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Is there an exclusionary effect of retroactive price reduction schemes?

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Abstract

This paper presents an experiment on the loyalty enhancing effect potentially created by retroactive price reduction schemes. Such price reductions are applied to all units bought in a certain time frame if the total quantity passes a given threshold. Close to the threshold, the marginal price the buyer pays for the missing units up to the threshold is very low. A dominant firm can use this effect to exclude potential rivals from competition, which is why some jurisdictions consider retroactive discounts as unlawful. This study shows that there in fact is a loyalty enhancing effect of retroactive discounts and how it relates to risk preferences and loss aversion.

Keywords: rebates and discounts, consumer behavior, risk aversion, loss aversion, experiment

JEL-Classification: C91, D03, D81

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1 Introduction

This paper studies price reduction schemes, conditioning on quantity, offered by a supplier to customers or distributors. More specifically, it considers retroactive rebates or discounts,[1] where the price reduction is granted only after a certain absolute or relative quantity threshold has been reached, but then the discount is granted to all units below and above the threshold.[2] Such retroactive price reductions are often said to induce loyalty to a dominant firm and therefore have an exclusionary effect. The reason is a so-called "suction effect": once a buyer started ordering some units from the dominant firm (for example, because the incumbent's competitors cannot offer the total quantity demanded), the buyer will not order from alternative sellers anymore, because close to the quantity threshold the marginal price for the remaining units is extremely low in comparison to the competing offers. The dominant firm can use this effect as an instrument to exclude potential rivals from competition.

The potential exclusionary effect of retroactive discounts is the reason why antitrust law in the European Union considers them unlawful if applied by dominant firms.[3] For example, in the case of *Michelin*[4] selling truck tyres using sophisticated bonus schemes or *Tomra*[5], a company producing reverse vending machines, the European Commission argued that retroactive systems including an absolute or relative quantity threshold qualify as unlawful loyalty rebates, artificially increasing the costs of choosing an alternative seller. Similarly, in a case of *British Airways*[6] airline tickets sold via travel agencies, the European Court took the view that a predatory intend is sufficient to consider bonus schemes unlawful, irrespective of their final effect. In contrast, US jurisdiction rather resumes that rebates and discounts are desir-

[1]Discounts are ex-ante price reductions, which have to be repaid from the buyer to the seller if the threshold level is not reached, while rebate schemes have the price reduction ex post such that the customer receives a repayment from the supplier when sales in fact exceed the threshold level.

[2]The European Commission (2009) names such schedules conditional rebates.

[3]Usually, firms having a market share about 50% are considered dominant.

[4]CFI, Case T-203/01

[5]ECJ, Case C-549/10

[6]ECJ, Case C-95/04

able, because first of all they imply a price reduction which is good for competition and, thus, for customers (see *Concord Boat v Brunswick*[7] or *Virgin Atlantic Airways v British Airways*[8]). Only if discounted prices turn in fact out to be predatory, loyalty discounts might be considered unlawful.

The disagreement of US and European courts about the treatment of retroactive rebates with respect to their exclusionary effect has been taken up in the academic literature. Faella (2008) provides an comprehensive overview over the antitrust assessment of several variants of rebate schemes from a law perspective. He argues in favour of a case-by-case analysis, which can be seen as a compromise between the European and the US American current treatment of rebate schemes. Maier-Rigaud (2005, 2006) provides a theoretical framework to compute exclusionary effects. In contrast to Faella (2008), he is against a case-by-case approach and advocates that economics should develop general criteria to judge whether certain rebate schemes have the potential to exclude competitors from the market.

This paper presents results from an experiment designed to answer the research question whether there is a suction effect of retroactive rebates and discounts justifying to forbid them all along. We thus focus on the influence of such price schemes on buyer behavior, but do not explicitly consider their consequences with respect to exclusionary effects on the seller side. More specifically, the experiment asks whether consumers have a behavioral tendency towards price reduction schemes, even if these schemes do not maximize their expected profit. Secondly, the paper relates any potential attitute towards receiving a rebate or discount to risk preferences. Finally, loss aversion may play a role, depending on whether the price reduction is framed as a discount or as a rebate.

The experiment studies three repetitions of a decision problem with 20 rounds in which subjects take the role of a retailer buying a fictitious product either from an incumbent monopolist or from the spot market. The incumbent offers a retroactive price reduction scheme which requires the retailer to order at least 90% of the total demand from the incumbent. On the spot market, the product is offered randomly at a high or low price, where the low spot market price

[7] Concord Boat Corp. v Brunswick Corp., 207 F. 3d 1039, 1061 (8th Cir. 2000)

[8] Virgin Atlantic Airways Ltd. v British Airways PLC, 257 F.3d 256, 265 (2nd Cir. 2001)

is below the incumbent's reduced price. Treatments vary the level of the low spot market price so that either the rebate scheme or trades at the spot market are maximizing expected profits. Additionally, the design controls for framing the incumbent's scheme as either a rebate or a disount. Finally, control treatments removing randomness of spot market prices are included.

Results show a substantial amount of reduction seeking when buying from the incumbent was optimal before the start of the 20 rounds, but a switch to the outside option turned out to be optimal given the realizations of random spot market prices during the initial rounds. Risk aversion increases the overall probability to choose the (risk-free) strategy to buy from the incumbent, but it does not contribute to explaining suboptimal reduction seeking. Loss aversion increases the tendency to choose the price reduction scheme when it is framed as a discount instead of a rebate, which explains suboptimal behavior well.

The experimental literature so far includes only few approaches to analyze the effect of rebates and discounts on buyer behavior. Beckenkamp and Maier-Rigaud (2006) induce a suction effect by placing buyers into a situation in which they have already bought a predetermined quantity close to the threshold from the incumbent. In contrast to this induced suction effect, which makes the situation in the experiment a one-shot decision, the present study considers the dynamic process if and how buyers move into a situation where the suction effect can set in. The work probably closest to the present one is a study by Morell et al. (2009). They find a substantial share of subjects who keep trying to reach the rebate scheme's quantity target even when it becomes suboptimal during the process of repeated decisions. They employ cumulative prospect theory to explain behavior in their experiment. In a neutrally framed setup with 10 rounds they study consumers' decisions between entering and staying in a retroactive rebate scheme and a save outside option. A suction effect comes into play by having two random draws in rounds 5 and 10 which make these rounds being omitted. As sales in 9 rounds are required to reach the quantity target for receiving the discount, cancelling round 5 makes a switch from the rebate strategy to the outside option optimal for rational, risk-neutral subjects. The design in the present study differs from theirs in several aspects. Most importantly, the save option is not the outside opportunity as in Morell et al. (2009) but the rebate scheme, as uncertainty is induced in a completely different way. Furthermore, they use the strategy method to elicit subjects' decisions for both situations, when switching from the rebate to the outside option is optimal and when it is not, which may potentially amplify treatment effects. Finally, the present experiment contains more rounds per supergame and enables learning via three repetitions of the supergame.

Rather loosely related to the experiment in the current paper are the experimental studies by Normann et al. (2007) on rebates under different marginal costs of the producer, by Davis and Millner (2005) on the effect of different rebate schemes on demand, and by Davis and Holt (1994, 1998) on secret discounts in posted-offer markets and collusion. They all are concerned with effects of rebate schemes on behavior, but do not specifically focus on the suction effect. Buyers' decision of whether to try to reach a quantity threshold depends on their risk attitude (see, for example, Holt and Laury, 2002; Dohmen et al., 2011). For risk averse buyers, the rebate gets more attractive with increasing variance of alternative offers. In the dynamic framework of our experiment, risk preferences furthermore potentially interfere with time preferences, a topic which is dealt with in the studies of Andersen et al. (2008) and Anderhub et al. (2001). Similarly, prospect theory (Kahnemann and Tversky, 1979), loss aversion (Tversky and Kahnemann, 1991) and the status quo bias as considered by Samuelson and Zeckhauser (1988) or Kahnemann et al. (1991) are concepts likely to determine whether subjects are prone to enter rebate systems. Finally, the experiment relates to experimental studies on stochastic demand and the newsvendor problem (Schweitzer & Cachon, 2000; Benzion et al., 2008; Bolton & Katok, 2005). Though not considering rebates at all, the decision problems are related as the newsvendor also faces uncertainty (arising from demand) about whether he will reach a certain sales level.

The next sections are ordered as follows. Section 2 introduces the experimental design and procedures, section 3 presents the hypotheses. The experimental results are discussed in section 4. Section 5 concludes.

2 Design and Procedures

The experiment lasts three times 20 rounds, where a supergame consisting of 20 rounds will be called a "trade period". The experiment studies the decisions of a (downstream) retailer R.

The demand of consumers and the supply of (upstream) producers are simulated. Demand is normalized to unit demand. The consumer is willing to buy 10 units per round at a price of at most 60. Total demand per trade period therefore amounts to 200 units. The retailer (the only real player) faces two computerized upstream producers. In each round, the retailer can decide whether to order 10 units from an upstream incumbent I or from the competitor C. The 10 units are automatically sold to the consumer at a fixed price of 60 in the end of a round. Table 1 summarizes the parameter variations and informs about the resulting profits. The incumbent continuously supplies the good at a fixed price, offering the following retroactive price reduction scheme:

$$p_I = \begin{cases} 50 & \text{if } Q_I \geq 180 \\ 60 & \text{otherwise} \end{cases}$$

Uncertainty arises from fluctuations in the availability of competing offers at the upstream market. Thus, the competitor represents a spot market, where the retailer may also get the product, but with more variation in prices. Spot market prices in each round are randomly determined as follows:

$$p_C = \begin{cases} p_C^{low} < 50 & \text{with probability } \alpha = 0.4 \\ p_C^{high} = 60 & \text{with probability } 1 - \alpha = 0.6 \end{cases}$$

Treatment variations occur at two instances. First, there is a variation in $p_C^{low} \in [25; 35]$. The two values of p_C^{low} are chosen such that in one case expected profit of the retailer before a trade period is larger when buying sufficiently many units to pass the threshold from the incumbent, while in the other case expected profit is maximal when buying from the competitor.[9] Secondly, the experiment varies the frame as REBATE or DISCOUNT. These two variations are conducted in a 2x2 design, resulting in four different treatments. Finally, for the REBATE frame there are two control treatments with certainty about the supply of the competitor. Holding the expected

[9]As the expected trade volume offered by the competitor is $0.4 * 20 = 80$, the expected quantity which has to be bought at a price of 60 is 120. To compute whether there can be a suction effect, we need to compare the marginal price of the incumbent for the remaining units up to the threshold ($p_I^{'} = 30$) with the competitor's price p_C^{low}.

Total demand	200	
Rebate threshold	180	
Expected supply of competitor at low price	80	
Unit demand price	60	
Price incumbent	60	
Reduced price incumbent	50	
Incremental price of incumbent after $Q_I = 120$	30	
Low price competitor	25	35
20-round-profit "Reduction"	2500	2300
20-round-profit "Competitor"	2800	2000

Table 1: Parameter values.

frequency of spot market offers constant, the low price here is available in 8 predetermined but unknown rounds. These two treatments serve as a control for how well subjects are able to compute optimal strategies when risk plays no role for the decision.

Instructions for the experiment where shown on screen and included an interactive guided tour through the screens of the experiment. A general calculator box was available while reading the instructions and during the experiment, but no explicit profit calculator was provided. Participants received detailed feedback about the full history of the current trade period. After the main experiment, subjects' risk attitude was measured using lotteries having the same mean and variance as the payoffs of the two main strategies in the buying decision problem:

- If $p_C^{low} = 25$: 2.56 Euros or 4.45 Euros with 50% probability each vs. 3.31 Euros for sure.
- If $p_C^{low} = 35$: 1.83 Euros or 3.19 Euros with 50% probability each vs. 2.87 Euros for sure.

The experiment was computerized using z-Tree (Fischbacher 2007). A total of 200 students from various disciplines took part in the experiment. They were recruited via ORSEE (Greiner 2004). The experiment took place in the *Lakelab*, the laboratory for experimental economics at the University of Konstanz, between June and November 2011. The experimental currency was points. 800 points were converted into 1 euro after the experiment. On average, participants earned 12.40 euros in the experiment which lasted for about one hour. The protocol during the experiment was as follows: After welcoming participants and explaining the main rules for participation in the experiment, they were randomly assigned seats in the laboratory. Subjects received instructions[10] on their computer screen and were given the possibility to familiarize themselves with the computer screens. Then the experiment started. At the end of a session, they were asked to complete a short questionnaire.

3 Hypotheses

There are two reasonable strategies in this decision problem. The "Reduction" strategy captures the retailer's strategy which makes sure to reach the quantity target and get the price reduction of the incumbent. As the threshold is at 180 units, it maximizes profit to buy exactly these 180 units from the incumbent and the remaining 20 units from the competitor, ideally in the first two rounds where the low price of the competitor is available.[11] The "Competitor" strategy describes the retailer buying from the competitor whenever he offers the low price. This strategy is the more risky choice, because the retailer does not know in advance whether the low price will actually be available in sufficiently many rounds. As the high price of the competitor equals the non-reduced price of the incumbent, this strategy does not make any prescription where to buy when the spot market price is high. However, before having bought more than two units from the spot market it is weakly maximizing expected profit to buy from the incumbent in high-price rounds. Calibration of parameters in the experiment is such that the "Reduction" strategy is optimal in treatments with $p_C^{low} = 25$ while "Competitor" is optimal when $p_C^{low} = 35$. Hypothesis 1 expresses the expectation to observe predominantly these two strategies.

Hypothesis 1 *Subjects buy either exactly two units or all units offered at p_C^{low} from the competitor.*

The previous literature on rebates (Beckenkamp and Maier-Rigaud, 2006; Morell et al. 2009) showed that threshold rebates exhibit some attraction to consumers beyond rational

[10] An English translation of the instructions can be found in the appendix.

[11] Note that the profit calculation for this strategy neglects the probability that the cheap offer is available in less than two rounds. The likelyhood of this event is less than 0.1 percent and never occured in the experiment.

maximization of expected payoffs. Hypothesis 2 formulates the expectation to replicate this effect in the present setting.

Hypothesis 2 *Subjects choose the "Reduction" strategy in situations where it would be maximizing expected profit to play "Competitor".*

The incumbent's price scheme specifies a standard unit price of 60 and offers a price reduction to 50 if total sales are at least 180 units, where this threshold is below the total demand of 200 units. This feature allows switching between strategies, because the retailer has to definitely decide for or against entering the price reduction scheme only when having the chance to buy at a cheap price from the spot market for the third time. In fact, it can happen that a switch becomes optimal ex post (that is, *after the start* of a trade period), when the realized availability of cheap offers by the competitor differs from their expected frequency during the first few rounds of a trade period. "Competitor" becomes optimal ex post, if the competitor offers the low price at least three times until round 4. Switching to the "Reduction" strategy is optimal, if the competitor offered the low price less than three times until round 9. Compared to the setup of Morell et al. (2009) it is harder for subjects in this experiment to determine when exactly a strategy switch is optimal. The next hypothesis expects that too few switches occur and that they rather stick to their initially selected strategy throughout the 20 rounds. If there is a loyalty-enhancing effect of the incumbent's price reduction scheme, then we furthermore expect that switching to the ex-post optimal strategy is more prevalent when the required switch is from "Competitor" to "Reduction" than the other way round.

Hypothesis 3 *Subjects play less often optimally when their profit-maximizing strategy given the realizations of spot market offers differs from the strategy that was optimal before the start of a trade period.*

Hypothesis 4 *When a strategy switch becomes optimal during a trade period, more subjects implement this switch from "Competitor" to "Reduction" than from "Reduction" to "Competitor".*

“Competitor” is the more risky strategy compared to “Reduction”, because the profit variance of the “Competitor” strategy is larger. Depending on the realization how often the competitor’s cheap offer is actually available during 20 rounds, expected profits can vary substantially, while profits when opting for the rebate or discount scheme are almost deterministic.[12] Hypothesis 4 states the expected relationship between risk aversion and strategy choices.

Hypothesis 5 *Subjects choosing the “Reduction” strategy are more risk averse than those buying any available unit from the competitor.*

When the threshold for the price reduction is not reached in the Discount frame, there is a payment from the retailer to the incumbent in the end of a trade period. Thus, loss aversion amplifies the suction effect in the Discount frame compared to the Rebate frame.

Hypothesis 6 *If “Reduction” is the profit maximizing strategy, fewer deviations from optimal behavior occur in the* Discount *than in the* Rebate *frame. If “Competitor” is the profit maximizing strategy, more deviations from optimal behavior occur in the* Discount *than in the* Rebate *frame.*

4 Results

In this section, we first illustrate how behavior evolves across the three trade periods of 20 rounds. Next, we discuss how the share of optimal profit-maximizing decisions differs between treatments. Finally, we show how risk aversion and loss aversion can help explaining these differences in the number of optimal decisions.

Actual behavior with respect to the identification of strategies is very clear. In the third trade period, all but seven[13] out of 160 subjects either buy 180 units from the incumbent and 20

[12] Uncertainty arises only from the unlikely event that the competitors’ offer is available less often than two times.

[13] These subjects are excluded from the further analysis.

Strategy	Optimal ex ante	ex post	Trade period 1st	3rd	p-value
"Reduction"	x	x	71%	83%	0.21
"Reduction"	-	x	47%	80%	0.40
"Competitor"	x	x	75%	81%	0.16
"Competitor"	-	x	58%	40%	0.29

Table 2: Share of ex-post optimal decisions in the first and in the third trade period.

units from the competitor, or they buy from the competitor whenever the low price is offered, thus playing precisely one of the expected strategy patterns, confirming hypothesis 1.

The share of subjects playing the ex-post optimal strategy increases from the first to the third trade period (see Table 2), though none of the differences is significant.[14] Only if "Reduction" is optimal ex ante, but "Competitor" ex post, the share of subjects playing "Competitor" decreases from 58% to 40% instead of increasing.[15] Thus, there is a tendency towards more optimal behavior across trade periods, except for the situation when "Competitor" becomes optimal ex post. In the two Control treatments with certainty about offers at the spot market the share of subjects playing their optimal strategy increases from 70% ($p_C^{low} = 35$) and 85% ($p_C^{low} = 25$) in the first trade period to 95% and 90% in the third trade period, indicating that subjects are well able to compute (ex-ante) optimal strategies at least with some experience. In the following analysis of differences between treatments we therefore concentrate on the third trade period.

4.1 How many subjects play their ex-post optimal strategy?

Figure 1 illustrates how many subjects choose their ex-post optimal strategy, differentiating between situations where this strategy was optimal ex ante (due to the treatment variation in p_C^{low}) and ex post (due to the realizations of the entry probability α), averaged over Rebate and Discount frame treatments. Let us focus first on the observations where ex-ante and

[14]The strategies which are optimal ex ante and ex post can differ for each subject across trade periods. To tackle with the resulting overlapping samples, we used the estimation procedure described by Bland and Butland (2011) to determine the (two-sided) p-values reported in Table 2.

[15]In this sample, there are no paired observations. Thus, we used the Fisher-exact test.

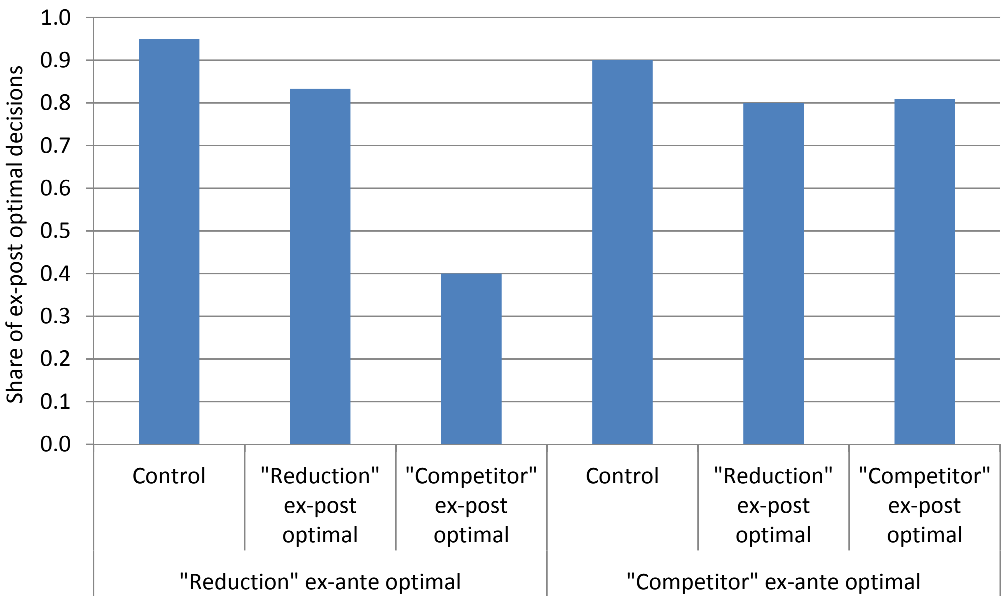

Figure 1: Share of subjects playing their optimal strategy in the third trade period.

ex-post optimal strategies coincide. 83% of the subjects play "Reduction" if it is optimal ex ante and ex post. 81% play "Competitor" when it is optimal ex ante and ex post. The numbers are statistically indistinguishable from the share of correct decisions of 95% and 90% in the Control treatments (Fisher exact test, two-sided, p-values = 0.50 and 0.27, respectively). We thus reject hypothesis 2, because there is not more non-optimal play of "Reduction" than of "Competitor". Next, we consider behavior when ex-ante and ex-post optimal decisions differ. In these situations, 80% play "Reduction" when it is ex post optimal, but only 40% play "Competitor" when it is ex post optimal. Thus, we observe significantly less optimal behavior when "Reduction" was optimal ex ante and "Competitor" ex post than in the reverse situation (Fisher exact test, one-sided, p-value = 0.03). We conclude that there is a loyalty effect of retroactive price reductions when a strategy switch becomes optimal during a trade period, rejecting the more general hypothesis 3, but providing strong support for our main hypothesis 4.

To find out whether subjects indeed considered the round when the low spot market price was offered for the third time as the point in time when they make their definite decision for that trade period, we consider their decision times. Table 3 presents the results of a simple OLS model explaining the time needed for entering a decision on the computer screen. *Third time*

Decision time		
Third time cheap	1.616***	2.141***
	(0.252)	(0.243)
Round	-0.272***	-0.167***
	(0.00949)	(0.0116)
Supergame no.		-1.728***
		(0.0634)
First 3 rounds		2.694***
		(0.187)
Constant	6.824***	8.740***
	(0.177)	(0.240)
Observations	9,600	9,600
Number of id	160	160

Table 3: Time needed for making a decision. Control treatments excluded. Subject random effects included. Standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

cheap is a dummy variable being equal to one if the competitor offers the low price for the third time in the current round. *Round* and *Supergame no.* control for changes in decision speed over time, *First 3 rounds* is another dummy controlling for decisions being slower in the initial phase of a trade period. The regressions illustrate that subjects on average think about two seconds longer when deciding about a strategy switch than in the remaining rounds, providing support for the idea that they perceive their decision in this round as particularly important and therefore worth spending more cognitive resources.

4.2 Risk aversion

Risk aversion explains the decision between the two strategies “Reduction” and “Competitor” well. Figure 2 depicts lottery choices, averaged over both frames, separating between treatments with low and high p_C^{low}, and divided according to subjects’ actually played strategies. As lotteries were designed in order to reflect mean and variance of profits of the two strategies in the main decision situation, it holds that the risky choice was optimal when ex ante the “Competitor” strategy was maximizing expected profit and, vice versa, the save choice was optimal when ex ante “Reduction” was maximizing expected profit. This difference is reflected in strong differences in levels of risky choices when the risky lottery choice is optimal and when it is not. More importantly, figure 2 illustrates that subjects playing “Competitor” (the more risky strategy) choose the risky option in the lottery on average more often, confirming hypothesis 5. The difference is statistically significant in a one-sided Fisher exact test for those subjects with $p_C^{low} = 25$, where the risky choice – and, thus, ex ante the “Competitor” strategy – was optimal (p-value $= 0.03$). For $p_C^{low} = 35$, the overall effect is similar, though not significant (p-value $= 0.16$).

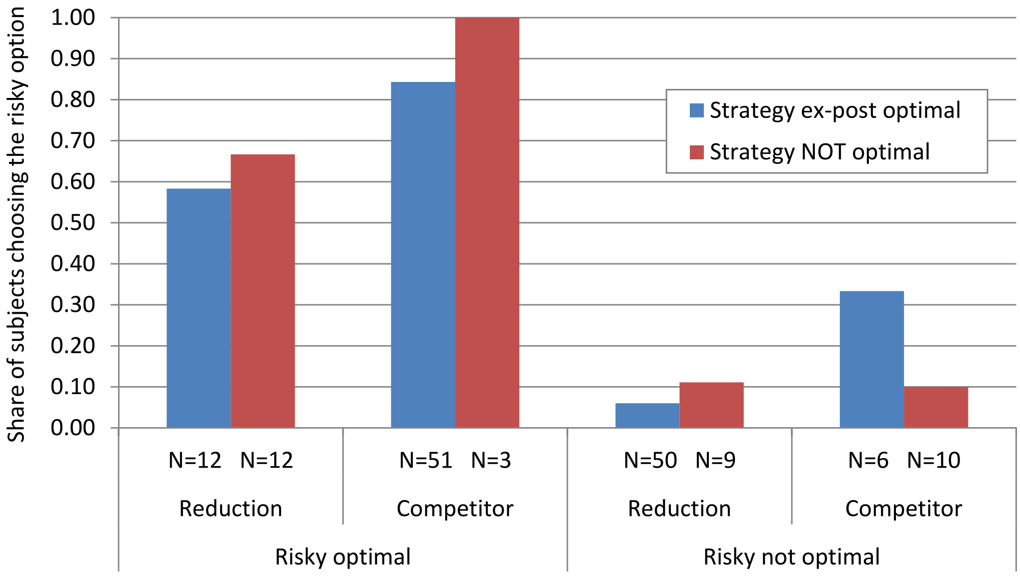

Figure 2: Strategy decisions and risk preferences.

In figure 2 the pairs of bars further separate lottery choices of subjects playing their strategy ex-post optimally or not. This is done to disentangle risk aversion and reduction seeking as reasons for behavioral patterns not maximizing expected profit. If risk aversion would explain the observation of subjects playing “Reduction” when it is not optimal, then these subjects should choose the risky option in the lotteries on average less often than subjects playing it optimally. However, subjects playing “Reduction” not optimally choose the risky option in the lotteries on average slightly *more* often than subjects playing “Reduction” optimally. Thus, risk aversion cannot explain the deviations from expected profit-maximizing behavior.

4.3 Loss aversion

Loss aversion amplifies the suction effect of the incumbent's price reduction scheme in the Discount frame compared to the Rebate frame, because of the later repayment if the threshold is not reached. Figure 3 shows the share of subjects behaving optimally given the ex ante predetermined value of p_C^{low} and the ex-post realization of α. If "Reduction" is the ex-ante and ex-post profit maximizing strategy, the figure shows fewer deviations from optimal behavior in the Discount than in the Rebate frame (one-sided Fisher exact test, p-value $= 0.12$). Similarly, if "Competitor" is the ex-ante and ex-post profit maximizing strategy, there are more deviations from optimal behavior in the Discount than in the Rebate frame (p-value $=$ 0.15). The framing effect is particularly strong when "Competitor" is the profit maximizing strategy only ex post (p-value $= 0.08$). Here, subjects have already bought several units at a price $p_I = 50$ from the incumbent, because ex ante they were correctly expecting that the rebate scheme maximizes profit. Failing to reach the rebate threshold when switching to the competitor after spot market realizations turned out to be favorable would imply paying the difference $60 - 50 = 10$ per unit back to the incumbent, which is perceived as a loss. This effect explains the overall attraction of the rebate scheme to a large extent.

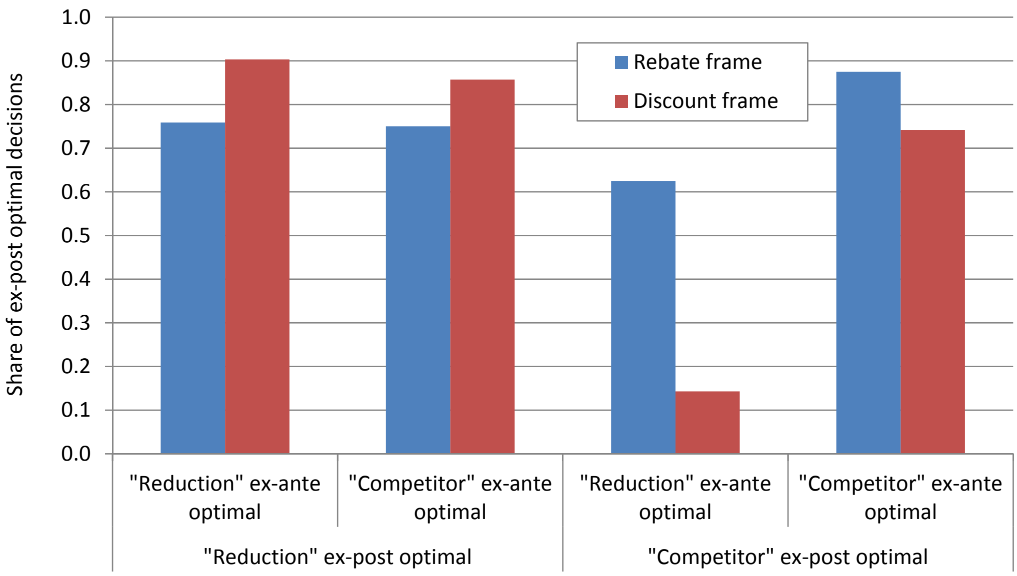

Figure 3: Share of subjects playing their (ex-ante and ex-post) optimal strategy, depending on frame

These findings support hypothesis 6. They are in contrast to the results in Beckenkamp and Maier-Rigaud (2006), reporting no difference between behavior in their rebate and discount conditions. A likely explanation for the contradicting results is that their experiment involves a one-shot decision where the behavioral impact of current gains and future losses is less strong than in the longer horizon of 20 rounds in the present study.

5 Conclusion

This paper studied an experiment on the decision to enter into price reduction schemes and to switch between such a scheme and the outside alternative. One novelty of the current paper is the flexible design allowing to consider not only behavioral patterns when the optimal decision can be computed initially, but also decisions when a strategy switch becomes optimal over time. Furthermore, the design in the present experiment allows to study behavior not only in the situation when subjects expecting to fulfill the conditions of a retroactive rebate or discount scheme ex post learn that they should better switch to a competing firm, but also the counterfactual case. It therefore goes beyond previous studies by Beckenkamp and Maier-Rigaud (2006) or Morell et al. (2009), in which the share of optimal decisions in a situation when a strategy switch is optimal was compared to behavior in a condition where no switch is optimal.

The data in this paper illustrates the attraction of rebate and discount schemes distorting consumer decisions away from expected profit maximization. If ex-ante and ex-post optimal decisions are identical, 83% of the subjects optimally choose the rebate or discount scheme and 81% optimally buy from the outsider. If ex-ante and ex-post optimal decisions differ, only 40% (ex-post) optimally choose "Competitor", but 80% "Reduction". Risk aversion and loss aversion can explain the decision whether to try to receive a discount or to buy from the competitor. Subjects deciding for the riskier strategy to buy from the competitor also choose the risky option in the lottery more often. Loss aversion amplifies the suction effect in the Discount frame when the price reduction is offered immediately but subject to later paymentment if the sales target is missed.

The findings of the experiment have immediate policy implications, for example for consumer protection and competition law. In particular, they suggest that retroactive price reduction schemes are detrimental to consumer welfare when framed as a discount. For future research, it would be interesting to introduce uncertainty via fluctuations in demand instead of (or in addition to) random supply at the upstream spot market. Such an approach would shift uncertainty from the outside option to the price reduction scheme, because with stochastic demand the possibility of reaching a quantity threshold becomes probabilistic. It would be interesting to see whether the above reported results with respect to risk aversion invert in this case, or whether such a design would find no effect of risk attitute on strategy choices as reported in previous papers.

6 Appendix: Instructions

(These are the instructions for the REBATE *frame and for $p_C^{low} = 25$.)*

Welcome to the Lakelab.

Today you will take part in a decision experiment. When you read the following instructions carefully you can earn money. The amount you get depends on your decisions and on chance, but not on the other participants' decisions.

It is not allowed to communicate with other participants during the experiment, therefore we ask you not to talk with each other. A violation of this rule leads to exclusion from the experiment and any payment.

Please read the instructions carefully. If you have any questions or if anything is unclear, please raise your hand. We will then come to your place.

After the main part of the experiment you will participate in a short lottery experiment. You get the instructions for the second part of the experiment displayed at the computer screen after the end of the first part.

This experiment consists of 3 times 20 rounds, i.e. after 20 rounds there will be a restart.

After you took part in all 60 rounds of the experiment, we will add up all your earnings.

During the experiment we do not speak about euros but about points. The obtained points you gain during the experiment will be converted into euros as follows: 800 points = 1 euro.

At the end of today's experiment you get the achieved points paid out in Euro in cash.

In the following we will describe the procedure of the experiment in detail. First, we explain to you the general procedure. Afterwards we will make you familiar with the procedure at the computer screen. Before we start the experiment we will ask you some control questions at the screen which should help you understand the procedure better. The experiment does not start until all participants are completely familiar with the procedure of the experiment and answered all control questions correctly.

In this experiment you make decisions in the role of a retailer who buys a fictitious product and resells it. In each round you can buy a predetermined amount of units of the fictitious product from two suppliers and resell them to a buyer. Both the two suppliers and the buyer are not real participants in the experiment, but are simulated by the computer.

The two suppliers have different supply strategies and a different price design:

Supplier 1 offers the product at a price of 60. If you buy during 20 rounds in total at least 180 units of the product from supplier 1, you get at the end of the 20 rounds for each unit you bought from supplier 1 a rebate of 10 points paid back. So, in this case you pay a final unit price of 50 at supplier 1.

Supplier 2 offers you the product for different prices. In some rounds you can buy the product from supplier 2 for a price of 25 points. In each round supplier 2 will offer a price of 25 with a probability of 40%. With a probability of 60% supplier 2 will ask for a price of 60. You will be informed about supplier 2's current price at the beginning of each round before you make your purchasing decision.

You will resell the units you bought from suppliers 1 and 2 to a buyer in each round. This buyer pays you a unit price of 60 points each. The buyer is ready to buy 10 units of the product for a price of 60.

During the experiment the calculator of the computer is available for you if you might want to calculate the consequences of your purchasing decision in advance. You can open the calculator by clicking the symbol next to the “OK” or “next” button.

At the end of each round you will get informed again about the prices and the quantities you traded in this round and all previous rounds. Moreover, your profit from all rounds will be shown and you get informed about the amount of units you bought at each supplier so far.

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