indeed strategic in the absence of commitment under selling, strategic behavior is not prevalent among buyers under renting, often leading to ratcheting.

Previous experimental work on dynamic pricing has focused on the Coase conjecture (i.e., selling without commitment) and has largely abstracted from seller commitment and other modes of trade. For instance, Fanning and Kloosterman (2022) test the Coase conjecture (Coase, 1972; Fudenberg et al., 1985; Gul et al., 1986) in an infinitely repeated bargaining setting and find that the price-setting behavior closely matches theory. Similarly, earlier work by Cason and Sharma (2001) considers a setting in which a durable good monopolist sells to two privately informed buyers. These authors provide experimental evidence that prices are lower for higher discount factors, which is consistent with Coasian dynamics. Reynolds (2000) suggests that initial price offers of durable good monopolists

[3]This finding is reminiscent of the stylized fact that subjects are willing to transfer around 30-40 percent of the endowment in standard ultimatum games, where the proposer makes a one-time offer to a responder who can accept or reject it (Camerer and Thaler, 1995; Oosterbeek et al., 2004). However, the bilateral relationship considered here is more complex in that the surplus is evolving over time and the buyer's willingness to pay is not known to the seller (who must form an expectation).

increase with the trading horizon in a setting where sellers face either one or five buyers with private valuation of the good, while holding the discount factor constant.

The remainder of the paper is structured as follows. Section 2 introduces the analytical framework and derives the theoretical predictions. Section 3 explains the experimental design and the choice of the relevant parameters. Section 4 presents the results for the mean prices in all four treatments and examines the pricing as well as purchasing patterns at the individual level. Section 5 discusses the results and explains how they contribute to our understanding of dynamic pricing. Section 6 concludes and offers directions for future research.

2 Analytical framework and theoretical predictions

We focus on the simplest setting in which dynamic pricing may emerge: A finite bilateral relationship between a seller and a buyer whose valuation of the good is fixed and private information. In this canonical setting studied by Hart and Tirole (1988), the only reason for pricing dynamics to emerge is the evolution of the seller's belief about the valuation of the buyer based on the observed purchase history, which is relevant for pricing if the seller lacks commitment ability. If the theory of dynamic pricing fails in the lab in this setting, it is difficult to see how it might work in more complex and changing environments (e.g., with an infinite number of trading periods or multiple buyers and sellers).

2.1 Bilateral relationship

Consider a long-term relationship between a seller of a durable good with zero production cost and a buyer with unit demand in every period $t = 1, ..., T$, with $T < \infty$. After T periods, the good becomes obsolete. Both the buyer and the seller are risk neutral. The buyer has a fixed and privately known per-period valuation $b \in \{\underline{b}, \overline{b}\}$ for the good, which is either high or low (i.e., $\overline{b} > \underline{b} > 0$). The seller's prior belief that the valuation is high (low) is μ_1 ($1 - \mu_1$, respectively). Throughout the analysis, we assume that the prior belief satisfies $\mu_1 > \underline{b}/\overline{b} \equiv \bar{\mu}$, which implies that the seller prefers to sell to the high-valuation

buyer only (and therefore runs the risk of not selling at all) in a static setting. The seller and the buyer have the same discount factor $\delta \in (0,1)$.

Let $x_t(b)$ denote the choice of a buyer with valuation b in period t, with $x_t(b) = 1$ if the buyer consumes and $x_t(b) = 0$ otherwise. If the durable good is for *sale*, then it is sold once and for all future periods, that is, if $x_t(b) = 1$, then $x_{t+1}(b) = 1$, ..., $x_T(b) = 1$. If the durable good is for *rent*, then it can be offered in every period separately.

Letting p_t denote the period-t payment from the buyer to the seller, the expected utility of a buyer with valuation b is given by

$$U(b) = \mathbb{E}\left[\sum_{t=1}^{T} \delta^{t-1} x_t(b)(b - p_t)\right], \quad b \in \{\underline{b}, \overline{b}\}, \tag{1}$$

where the expectation is taken over the payments requested by the seller, and the seller's expected profit is

$$\pi = \mathbb{E}\left[\sum_{t=1}^{T} \delta^{t-1} x_t(b) p_t\right], \tag{2}$$

where the expectation is taken over the buyer's valuation. For later reference, we let $\Delta_t \equiv \sum_{\tau=t}^{T} \delta^{\tau-t}$ denote the (present discounted) number of periods from t onward.

2.2 Commitment

It is well known that, with commitment, the profit-maximizing solution for the sale model coincides with that of the rental model and involves constant consumption over time, that is, either $x_t(b) = 0$ or $x_t(b) = 1$ for all t. In the sale model, trade occurs only in the first period but the good can be consumed in every period after trade. In the rental model, trade occurs in every period and involves the constant per-period payment ρ. The profit-maximizing policy for the seller is to charge $\rho = \overline{b}$ because the expected profit from selling exclusively to the high-valuation buyer exceeds the profit from selling for sure, $\mu_1 \overline{b} > \underline{b}$, by assumption. In the sale model, the price corresponds to the net present value of the per-period payments in the rental model, $\sum_{t=1}^{T} \delta^{t-1} \overline{b}$. Importantly, trade occurs only if the buyer has high valuation (i.e., $x_t(\overline{b}) = 1$, $x_t(\underline{b}) = 0$) for all t) and the rent of

the high-valuation buyer is fully extracted. The first prediction from the theory is thus the following (Hart and Tirole, 1988, Proposition 1).

Prediction 1. *With commitment, the seller charges the rental equivalent* $\rho = \overline{b}$ *in every period and earns expected profit* $\pi = \mu_1 \Delta_1 \overline{b}$*. Only the high-valuation buyer consumes.*

2.3 Non-commitment

Without commitment, the profit-maximizing solution for the sale model does not coincide with that of the rental model. We consider each model in turn.

2.3.1 Sale model without commitment

This model is a finite-horizon version of the standard durable good monopoly where the good is sold once and for all future periods. The seller's strategy is a sequence of price offers, $p_1, ..., p^T$, and the buyer's strategy is a sequence of decisions to accept or reject. In addition, the seller must form a period-t belief μ_t about the buyer having high valuation, based on previous offers and their rejection by the buyer. Together, these strategies must form a Perfect Bayesian Equilibrium (PBE), where strategies are optimal given beliefs and beliefs are determined by Bayes' rule whenever possible.

Hart and Tirole (1988, Proposition 2) show that, along the equilibrium path, prices are gradually declining as the seller is becoming more and more pessimistic about the probability of facing a high-valuation buyer. Intuitively, the result follows from the following considerations. First, note that the seller never makes an offer $p_t < \Delta_t \underline{b}$ because she can guarantee herself the profit $\Delta_t \underline{b}$ by selling to the low-valuation type in period t. Second, consider an offer $p_t > \Delta_t \underline{b}$ and suppose that the posterior belief satisfies $\mu_{t+1}(h_t, p_t) \leq \bar{\mu}$, where h_t denotes the history up to period t. Then the best offer in the following period is $p_{t+1}(h_t, p_t) = \Delta_{t+1} \underline{b}$, which the seller can guarantee herself by selling to the low-valuation buyer in period $t+1$. Anticipating this, a high-valuation buyer will accept the offer p_t if it is sufficiently low, that is, if $\Delta_t \overline{b} - p_t \geq \Delta_{t+1}(\overline{b} - \underline{b})$, or, $p_t \leq \overline{b} + \Delta_{t+1} \underline{b} \equiv \tilde{p}_t$. Third, it can be shown that, whenever $\mu_t > \bar{\mu}$, the seller prefers

to make the offer $\tilde{p}_t > \Delta_t \underline{b}$, which makes the high-valuation buyer indifferent between buying in period t and buying in period $t+1$.

Therefore, given the prior belief $\mu_1 > \bar{\mu}$, the first price offered by the seller satisfies $p_1 = \tilde{p}_1 > \Delta_1 \underline{b}$. The game ends if the buyer accepts the offer. If the buyer rejects the offer, the seller becomes more pessimistic about the valuation of the buyer, updates her belief accordingly, and makes another offer in the next period. This process is repeated until the good is sold or the game ends in period T. Prices are decreasing along the equilibrium path and determined as sketched above.

Hart and Tirole (1988) highlight that the PBE of the finite-horizon durable good game exhibits Coasian dynamics, which are defined as follows:

Definition 1 (Coasian dynamics)**.** *An equilibrium, which consists of a sequence of trades* $\{x_t(b)\}_{t=1}^T$ *and associated payments, exhibits Coasian dynamics if*

(i) for all valuations b, the sequence of trades $\{x_t(b)\}_{t=1}^T$ *satisfies durable good dynamics.*

(ii) the utility of the low-valuation buyer is zero, $U(\underline{b}) = 0$.

(iii) the utility of the high-valuation buyer is the (present discounted) sum of the differences in valuations, $U(\overline{b}) = \sum_{t=1}^T \delta^{t-1} x_t(\underline{b})(\overline{b} - \underline{b})$.

The second prediction from the theory is then the following (Hart and Tirole, 1988, Proposition 2).

Prediction 2. *The finite-horizon durable good model without commitment exhibits Coasian dynamics. Specifically, the seller makes decreasing price offers until the buyer accepts or the game ends, and the first price satisfies* $p_1 > \Delta_1 \underline{b}$.

2.3.2 Rental model without commitment

In the rental model without commitment, the seller decides in every period whether to rent out the good to the buyer. The seller makes an offer p_t for the current period, and the

buyer receives utility $b - p_t$ if she accepts the offer and zero otherwise. The price and the acceptance decision in period t depend on the history h_t, which records the sequence of previous offers and whether they were accepted.

Hart and Tirole (1988, Proposition 3) show that, if $\delta > \frac{1}{2}$ and the horizon T is long, then the seller charges the price $p_t = \underline{b}$ and rents the good out to high- and low-valuation buyers until close to the end of the horizon. That is, the seller does not engage in dynamic pricing whatever her beliefs about the buyer's valuation for most of the game. The intuition for this result is as follows. Suppose that the buyer refuses any offer $p_t > \underline{b}$ that reveals a high-valuation. Then, by accepting such an offer, the buyer reveals a high valuation, which induces the seller to offer the price $\overline{b}$ in all subsequent periods, which yields zero future payoff to the buyer. Hence, accepting the offer $p_t > \underline{b}$ yields a total payoff below $\overline{b} - \underline{b}$. Rejecting the offer, in turn, allows the buyer to buy the good at price $\underline{b}$ in almost all future periods, which yields a future payoff that is close to $\frac{\delta}{(1-\delta)}(\overline{b} - \underline{b})$ for a long horizon T. This payoff is larger than $\overline{b} - \underline{b}$ for $\delta > \frac{1}{2}$.

The third prediction from the theory is then the following (Hart and Tirole, 1988, Proposition 3).

Prediction 3. *If $\delta > \frac{1}{2}$ and the horizon T is long, then the seller charges the price $\underline{b}$ until close to the end of the horizon.*

3 Experimental design

We conducted the experiment in the Behavioral Lab at the University of St. Gallen in Switzerland, where we implemented a total of 1,410 bilateral relationships in 18 sessions. Our subjects were recruited electronically from a pool of undergraduate and graduate students who had signed up to participate in experiments. The descriptive statistics of the participants' characteristics can be found in Table A1. Importantly, apart from the gender, age, and the respective field of study, we asked all our subjects to indicate, on a 5-point scale, (i) how patient and (ii) how risk tolerant they consider themselves to be, and (iii)

whether they are willing to punish someone who treats them unfairly, even if there may be costs for them personally (see Vischer et al., 2013; Falk et al., 2023).

Every subject was assigned to a session that implemented either the sale or the rental model and a fixed role as anonymous seller or buyer throughout ten consecutive bilateral relationships with a horizon of ten periods ($T = 10$) each. Subjects could not participate in more than one session and were randomly matched for every relationship. The first five relationships were conducted with commitment, and the next five relationships without commitment (or vice versa).[4] That is, each subject participated as seller or buyer either in the sale or the rental model, once with commitment and once without commitment. In line with the theory discussed above, we implemented the following four treatments surveyed in Table 1: (i) Sale with commitment [SC]; (ii) Sale without commitment [SNC]; (iii) Rental with commitment [RC]; (iv) Rental without commitment [RNC].

Importantly, in the treatments with *commitment*, sellers were asked to fix the entire price path *at the beginning* of a bilateral relationship, without the possibility of changing prices later on. Buyers were informed that the sellers had irrevocably fixed the price path at the beginning; however, they were not immediately shown all these prices, which varied across sellers. Instead, buyers learned about them period-by-period. This approach allowed us to implement commitment in the experiment in the exact same way for all buyers. In the treatments *without commitment*, sellers could set prices *period-by-period* based on the previous histories, and buyers were informed accordingly.[5]

Buyers were exogenously assigned valuations of $\bar{b} = 100$ and $\underline{b} = 50$, respectively. The value of the good depreciated at a fixed per-period rate, given a per-period discount factor of $\delta = 0.6$. The value of the discount factor was chosen to lead to a strong depreciation of the good's value from one period to the next, thereby inducing participants to consider each period separately, even though the experiment lasted less than two hours. The maximum surplus from a bilateral relationship was $\Delta_1 \bar{b} = 250$ if the buyer had a high valuation, and

[4]Figure A1 presents the response graphs separately for participants who initially took part in the treatment with commitment and those who initially engaged in the treatment condition without commitment. The results indicate no significant differences with regard to the treatment order.

[5]Screenshots of the corresponding answering forms are presented in Appendix A.3.

Table 1: Treatments

Name	**Prices set in**	**# Bilateral relations** Total: 1,410	**# Subjects** Total: 282
SC	t_1	315	126
SNC	$t_1, ..., T$	315	126
RC	t_1	390	156
RNC	$t_1, ..., T$	390	156

Notes: The table provides an overview of the four treatments, presenting the number of observed bilateral relationships and the number of participants in each. In the treatments with commitment, the prices for all T periods were set at the onset of a bilateral relationship. Conversely, in the treatments without commitment, sellers were asked to set a single price in each period. Thus, in the SNC treatment, prices were set until the offer was accepted or the bilateral relationship ended. Screenshots of the corresponding answering forms are presented in Appendix A.3.

$\Delta_1 \underline{b} = 125$ if the buyer had a low valuation. At the beginning of each bilateral relationship, buyers were privately informed of their randomly assigned valuations. Importantly, each buyer's per-period valuation for the good remained constant over the ten periods of the corresponding bilateral relationship; however, it could change from relationship to relationship. Sellers, on the other hand, were only informed that the probability of being matched with a high-valuation buyer was 60 percent, setting the prior belief of sellers to $\mu_1 = 0.6$.

Table 2 summarizes the parameter values that calibrate the experiment. During every bilateral relationship, subjects were reminded about the current period t and the decisions to be made. In addition, they were reminded of the outcome of their bilateral relationship (i.e., the allocation of the good and the payoffs) at the end of each relationship. Note that the good became obsolete if it was never consumed, resulting in a zero payoff for both the seller and the buyer. The rematching to new bilateral relationships occurred after all parallel bilateral relationships had ended.

Subjects were neutrally informed about the relevant terms in the experiment. To help them with the decision making, the instructions explained how to discount the buyer's

Table 2: Calibration

Parameter	Label	Value
Horizon	T	10
Low valuation	$\underline{b}$	50
High valuation	$\bar{b}$	100
Relative valuation	$\underline{b}/\bar{b} \equiv \overline{\mu}$	0.5
Probability of high valuation	μ_1	0.6
Discount factor	δ	0.6

Notes: The table documents the relevant parameter values of the experiment. Importantly, these parameter values were common knowledge among both buyers and sellers.

valuation over time and presented them with a table that showed the evolution of the surplus from the bilateral relationship with a high- and low-valuation buyer, respectively.[6]

The experiment was programmed and run in oTree (Chen et al., 2016). Sessions lasted a maximum of two hours. Participants received a fixed participation fee of CHF 20 (roughly $20), set in accordance with institutional guidelines. Additional payments were contingent on performance.[7] Average total payments in the sale and rental models were CHF 24 and CHF 32, respectively. An ethics approval was obtained from the Ethics Committee of the University of St. Gallen (HSG-EC-20210115-A).

4 Results

4.1 Sale model

4.1.1 Sale with commitment [SC]

For the Sale with commitment [SC] treatment, Prediction 1 and the parameter values given in Table 2 imply that the seller charges the price $p_1 = \sum_{\tau=1}^{10}(0.6)^{\tau-t}100 = 250$ in the first period, which fully extracts the surplus of a high-valuation buyer and prices the low-valuation buyer out of the market. The prices from the second period onward are

[6] We included the full set of instructions in Appendix A.3.

[7] For each participant, we randomly selected one of their bilateral relationships. Participants then received the payoffs of the selected bilateral relationship, with an exchange rate of 20 to 1, in addition to the fixed participation fee.

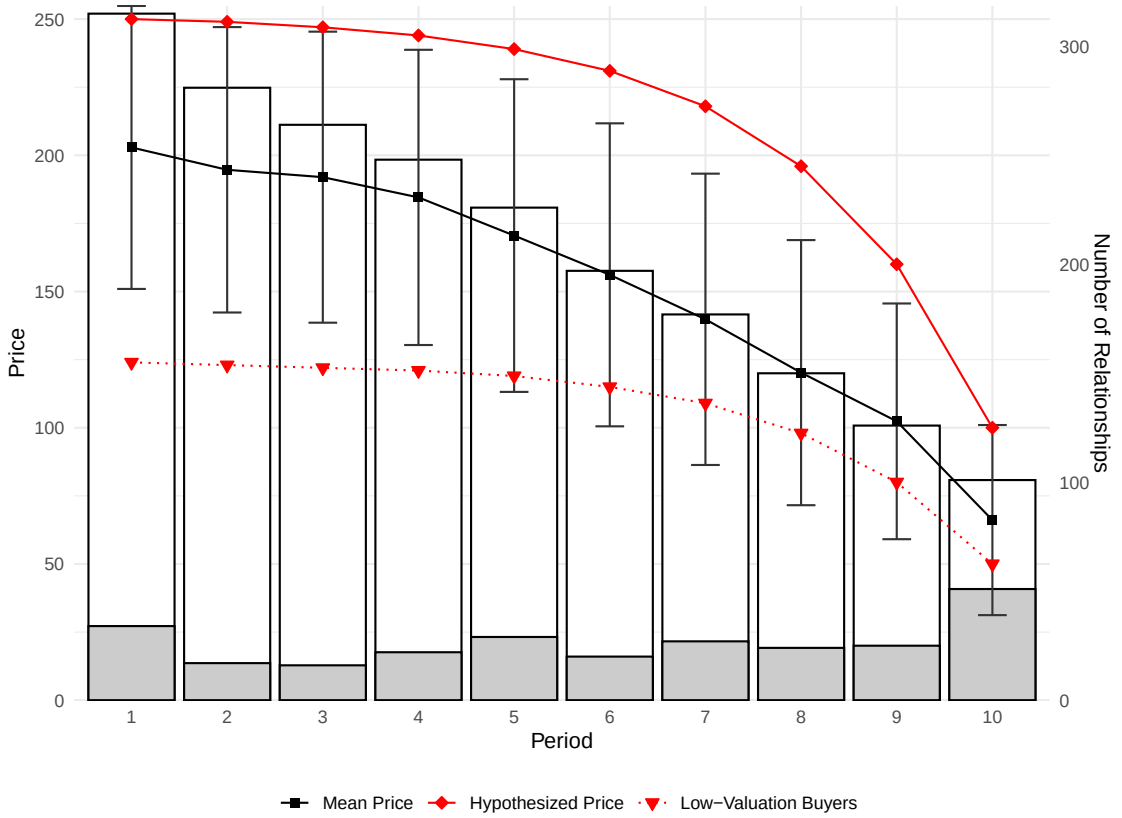
not completely pinned down but must make sure that (i) the high-value buyer purchases in the first period, and (ii) the low-value buyer does not want to purchase in any of the periods. For the sake of the experiment, we hypothesize that the seller continues to seek to extract the high-valuation buyer's maximum willingness to pay from the second period onward, which yields an upper bound for the prices that the buyer can pay. This leads to the following hypothesis to be tested:

Hypothesis 1 (Sale with commitment)**.** *Sellers commit to a declining path of sale prices* $p_1, p_2, ..., p_{10}$ *that fully extract the surplus of high-valuation buyers, and only high-valuation buyers purchase.*

Figure 1 shows the hypothesized price path (scale on the left axis), which is equivalent to the maximum willingness to pay of a high-valuation buyer, represented by a solid red line. The dotted red line represents the maximum willingness to pay of a low-valuation buyer. The black line shows the mean prices offered in periods $t = 1, ..., 10$. Additionally, the error bars depict the standard deviations of the price offers.

A number of observations on seller behavior are in order. First, the mean prices offered by sellers are tracing a declining price path, indicating that sellers are aware of the diminishing value of the good. Second, the mean prices offered by sellers are consistently below the predicted prices. Third, the gap between the mean prices and the predicted prices remains fairly constant across periods. Specifically, sellers are willing to transfer approximately 30 percent of the maximum surplus to buyers. This finding is reminiscent of the stylized fact that the majority of subjects are willing to transfer $30-40$ percent of the endowment in standard ultimatum games, where the proposer makes a one-time offer to the responder, who can accept or reject it (Oosterbeek et al., 2004). However, the dynamic pricing setting considered here is more complex because the surplus of the relationship is uncertain and evolves over time. Therefore, deviations from the predicted prices may arise not only from social preferences but also from risk preferences (risk aversion) and time preferences (impatience).

Figure 1: Price path in the SC treatment



Notes: The figure shows in black the mean prices offered in the SC treatment (scale on left axis). The error bars represent the standard deviations of the price offers. The solid red line depicts the predicted price path, which corresponds to the maximum willingness to pay of a high-valuation buyer. The dotted red line represents the maximum willingness to pay of a low-valuation buyer. The white bars depict the total number of ongoing bilateral relationships, while the gray bars show the number of bilateral relationships where the buyer decides to buy the good at the price effective in the respective period (scale on right axis).

Figure 1 also depicts (i) the number of active bilateral relationships, starting with a total of 315 bilateral relationships in period 1, of which 101 bilateral relationships last until period 10, and (ii) the number of bilateral relationships that end because the buyer decides to purchase the good (scale on the right axis). Regarding buyer behavior, it should be noted that offers are accepted in all 10 periods, although theory predicts that high-valuation buyers purchase the good in the first period, whereas low-valuation buyers abstain from purchasing entirely. Moreover, most purchases occur in the last period at an average price well below 100, which suggests that many sellers are not maximizing their

expected profits in the last period and instead sell at a discount. Overall, the data show that the durable good is sold in 265 of the 315 bilateral relationships.

As for the resulting payoffs, we make the following observations (see Table A2 for an overview of the average treatment outcomes). First, the sellers' mean present discounted profit when interacting with high-valuation buyers is significantly below the theoretically predicted level (41.38 vs. 250.00, $p < 0.01$, Wilcoxon signed rank test). However, their mean present discounted profit when interacting with low-valuation buyers is significantly greater than its theoretically predicted level (11.44 vs. 0.00, $p < 0.01$, Wilcoxon signed rank test). On the buyer side, the average present discounted surplus of high-valuation buyers is significantly greater than predicted (23.87 vs. 0.00, $p < 0.01$, Wilcoxon signed rank test). Moreover, the mean present discounted surplus of low-valuation buyers is also statistically significantly greater than zero (2.19 vs. 0.00, $p < 0.01$, Wilcoxon signed rank test).

Finally, we approximate the efficiency of bilateral relationship i in the SC treatment by the ratio of the sum of the appropriately discounted price accepted in period k, denoted as p_k^i, and the appropriately discounted difference between the buyer's maximum willingness to pay and the price accepted in period k to the expected present discounted equilibrium surplus under commitment

$$E_i^{SC} = \frac{\delta^{k-1} p_k^i + \delta^{k-1}(\Delta_k b^i - p_k^i)}{\mu_1 \Delta_1 \overline{b}}. \tag{3}$$

The average efficiency in the SC treatment is thus given by $E^{SC} = \sum_i E_i^{SC} / n^{SC}$, where n^{SC} is the number of bilateral relationships conducted in the SC treatment. We find an average efficiency of $E^{SC} = 0.30$ and conclude that the average efficiency differs significantly from the predicted value of 1 ($p < 0.01$, two-sided Wilcoxon signed rank test). That is, on average, only 30 percent of the expected equilibrium surplus is realized.

4.1.2 Sale without commitment [SNC]

For the Sale without commitment [SNC] treatment, Prediction 2 and the parameter values given in Table 2 imply the following hypothesis (see Appendix A.2 for further details on its derivation):

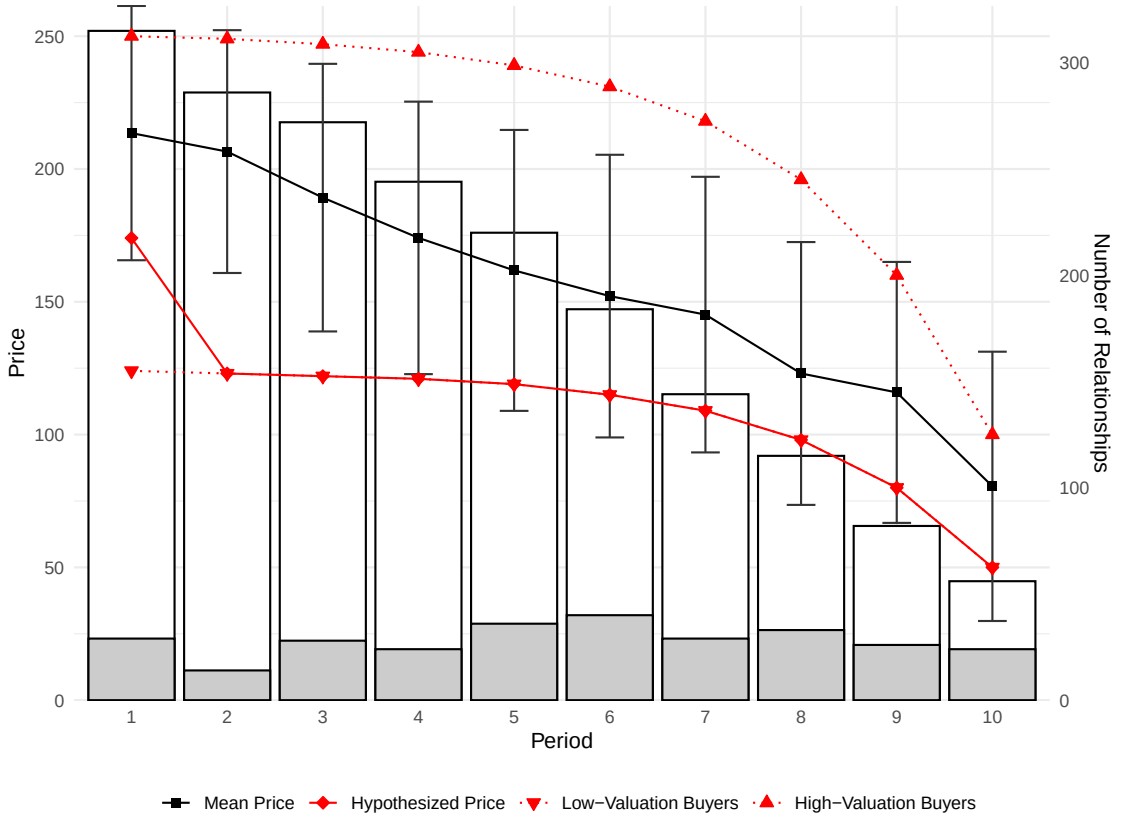
Hypothesis 2 (Sale without commitment)**.** *Sellers set a price $p_1 = 174$ in the first period, and, if rejected, they lower the price to $p_2 = 123$ in the second period. Given this pricing strategy, high-valuation buyers are indifferent between purchasing in the first or second period, while low-valuation buyers purchase the good at the price effective in the second period.*

Figure 2 displays the hypothesized prices, as well as the mean and standard deviations of the prices offered in each period $t = 1, ..., 10$ (scale on the left axis). The two dotted red lines represent the maximum willingness to pay of high- and low-valuation buyers, respectively. Importantly, in the SNC treatment, we only observe prices up to the period in which the buyers accept the price offers. Consequently, the mean price per period is calculated with a diminishing number of observations.

The following observations on seller behavior are pertinent. As in the SC treatment, the mean prices offered follow a gradually declining price path. However, in this case, the mean prices offered by sellers are well above the predicted price levels. Notably, the average initial price offer in the SC treatment is significantly smaller than the average first period price in the SNC treatment (202.89 vs. 213.51, $p < 0.01$, Wilcoxon signed rank test).

With regard to buyer behavior, it should be noted that price offers are accepted in all 10 periods (scale on the right axis). Specifically, the average duration of the bilateral relationships resulting in a sale of the durable good is 5 periods when sellers are interacting with high-valuation buyers and 7 periods when interacting with low-valuation buyers. Additionally, while theory predicts that the good is purchased in all bilateral relationships, actual purchases are made only in 283 of the 315 observed relationships.

Figure 2: Price path in the SNC treatment



Notes: The figure shows in black the mean prices offered in the SNC treatment (scale on the left axis). The error bars represent the standard deviations of the price offers. The solid red line depicts the predicted price path. The dotted red lines represent the maximum willingness to pay of high-valuation and of low-valuation buyers, respectively. The white bars depict the total number of ongoing bilateral relationships, while the gray bars show the number of bilateral relationships where the buyer decides to buy the good at the price effective in the respective period (scale on right axis).

Interestingly, sellers' mean present discounted profit in the SC treatment is not statistically significantly different from that in the SNC treatment (29.50 vs. 26.90, $p = 0.72$, Wilcoxon signed rank test). Furthermore, sellers' average present discounted profit in the SNC treatment is significantly below its theoretically predicted level, both when interacting with high-valuation buyers (35.09 vs. 174.00, $p < 0.01$, Wilcoxon signed rank test) and low-valuation buyers (16.25 vs. 74.00, $p < 0.01$, Wilcoxon signed rank test).

On the buyer side, we find no statistically significant difference between the average present discounted surplus in the SC treatment and the SNC treatment (15.27 vs. 17.66, $p = 0.12$, Wilcoxon signed rank test). Yet, the mean present discounted surplus of high-valuation buyers is significantly lower than in the SNC treatment (29.53 vs. 76.00, $p < 0.01$, Wilcoxon signed rank test), while the mean present discounted surplus of low-valuation buyers is statistically significantly greater than zero (2.24 vs. 0.00, $p < 0.01$, Wilcoxon signed rank test).

In the SNC treatment, we assess the efficiency of bilateral relationship i by dividing the sum of the appropriately discounted price accepted in period k, p_k^i, and the appropriately discounted difference between the buyer's maximum willingness to pay and the price accepted in period k by the maximum expected surplus under non-commitment

$$E_i^{SNC} = \frac{\delta^{k-1} p_k^i + \delta^{k-1}(\Delta_k b^i - p_k^i)}{\mu_1 174 + (1-\mu_1)\delta\Delta_2 \underline{b} + \mu_1 74}. \tag{4}$$

The average efficiency in the SNC treatment is thus given by $E^{SNC} = \sum_i E_i^{SNC} / n^{SNC}$, where n^{SNC} is the number of bilateral relationships conducted in the Sale without commitment treatment. The resulting average efficiency is $E^{SNC} = 0.25$, which differs significantly from the predicted value of 1 ($p < 0.01$, two-sided Wilcoxon signed rank test). That is, on average, only a quarter of the expected equilibrium surplus is realized in the SNC treatment.

4.2 Rental model

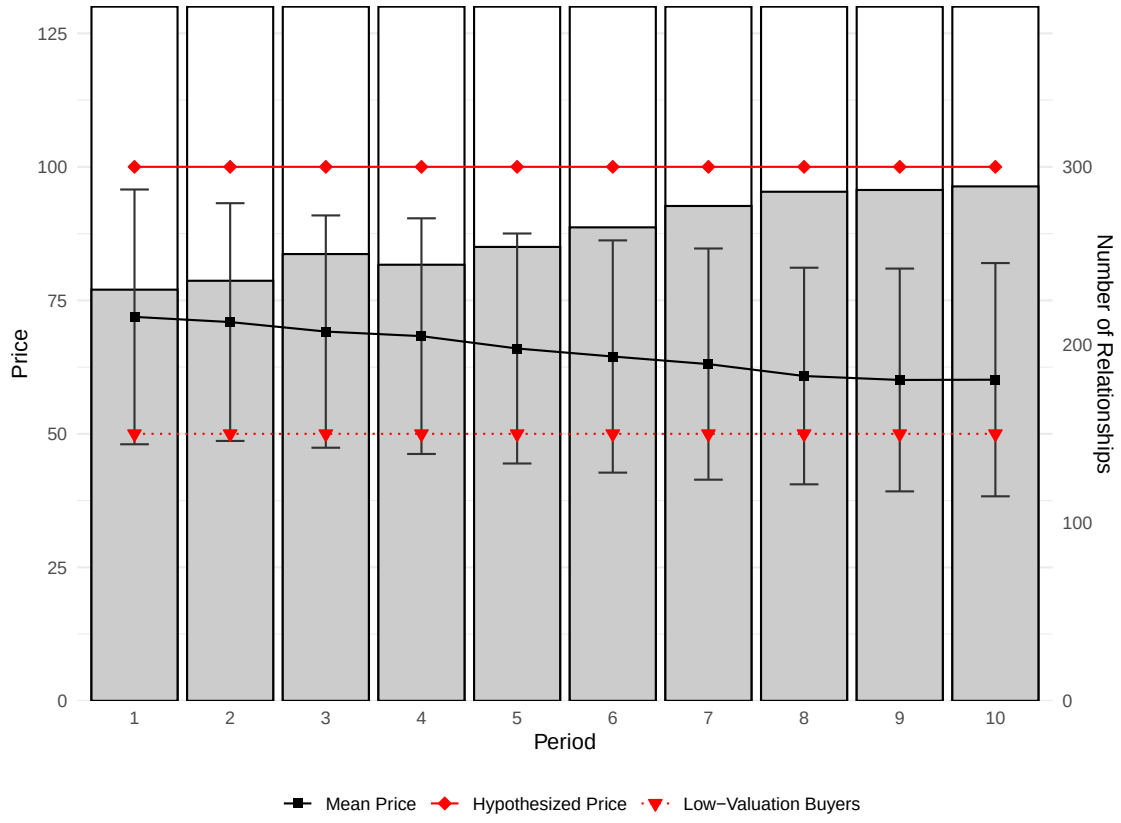
4.2.1 Rental with commitment [RC]

In the Rental with commitment [RC] treatment, we derive the following hypothesis from Prediction 1 and the parameter values given in Table 2:

Hypothesis 3 (Rental with commitment)**.** *Sellers commit to a constant path of rental prices $p_t = 100$, with $t = 1, ..., 10$, that fully extract the surplus of high-valuation buyers, and only high-valuation buyers rent the good in each period.*

Figure 3 shows the predicted price path as well as the mean and standard deviation of the prices offered in each period $t = 1, ..., 10$ in the RC treatment (scale on the left axis). The dotted red line represents the maximum willingness to pay of a low-valuation buyer. Two key observations regarding seller behavior should be noted. First, despite their commitment, the mean prices offered by the sellers are slightly decreasing from period to period. Second, the mean prices are substantially below the predicted prices of $p_t = 100$ for $t = 1, ..., 10$. In fact, across all 10 periods, sellers are willing to transfer approximately 35 percent of the maximum surplus to buyers in the RC treatment.

Figure 3: Price path in the RC treatment



Notes: The figure shows in black the mean prices offered in the RC treatment (scale on the left axis). The error bars represent the standard deviations of the price offers. The solid red line depicts the hypothesized price path, which corresponds to the maximum willingness to pay of a high-valuation buyer. Similarly, the dotted red line represents the maximum willingness to pay of a low-valuation buyer. The white bars depict the total number of ongoing bilateral relationships, while the gray bars show the number of bilateral relationships where the buyer decides to rent the good at the price effective in the respective period (scale on right axis).

Similar to the sale treatments, Figure 3 not only depicts the observed and predicted price paths, but it also shows the number of bilateral relationships in which the buyer decides to rent the good at the effective price in the corresponding period (scale on the right axis). Thus, with regard to buyer behavior, it is important to note that the total number of accepted offers increases with the progression of the bilateral relationships. While approximately 60 percent of all rental offers are accepted in the first period of the bilateral relationships in the RC treatment, almost 290 out of the 390 observed price offers are accepted in the last period of the bilateral relationships.

Due to the low prices offered, sellers' mean profit summed up over all 10 periods when interacting with high-valuation buyers is significantly below the theoretically predicted level (500.13 vs. 1000.00, $p < 0.01$, Wilcoxon signed rank test). However, when interacting with low-valuation buyers, their mean profit is significantly greater than zero (191.32 vs. 0.00, $p < 0.01$, Wilcoxon signed rank test). Further, on the buyer side, we find that the mean surplus of both high-valuation and low-valuation buyers is strictly greater than zero (321.50 and 19.37, respectively, $p < 0.01$, Wilcoxon signed rank tests).

Lastly, in the case of the RC treatment, the efficiency of bilateral relationship i is measured by dividing the sum of all prices accepted over the course of the bilateral relationship plus the sum of all differences between the buyer's valuation and the prices accepted, by the maximum expected surplus under commitment

$$E_i^{RC} = \frac{\sum_{t=1|k=1}^{T} p_{tk}^i + \sum_{t=1|k=1}^{T} (b^i - p_{tk}^i)}{\mu_1 T \bar{b}}, \tag{5}$$

where $k = 1$ if the buyer accepts the price offer. The average efficiency in the RC treatment is calculated as $E^{RC} = \sum_i E_i^{RC} / n^{RC}$, where n^{RC} denotes the number of bilateral relationships conducted in the RC treatment. As reported in Table A2, the resulting average efficiency is $E^{RC} = 0.99$, which does not differ significantly from the predicted value of 1 ($p = 0.64$, two-sided Wilcoxon signed rank test). Thus, in contrast to the sale treatments, we do not observe insufficient trade in the Rental with commitment treatment.

4.2.2 Rental without commitment [RNC]

For the Rental without commitment [RNC] treatment, we examine the following hypothesis derived from Prediction 3 and the parameter values given in Table 2:

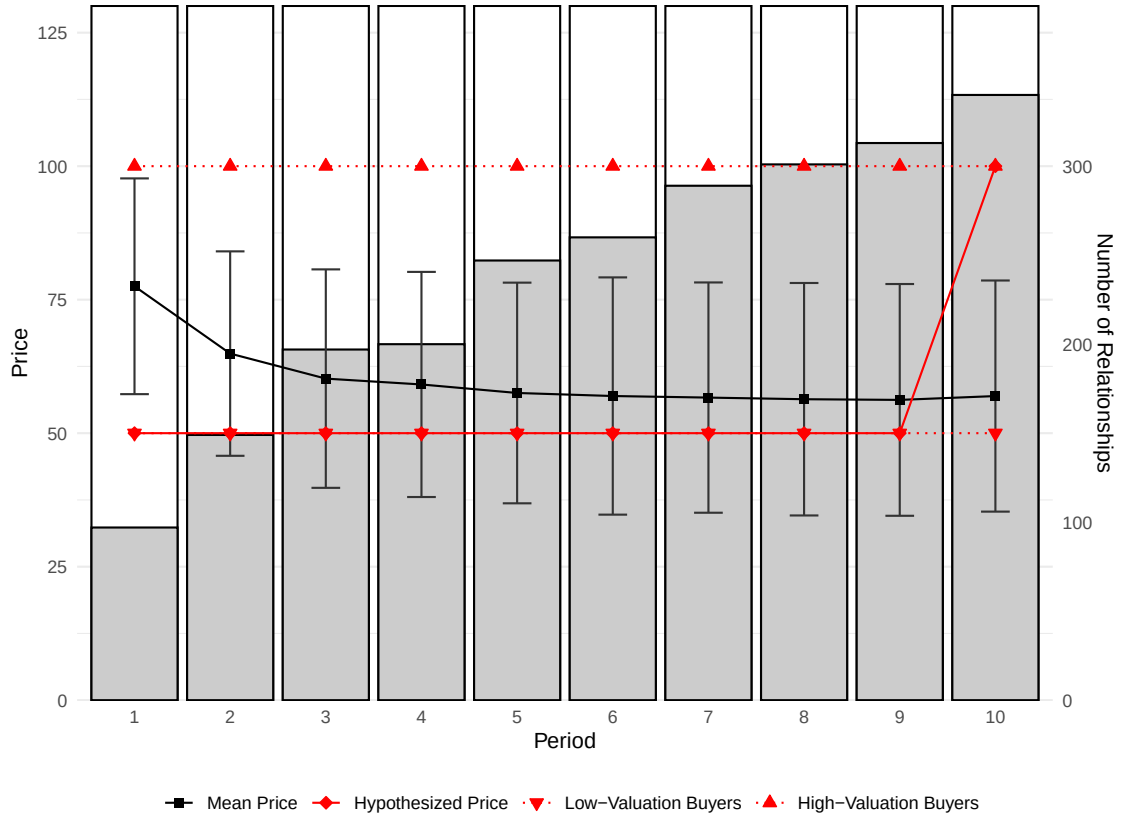
Hypothesis 4 (Rental without commitment)**.** *Sellers set a constant path of rental prices, denoted as* $p_t^{RNC} = 50$ *for* $t = 1,...,9$*, so that both high-valuation and low-valuation buyers rent the good each period. In period* 10*, sellers choose a price* $p_{10}^{RNC} = 100$ *that fully extracts the surplus of high-valuation buyers, and only high-valuation buyers rent the good in the last period.*

Figure 4 depicts the hypothesized price path, as well as the mean and standard deviation of the prices offered in each period $t = 1,...,10$ (scale on the left axis). As in the SNC treatment, the two dotted red lines represent the maximum willingness to pay of high-valuation and low-valuation buyers, respectively.

Three observations on seller behavior are in order. First, the mean prices offered by sellers gradually decline over the first five periods and then stay roughly constant, leading to a price path that resembles a hockey stick. This suggests that sellers eventually stop updating their beliefs about the buyer's valuation. Second, the initial prices offered are considerably higher than the hypothesized price of $p_1 = ... = p_9 = 50$, but lower than the maximum willingness to pay of high-valuation buyers, $\overline{b} = 100$. Third, the mean price offered in the RC treatment is significantly higher than in the RNC treatment (65.49 vs. 60.25, $p < 0.01$, Wilcoxon signed rank test).

On the buyer side, we observe a steeply increasing number of price acceptances over the course of the 10 periods, with the good being rented out in 340 of the 390 bilateral relationships in the last period (scale on the right axis). In contrast, during the first period of the bilateral relationships in the RNC treatment, only 25 percent of all rental offers are accepted. This has important implications for the payoffs obtained by sellers and buyers. First, in line with the theory outlined in Section 2.3, the average profit of sellers summed over all 10 periods is significantly higher in the RC treatment than in the RNC

Figure 4: Price path in the RNC treatment



Notes: The figure shows in black the mean prices offered in the RNC treatment (scale on the left axis). The error bars represent the standard deviations of the price offers. The solid red line depicts the hypothesized price path. The dotted red lines show the maximum willingness to pay of high-valuation and low-valuation buyers, respectively. The white bars depict the total number of ongoing bilateral relationships, while the gray bars show the number of bilateral relationships where the buyer decides to rent the good at the price effective in the respective period (scale on right axis).

treatment (385.32 vs. 337.48, $p < 0.01$, Wilcoxon signed rank test). Further, in the RNC treatment, the average profit of sellers is significantly below the levels predicted for interactions with high-valuation buyers (452.11 vs. 550.00, $p < 0.01$, Wilcoxon signed rank test) and low-valuation buyers (190.68 vs. 450.00, $p < 0.01$, Wilcoxon signed rank test), respectively. Interestingly, on the buyer side, the mean surplus summed over all 10 periods is significantly greater in the RC treatment than in the RNC treatment (209.17 vs. 174.57, $p = 0.04$, Wilcoxon signed rank test). This finding is due to the average surplus of high-valuation buyers being significantly lower than predicted in the RNC

treatment (278.95 vs. 450.00, $p < 0.01$, Wilcoxon signed rank test). Conversely, the average surplus of low-valuation buyers is well above its predicted level (40.89 vs. 0.00, $p < 0.01$, Wilcoxon signed rank test).

Analogously to the RC treatment, we assess the efficiency of bilateral relationship i by dividing the sum of all rental prices accepted plus the sum of all differences between the buyer's valuation and the prices accepted by the maximum expected surplus under non-commitment

$$E_i^{RNC} = \frac{\sum_{t=1|k=1}^{T} p_{tk}^i + \sum_{t=1|k=1}^{T} (b^i - p_{tk}^i)}{\mu_1 \bar{b} + (T-1)\underline{b} + \mu_1 (T-1)(\bar{b} - \underline{b})}, \tag{6}$$

where $k = 1$ if the buyer accepts the price offer. The average efficiency in the RNC treatment is then calculated as $E^{RNC} = \sum_i E_i^{RNC} / n^{RNC}$, where n^{RNC} is the number of bilateral relationships conducted in the Rental without commitment treatment. The resulting average efficiency is $E^{RNC} = 0.66$, which significantly deviates from the predicted value of 1 ($p < 0.01$, two-sided Wilcoxon signed rank test). That is, on average, around two-thirds of the expected equilibrium surplus is realized in the RNC treatment.

4.3 Uncovering individual pricing and purchasing patterns

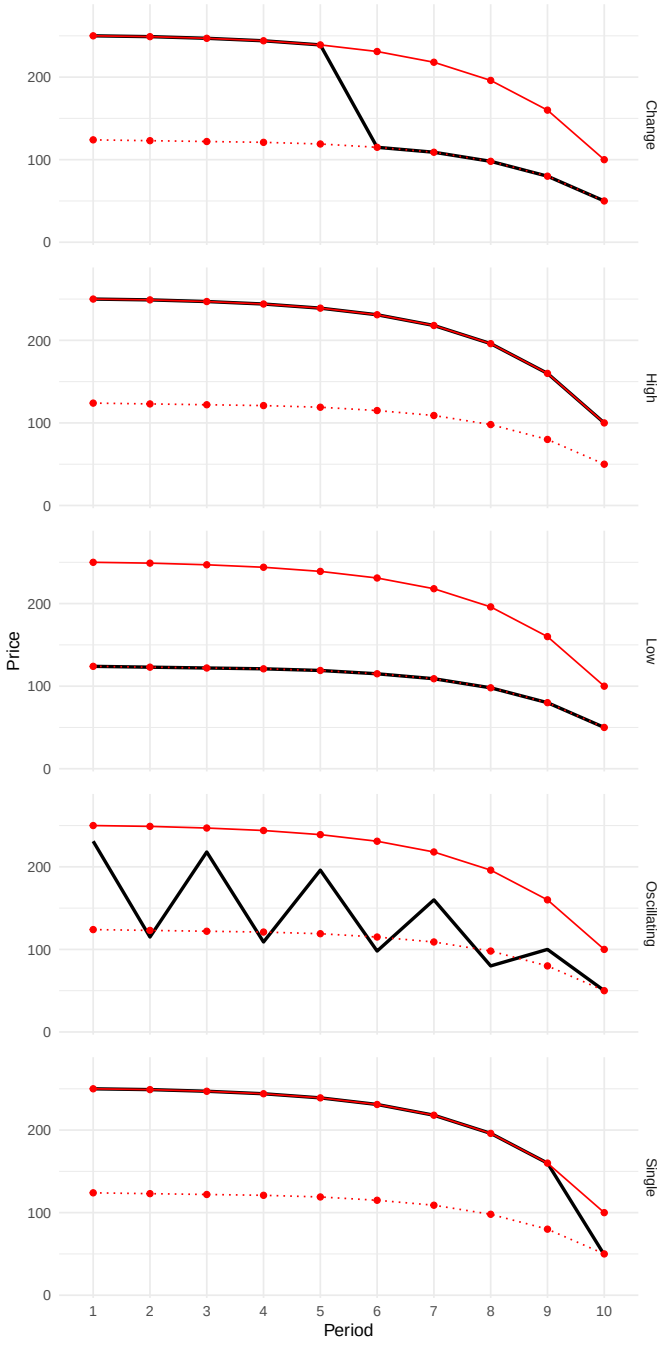
4.3.1 Sale with commitment [SC]

Noting that prices are set at the beginning and therefore cannot reflect belief updating under commitment, we identify five distinct pricing patterns that are mutually exclusive by using cluster analysis. These pricing patterns are termed (i) *Change*, (ii) *High*, (iii) *Low*, (iv) *Oscillating*, and (v) *Single*.[8] Figure 5 illustrates exemplary price paths for each of these patterns as observed in the SC treatment. Moreover, Figure A2 presents the relative frequencies of these patterns, and Figure A3 provides a visual representation of every individual price path observed in the SC treatment.

We find that *Change* is the most common pattern (observed in 40 percent of the relationships in the SC treatment). It contains all price paths where prices exceed the

[8] In conducting the classification, we examined all individual price paths and assigned them to one of the five distinct pricing patterns based on their characteristics.

Figure 5: Different pricing patterns in the SC treatment



Notes: The figure displays exemplary price paths for each of the five pricing patterns in black. These specific price paths are actual observations from our data set of the SC treatment. In each of the five graphs, the solid red line represents the predicted price path. The dotted red line, in turn, corresponds to the maximum willingness to pay of a low-valuation buyer.

maximum willingness to pay of a low-valuation buyer for a consecutive number of periods s, with $1 < s < T$, followed by prices that do not exceed the maximum willingness to pay of a low-valuation buyer for the remaining $T - s$ periods, or vice versa. Hence, price paths of sellers who, for instance, set prices $p_t = \sum_{\tau=t}^{10}(0.6)^{\tau-t}100$ for $t = 1,...,5$ and prices $p_t = \sum_{\tau=t}^{10}(0.6)^{\tau-t}50$ for $t = 6,...,10$ are part of this class.

Oscillating is the second-most common pattern. As depicted in Figure 5, sellers who choose a pricing schedule that belongs to this class alternate between "high" and "low" prices (i.e., prices strictly above and weakly below the maximum willingness to pay of a low-valuation buyer, respectively). The third most common pricing pattern is labeled *Single*. This pattern contains price paths that maintain either high or low prices for all but a single period, as exemplified in the bottom graph of Figure 5.[9]

Interestingly, even though theory predicts that prices are consistently above the maximum willingness to pay of a low-valuation buyer, price paths with this feature account for only 16 percent of all observed price paths. An even smaller fraction of the price paths observed in the data consistently features prices equal to or below the maximum willingness to pay of a low-valuation buyer in all T periods.

Next, we examine whether there is a connection between the characteristics of the participants and the pricing patterns they adopt in the SC treatment. Specifically, we conduct a multinomial logistic regression, with the dependent variable being the observed pricing pattern and the independent variables accounting for the participants' answers to the three personality-related survey questions as well as their response time when setting the prices for all T periods.[10] The list of control variables includes the subjects' gender, age, study program, familiarity with the SC treatment (i.e., the number of the respective bilateral relationship), and the type of the treatment succession (i.e., whether

[9]Note that the singular decrease or increase in the price level can occur in any of the 10 periods and is not restricted solely to either the initial or final period (see the bottom graph in Figure A3).

[10]For a more detailed overview of the relative frequencies of the three personality-related explanatory variables in the sale and rental treatments, along with an explanation of how these variables were coded, please refer to Table A3.

they participated in the SNC treatment beforehand). Being the most prevalent, the *Change* pattern is chosen as the baseline in the multinomial logistic regression.

Table 3: Pricing patterns in the SC treatment

	High	Low	Oscillating	Single
	(1)	(2)	(3)	(4)
Patient	1.678***	0.194	−0.271	−0.481
	(0.520)	(0.659)	(0.421)	(0.499)
Impatient	1.968***	−0.990	−1.106	0.613
	(0.732)	(1.295)	(0.751)	(0.659)
Willing to take risks	2.391***	0.375	−0.203	0.595
	(0.592)	(0.744)	(0.458)	(0.501)
Not willing to take risks	−15.002***	−9.691***	2.458***	2.502***
	(0.000)	(0.000)	(0.810)	(0.932)
Willing to punish	0.865*	−0.486	−0.169	−0.599
	(0.507)	(0.713)	(0.497)	(0.477)
Not willing to punish	0.518	−1.218	−0.502	−0.134
	(0.485)	(0.750)	(0.491)	(0.559)
Response time	−0.012**	−0.012	0.006	0.006
	(0.006)	(0.008)	(0.003)	(0.004)
Controls		Yes		
AIC		882.554		
Pseudo R^2		0.179		

Notes: Focusing only on the SC treatment, the table reports the estimated log-odds from the multinomial logistic regression model using the *Change* pattern as the baseline. Control variables include the gender, study program, age, number of the bilateral relationship, and the type of treatment succession. Standard errors are reported in parentheses. ***, **, and * denote $p < 0.01$, $p < 0.05$, and $p < 0.1$, respectively.

Table 3 presents the regression results. We want to point out the following findings. First, the log-odds of committing to continuously high prices, rather than adopting a price trajectory consistent with the *Change* pattern, are significantly higher for sellers who self-identify as either patient or impatient, and for sellers with a self-declared willingness to take risks. Conversely, holding all other factors constant, the log-odds of committing to either consistently high or consistently low prices, rather than committing to a change in the price level at some point during the 10 periods, are significantly lower for sellers

who are either not willing or not at all willing to take risks. Lastly, the regression coefficient for the response time is statistically different from zero only when contrasting the theoretically predicted pricing behavior with the baseline pricing pattern. Otherwise, we find no particular relationship between a seller's response time and her choice of pricing schedule.

4.3.2 Rental with commitment [RC]

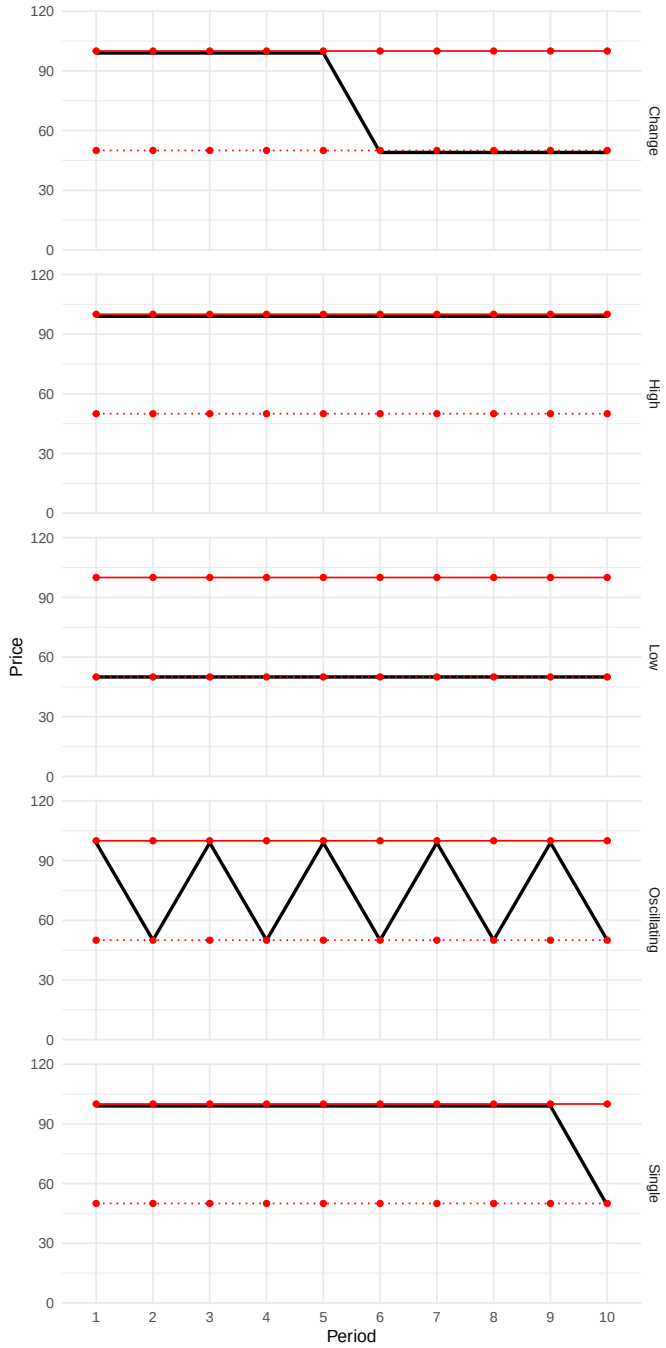
We apply a similar classification to the RC treatment, distinguishing between the same five distinct pricing patterns as above.[11] Figure 6 illustrates for each of these five patterns an exemplary price path as observed in our experiment. The relative frequencies of each pricing pattern in the RC treatment are depicted on the right in Figure A2. Figure A4 provides a visual depiction of every individual price path observed in the RC treatment.

Notably, we find that approximately 30 percent of all observed price paths in the RC treatment align with the *Change* pattern, thereby establishing its dominance as the most prevalent pricing pattern in both treatments with commitment. Again, this class encompasses all price paths where, for a consecutive number of $1 < s < T$ periods, prices are set at a level $p_t \leq \underline{b}$, with $t = 1, ..., s$, and then transition to a level $p_t > \underline{b}$, with $t = T - s + 1, ..., T$, for the subsequent $T - s$ periods, or vice versa. Thus, as depicted in the top graph of Figure 6, the price paths of sellers who, for instance, set a price $p_t = \overline{b}$ for $t = 1, ..., 5$, followed by a price $p_t = \underline{b}$ for $t = 6, ..., 10$ fall into this class.

The second most common pricing pattern in the RC treatment is, again, the *Oscillating* pattern. As illustrated in the second-to-last graph of Figure 6, one such example of a price path belonging to this class involves sellers continuously alternating between pricing their rental good at $\underline{b}$ and $\overline{b}$ throughout the entire duration of a bilateral relationship.

[11] In the RC treatment, our initial focus was on price paths where sellers maintained a constant price over the 10 periods or varied between two prices (e.g., 50 and 100). We contend that such pricing behavior is the most straightforward in the rental setting. Notably, among the 390 observed price paths, 203 did indeed fall into either of these two categories. These identified price paths were then assigned to one of the five distinct pricing patterns based on their price levels. In a second step, analogous to the SC treatment, we examined all the remaining price paths and also assigned them to one of the five mutually exclusive pricing patterns based on their distinctive characteristics.

Figure 6: Different pricing patterns in the RC treatment



Notes: The figure displays exemplary price paths representing each of the five pricing patterns, depicted in black. The illustrated price paths are derived from our data on the RC treatment. In each of the five graphs, the red solid line indicates the predicted price path. The red dotted line, in turn, shows the maximum willingness to pay of a low-valuation buyer.

Interestingly, we find that a considerably smaller fraction of sellers is committing to a single increase or drop in the price level over the T periods (i.e., the *Single* pattern) when the good is for rent rather than for sale. One particular example of this pricing pattern involves sellers committing to a price $p_t = \overline{b}$ for $t = 1, ..., 9$ and a price $p_T = \underline{b}$ in the final period (as illustrated in the bottom graph of Figure 6).[12]

According to Hypothesis 3, sellers should commit to a constant price path that fully extracts the surplus of high-valuation buyers. Yet, we find that price schedules featuring prices $p_t > \underline{b}$ for all $t = 1, ..., T$ account for less than one quarter of all 390 observed price paths in the RC treatment. Moreover, as shown in the second graph of Figure A4, the price levels within this class vary greatly. In fact, even within this class, we find that the mean price is still significantly below the maximum willingness to pay of a high-valuation buyer (82.71 vs. 100.00, $p < 0.01$, Wilcoxon signed rank test). Lastly, our data analysis suggests that in approximately 18 percent of all bilateral relationships, sellers consistently set prices either equal to or even below the total willingness to pay of low-valuation buyers, implying $p_t \leq \underline{b}$ for all $t = 1, ..., T$.

Analogous to our analysis of the SC treatment, we examine whether there is a connection between the characteristics of the participants and the pricing patterns they adopt in the RC treatment, using a multinomial logistic regression model. The included control variables encompass the sellers' gender, age, study program, familiarity with the RC treatment, and the type of treatment succession (i.e., whether they previously participated in the RNC treatment). Again, the *Change* pattern is chosen as the baseline.

The regression results for the RC treatment are detailed in Table 4. We want to highlight the following findings. First, the two variables indicating the willingness to take risks and the willingness to punish unfair treatment are significant positive predictors of setting continuously high prices rather than choosing a price schedule consistent with the *Change* pattern. Second, the log-odds of committing to consistently low prices, rather than adopting a price trajectory consistent with the baseline pattern, are significantly

[12] Again, the singular decrease or increase in the price level can occur at any point within the 10 periods comprising a bilateral relationship.

Table 4: Pricing patterns in the RC treatment

	High	Low	Oscillating	Single
	(1)	(2)	(3)	(4)
Patient	−0.509	−2.349***	−0.684*	0.057
	(0.406)	(0.610)	(0.380)	(0.516)
Impatient	−0.455	−0.970*	−1.700***	−0.389
	(0.451)	(0.496)	(0.532)	(0.720)
Willing to take risks	0.946***	−0.285	−0.385	0.474
	(0.351)	(0.402)	(0.391)	(0.501)
Not willing to take risks	−1.406	0.351	−2.422**	−0.711
	(1.137)	(0.791)	(1.196)	(1.205)
Willing to punish	0.811**	0.465	0.372	−1.402*
	(0.388)	(0.427)	(0.399)	(0.800)
Not willing to punish	−0.679	−0.561	−1.056**	−0.733
	(0.463)	(0.471)	(0.436)	(0.572)
Response time	0.004	−0.013	0.011**	0.004
	(0.006)	(0.008)	(0.005)	(0.007)
Controls		Yes		
AIC		1,125.127		
Pseudo R^2		0.160		

Notes: Focusing only on the RC treatment, the table reports the estimated log-odds from the multinomial logistic regression model using the *Change* pattern as the baseline. Control variables include the gender, study program, age, number of the bilateral relationship, and the type of treatment succession. Standard errors are reported in parentheses. ***, **, and * denote $p < 0.01$, $p < 0.05$, and $p < 0.1$, respectively.

smaller for individuals who self-identify as patient or very patient. Third, we find that impatience, the unwillingness to take risks, and the reluctance to punish unfair behavior are all significant negative predictors of setting oscillating prices rather than committing to a price schedule consistent with the *Change* pattern. Lastly, considering response time, we observe a statistically significant effect only when contrasting the *Oscillating* pricing pattern with the baseline class. Otherwise, there is no discernible relationship between a seller's response time and her pricing behavior.

4.3.3 Sale without commitment [SNC]

Recall from Section 2.3 that sellers who cannot commit are expected to decrease their price offers from one period to the next if the good is for sale. The reason is that sellers become increasingly pessimistic about the probability of facing a high-valuation buyer. We therefore categorize sellers as strategic if they narrow the gap between the price they offer in period t and the maximum willingness to pay of a low-valuation buyer in period t throughout the course of the bilateral relationship.

Looking at the data, we find that in 55 percent of the 315 bilateral relationships observed in our SNC treatment, sellers did indeed adhere to this pricing behavior. Furthermore, we observe that the average duration of the relationships resulting in a purchase by the buyer is significantly shorter for strategic sellers than for sellers who do not seem to update their beliefs as predicted by theory (4.25 vs. 7.72, $p < 0.01$, Wilcoxon rank sum test). As a result, the average present discounted profit of the strategic sellers is considerably higher than that of their counterparts (45.43 vs. 4.60, $p < 0.01$, Wilcoxon rank sum test).

Without commitment, high-valuation buyers have an incentive to imitate low-valuation buyers and strategically delay their purchases, thereby benefiting from lower prices in later periods. In line with Hypothesis 2, we classify high-valuation buyers as strategic if they reject all price offers $p_1 > 174$ in the first period and only purchase the good at a price $p_t \leq \sum_{\tau=t}^{10}(0.6)^{\tau-t}50$ for $t = 2, ..., 10$. Indeed, we find that in 72 percent of all bilateral relationships where the buyer has a high-valuation, the buyers strategically delay their purchase. As expected, the average present discounted surplus of the high-valuation buyers who strategically delay their purchase is significantly higher than that of those who do not (35.92 vs. 13.16, $p < 0.01$, Wilcoxon rank sum test). However, the mean duration of the bilateral relationships resulting in the sale of the durable good is around 5 periods for both types of high-valuation buyers ($p = 0.86$, Wilcoxon rank sum test).

Similar to our analysis of the different pricing patterns under commitment, we are interested in exploring how various factors, including participants' self-assessed

personality traits and response times, influence their behavior as buyers or sellers in the SNC treatment. Thus, we conduct separate logistic regression analyses with the dependent variable being the binary variable indicating strategic behavior on the part of the buyers (see Column (1) of Table 5), and on the part of the sellers (see Column (2) of Table 5). We use the same set of independent and control variables as in the multinomial logistic regressions discussed earlier.

In short, the estimation results reported in Table 5 yield the following three findings. First, all average marginal effects presented in Column (1) of Table 5 are not statistically different from zero. That is, our estimation results indicate no particular relationship between a buyer's self-assessed personality traits and response time, and her purchasing behavior within the SNC treatment. Second, Column (2) of Table 5 indicates that sellers expressing a reluctance or complete unwillingness to take risks are approximately 33 percentage points less likely to behave strategically, holding all other factors constant. Third, focusing only on sellers in the SNC treatment, the response time emerges as a significant positive predictor of strategic behavior. In other words, sellers who spend more time setting their prices within a bilateral relationship are more likely to update their beliefs regarding the buyer's type according to theory.

4.3.4 Rental without commitment [RNC]

In the RNC treatment, we classify sellers as strategic if they increase the price after a purchase in period t at price $p_t > 50$ to $p_{t+1} \geq p_t$ in the subsequent period. That is, we expect the ratchet effect to emerge when high-valuation buyers reveal their true willingness to pay. We find that in 90 percent of all 390 observed bilateral relationships in the RNC treatment, sellers did indeed adhere to this pricing behavior. Yet, surprisingly, we also find that the average profit of these strategic sellers is considerably lower than the average profit of sellers who, at times, decrease their rental offers after a price acceptance (326.54 vs. 438.87, $p < 0.01$, Wilcoxon rank sum test).

Table 5: Logit estimates for strategic behavior

	Sale Non-Commitment		*Rental Non-Commitment*	
	Buyer	Seller	Buyer	Seller
	(1)	(2)	(3)	(4)
Patient	−0.038	0.057	0.179**	−0.004
	(0.108)	(0.066)	(0.091)	(0.033)
Impatient	0.094	−0.062	0.050	−0.156**
	(0.084)	(0.104)	(0.109)	(0.065)
Willing to take risks	−0.010	0.016	−0.037	0.010
	(0.090)	(0.070)	(0.079)	(0.033)
Not willing to take risks	0.047	−0.331***	−0.158	0.103***
	(0.101)	(0.104)	(0.127)	(0.018)
Willing to punish	−0.065	0.000	0.052	0.015
	(0.085)	(0.074)	(0.144)	(0.037)
Not willing to punish	0.037	−0.053	0.269**	0.087***
	(0.109)	(0.070)	(0.108)	(0.030)
Response time	−0.005	0.014***	−0.029	−0.015***
	(0.004)	(0.006)	(0.018)	(0.006)
Controls	Yes	Yes	Yes	Yes
Observations	178	315	219	390
Log Likelihood	−99.638	−196.654	−131.089	−103.633
AIC	229.277	423.307	294.179	237.265
Pseudo R^2	0.057	0.094	0.107	0.168

Notes: The table reports the estimated average marginal effects from the logistic regression models using the dummy variable indicating strategic behavior of buyers and sellers as the dependent variable. Control variables include the gender, study program, age, number of the bilateral relationship, and the type of treatment succession. Standard errors are reported in parentheses. ***, **, and * denote $p < 0.01$, $p < 0.05$, and $p < 0.1$, respectively.

On the buyer side, as outlined in Section 2.3, we classify high-valuation buyers as strategic if they reject any price $p_t > 50$ in periods $t = 1, ..., 9$, because accepting such offers would reveal their high willingness to pay. Yet, we observe that in only 39 percent of all bilateral relationships involving a high-valuation buyer, buyers indeed adopt this forward-looking purchasing behavior. Interestingly, the average price accepted by these strategic buyers is even slightly below the maximum willingness to pay of the low-valuation buyers, whereas the average price accepted by the myopic buyers is significantly higher (46.35 vs. 71.35, $p < 0.01$, Wilcoxon rank sum test). As a result, the average surplus of strategic buyers is significantly higher than that of myopic high-valuation buyers (379.92 vs. 213.65, $p < 0.01$, Wilcoxon rank sum test).

Finally, we repeat the logistic regressions discussed in the preceding section, focusing on the strategic behavior among buyers and sellers in the RNC treatment. The estimation results are presented in Columns (3) and (4) of Table 5. Examining buyer behavior, we find that the estimated probability of strategic behavior (i.e., rejecting price offers that would reveal their true willingness to pay) is significantly higher for high-valuation buyers who identify as either patient or very patient. Additionally, the probability of strategic behavior is 26.9 percentage points higher among high-valuation buyers who express an unwillingness to penalize unfair behavior, all else being equal.

Shifting the focus to sellers in the RNC treatment, we also find the aforementioned personality trait to be a significant positive predictor of strategic pricing behavior. Moreover, our estimation results indicate that sellers expressing a reluctance to take risks are approximately 10.3 percentage points more likely to set their rental prices strategically. In contrast, holding all other variables constant, sellers identifying as either impatient or very impatient are, on average, 15.6 percentage points less likely to strategically update their beliefs regarding the buyer's type. Finally, upon comparing the regression results documented in Columns (2) and (4) of Table 5, we discern a reversal in the sign of the response time coefficient. In other words, ceteris paribus, we find that taking time to set

prices is a significant negative predictor of strategic belief updating among sellers in the RNC treatment.

5 Discussion

In this section, we discuss how the results of our lab experiment contribute to the understanding of dynamic pricing theory.

5.1 The role of commitment

The experiment suggests that commitment has less bite than the theory predicts. While the ability to commit to future prices should allow sellers to fully extract the surplus from high-value buyers and price low-value buyers out of the market, we find that sellers are willing to leave around 30% of the surplus to buyers and sell to both high- and low-value buyers. A possible explanation is the way seller commitment is implemented: (i) sellers must fix the entire price path at the outset; (ii) buyers are informed that the seller has irrevocably fixed the price path, but prices are revealed period-by-period. While this approach ensures uniformity in implementing commitment for all buyers, it may reduce the salience of commitment (Bordalo et al., 2013) from the buyer's perspective, thereby diminishing its effect on trade.

The analysis of individual pricing patterns under commitment suggests an alternative, more substantive explanation. Instead of fully extracting surplus from high-value buyers and pricing low-value buyers out of the market, many sellers commit to price changes or even oscillations between the willingness-to-pay thresholds of high- and low-valuation buyers. This behavior likely reflects an effort to secure at least one sale before the good becomes obsolete at the end of the relationship. Such pricing behavior is consistent with an "inverse" endowment effect (Kahneman et al., 1990), driven by the looming threat of obsolescence. This induces sellers to undervalue their good and at times offer prices below the objective market value before it becomes obsolete.

Fanning and Kloosterman (2022) emphasize fairness concerns as an important factor in explaining the rent-sharing behavior between sellers and buyers. While we agree that fairness concerns likely play a significant role in explaining the substantial rents offered to buyers, they arguably cannot explain why sellers commit to changing or oscillating prices.

5.2 Selling vs. renting

Previous empirical work has primarily focused on the canonical durable goods setting, where the good is sold without seller commitment. Interestingly, we find that only about a quarter of the expected equilibrium surplus is realized in this scenario. Even with seller commitment, only about a third of the expected surplus is captured when the good is sold. In contrast, we find that up to 99% of the expected equilibrium surplus is realized when the good is rented.

These findings suggest that dynamic pricing theory better explains behavior under renting than under selling. A possible explanation is that participants find the dynamics under renting easier to understand than those under selling. However, this explanation seems at odds with the observation that the pricing patterns under renting with commitment often involve frequent changes and even oscillating price paths. Moreover, in the absence of commitment, a notable number of sellers and buyers exhibit strategic behavior that diverges from theoretical predictions.

5.3 Strategic behavior

Dynamic pricing theory presumes that, in the absence of commitment, both sellers and buyers are forward-looking and strategic. In the context of selling, a seller is considered strategic if she gradually lowers the price over time to approach the low-value buyer's maximum willingness to pay. Meanwhile, a high-valuation buyer is strategic if she pretends to be a low-valuation buyer, delaying her purchase to benefit from future price reductions. We find that sellers behave strategically in 55% of the sale relationships without commitment, while high-valuation buyers are strategic in 72% of these relationships.

Strategic sellers tend to sell earlier and earn higher present discounted profit, while strategic buyers achieve higher present discounted payoff without significantly delaying their purchases.

In renting, by contrast, a seller is strategic if she raises the price after a buyer purchases at a price above the low-valuation buyer's willingness to pay (ratcheting). A high-valuation buyer is strategic if she imitates a low-valuation buyer and delays trade to benefit from lower future prices. Our results show that sellers are strategic in 90% of renting relationships without commitment, whereas high-valuation buyers are strategic in only 39% of these cases. Interestingly, strategic sellers earn less than those who occasionally offer lower prices after buyer acceptance, while strategic buyers earn a higher payoff.

Overall, our analysis shows that the majority of sellers and high-valuation buyers act strategically under selling. However, under renting, strategic behavior is primarily observed among sellers, suggesting that ratcheting is a critical feature of dynamic pricing in rental settings, whereas strategic delays by buyers play a less significant role.

6 Conclusion

This paper presents experimental evidence on dynamic pricing in bilateral relationships. We find that the canonical theoretical analysis by Hart and Tirole (1988) accurately predicts the *average* prices set by sellers across more than 1,400 relationships over time. However, it falls short of capturing the complexity and diversity of *individual* price trajectories within these relationships. Our analysis suggests that commitment has less bite than theory predicts, with sellers often transferring around 30 percent of the surplus to buyers and frequently committing to changing or oscillating prices. A possible explanation is the sellers' desire to complete the trade before the good becomes obsolete at the end of the relationship—an effect resembling an inverse endowment effect. Another important finding is that the theory better explains behavior under renting than under selling, possibly due to the simpler dynamics in renting. Lastly, we observe that in the

absence of commitment, strategic behavior is prevalent among sellers but less so among buyers.

Our analysis suggests several avenues for future research. In particular, it would be interesting to further investigate the strategic behavior of buyers and sellers using real-world field data, which could provide deeper insights into the impact of individual consumer tracking on dynamic pricing strategies. Future work could also analyze the conditions under which the tracking of individual consumers and the ensuing discriminatory pricing schedules lead to a consumer backlash. After all, understanding the social dimensions of dynamic pricing practices can shed light on the sustainability and acceptance of such pricing behavior.

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Appendix

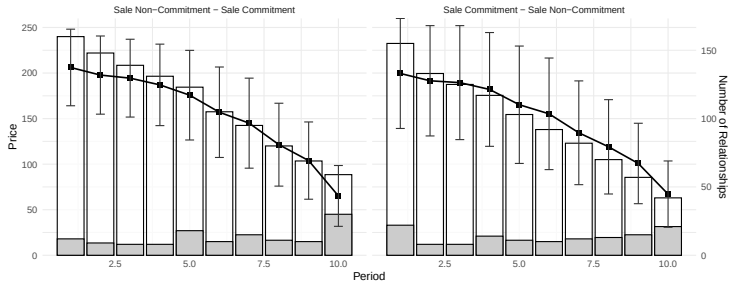
A.1 Tables and figures

Table A1: Descriptive statistics of participants

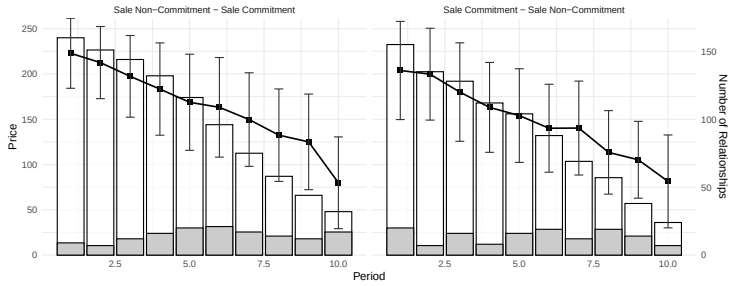
Variable	Value	Relative frequency (%)
Gender	Female	41.1
	Male	58.5
	Additional category	0.4
Study program	Assessment program	18.8
	Bachelor program	41.5
	Master program	36.5
	PhD program	3.2
Patience	Very patient	3.2
	Patient	21.6
	More or less patient	32.6
	Undecided	6.0
	More or less impatient	22.0
	Impatient	11.4
	Very impatient	3.2
Risk attitude	Very willing to take risks	1.4
	Willing to take risks	28.7
	More or less willing to take risks	34.1
	Undecided	6.0
	More or less not willing to take risks	22.4
	Not willing to take risks	6.7
	Not at all willing to take risks	0.7
Punishment	Very willing to do so	4.6
	Willing to do so	20.2
	More or less willing to do so	28.4
	Undecided	12.1
	More or less unwilling to do so	17.0
	Not willing to do so	14.5
	Not at all willing to do so	3.2

Notes: The table reports the relative frequencies of the variables included in the survey. Participants were asked to complete the survey before commencing the experiment. Following Vischer et al. (2013) and Falk et al. (2023), the original questions concerning subjective preferences were: (i) Are you generally an impatient person or someone who shows great patience?, (ii) Are you generally willing to take risks or do you try to avoid risks?, and (iii) How willing are you to punish someone who treats you unfairly, even if there may be costs for you? A total of 282 participants took part in the experiment.

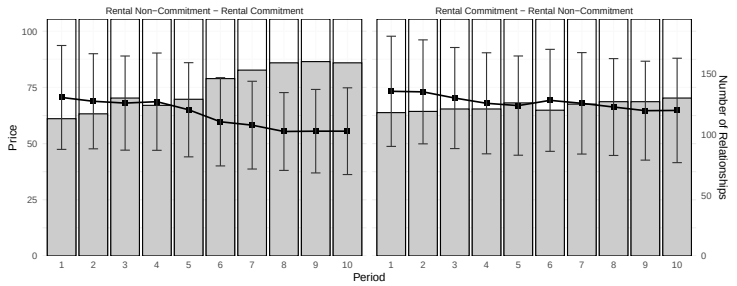
Figure A1: Order effects



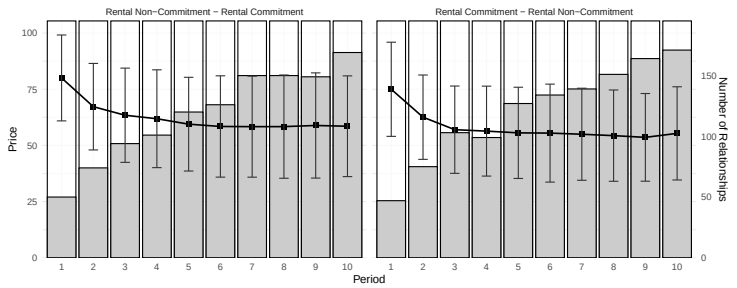
(a) Price paths in the SC treatment



(b) Price paths in the SNC treatment



(c) Price paths in the RC treatment



(d) Price paths in the RNC treatment

Notes: The figure presents the mean prices offered in the (a) SC, (b) SNC, (c) RC, and (d) RNC treatments (scale on left axis). The error bars indicate the standard deviation of the price offers. The white bars depict the total number of ongoing bilateral relationships, while the gray bars show the number of bilateral relationships where the buyer decides to buy/rent the good at the price effective in the respective period (scale on right axis). On the right-hand side, the graphs depict price offers from participants who initially engaged in the treatment with commitment, while on the left-hand side, the graphs showcase price offers from participants who first took part in the treatment condition without commitment.

Table A2: Average outcomes in the four treatments

	Seller Payoff		Buyer Payoff		Efficiency
	High	Low	High	Low	
SC	41.38	11.44	23.87	2.19	0.30
	(4.19)	(2.91)	(2.86)	(1.01)	(0.03)
SNC	35.09	16.25	29.53	2.24	0.25
	(3.66)	(3.65)	(3.25)	(0.67)	(0.02)
RC	500.13	191.32	321.50	19.37	0.99
	(13.68)	(12.50)	(10.76)	(3.28)	(0.03)
RNC	452.11	190.68	278.95	40.89	0.66
	(14.56)	(8.72)	(9.86)	(3.96)	(0.02)

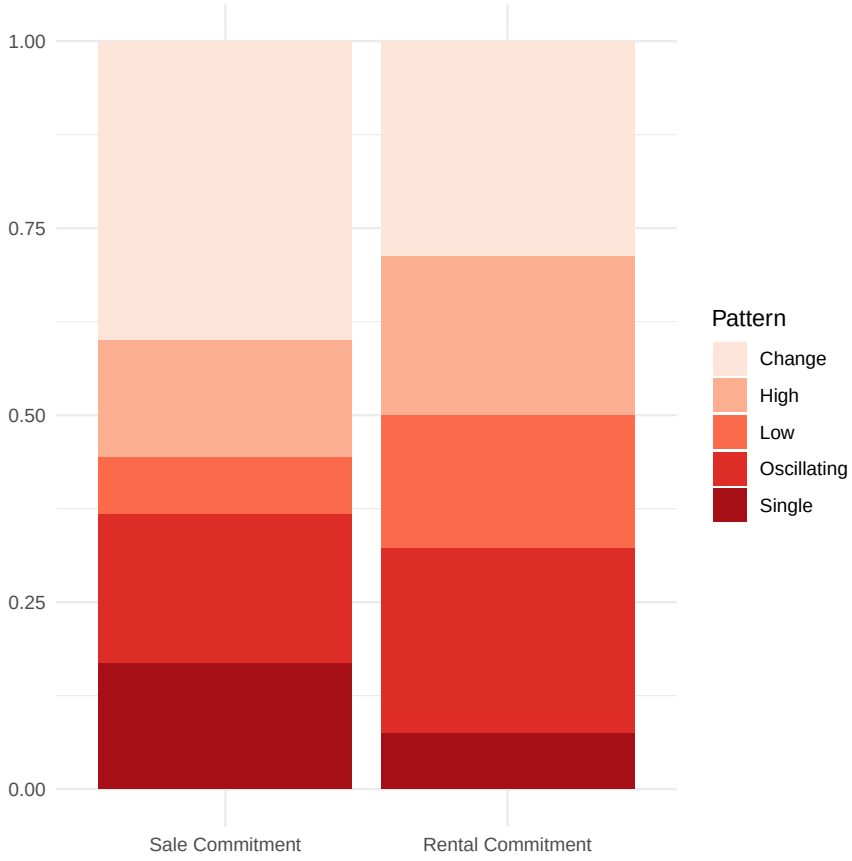
Notes: The table displays the average payoffs for the four treatments based on the buyer's maximum willingness to pay. The last column documents the mean efficiency of the corresponding treatment condition. In the sale treatments, the payoffs indicated represent present discounted payoffs, whereas in the rental treatments, they reflect overall market payoffs. Standard errors are denoted within brackets.

Table A3: Descriptive statistics of self-assessment by treatment

Variable	Value	Relative frequency (%)	
		Sale	Rental
Patience	Patient	25.0	24.7
	Neither patient nor impatient	61.6	60.0
	Impatient	13.4	15.3
Risk attitude	Willing to take risks	33.0	28.2
	Neither willing nor unwilling	57.2	65.9
	Not willing to take risks	9.8	5.9
Punishment	Willing to do so	23.2	25.9
	Neither willing nor unwilling	60.7	55.3
	Not willing to do so	16.1	18.8

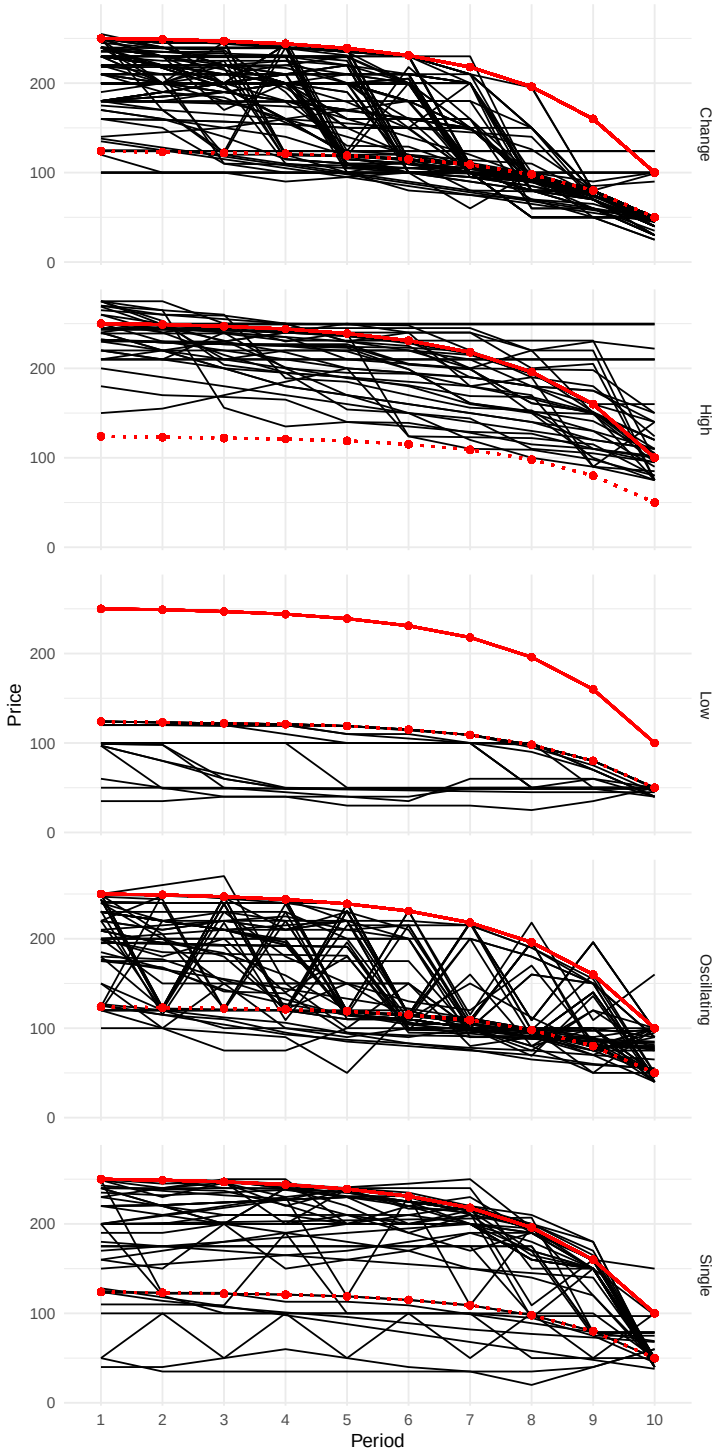
Notes: The table reports the relative frequencies of the three explanatory variables regarding subjective preferences, separately for the sale and rental treatments. Participants are classified as "Patient" if they self-identify as very patient or patient. Conversely, they are categorized as "Impatient" if they identify as very impatient or impatient. Analogously, participants are identified as "Willing to take risks" if they consider themselves very willing or willing to take risks, while those labeled as "Not willing to take risks" consider themselves very unwilling or unwilling to take risks. Lastly, participants are classified as "Willing to do so" in terms of punishment if they express being very willing or willing to punish someone who treats them unfairly, even at potential personal costs. In contrast, they are classified as "Not willing to do so" if they express being not at all willing or not willing to do so. A total of 126 subjects took part in the sale treatments, while a total of 156 participants took part in the rental treatments.

Figure A2: Relative frequencies of the pricing patterns



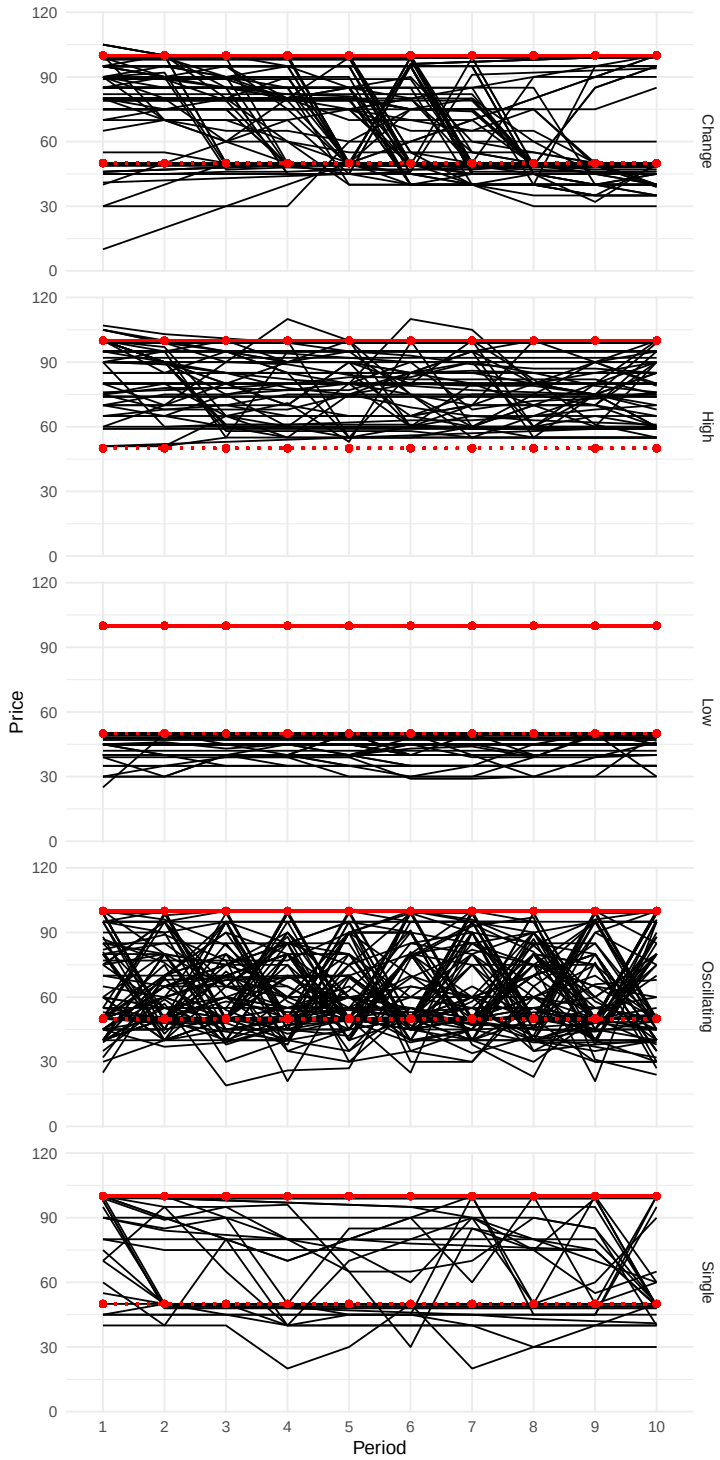
Notes: The figure shows the relative frequencies of the five pricing patterns in the (i) SC and (ii) RC treatments. In both treatment conditions with commitment, the *Change* pattern is the most prevalent pricing pattern of the sellers. Furthermore, we observe that *Oscillating* is the second most common pricing pattern in both the SC and RC treatments.

Figure A3: Observed price paths in the SC treatment



Notes: The figure illustrates all individual price paths observed in our data set from the SC treatment, categorized by pricing patterns. Within each of the five graphs, the red solid line represents the anticipated price path, while the red dotted line indicates the maximum willingness to pay of a low-valuation buyer.

Figure A4: Observed price paths in the RC treatment



Notes: The figure presents all price paths from our RC treatment data set, categorized by pricing pattern. Within each of the five graphs, the red solid line represents the predicted price path, while the red dotted line corresponds to the maximum willingness to pay of a low-valuation buyer.

A.2 Derivations

A.2.1 Sale without commitment [SNC]: Hypothesis 2

First of all, Remark 3 in Proposition 2 of Hart and Tirole (1988) reads

$$\overline{b}[(1+\delta)(\overline{\mu}_2-\overline{\mu}_1)-\overline{\mu}_1(1-\overline{\mu}_2)]=\underline{b}\delta(\overline{\mu}_2-\overline{\mu}_1). \tag{A.1}$$

For the parameter values given in Table 2 (i.e., $\overline{\mu}_1=\underline{b}/\overline{b}=0.5$ and $\delta=0.6$), we have

$$100[(1+0.6)(\overline{\mu}_2-0.5)-0.5(1-\overline{\mu}_2)]=50*0.6(\overline{\mu}_2-0.5).$$

Thus, solving for $\overline{\mu}_2$ yields

$$\overline{\mu}_2\approx 0.64.$$

Following Remark 1 in Proposition 2 of Hart and Tirole (1988), we find that

$$0.6=\mu_1\in(\overline{\mu}_1,\overline{\mu}_2), \tag{A.2}$$

which implies that bargaining should end with probability one in or before period $t=2$. Hence, according to theory, the seller sets a price p_2 equal to the maximum willingness to pay of a low-valuation buyer. Consequently, the present discounted utility of a low-valuation buyer is $U(\underline{b})=0$, whereas the present discounted utility of a high-valuation buyer is

$$U(\overline{b})=(100-50)(0.6+0.6^2+...+0.6^9)\approx 74.$$

Inserting into Equation 1 and solving for p_1 then yields

$$p_1\approx 248-74=174.$$

A.3 Instructions

A.3.1 Sale with commitment [SC]

A.3.1.1 Seller

This is an experiment in economic decision making. For your participation in this experiment you will receive a minimum amount of CHF 20. The instructions are simple and if you follow them carefully you will earn an extra amount that will be added to the minimum amount. All payments will be made in cash at the end of this experiment.

We are going to set up a series of markets that will last for ten periods each. In each of these markets, *one* seller interacts with *one* buyer, and you will take the role of a ***seller*** throughout the experiment. You will be randomly matched with a buyer in each market. The buyer and the seller remain anonymous to each other at all times. Once a market is closed, another market will open up in which you will be matched with another anonymous buyer. The experiment ends after you have participated in 10 markets.

These 10 markets are divided into two sets of 5 markets each. After the first 5 markets have been played, the details of the decisions you must make will change and the remaining 5 markets will work differently from the first 5 markets. The following instructions will explain how the markets work for one of these two sets of 5 markets each. If you have not played 5 markets previously, then the following instructions will describe the first 5 markets. After they have been played, you will receive a new set of instructions for the remaining 5 markets. If you have already played 5 markets, then the following instructions will specify the last 5 markets.

We now describe the working of the 5 markets, your role and the decisions you must make, and the payment you will obtain.

At the beginning of each market, you are in possession of a virtual good that you can sell to the buyer once within ten periods at no cost. While the virtual good has no value to you, the value of the good to buyers is either 50 points or 100 points. 60 percent of all buyers assign the high value of 100 points to the good. The remaining 40 percent of all buyers assign the low value of 50 points.

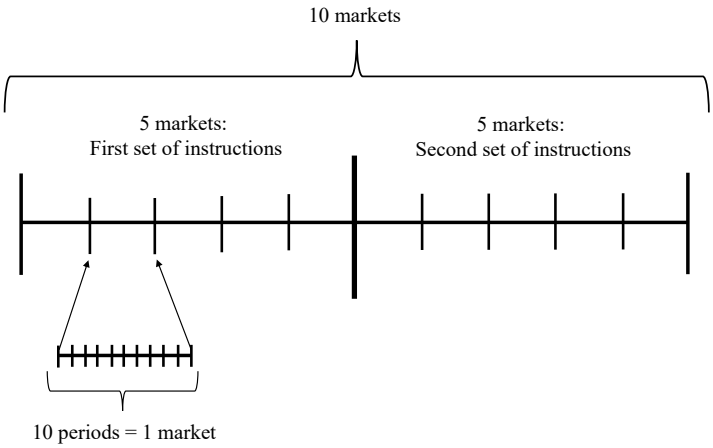


Figure A5: General structure of the experiment

When entering a market, you do not know whether you are matched with a high-value or a low-value buyer. But note that both the high-value and the low-value buyer have an incentive to purchase the good earlier rather than later. When a buyer purchases the good, he/she obtains his/her value of the good in the purchase period and every subsequent period until the market ends (without having to purchase again). In addition, the value a buyer receives decreases by 40% from period to period, so that a buyer receives his/her full value only in the purchase period and reduced values in the following periods.

The two tables below show how the high-value buyer's values change depending on when he/she buys. The first table shows the values from the perspective of the first period, the second table shows the values from the perspective of the second period.

	Value delivered in period				
Purchase period	1	2	...	10	Total value
1	100	0.6×100	...	$0.6^9 \times 100$	$100 + 0.6 \times 100 + ... + 0.6^9 \times 100$
2		0.6×100	...	$0.6^9 \times 100$	$0.6 \times 100 + ... + 0.6^9 \times 100$
...				...	...
10				$0.6^9 \times 100$	$0.6^9 \times 100$

Table A4: High-value buyer's total values viewed from period 1 (Example)

From the perspective of period 1, in Table A4, if the buyer chooses to purchase in the first period, the value delivered is 100 in the first period, 0.6×100 in the second, and so on, until $0.6^9 \times 100$ in the final period. As a result, the total value delivered is $100 + 0.6 \times 100 + ... + 0.6^9 \times 100$. Instead, if the buyer chooses to wait and buy in the second period, from the perspective of period 1 the value delivered is 0.6×100 in the second period, $0.6^2 \times 100$ in the third, and so on, until $0.6^9 \times 100$ in the final period. So, the total value delivered is $0.6 \times 100 + 0.6^2 \times 100 + ... + 0.6^9 \times 100$.

	Value delivered in period				
Purchase period	2	3	...	10	Total value
2	100	0.6×100	...	$0.6^8 \times 100$	$100 + 0.6 \times 100 + ... + 0.6^8 \times 100$
3		0.6×100	...	$0.6^8 \times 100$	$0.6 \times 100 + ... + 0.6^8 \times 100$
...					...
10				$0.6^8 \times 100$	$0.6^8 \times 100$

Table A5: High-value buyer's total values viewed from period 2 (Example)

From the perspective of period 2, in Table A5, if the buyer chooses to purchase in the second period, the value delivered in that period is 100, 0.6×100 in the third, and so on, until $0.6^8 \times 100$ in the final period, and thus the total value delivered is $100 + 0.6 \times 100 + ... + 0.6^8 \times 100$. The first period is not shown because, from the perspective of period 2, buying in the first period is no longer possible as the first period has already passed.

The buyer may purchase the good in any one of the 10 periods that a market lasts. When the good is sold, the price is paid by the buyer in that period and the market is closed. If the good is not sold within the 10 periods that the market is open, the good perishes and no longer provides any value to buyers. You can find the total value that high-value and low-value buyers would receive if they were to buy in the corresponding period of the market in Table A6.

You must choose the prices at which to sell your good while the market is open. **At the beginning of each market, you will be requested to set the prices for all 10 periods.**

Every price must at least be 0. You make this choice by setting the prices in an answer field of the following form:

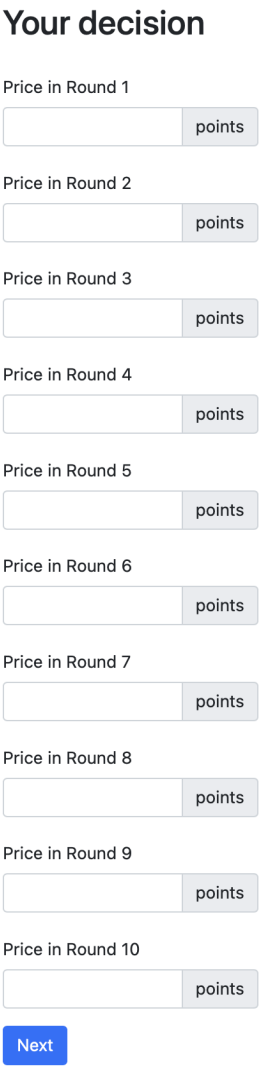


Figure A6: Answer field for setting the prices for all 10 periods

The prices you insert at the beginning of a market cannot be changed in later periods of the market. In each period of the market the buyer is shown your predetermined price for the corresponding period. If the buyer refuses to purchase the good at the price effective in the current period, the market moves on to the next period. Then again, the buyer will be shown the subsequent price as defined by you at the

beginning of the market and choose whether to buy or not. This is repeated until the good is sold or all 10 periods have elapsed. Table A6 shows you the total value that buyers of type 100 points and 50 points would receive when buying in a given period. For example, in period 1, a buyer of type 100 points would obtain a total value of 250 points if he/she would buy in that period.

You will receive a minimum amount of CHF 20 in any case. In addition, the computer will randomly select one of the 10 markets you participated in. This market will be relevant for determining the additional amount you receive on top of your participation fee. If the selected market is one of the 5 markets described in these instructions, then your additional payment will be determined as follows. If you sold your good while the selected market was open, you will receive the price paid by the buyer at an exchange rate of 20 : 1 on top of the CHF 20. For example, if you sold your good at a price of 150 points in the selected market, you will earn an additional CHF 7.50. If you did not sell your good in the selected market, you will simply receive the minimum amount of CHF 20.

	Total value	
Purchase period	With value 100	With value 50
1	250	124
2	249	123
3	247	122
4	244	121
5	239	119
6	231	115
7	218	109
8	196	98
9	160	80
10	100	50

Table A6: Buyer's total values

A.3.1.2 Buyer

This is an experiment in economic decision making. For your participation in this experiment you will receive a minimum amount of CHF 20. The instructions are simple and if you follow them carefully you will earn an extra amount that will be added to the minimum amount. All payments will be made in cash at the end of this experiment.

We are going to set up a series of markets that will last for ten periods each. In each of these markets, *one* seller interacts with *one* buyer, and you will take the role of a ***buyer*** throughout the experiment. You will be randomly matched with a seller in each market. The buyer and the seller remain anonymous to each other at all times. Once a market is closed, another market will open up in which you will be matched with another anonymous seller. The experiment ends after you have participated in 10 markets.

These 10 markets are divided into two sets of 5 markets each. After the first 5 markets have been played, the details of the decisions you must make will change and the remaining 5 markets will work differently from the first 5 markets. The following instructions will explain how the markets work for one of these two sets of 5 markets each. If you have not played 5 markets previously, then the following instructions will describe the first 5 markets. After they have been played, you will receive a new set of instructions for the remaining 5 markets. If you have already played 5 markets, then the following instructions will specify the last 5 markets.

We now describe the working of the 5 markets, your role and the decisions you must make, and the payment you will obtain.

The seller you are matched with in a market is in possession of a virtual good that he/she can sell at no cost and that you can buy <u>once</u> within ten periods. At the beginning of each market, you are informed about the value you assign to this virtual good. This value remains the same for all periods of the corresponding market being open. The value can be either 100 points or 50 points. It is commonly known that 60 percent of all buyers assign the high value of 100 points to the good. The remaining 40 percent of all

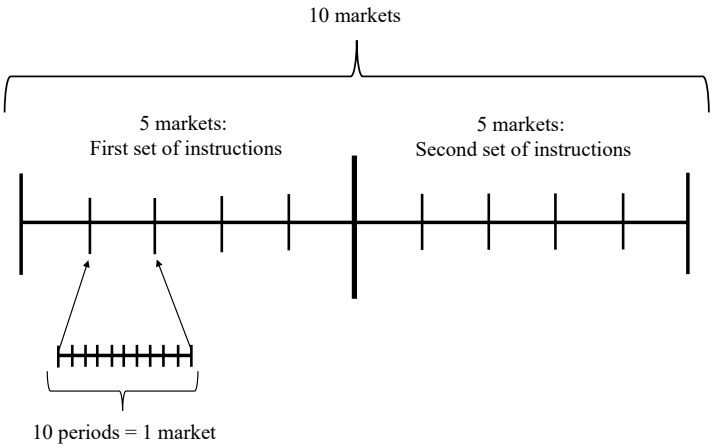


Figure A7: General structure of the experiment

buyers assign the low value of 50 points. **However, when entering a market, the seller does not know whether you are a high-value or a low-value buyer.**

When you purchase the good, you will obtain your value of the good in both the current period and every subsequent period until the market ends (without having to purchase again). You therefore have an incentive to purchase the good earlier rather than later as the total value you obtain will be greater. Note, though, that the value you receive in each period decreases by 40% from period to period, so that you receive your full value (either 100 points or 50 points) only in the purchase period, and reduced values in the following periods until the market ends.

The two tables below show an example of how your values change depending on when you make the purchase. The first table shows the values from the perspective of the first period, the second table shows the values from the perspective of the second period. We will assume in this example that you value the good at 100 points.

From the perspective of period 1, in Table A7, if you choose to purchase in the first period, the value delivered is 100 in the first period, 0.6×100 in the second, and so on, until $0.6^9 \times 100$ in the final period. As a result, the total value delivered is $100 + 0.6 \times 100 + ... + 0.6^9 \times 100$. Instead, if you choose to wait and to buy in the second

	Value delivered in period				
Purchase period	1	2	...	10	Total value
1	100	0.6×100	...	$0.6^9 \times 100$	$100 + 0.6 \times 100 + ... + 0.6^9 \times 100$
2		0.6×100	...	$0.6^9 \times 100$	$0.6 \times 100 + ... + 0.6^9 \times 100$
...				...	...
10				$0.6^9 \times 100$	$0.6^9 \times 100$

Table A7: High-value buyer's total values viewed from period 1 (Example)

period, from the perspective of period 1 the value is 0.6×100 in the second period, $0.6^2 \times 100$ in the third, and so on, until $0.6^9 \times 100$ in the final period. So, the total value delivered is $0.6 \times 100 + 0.6^2 \times 100 + ... + 0.6^9 \times 100$.

	Value delivered in period				
Purchase period	2	3	...	10	Total value
2	100	0.6×100	...	$0.6^8 \times 100$	$100 + 0.6 \times 100 + ... + 0.6^8 \times 100$
3		0.6×100	...	$0.6^8 \times 100$	$0.6 \times 100 + ... + 0.6^8 \times 100$
...					...
10				$0.6^8 \times 100$	$0.6^8 \times 100$

Table A8: High-value buyer's total values viewed from period 2 (Example)

From the perspective of period 2, in Table A8, if you choose to purchase in the second period, the value delivered in that period is 100, 0.6×100 in the third, and so on, until $0.6^8 \times 100$ in the final period, and thus the total value delivered is $100 + 0.6 \times 100 + ... + 0.6^8 \times 100$. The first period is not shown because, from the perspective of period 2, buying in the first is no longer possible as the first period has already passed.

Thus, depending on the value you assign to the good, the total value that you would receive if you were to buy the good in the corresponding period of the market evolves over all 10 periods as depicted in Table A9.

You may purchase the good in any one of the 10 periods that a market lasts. When you decide to buy the good, you pay the price demanded by the seller for the corresponding period and the market is closed. If you decide not to buy the good within the 10 periods that the market is open, the good perishes and no longer provides any value to you. You

can find the total value that you would receive if you were to buy in the corresponding period of the market in Table A9.

The seller must choose the prices at which to sell his/her good while the market is open. **At the beginning of each market, the seller will be requested to set the prices for all 10 periods without being able to change them in later periods of the market. As a buyer you are shown the predetermined price corresponding to the period you are currently in.** You can then decide whether to buy the good and pay the price effective in the corresponding period or reject the offer and move on to the subsequent period. You make this choice by selecting your reaction when shown the following:

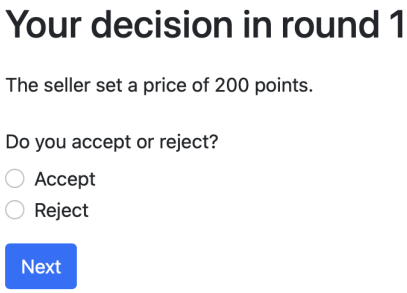


Figure A8: Accepting or rejecting the price set by the seller

If you buy the good at the price effective in the current period, the market is closed. **If you refuse to purchase the good at the price effective in the current period, the market moves on to the next period. You will then be shown the subsequent price as determined by the seller at the beginning of the market and you may again choose whether to buy the good or not.** This is repeated until the good is bought or all 10 periods have elapsed. Note that if you buy the good at a price greater than your total value in the given period, you will make a loss. However, if you buy the good at a price lower than your total value in the given period, you will make a gain in this market.

You will receive a minimum amount of CHF 20 in any case. In addition, the computer will randomly select one of the 10 markets you participated in. This market will be relevant for determining the additional amount you receive on top of your participation fee. If the selected market is one of the 5 markets described in these instructions, then

your additional payment will be determined as follows. If you bought the good while the selected market was open, you will receive the difference between the total value of the purchase and the price paid at an exchange rate of 20 : 1 on top of the CHF 20. For example, if you were a buyer who values the good at 100 points and bought the good at a price of 150 in period 3 of the selected market (when your total value was 247), you will earn an additional CHF 4.85. If you did not buy the good in the corresponding market, you will simply receive the minimum amount of CHF 20.

	Total value	
Purchase period	With value 100	With value 50
1	250	124
2	249	123
3	247	122
4	244	121
5	239	119
6	231	115
7	218	109
8	196	98
9	160	80
10	100	50

Table A9: Buyer's total values

A.3.2 Sale without commitment [SNC]

A.3.2.1 Seller

This is an experiment in economic decision making. For your participation in this experiment you will receive a minimum amount of CHF 20. The instructions are simple and if you follow them carefully you will earn an extra amount that will be added to the minimum amount. All payments will be made in cash at the end of this experiment.

We are going to set up a series of markets that will last for ten periods each. In each of these markets, *one* seller interacts with *one* buyer, and you will take the role of a ***seller*** throughout the experiment. You will be randomly matched with a buyer in each

market. The buyer and the seller remain anonymous to each other at all times. Once a market is closed, another market will open up in which you will be matched with another anonymous buyer. The experiment ends after you have participated in 10 markets.

These 10 markets are divided into two sets of 5 markets each. After the first 5 markets have been played, the details of the decisions you must make will change and the remaining 5 markets will work differently from the first 5 markets. The following instructions will explain how the markets work for one of these two sets of 5 markets each. If you have not played 5 markets previously, then the following instructions will describe the first 5 markets. After they have been played, you will receive a new set of instructions for the remaining 5 markets. If you have already played 5 markets, then the following instructions will specify the last 5 markets.

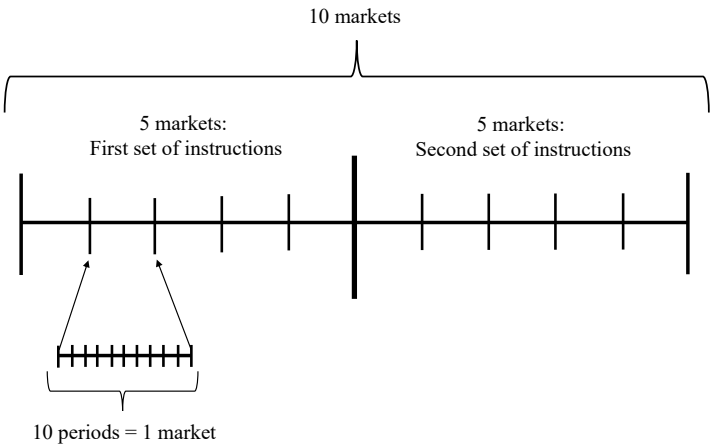


Figure A9: General structure of the experiment

We now describe the working of the 5 markets, your role and the decisions you must make, and the payment you will obtain.

At the beginning of each market, you are in possession of a virtual good that you can sell to the buyer <u>once</u> within ten periods at no cost. While the virtual good has no value to you, the value of the good to the buyer is either 50 points or 100 points.

60 percent of all buyers assign the high value of 100 points to the good. The remaining 40 percent of all buyers assign the low value of 50 points.

When entering a market, you do not know whether you are matched with a high-value or a low-value buyer. But note that both the high-value and the low-value buyer have an incentive to purchase the good earlier rather than later. When a buyer purchases the good, he/she obtains his/her value of the good in the purchase period and every subsequent period until the market ends (without having to purchase again). In addition, the value a buyer receives decreases by 40% from period to period, so that a buyer receives his/her full value only in the purchase period and reduced values in the following periods.

The two tables below show how the high-value buyer's values change depending on when he/she buys. The first table shows the values from the perspective of the first period, the second table shows the values from the perspective of the second period.

	Value delivered in period				
Purchase period	1	2	...	10	Total value
1	100	0.6×100	...	$0.6^9 \times 100$	$100 + 0.6 \times 100 + ... + 0.6^9 \times 100$
2		0.6×100	...	$0.6^9 \times 100$	$0.6 \times 100 + ... + 0.6^9 \times 100$
...				...	...
10				$0.6^9 \times 100$	$0.6^9 \times 100$

Table A10: High-value buyer's total values viewed from period 1 (Example)

From the perspective of period 1, in Table A10, if the buyer chooses to purchase in the first period, the value delivered is 100 in the first period, 0.6×100 in the second, and so on, until $0.6^9 \times 100$ in the final period. As a result, the total value delivered is $100 + 0.6 \times 100 + ... + 0.6^9 \times 100$. Instead, if the buyer chooses to wait and buy in the second period, from the perspective of period 1 the value delivered is 0.6×100 in the second period, $0.6^2 \times 100$ in the third, and so on, until $0.6^9 \times 100$ in the final period. So, the total value delivered is $0.6 \times 100 + 0.6^2 \times 100 + ... + 0.6^9 \times 100$.

From the perspective of period 2, in Table A11, if the buyer chooses to purchase in the second period, the value delivered in that period is 100, 0.6×100 in the third, and so on, until $0.6^8 \times 100$ in the final period, and thus the total value delivered is

	Value delivered in period				
Purchase period	2	3	...	10	Total value
2	100	0.6×100	...	$0.6^8 \times 100$	$100 + 0.6 \times 100 + ... + 0.6^8 \times 100$
3		0.6×100	...	$0.6^8 \times 100$	$0.6 \times 100 + ... + 0.6^8 \times 100$
...					...
10				$0.6^8 \times 100$	$0.6^8 \times 100$

Table A11: High-value buyer's total values viewed from period 2 (Example)

$100 + 0.6 \times 100 + ... + 0.6^8 \times 100$. The first period is not shown because, from the perspective of period 2, buying in the first period is no longer possible as the first period has already passed.

The buyer may purchase the good in any one of the 10 periods that a market lasts. When the good is sold, the price is paid by the buyer in that period and the market is closed. If the good is not sold within the 10 periods that the market is open, the good perishes and no longer provides any value to buyers. You can find the total value that high-value and low-value buyers would receive if they were to buy in the corresponding period of the market in Table A12.

You must choose the prices at which to sell your good while the market is open. **In each of the 10 periods, you will be requested to set the price for that period only.** Every price must at least be 0. You make this choice by setting the prices in an answer field as depicted in Figure A10.

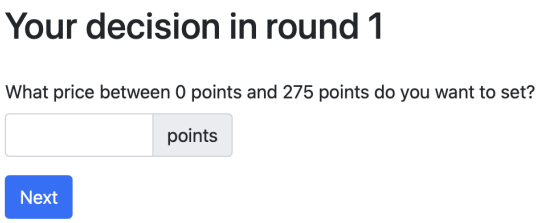


Figure A10: Answer field for setting the price

In each period of the market you will be able to input a price for that period. If the buyer purchases the good at the price effective in the current period, the market is

closed. If the buyer refuses to purchase the good at the price effective in the current period, the market moves to the next period. You will then again be requested to set a price, before the buyer again chooses whether to buy or not. This is repeated until the good is sold or all 10 periods have elapsed. Table A12 shows you the total value that buyers with a value of 100 points and 50 points for the good would receive when buying in a given period. For example, in period 1, a buyer who values the good at 100 points would obtain a total value of 250 points if he/she would buy in that period.

You will receive a minimum amount of CHF 20 in any case. In addition, the computer will randomly select one of the markets you participated in. This market will be relevant for determining the additional amount you receive on top of your participation fee. If the selected market is one of the 5 markets described in these instructions, then your additional payment will be determined as follows. If you sold your good while the selected market was open, you will receive the price paid by the buyer at an exchange rate of 20 : 1 on top of the CHF 20. For example, if you sold your good at a price of 150 points in the selected market, you will earn an additional CHF 7.50. If you did not sell your good in the selected market, you will simply receive the minimum amount of CHF 20.

	Total value	
Purchase period	With value 100	With value 50
1	250	124
2	249	123
3	247	122
4	244	121
5	239	119
6	231	115
7	218	109
8	196	98
9	160	80
10	100	50

Table A12: Buyer's total values

A.3.2.2 Buyer

This is an experiment in economic decision making. For your participation in this experiment you will receive a minimum amount of CHF 20. The instructions are simple and if you follow them carefully you will earn an extra amount that will be added to the minimum amount. All payments will be made in cash at the end of this experiment.

We are going to set up a series of markets that will last for ten periods each. In each of these markets, *one* seller interacts with *one* buyer, and you will take the role of a ***buyer*** throughout the experiment. You will be randomly matched with a seller in each market. The buyer and the seller remain anonymous to each other at all times. Once a market is closed, another market will open up in which you will be matched with another anonymous seller. The experiment ends after you have participated in 10 markets.

These 10 markets are divided into two sets of 5 markets each. After the first 5 markets have been played, the details of the decisions you must make will change and the remaining 5 markets will work differently from the first 5 markets. The following instructions will explain how the markets work for one of these two sets of 5 markets each. If you have not played 5 markets previously, then the following instructions will describe the first 5 markets. After they have been played, you will receive a new set of instructions for the remaining 5 markets. If you have already played 5 markets, then the following instructions will specify the last 5 markets.

We now describe the working of the 5 markets, your role and the decisions you must make, and the payment you will obtain.

The seller you are matched with in a market is in possession of a virtual good that he/she can sell at no cost and that you can buy <u>once</u> within ten periods. At the beginning of each market, you are informed about the value you assign to this virtual good. This value remains the same for all periods of the corresponding market being open. The value can be either 100 points or 50 points. It is commonly known that 60 percent of all buyers assign the high value of 100 points to the good. The remaining 40 percent of all

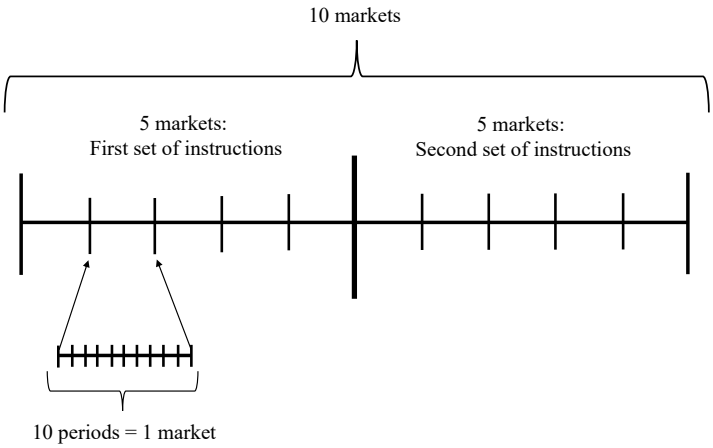


Figure A11: General structure of the experiment

buyers assign the low value of 50 points. **However, when entering a market, the seller does not know whether you are a high-value or a low-value buyer.**

When you purchase the good, you will obtain your value of the good in both the current period and every subsequent period until the market ends (without having to purchase again). You therefore have an incentive to purchase the good earlier rather than later as the total value you obtain will be greater. Note, though, that the value you receive in each period decreases by 40% from period to period, so that you receive your full value (either 100 points or 50 points) only in the purchase period, and reduced values in the following periods until the market ends.

The two tables below show an example of how your values change depending on when you make the purchase. The first table shows the values from the perspective of the first period, the second table shows the values from the perspective of the second period. We will assume in this example that you value the good at 100 points.

From the perspective of period 1, in Table A13, if you choose to purchase in the first period, the value delivered is 100 in the first period, 0.6×100 in the second, and so on, until $0.6^9 \times 100$ in the final period. As a result, the total value delivered is $100 + 0.6 \times 100 + ... + 0.6^9 \times 100$. Instead, if you choose to wait and to buy in the second

	Value delivered in period				
Purchase period	1	2	...	10	Total value
1	100	0.6×100	...	$0.6^9 \times 100$	$100 + 0.6 \times 100 + ... + 0.6^9 \times 100$
2		0.6×100	...	$0.6^9 \times 100$	$0.6 \times 100 + ... + 0.6^9 \times 100$
...				...	...
10				$0.6^9 \times 100$	$0.6^9 \times 100$

Table A13: High-value buyer's total values viewed from period 1 (Example)

period, from the perspective of period 1 the value is 0.6×100 in the second period, $0.6^2 \times 100$ in the third, and so on, until $0.6^9 \times 100$ in the final period. So, the total value delivered is $0.6 \times 100 + 0.6^2 \times 100 + ... + 0.6^9 \times 100$.

	Value delivered in period				
Purchase period	2	3	...	10	Total value
2	100	0.6×100	...	$0.6^8 \times 100$	$100 + 0.6 \times 100 + ... + 0.6^8 \times 100$
3		0.6×100	...	$0.6^8 \times 100$	$0.6 \times 100 + ... + 0.6^8 \times 100$
...					...
10				$0.6^8 \times 100$	$0.6^8 \times 100$

Table A14: High-value buyer's total values viewed from period 2 (Example)

From the perspective of period 2, in Table A14, if you choose to purchase in the second period, the value delivered in that period is 100, 0.6×100 in the third, and so on, until $0.6^8 \times 100$ in the final period, and thus the total value delivered is $100 + 0.6 \times 100 + ... + 0.6^8 \times 100$. The first period is not shown because, from the perspective of period 2, buying in the first is no longer possible as the first period has already passed.

Thus, depending on the value you assign to the good, the total value that you would receive if you were to buy the good in the corresponding period of the market evolves over all 10 periods as depicted in Table A15.

You may purchase the good in any one of the 10 periods that a market lasts. When you decide to buy the good, you pay the price demanded by the seller for the corresponding period and the market is closed. If you decide not to buy the good within the 10 periods that the market is open, the good perishes and no longer provides any value to you. You

can find the total value that you would receive if you were to buy in the corresponding period of the market in Table A15.

The seller will choose the prices at which to sell his/her good while the market is open. **In each of the 10 periods, the seller will be requested to set the price for that period.** This price will be shown to you. You must then decide whether to buy the good at this price or reject the offer and move on to the next period. You make this choice by selecting your reaction when shown the following:

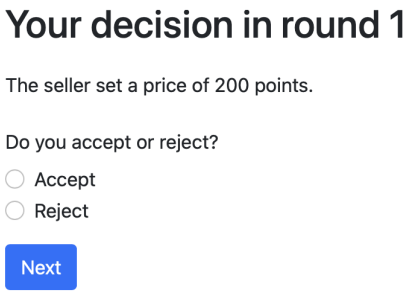


Figure A12: Accepting or rejecting the price set by the seller

If you buy the good at the price effective in the current period, the market is closed. If you refuse to purchase the good at the price effective in the current period, the market moves on to the next period. **The seller will then again be requested to set a price, before you again choose whether to buy or not.** This is repeated until the good is bought or all 10 periods have elapsed. Note that if you buy the good at a price greater than your total value in the given period, you will make a loss in this market. However, if you buy the good at a price lower than your total value in the given period, you will make a gain in this market.

You will receive a minimum amount of CHF 20 in any case. In addition, the computer will randomly select one of the 10 markets you participated in. This market will be relevant for determining the additional amount you receive on top of your participation fee. If the selected market is one of the 5 markets described in these instructions, then your additional payment will be determined as follows. If you bought the good while the selected market was open, you will receive the difference between the total value of

the purchase and the price paid at an exchange rate of 20 : 1 on top of the CHF 20. For example, if you were a buyer who values the good at 100 points and bought the good at a price of 150 in period 3 of the selected market (when your total value was 247), you will earn an additional CHF 4.85. If you did not buy the good in the corresponding market, you will simply receive the minimum amount of CHF 20.

	Total value	
Purchase period	With value 100	With value 50
1	250	124
2	249	123
3	247	122
4	244	121
5	239	119
6	231	115
7	218	109
8	196	98
9	160	80
10	100	50

Table A15: Buyer's total values

A.3.3 Rental with commitment [RC]

A.3.3.1 Seller

This is an experiment in economic decision making. For your participation in this experiment you will receive a minimum amount of CHF 20. The instructions are simple and if you follow them carefully you will earn an extra amount that will be added to the minimum amount. All payments will be made in cash at the end of this experiment.

We are going to set up a series of markets that will last for ten periods each. In each of these markets, *one* seller interacts with *one* buyer, and you will take the role of a ***seller*** throughout the experiment. You will be randomly matched with a buyer in each market. The buyer and the seller remain anonymous to each other at all times. Once a

market is closed, another market will open up in which you will be matched with another anonymous buyer. The experiment ends after you have participated in 10 markets.

These 10 markets are divided into two sets of 5 markets each. After the first 5 markets have been played, the details of the decisions you must make will change and the remaining 5 markets will work differently from the first 5 markets. The following instructions will explain how the markets work for one of these two sets of 5 markets each. If you have not played 5 markets previously, then the following instructions will describe the first 5 markets. After they have been played, you will receive a new set of instructions for the remaining 5 markets. If you have already played 5 markets, then the following instructions will specify the last 5 markets.

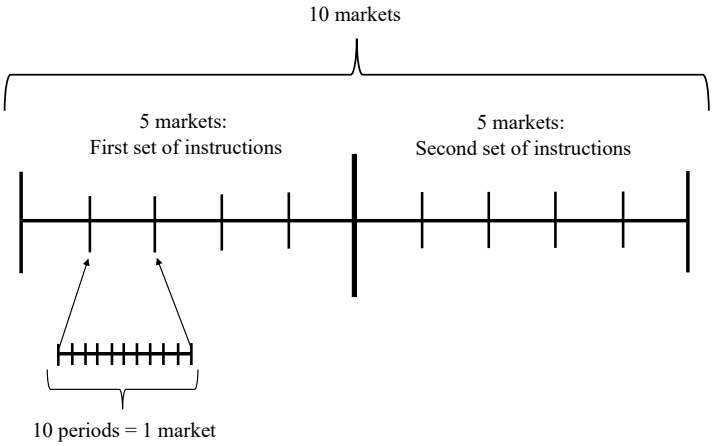


Figure A13: General structure of the experiment

We now describe the working of the 5 markets, your role and the decisions you must make, and the payment you will obtain.

Each market lasts for 10 periods. **At the beginning of each period, you are in possession of a virtual good that you can sell to the buyer for the corresponding period at no cost. You can thus sell the good up to 10 times.** While the virtual good has no value to you, the per-period value of the good to buyers is either 100 points or

50 points. 60 percent of all buyers assign the high value of 100 points to the good. The remaining 40 percent of all buyers assign the low value of 50 points.

When entering a market, you do not know whether you are matched with a high-value or a low-value buyer. Importantly, the per-period value that the buyer you are matched with assigns to your virtual good does not vary over the course of the corresponding market. When a buyer buys the good in a given period, he/she will obtain his/her value of the good in that period only. The buyer will thus decide in each period anew whether to buy the good or not until the market closes.

The buyer may decide to buy the good in any of the 10 periods independent of whether he/she has bought the good in a previous period or not. When the good is sold, the price is paid by the buyer and the market moves to the subsequent period. After all 10 periods for which the market is open have been played, the good becomes valueless to buyers.

You must choose the prices at which to sell your good while the market is open. **At the beginning of each market, you will be requested to set the prices for all 10 periods.** Every price must at least be 0. You make this choice by setting the prices in an answer field as shown in Figure A14.

The prices you insert at the beginning of a market cannot be readjusted in later periods of the market. In each period of the market the buyer is shown your predetermined price for the corresponding period and will decide whether to buy the good at the price effective in the current period or not. Once the buyer has made his/her decision, the market moves to the next period. Then again, the buyer will be shown the subsequent price as defined by you at the beginning of the market and choose whether to buy the good or not. This is repeated until all 10 periods have been played.

You will receive a minimum amount of CHF 20 in any case. In addition, the computer will select one of the 10 markets you participated in at random. This market will be relevant for determining the additional amount you receive on top of the participation fee. If the selected market is one of the 5 markets described in these instructions, then your

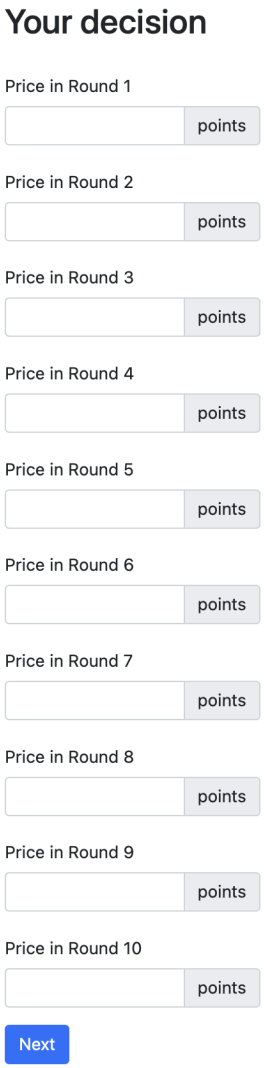


Figure A14: Answer field for setting the prices for all 10 periods

additional payment will be determined as follows. If you sold your good at least once during the 10 periods of the selected market being open, all the prices paid by the buyer in that market over all 10 periods will be summed up. You will then receive this sum at an exchange rate of 20 : 1 on top of the CHF 20. For example, if you sold your good four times in the selected market, once at a price equal to 95, twice at a price equal to 90 and once at a price equal to 75, you will earn an additional CHF 17.50. If you did not sell your

good at least once in the selected market, you will simply receive the minimum amount of CHF 20.

A.3.3.2 Buyer

This is an experiment in economic decision making. For your participation in this experiment you will receive a minimum amount of CHF 20. The instructions are simple and if you follow them carefully you will earn an extra amount that will be added to the minimum amount. All payments will be made in cash at the end of this experiment.

We are going to set up a series of markets that will last for ten periods each. In each of these markets, *one* seller interacts with *one* buyer, and you will take the role of a ***buyer*** throughout the experiment. You will be randomly matched with a seller in each market. The buyer and the seller remain anonymous to each other at all times. Once a market is closed, another market will open up in which you will be matched with another anonymous seller. The experiment ends after you have participated in 10 markets.

These 10 markets are divided into two sets of 5 markets each. After the first 5 markets have been played, the details of the decisions you must make will change and the remaining 5 markets will work differently from the first 5 markets. The following instructions will explain how the markets work for one of these two sets of 5 markets each. If you have not played 5 markets previously, then the following instructions will describe the first 5 markets. After they have been played, you will receive a new set of instructions for the remaining 5 markets. If you have already played 5 markets, then the following instructions will specify the last 5 markets.

We now describe the working of the 5 markets, your role and the decisions you must make, and the payment you will obtain.

Each market lasts for 10 periods. **In each period, the seller is in possession of a virtual good that he/she can sell to you for the corresponding period at no cost. You can thus buy the good up to <u>10 times</u>.** At the beginning of each market, you are informed about the per-period value you assign to a virtual good, being either 100 points or 50 points. This value remains the same for all periods of the corresponding market being

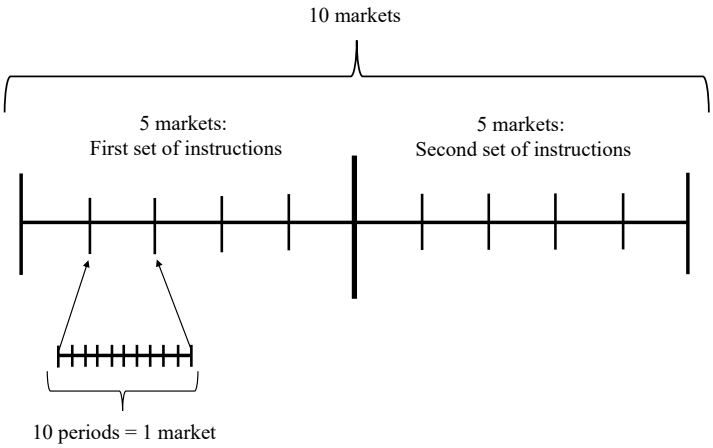


Figure A15: General structure of the experiment

open. It is commonly known that 60 percent of all buyers assign the high value of 100 points to the good. The remaining 40 percent of all buyers assign the low value of 50 points.

When entering a market, the seller does not know whether you are a high-value or a low-value buyer. When you buy the good in a given period, you will obtain your value of the good in that period only. You will thus decide in each period anew whether to buy the good or not until the market closes.

You may decide to buy the good in any of the 10 periods independent of whether you have bought the good in a previous period or not. When the good is sold, you pay the corresponding price set by the seller and the market moves to the subsequent period. After all 10 periods for which the market is open have been played, the good becomes valueless to you.

The seller must choose the prices at which to sell his/her good while the market is open. **At the beginning of each market, the seller will be requested to set the prices for all 10 periods without being able to readjust them in later periods of the market.** As a buyer you are shown the predetermined price corresponding to the period you are currently in. You may then decide whether to buy the good for the corresponding period

and pay the price effective in that period or to reject the offer. You make this choice by selecting your reaction when shown the following:

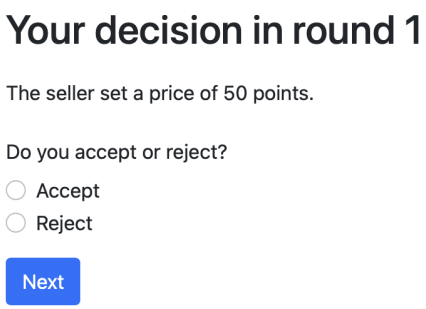


Figure A16: Accepting or rejecting the price set by the seller

In each period of the market you will decide whether to buy the good at the price effective in the current period or not. **Once you have made your decision, the market moves to the next period. You will then be shown the subsequent price as determined by the seller at the beginning of the market and may again choose whether to buy the good or not.** This is repeated until all 10 periods have been played. Note that if you buy the good at a price greater than your per-period value, you will make a loss. However, if you buy the good at a price lower than your per-period value, you will make a gain.

You will receive a minimum amount of CHF 20 in any case. In addition, the computer will select one of the 10 markets you participated in at random. This market will be relevant for determining the additional amount you receive on top of your participation fee. If the selected market is one of the 5 markets described in these instructions, then your additional payment will be determined as follows. If you bought the good at least once during the 10 periods of the selected market being open, the differences between the price paid and your value for the good will be summed up over all the periods of the selected market in which you chose to purchase. You will then receive this sum at an exchange rate of 20 : 1 on top of the CHF 20. For example, if you were a buyer that values the good at 100 points and bought the good twice at a price of 80 and twice at a price of 60 in the selected market, you will earn an additional CHF 6. If you did not buy the good at least once in the selected market, you will simply receive the minimum amount of CHF 20.

A.3.4 Rental without commitment [RNC]

A.3.4.1 Seller

This is an experiment in economic decision making. For your participation in this experiment you will receive a minimum amount of CHF 20. The instructions are simple and if you follow them carefully you will earn an extra amount that will be added to the minimum amount. All payments will be made in cash at the end of this experiment.

We are going to set up a series of markets that will last for ten periods each. In each of these markets, *one* seller interacts with *one* buyer, and you will take the role of a ***seller*** throughout the experiment. You will be randomly matched with a buyer in each market. The buyer and the seller remain anonymous to each other at all times. Once a market is closed, another market will open up in which you will be matched with another anonymous buyer. The experiment ends after you have participated in 10 markets.

These 10 markets are divided into two sets of 5 markets each. After the first 5 markets have been played, the details of the decisions you must make will change and the remaining 5 markets will work differently from the first 5 markets. The following instructions will explain how the markets work for one of these two sets of 5 markets each. If you have not played 5 markets previously, then the following instructions will describe the first 5 markets. After they have been played, you will receive a new set of instructions for the remaining 5 markets. If you have already played 5 markets, then the following instructions will specify the last 5 markets.

We now describe the working of the 5 markets, your role and the decisions you must make, and the payment you will obtain.

Each market lasts for 10 periods. **At the beginning of each period, you are in possession of a virtual good that you can sell to the buyer for the corresponding period at no cost. You can thus sell the good up to 10 times.** While the virtual good has no value to you, the per-period value of the good to buyers is either 50 points or 100 points. 60 percent of all buyers assign the high value of 100 points to the good. The remaining 40 percent of all buyers assign the low value of 50 points.

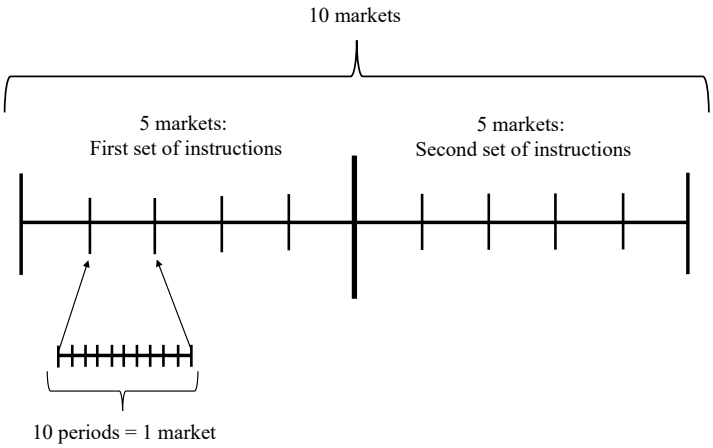


Figure A17: General structure of the experiment

When entering a market, you do not know whether you are matched with a high-value or a low-value buyer. Importantly, the per-period value that the buyer you are matched with assigns to your virtual good does not vary over the course of the corresponding market. When a buyer buys the good in a given period, he/she will obtain his/her value of the good in that period only. The buyer will thus decide in each period anew whether to buy the good or not until the market closes.

The buyer may decide to buy the good in any of the 10 periods independent of whether he/she has bought the good in a previous period. When the good is sold, the price is paid by the buyer and the market moves to the subsequent period. After all 10 periods for which the market is open have been played, the good perishes and no longer provides any value to buyers.

You must choose the prices at which to sell your good while the market is open. **In each of the 10 periods, you will be requested to set the price for that period.** Every price must at least be 0. You make this choice by setting the prices in an answer field as depicted in Figure A18.

In each period of the market you will be able to input a price for that period in the table. Similarly, in each period of the market the buyer will decide whether to buy the

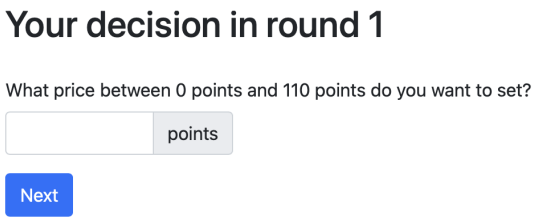


Figure A18: Answer field for setting the price

good at the price effective in the current period or not. **Once the buyer has made his/her decision, the market moves to the next period. You will then again be requested to set a price, before the buyer again chooses whether to buy the good or not.** This is repeated until all 10 periods have been played.

You will receive a minimum amount of CHF 20 in any case. In addition, the computer will select one of the 10 markets you participated in at random. This market will be relevant for determining the additional amount you receive on top of your participation fee. If the selected market is one of the 5 markets described in these instructions, then your additional payment will be determined as follows. If you sold your good at least once during the 10 periods of the selected market being open, all the prices paid by the buyer in that market over all 10 periods will be summed up. You will then receive this sum at an exchange rate of 20 : 1 on top of the CHF 20. For example, if you sold your good four times in the selected market, once at a price equal to 95, twice at a price equal to 90 and once at a price equal to 75, you will earn an additional CHF 17.50. If you did not sell your good at least once in the selected market, you will simply receive the minimum amount of CHF 20.

A.3.4.2 Buyer

This is an experiment in economic decision making. For your participation in this experiment you will receive a minimum amount of CHF 20. The instructions are simple and if you follow them carefully you will earn an extra amount that will be added to the minimum amount. All payments will be made in cash at the end of this experiment.

We are going to set up a series of markets that will last for ten periods each. In each of these markets, *one* seller interacts with *one* buyer, and you will take the role of a ***buyer*** throughout the experiment. You will be randomly matched with a seller in each market. The buyer and the seller remain anonymous to each other at all times. Once a market is closed, another market will open up in which you will be matched with another anonymous seller. The experiment ends after you have participated in 10 markets.

These 10 markets are divided into two sets of 5 markets each. After the first 5 markets have been played, the details of the decisions you must make will change and the remaining 5 markets will work differently from the first 5 markets. The following instructions will explain how the markets work for one of these two sets of 5 markets each. If you have not played 5 markets previously, then the following instructions will describe the first 5 markets. After they have been played, you will receive a new set of instructions for the remaining 5 markets. If you have already played 5 markets, then the following instructions will specify the last 5 markets.

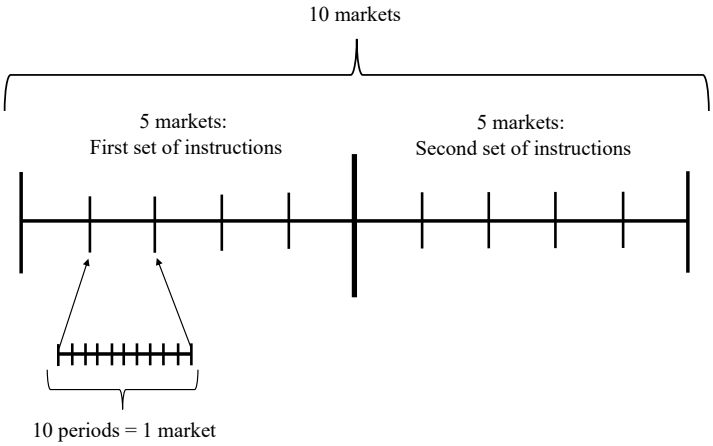


Figure A19: General structure of the experiment

We now describe the working of the 5 markets, your role and the decisions you must make, and the payment you will obtain.

Each market lasts for 10 periods. **In each period, the seller is in possession of a virtual good that he/she can sell to you for the corresponding period at no cost. You can thus buy the good up to 10 times.** At the beginning of each market, you are informed about the per-period value you assign to the virtual good, being either 100 points or 50 points. This value remains the same for all periods of the corresponding market being open. It is commonly known that 60 percent of all buyers assign the high value of 100 points to the good. The remaining 40 percent of all buyers assign the low value of 50 points.

When entering a market, the seller does not know whether you are a high-value or a low-value buyer. When you buy the good in a given period, you will obtain your value of the good in that period only. You will thus decide in each period anew whether to buy the good or not until the market closes.

You may decide to buy the good in any of the 10 periods independent of whether you have bought the good in a previous period or not. When the good is sold, you pay the corresponding price set by the seller and the market moves to the subsequent period. After all 10 periods for which the market is open have been played, the good becomes valueless to you.

The seller must choose the prices at which to sell his/her good while the market is open. **In each of the 10 periods, the seller will be requested to set the price for that period.** As a buyer you may then decide whether to buy the good for the corresponding period and pay the price effective in that period or to reject the offer. You make this choice by selecting your reaction in an answer field as depicted in Figure A20

In each period of the market you will decide whether to buy the good at the price effective in the current period or not. **Once you have made your decision, the market moves to the next period with the seller choosing the price for the subsequent period.** You may then again choose whether to buy the good or not. This is repeated until all 10 periods have been played. Note that if you buy the good at a price greater than your

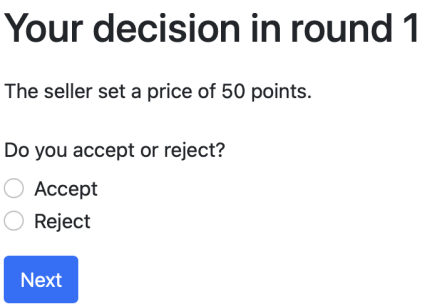


Figure A20: Accepting or rejecting the price set by the seller

per-period value, you will make a loss. However, if you buy the good at a price lower than your per-period value, you will make a gain.

You will receive a minimum amount of CHF 20 in any case. In addition, the computer will select one of the 10 markets you participated in at random. This market will be relevant for determining the additional amount you receive on top of your participation fee. If the selected market is one of the 5 markets described in these instructions, then your additional payment will be determined as follows. If you bought the good at least once during the 10 periods of the selected market being open, the differences between the price paid and your value for the good will be summed up over all the periods of the selected market in which you chose to purchase. You will then receive this sum at an exchange rate of 20 : 1 on top of the CHF 20. For example, if you were a buyer who values the good at 100 points and bought the good twice at a price of 80 and twice at a price of 60 in the selected market, you will earn an additional CHF 6. If you did not buy the good at least once in the selected market, you will simply receive the minimum amount of CHF 20.