STICKY REBATES: LOYALTY REBATES IMPEDE RATIONAL SWITCHING OF CONSUMERS

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ABSTRACT

Competition policy often relies on the assumption of a rational consumer, although other models may better account for people's decision-making behavior. In three experiments, we investigate the influence of loyalty rebates on consumers based on the alternative Cumulative Prospect Theory (CPT). CPT predicts that loyalty rebates could harm consumers by impeding rational switching from an incumbent to an outside option (for example, a market entrant). In a repeated trading task, participants decided whether or not to enter a loyalty rebate scheme and to continue buying within that scheme. Meeting the condition triggering the rebate was uncertain. Loyalty rebates considerably reduced the likelihood that participants switched to a higher-payoff outside option later. We conclude that loyalty rebates may inflict substantial harm on consumers and may have an underestimated potential to foreclose consumer markets. Our findings therefore provide additional arguments why a dominant firm using target rebates may monopolize a market or abuse its market power. They also provide arguments why target rebates may raise consumer protection concerns.

JEL: D03; D18; K21; L42

I. INTRODUCTION

Loyalty consumer rebates are omnipresent. A U.S. household, on average, participates in 6.2 loyalty programs.[1] Many of these loyalty programs include a conditional element. Retailers (for example, Best Buy, Anson's, Peek & Cloppenburg), hotel chains, and airlines offer discounts, preferential service, premiums, or extra bonus miles conditional on the consumer purchasing a certain minimum per year. We show that these conditional loyalty rebates tend to create psychological

[1] Xavier Drèze & Joseph C. Nunes, *Recurring Goals and Learning: The Impact of Successful Reward Attainment on Purchase Behavior*, 48 J. MARKETING RES. 268, 268 (2011).

switching costs in consumers, which renders those conditional loyalty rebates a potential threat to competition.

The consumer loyalty rebates treated here (also referred to as "target rebates" or "all unit discounts") are based on the following mechanism: a firm grants a significant price reduction on all units bought during a certain reference period if, within that reference period, the customer reaches a certain target in purchase volume close to his total demand. The consumer may frame the target as a goal which he aims to reach. Recently, Lufthansa, the largest German airline, offered its customers a classic example of a consumer loyalty rebate scheme. Customers received a discount (in the form of further bonus miles) on all purchases within a year (reference period), if they reached a threshold close to their expected demand during that year.[2] The first sentence Lufthansa wrote to its customers when introducing the new conditional rebate was: "Dear Mr./Mrs. X, do you know the marvelous feeling of having reached a goal you set yourself?" In this article, we investigate whether loyalty rebates that induce consumers to adopt such goals, be they imposed or self-set, pose a threat to competition by imposing additional switching costs. Specifically, it can be expected on theoretical grounds that goals shift reference points upwards so that foregoing the rebate is perceived as a loss. According to Prospect Theory,[3] this should make individuals more reluctant to switch to a different supplier due to loss aversion, leading to an increase in psychological switching cost. Such a psychological switching cost can ultimately have detrimental effects on competition, which should be taken into account in the legal assessment and regulation of rebates. There is empirical evidence, for instance, that an airline dominating a hub airport can use frequent flyer programs to foreclose smaller but equally efficient competitors from the market.[4] The psychological switching costs that target rebates generate could reinforce or even cause this effect. The potential of target rebates to foreclose markets makes loyalty programs a potential issue of antitrust law, which prohibits dominant firms to abuse their market power (section 2 of the Sherman Act and Article 102 of the Treaty on the Functioning of the European Union [TFEU]). Further, one may consider action under consumer protection laws, because the described psychological switching cost is to the detriment of consumers.

The relevance of nonrational behavior in competition has been vividly discussed in the antitrust community under the label "behavioral antitrust."

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[2] Here, the heterogeneity of consumers posed a serious problem for setting a unified threshold close to expected demand. Lufthansa solved that problem by giving consumers an incentive to set their own target for the year to come roughly at their expected demand. Other suppliers solve the same problem by offering several targets that yield increasing rebates.

[3] *See generally* Daniel Kahneman & Amos Tversky, *Prospect Theory: An Analysis of Decision Under Risk*, 47 ECONOMETRICA 263 (1979).

[4] *See* Mara Lederman, *Do Enhancements to Loyalty Programs Affect Demand? The Impact of International Frequent Flyer Partnerships on Domestic Airline Demand*, 38 RAND J. ECON. 1134 (2007).

Retail price maintenance,[5] merger control,[6] and market entry,[7] for example, have been reevaluated using insights from behavioral economics. This new direction of research received a lot of attention and support,[8] but it was also criticized for applying insights derived from a student subject pool to firm behavior, for pursuing a paternalistic agenda, and for making welfare analysis impossible.[9]

The most promising applications of behavioral antitrust have dealt with consumer behavior. Replacing a standard demand function with a more realistic model of consumer behavior often leads to very different predictions in situations highly relevant to antitrust.[10] The criticism with respect to extrapolating insights from observed behavior of participants in lab experiments (most of whom are students) to corporate behavior do not apply to consumer behavior because students are typically consumers in many markets. In addition, the paternalism argument has less bite in consumer protection contexts because consumer protection law specifically aims at protecting consumers where they cannot protect themselves. Finally, that behavioral antitrust makes welfare analysis impossible is not a convincing argument against behavioral antitrust *per se*. On one hand, where one needs to predict agents' behavior in markets one should certainly use the best performing model. In contexts where "behavioral" models outperform rational-choice models in predicting peoples' behavior on should use "behavioral" models. On the other hand, even where normative inferences are derived from welfare analysis, one cannot simply reinterpret mistakes people make (for example, by responding to mere framing) as revealed preferences. Such a procedure would render the welfare analysis uninformative of agents' well-being. Clinging to uninformative welfare analysis just because it is possible effectively ignores the problem. In fact, the argument that behavioral antitrust renders welfare analysis impossible merely urges the

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[5]   William J. Rinner & Avishalom Tor, *Behavioral Antitrust: A New Approach to the Rule of Reason After Leegin*, 2011 U. ILL. L. REV. 805 (2011).

[6]   Maurice E. Stucke, *Behavioral Economists at the Gate: Antitrust in the Twenty-First Century*, 38 LOY. U.CHI. L. J. 513 (2007); Amanda P. Reeves & Maurice E. Stucke, *Behavioral Antitrust*, 86 IND. L. J. 1527 (2011).

[7]   Avishalom Tor, *The Fable of Entry: Bounded Rationality, Market Discipline, and Legal Policy*, 101 MICH. L. REV. 482 (2002).

[8]   *See, e.g.*, J. Thomas Rosch, Commissioner, Fed. Trade Comm'n, Convergence and Comity: Still Improbable?, Remarks Before the Friends of Europe Roundtable on New Transatlantic Trends in Competition Policy (June 10, 2010), *available at* http://www.ftc.gov/sites/default/files/documents/public_statements/remarks-friends-europe-roundtable-new-transatlantic-trends-competition-policy/100710transatlanticremarks.pdf. Competition Policy International, an academic journal that covers competition law, economics, and policy, devoted its sixth volume to behavioral economics. *See CPI(6)1*, COMPETITION POLICY International, https://www.competitionpolicyinternational.com/cpi-6.

[9]   *See* Gregory J. Werden, Luke M. Froeb & Mikhael Shor, *Behavioral Antitrust and Merger Control*, 167 J. INST. & THEORETICAL Econ. 126 (2011).

[10] *See* STEFFEN HUCK, JIDONG ZHOU & CHARLOTTE DUKE, CONSUMER BEHAVIOURAL BIASES IN COMPETITION: A SURVEY (U.K. Office of Fair Trading 2011), *available at* http://webarchive.nationalarchives.gov.uk/20140402142426/http://www.oft.gov.uk/shared_oft/research/OFT1324.pdf.

discipline of economics to meet the challenge of constructing welfare analysis under endogenous preferences.[11]

Rebates are high on the agenda of competition policy both in the United States and in the European Union. In both jurisdictions, a tendency to consider the psychology of buying behavior in practice is emerging.

U.S. Courts used to take a rather lenient position towards loyalty rebates, particularly if they only concerned one product.[12] Although single-product rebates long seemed to be legal *per se*, recent cases like *AMD v. Intel* and *ZF Meritor v. Eaton* have shown that conditional rebates can lead to expensive settlements or even to antitrust liability under section 2 of the Sherman Act. U.S. Courts have started to worry about the potential of conditional rebates to serve as substitutes for exclusive dealing arrangements and to foreclose markets.

Even though we are not aware of any U.S. antitrust decision or opinion explicitly referring to any psychological state of mind, we understand the Supreme Court's distinction between 'sophisticated' and 'unsophisticated' consumers to point into a similar direction. Information cost can be both organizational and cognitive. Psychological effects contribute greatly to the cognitive costs of information. In *Kodak*, the Supreme Court treated behavior of unsophisticated consumers to be relevant insofar as it affects markets.[13] Consumers who are prone to experiencing psychological switching costs could be categorized as a subtype of unsophisticated consumers.

Even in the case in which a rebate concerns only a single product, European antitrust authorities have long been concerned about the detrimental effects of loyalty rebates, especially with respect to those rebates generating a discontinuity in the pricing function that may cause a "suction effect" (see Part II.A). But on top of the effects conditional rebates may have on rational buyers, European authorities now worry about the "weak psychological position" in which rebates place buyers.[14] For both the standard and the psychological reasons, the European Commission and the European courts have suppressed loyalty and target rebates with a target close to total demand on a *per se* basis, if they were applied by a dominant company, unless their reference period was shorter than three months (for example, *Hoffmann-LaRoche v. Commission*; *Michelin v. Commission I.*; *British Airways v. Commission*; *Michelin v. Commission II.*; *Tomra v. Commission*; *Intel v. Commission*). For the future, the European Commission included rebates among its enforcement priorities under Art. 102 TFEU.[15]

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[11] *See* Alexander Morell, *Behavioral Antitrust and Merger Control: Comment*, 167 J. INST. & THEORETICAL ECON. 143 (2011).

[12] *See, e.g.*, Concord Boat Corp. v. Brunswick Corp., 207 F.3d 1039 (8th Cir. 2000), *cert. denied*, 531 U.S. 979 (2000).

[13] *See* Eastman Kodak Co. v. Image Tech. Serv., 504 U.S. 451, 475–76 (1992).

[14] Commission Decision (EC) No. COMP/E-2/36.041/PO – Michelin, 2002 O.J. (L 143) 1, 223.

[15] *See* European Commission, DG Discussion Paper on the Application of Article 82 on the Treaty to Exclusionary Abuses (2005), *available at* http://ec.europa.eu/competition/antitrust/art82/discpaper2005.pdf; *see also* European Commission, Guidance on the Commission's

Furthermore, if the European Commission is correct in that loyalty rebates put even professional buyers in a weak psychological position, such a notion implies that these rebates offered to consumers should *a fortiori* raise consumer protection concerns.

The current paper seeks to provide empirical data for the question of whether individuals indeed stick to loyalty rebate schemes, even when switching to an outside option (a competitor's product) yields a higher expected payoff and less risk. It also intends to ascertain which factors influence the degree to which rebates create a psychological switching cost.

For this purpose, we investigate the influence of loyalty rebates on consumers' purchasing behavior. Applying CPT as a candidate model of consumer behavior,[16] we predict and find that conditional loyalty rebates induce a psychological switching cost. By means of these switching costs, conditional rebates are a potential tool for inefficient market foreclosure and may directly harm consumers. With respect to antitrust law and to consumer protection law, our findings provide an argument to intensify the scrutiny to which rebates are subject.

II. EFFECTS OF LOYALTY REBATES

Target rebates raise competition concerns because they create switching costs. Starting from the framework of rational choice theory, we will first explain how these switching costs arise and how they can lead to detrimental effects on competition. Then we will explain what additional concerns they raise if psychological switching costs are considered.

A. Predictions of Rational Choice Theory

From a perspective of rational choice theory (RCT), rebates generate switching costs. If a rebate is granted under the condition of exclusivity, sourcing parts of one's demand from a competitor entails foregoing the rebate. Switching therefore comes at a cost. To be attractive, a competitor's offer needs to outweigh these costs.

This switching cost is higher on a per-unit basis if the rebate is effectively distributed only over a small part of demand because either the rest of demand has already been sourced from the incumbent or because the rest will be sourced from the incumbent for sure (assured base of sales). This phenomenon sometimes has been called the "suction effect"—that is, the more you have bought,

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Enforcement Priorities in Applying Article 82 of the EC Treaty to Abusive Exclusionary Conduct by Dominant Undertakings (2009), *available at* http://ec.europa.eu/competition/antitrust/art82/guidance_en.pdf.

[16] *See generally* Amos Tversky & Daniel Kahneman, *Advances in Prospect Theory: Cumulative Representation of Uncertainty*, 5 J. RISK & UNCERTAINTY 293 (1992).

the more attractive the rebate, because the full rebate now strongly reduces the price of the small remaining volume of purchases.[17]

A rebate's suction effect also may increase as a function of completed purchases if there is uncertainty about the availability of buying opportunities. Purchases may reduce uncertainty about whether a buyer will actually get the rebate. Imagine the buyer may have two purchasing opportunities, each arising with 50 percent probability and reaching the rebate requires buying at both. Then at the outset the probability of reaching the rebate will be 25 percent (50 percent × 50 percent). Once the first purchase has been made the probability will be 50 percent. This may reinforce the "suction effect" and thus increase switching costs.

Switching costs are not a problem *per se.* But they may lead to inefficient foreclosure under certain market conditions. Analogous to exclusive dealing agreements,[18] foreclosure by conditional rebates may, for example, require uncertainty about the entrant's costs. If then the incumbent uses rebates to extract a "market entrance fee" from the entrant and if he calibrates the fee to the expected costs of an entrant, some entrants may be efficient in principle but not efficient enough to afford the entrance fee. Thereby these efficient entrants are foreclosed.[19] Also, large economies of scale could lead to inefficient foreclosure by rebates. Economies of scale may make entry impossible unless the entrant captures enough buyers to reach an efficient scale. Exclusive dealing agreements as well as target rebates can induce coordination failure among buyers, which would prevent an entrant from reaching the efficient scale and ultimately prevent efficient entry.[20] Finally, the European Commission in 2009 proposed a test that identifies an assured base of sales ("non contestable share"),[21] which the competitor cannot realistically tackle as a condition to foreclose a market with the help of rebates.

Common to all these approaches of modeling potential harmful effects of rebates is the strategic use of switching costs (penalty, forgoing a discount, forgoing very low prices), which the incumbent controls.

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[17] European Commission, Guidance on the Commission's Enforcement Priorities in Applying Article 82 of the EC Treaty to Abusive Exclusionary Conduct by Dominant Undertakings, *supra* note 15.

[18] Jordi Gual, Martin Hellwig, Anne Perrot, Michele Polo, Patrick Rey, Klaus Schmidt & Rune Stenbacka, an Economic Approach to Article *82* (July 2005), *available at* http://ec.europa.eu/dgs/competition/economist/eagcp_july_21_05.pdf.

[19] Philippe Aghion & Patrick Bolton, *Contracts As a Barrier to Entry*, 77 Am. Econ. Rev. 388 (1987).

[20] *See* Eric B. Rasmusen, J. Mark Ramseyer & John S. Wiley, Jr., *Naked Exclusion*, 81 Am. Econ. Rev. 1137 (1991); *see also* B. Douglas Bernheim & Michael D. Whinston, *Exclusive Dealing*, 106 J. Pol. Econ. 64 (1998).

[21] European Commission, Guidance on the Commission's Enforcement Priorities in Applying Article 82 of the EC Treaty to Abusive Exclusionary Conduct by Dominant Undertakings, *supra* note 15.

B. Predictions of Cumulative Prospect Theory

We argue that from a behaviorally informed perspective, namely from the perspective of CPT,[22] the switching costs of rebates should, however, go beyond the effects described so far on the basis of RCT. On top of the switching costs that the rational choice theory predicts, rebates also create psychological switching costs. In the approach of Bolton and Aghion,[23] higher, unpredicted psychological switching costs would unintendedly increase the barriers to entry and lead to even more inefficient foreclosure. In the Commission's framework, psychological switching costs that induce customers to refrain switching to a competitor, even when that competitor does make attractive offers, may stabilize a non-contestable share. Though additional psychological switching costs will be relevant in most models on rebates, in this paper we look at switching costs in isolation. Subsequent work may integrate what we find into market models.

CPT applies to decisions under risk. In fact, rebates place buyers into a situation of risk. Usually, buyers cannot predict with precision whether they will reach the rebate target or not. Accordingly, with some probability they may pay a high price, and with some other probability they will pay a low price. Buying outside a rebate scheme at a constant price per unit eliminates this risk. But it may increase the expected price in return. A rational risk-neutral buyer would certainly switch out of a rebate scheme if the outside option offered a higher expected payoff. If the rational agent was risk-averse—as it is commonly assumed and found in reality[24]—he would have additional incentive to leave the rebate. In contrast, under a certain set of conditions, CPT would predict that, even if the outside option offers lower risk and higher expected payoff, a buyer would keep buying in the rebate scheme. We will refer to this as the *stickiness effect* of rebates. Our experiment will test these opposing predictions of RCT and CPT.

According to CPT, rebates cause irrational stickiness of consumers due to reference-point shifts—in addition to the issues already discussed in the literature. Preferences should depend on reference points, which are influenced by hopes,[25] goals,[26] and expectations.[27] Buyers will hope to reach the rebate and adopt reaching the rebate threshold as their goal. Hence, they will consider a

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[22] See Tversky & Kahneman, *supra* note 16.

[23] *See* Aghion & Bolton, *supra* note 19.

[24] Charles A. Holt & Susan K. Laury, *Risk Aversion and Incentive Effects*, 92 AM. ECON. REV. 1644 (2002).

[25] *See* Richard Thaler, *Mental Accounting and Consumer Choice*, 4 MARKETING SCI. 199 (1985); *see also* Amos Tversky & Daniel Kahneman, *The Framing Decisions and the Psychology of Choice*, 221 SCI. 453 (1981); Kahneman & Tversky, *supra* note 3.

[26] Chip Heath, Richard P. Larrick & George Wu, *Goals As Reference Points*, 38 COGNITIVE PSYCHOL. 79 (1999).

[27] Johannes Abeler, Armin Falk, Lorez Goette & David Huffman, *Reference Points and Effort Provision*, 101 AM. ECON. REV. 470 (2011).

failure to reach the rebate as a loss. In the loss frame, individuals usually seek risk[28] and are therefore likely to prefer the risky option (that is, staying in the rebate) over a safe outside option with equal expected value or even a higher expected value (that is, purchasing the outside option at a constant price).

Using standard parameters and assuming that the rebate payoff is adopted as the reference point, in the Appendix we formally derive from CPT the prediction that irrational stickiness should be observed for all rebates for which not reaching the rebate is sufficiently likely (that is, the probability of reaching the rebate must be smaller than 76 percent).[29] Furthermore, stickiness should increase with increasing riskiness of the rebate, that is, the difference between the overall payoffs for reaching and not reaching the rebate. Finally, when taking into account individual differences, stickiness should increase with increasing loss aversion.[30]

C. Previous Findings

The predictive power of CPT for decision behavior has been supported by ample evidence using student participants[31] and also by evidence from studies with representative samples of the Dutch population[32] and evidence gathered

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[28] Kahneman & Tversky, *supra* note 3.

[29] *See* Tversky & Kahneman, *supra* note 16; *see also* Ulrich Schmidt & Horst Zank, *Risk Aversion in Cumulative Prospect Theory*, 54 MGMT. SCI. 208 (2008); Andreas Glöckner & Thorsten Pachur, *Cognitive Models of Risky Choice: Parameter Stability and Predictive Accuracy of Prospect Theory*, 123 COGNITION 21 (2012).

[30] It should be noted that behavioral effects that go beyond what is captured in CPT, such as routine effects (Tilmann Betsch, *Preference Theory: An Affect-Based Approach to Recurrent Decision Making*, *in* THE ROUTINES OF DECISION MAKING 39 (Tilmann Betsch & Susanne Haberstroh eds, Psychol. Press 2012); Tilmann Betsch, Babette Brinkmann, Klaus Fiedler & Katja Breining, *When Prior Knowledge Overrules New Evidence: Adaptive Use of Decision Strategies and the Role of Behavioral Routines*, 58 SWISS J. PSYCHOL. 151 (1991); Tilmann Betsch, Susanne Haberstroh, Andreas Glöckner, Thomas Haar & Klaus Fiedler, *The Effects of Routine Strength on Adaptation and Information Search in Recurrent Decision Making*, 84 ORGANIZATIONAL BEHAV. & HUMAN DECISION PROCESSES 23 (2001)), sunk cost effects (Hal R. Arkes & Catherine Blumer, *The Psychology of Sunk Cost*, 35 ORGANIZATIONAL BEHAV. & HUMAN DECISION PROCESSES 124 (1985)), or cognitive dissonance (LEON FESTINGER, A THEORY OF COGNITIVE DISSONANCE (Stan. Univ. Press 1957); Thomas R. Shultz & Mark R. Lepper, *Cognitive Dissonance Reduction As Constraint Satisfaction*, 103 PSYCHOL. REV. 219 (1996)), might contribute to stickiness effects as well. We will focus our investigation on predictions by CPT, because of its prominence and because, in contrast to the other models, it is sufficiently well specified in mathematical terms to allow predicting choice behavior very accurately also on the individual level (Glöckner & Pachur, *supra* note 29). However, we partially take into account these effects to construct strong hypotheses for a critical test of CPT.

[31] Andreas Glöckner & Tilmann Betsch, *Do People Make Decisions Under Risk Based on Ignorance? An Empirical Test of the Priority Heuristic Against Cumulative Prospect Theory*, 107 ORGANIZATIONAL BEHAV. & HUMAN DECISION PROCESSES 75 (2008); Glöckner & Pachur, *supra* note 29; Kahneman & Tversky, *supra* note 3; Tversky & Kahneman, *supra* note 16.

[32] Adam S. Booij, Bernard M.S. van Praag & Gijs van de Kuilen, *A Parametric Analysis of Prospect Theory's Functionals for the General Population*, 68 THEORY & DECISION 115 (2010).

"in the wild."[33] However, some limitations have also been demonstrated. For example, when using a critical property approach, it has been shown that CPT cannot account for several systematic effects in three-outcome gambles.[34] Recent research also indicates that some effects predicted by CPT disappear in decisions from experience.[35] Furthermore, process analysis indicates that CPT should not be considered to be a process model for decision-making.[36] Nevertheless, many findings, including the ones mentioned above, suggest that CPT is a reasonable paramorphic (as-if) model for choices in two-outcome prospects with stated probabilities, such as the ones considered in this paper.

In contrast to the large literature on CPT, only a certain branch of marketing research has contributed specifically to empirically exploring the effect of rebates.[37] This literature concentrates on optimizing loyalty programs. It does not show what is the minimum rebate design that still can impede rational switching and implement substantial psychological switching costs. Our experiment sets up a minimal rebate paradigm focusing on the very essentials. We do not use any factor that improves the psychological attractiveness of a rebate beyond the pure conditional, monetary payoff structure. Given the results from the management literature, our rebate scheme should have a hard time to seduce any participant not to maximize her expected payoffs. We pursue this minimal rebate paradigm to generate reliable evidence that indeed the mere payoff structure suffices to generate the observed effects.

A single experiment was conducted specifically to feed into antitrust law and economics of rebates. It demonstrated nonrational attraction effects of loyalty

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[33] Colin F. Camerer, *Prospect Theory in the Wild: Evidence from the Field*, in 3 NEGOTIATION, DECISION MAKING AND CONFLICT MANAGEMENT 575 (Max H. Bazerman ed., Edward Elgar 2005).

[34] Michael H. Birnbaum, *Evidence Against Prospect Theories in Gambles with Positive, Negative, and Mixed Consequences*, 27 J. ECON. PSYCHOL. 737 (2006); Michael H. Birnbaum, *New Paradoxes of Risky Decision Making*, 115 PSYCHOL. REV. 463 (2008); Michael H. Birnbaum, *New Tests of Cumulative Prospect Theory and the Priority Heuristic: Probability-Outcome Tradeoff with Branch Splitting*, 3 JUDGMENT & DECISION MAKING 304 (2008).

[35] Ido Erev, Eyal Ert & Eldad Yechiam, *Loss Aversion, Diminishing Sensitivity, and the Effect of Experience on Repeated Decisions*, 21 J. BEHAV. DECISION MAKING 575 (2008); Ralph Hertwig, Greg Barron, Elke U. Weber & Ido Erev, *Decisions from Experience and the Effect of Rare Events in Risky Choice*, 15 PSYCHOL. SCI. 534 (2004); Benjamin E. Hilbig & Andreas Glöckner, *Yes, They Can! Appropriate Weighing of Small Probabilities As a Function of Information Acquisition*, 138 ACTA PSYCHOLOGICA 390 (2011).

[36] Andreas Glöckner & Ann-Katrin Herbold, *An Eye-Tracking Study on Information Processing in Risky Decisions: Evidence for Compensatory Strategies Based on Automatic Processes*, 24 J. BEHAV. DECISION MAKING 71 (2011).

[37] *See, e.g.*, Xavier Drèze & Joseph C. Nunes, *Using Combined-Currency Prices to Lower Consumers' Perceived Cost*, 41 J. MARKETING RES. 59 (2004); Joseph C. Nunes & Xavier Drèze, *The Endowed Progress Effect: How Artificial Advancement Increases Effort*, 32 J. CONSUMER RES. 504 (2006); Joseph C. Nunes & Xavier Drèze, *Your Loyalty Program Is Betraying You*, HARV. BUS. REV. (Apr. 2006), https://hbr.org/2006/04/your-loyalty-program-is-betraying-you/ar/1.

rebates.[38] For simulated retail markets, Beckenkamp and Maier-Rigaud showed that subjects stuck to a loyalty rebate scheme, even if maximizing the expected payoff suggested otherwise. Although this previous work was important, it addressed only the relatively complex decisions in retail markets and had some additional limitations that we would like to overcome in the current study.

With respect to theory, Beckenkamp and Maier-Rigaud do not account for the mutual offsetting effects of the value function and probability-weighting function of CPT when deriving their hypothesis. In their experiment, subjects in fact had to solve a news-vendor problem,[39] which most subjects must have considered extremely difficult to do. Because subjects started out in a rebate scheme by default, they may have stayed loyal merely because they wanted to avoid any decision (including the decision to switch) in a situation they felt that they did not oversee.

Our approach differs in four crucial respects from that of Beckenkamp and Maier-Rigaud. First, we focus on consumer decisions in contrast to retailer decisions. Second, like many consumer environments, our experimental tasks are simple, transparent, and easy to grasp and solve. Third, we investigate factors possibly influencing the magnitude of the effect based on predictions of CPT. Fourth, in our task, consumers themselves decided whether to enter the rebate or not so that the rebate was not preset as a default.

III. GENERAL METHOD AND HYPOTHESIS

In three experiments with a total number of 175 participants, we investigate experimentally whether stickiness can be empirically observed and whether its size can be experimentally influenced. We therefore manipulate the realization of expected demand affecting the relative attractiveness of the rebate scheme relative to an outside option. We further manipulate the magnitude of the rebate (for example, overall €10 rebate instead of €5 rebate) and investigate the influence of mere buying frequency in the rebate scheme (for example, buying 10 instead of 5 objects), while holding the differences in total payoffs (rebate magnitude) constant. We thereby stripped down the design of the experimental rebate to the very essentials of a consumer loyalty rebate scheme setting. Analogous to the abovementioned Lufthansa example, the situation that we aim to capture is the following: a consumer has the possibility to enter a loyalty rebate scheme for a product he intends to buy repeatedly in a certain time period. If he reaches the imposed[40] target (for example, buying 10 items), the

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[38] Martin Beckenkamp & Frank P. Maier-Rigaud, *An Experimental Investigation of Article 82 Rebate Schemes*, 2 COMPETITION L. REV. 1 (2006).

[39] *See* Moutaz Khouja, *The Single-Period (News Vendor) Problem: Literatures Review and Suggestions for Future Research*, 27 OMEGA, INT'L MGMT. SCI. 537 (1999).

[40] In the experiment we do not face the difficulty of heterogeneous consumer demand because we can induce it. As we did not want to study the effect of a self-imposed target but that of the essential features of a target rebate we did not let subjects chose their target but imposed it. If

rebate will be granted for all items bought and the overall price will be extremely low; if he does not reach the target, however, the rebate will not be granted and the price will be high. The price of the outside option is between these two prices. After some time, a random event ("external shock") decreases the likelihood that he or she can reach the target, so that it becomes rational to switch. We measure whether persons switch or stick to the rebate.

We set up consecutive buying decisions (rounds) concerning tokens connected by a rebate condition. Two chance moves that can lead to the omission of the *critical round* and of the *last round* represent the uncertainty about consumers' demands. The critical round is omitted with a certain probability. Options are constructed so that, according to RCT, people should switch to a safe outside option if the critical round is omitted. The chance move in the last round is necessary to maintain uncertainty about consumers' demand even after the consumer has learned whether the critical round takes place. We vary the number of repetitions (rounds) of buying and the magnitude of the rebate granted across different subjects.

In the experiments, we use rebate schemes with a sufficiently high probability for not reaching the rebate (after the critical round was omitted). As explained above, and as shown in the Appendix, CPT predicts that the subjects who have consistently bought tokens up to the critical round do not exit the rebate scheme even if exit yields a higher expected payoff (Stickiness Hypothesis (H1)).

Beyond investigating the mere existence of the stickiness effect, we were interested in whether CPT can also predict its severity. We therefore constructed our material to test two further hypotheses, including manipulations for which an effect was predicted and one for which a null-effect was predicted. The second manipulation was also selected to test an assumption underlying core arguments recently used in the regulation of rebates. According to CPT, the stickiness effect should increase with increasing difference between the total payoffs of reaching vs. not reaching the rebates.[41] We therefore predict that a rebate of larger magnitude leads to greater stickiness (Magnitude Hypothesis (H2)). According to CPT, the stickiness of rebates should mainly depend on magnitude, that is, the difference between high and low payoff.[42] It should not be influenced by the mere number of repetitions of previous buying. CPT therefore predicts the following null hypothesis that the stickiness of rebates does not increase with the mere number of repetitions of buying if the magnitude of the rebate is constant (Repetition Null Hypothesis (H3)).

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anything, imposing the target should work against our hypothesis because participants could be expected to be more reluctant to regard an imposed target as their goal than they would to regard a self-set goal as their target.

[41] *See* Appendix.

[42] *See id.*

It bears emphasis that this is a strong null hypothesis. Previous findings indicate increased routine effects with repeated buying,[43] which contradicts the CPT prediction. In addition, with more repetitions, subjects "invest" more money into the rebate. This may trigger a sunk cost effect[44] that also works against the specific CPT prediction. This hypothesis is also particularly interesting for practical reasons, because it captures the claim by the Court of Justice of the European Union that a longer reference period of a loyalty rebate may lead to greater market foreclosure.[45] Of course, in the situations addressed by the Court of Justice of the European Union, the number of rounds and the differences between total payoffs will most likely be confounded. It is nevertheless relevant to differentiate between effects of magnitude and repetition.

IV. EXPERIMENT 1: STICKY REBATES AND INDIRECT COMPARISON

A. Participants and Design

Participants were recruited from the MPI Decision Lab subject pool using ORSEE.[46] The majority of participants were students of the University of Bonn, from a wide variety of subject backgrounds. A total of 64 participants (participants had an average age of 24, 37 of whom were female) took part in the six sessions. The study lasted between 60 and 90 minutes, and participants received a performance-contingent payoff ranging from €0.94 to €17.80 (approximately US$1.40 to US$26.70)[47] in exchange for their participation. We use a 2 × 2 × 2 mixed effects design (whether a negative shock on expected demand occurs; whether repetition in buying is high; and whether the rebate magnitude is high). The within-subject effect of the shock tests the stickiness hypothesis. The between-subject effects of rebate magnitude and repetition test the second and third hypotheses, respectively. Whereas all subjects go through both demand shock conditions, they are randomly assigned to one of the two repetition conditions and to one of the two magnitude conditions.

B. Procedure

First, participants read the experimental instructions and answered a control questionnaire to ensure that they had understood the instructions and were able to calculate the possible payoffs. Subjects were provided with pocket

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[43] Betsch, Haberstroh, Glöckner, Harr & Fiedler, *supra* note 30.

[44] *Cf.* Arkes & Blumer, *supra* note 30.

[45] Case 322/81, Michelin v. Comm'n, 1983 E.C.R. 3466; Case T-203/01, Michelin v. Comm'n, 2003 E.C.R. II-4082.

[46] Ben Greiner, *An Online Recruitment System for Economic Experiments*, in FORSCHUNG UND WISSENSCHAFTLICHES RECHNEN 79 (Kurt Kremer & Volker Macho eds., 2003).

[47] These payoffs include the gains and losses subjects incurred when they chose and played the lotteries measuring their risk preferences and loss aversion.

calculators that they could use at any time during the entire experiment. Payoffs in the experiment were stated in terms of Euros (Figure 1). In each round of the experiment, participants could buy either a rebate token or choose an outside option. In two of the rounds (the *critical* and the *last round*), however, buying a token was only possible with a certain probability, which induced uncertainty about whether a person would reach the rebate or not. Persons were informed about the probabilities of both random events, which could occur (that is, possible decision between token or outside option) or not occur (that is, round omitted). The critical round took place with a probability of $p_C = 0.83$. The last round took place with a probability of $p_L = 0.15$. p_C and p_L were independent and this was common knowledge to all subjects. In order to receive the rebate for the tokens, the person needed to buy tokens in all but one round. Stated differently, the rebate was still granted if one of the random draws turned out negative and the person had bought tokens in all remaining rounds. Hence, given that the critical round would occur, the probability of reaching the rebate was high ($p_R = p_C + (1 - p_C)p_L = 0.86$). Nevertheless, if the critical round did not take place, this probability was reduced dramatically to $p_R^* = p_L = 0.15$.

The payoffs and probabilities were set in such a way that if the critical round was omitted (for a subject who bought tokens in every previous round), RCT and CPT would make contrary predictions about staying in or quitting the loyalty rebate option: the expected payoff for continuing to buy tokens was lower than that for choosing the outside option. Hence, RCT predicts rational switching to the outside option.[48] In contrast, CPT predicts a stickiness effect of rebates and continued buying of rebate token.[49] As the main dependent measure, we used buying behavior in the round after the random draw that determines whether the critical round takes place or not.

Choice data in the following round was only informative if the critical round was indeed omitted. To avoid data loss for cases in which this was not the case, before the realization of the random event determining whether the critical round would take place or not, subjects needed to commit themselves to decisions in both potential states of the world—that is, they decided what they would do if the critical round was omitted and what they would do in case it took place. If a round was omitted, it was neither possible to choose the outside option nor to buy a token. After it was randomly determined whether the critical round took place or not, the buying behavior committed to ex ante was implemented automatically. Then participants continued buying in subsequent rounds.

After subjects had gone through the experiment, we elicited risk preferences and the loss aversion parameter λ using the incentivized scales developed by Holt

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48   *See infra* tbl. 2.
49   *See id.*

Round 3

You can either purchase a token or choose a direct payment.

Figure 1. Screen on which participants took their decisions

and Laury[50] and Gächter, Johnson, and Herrmann.[51] The Holt-Laury scale measures risk aversion by letting subjects choose between 10 pairs of lotteries. Each pair contains a low-risk lottery yielding €2 with probability π and €1.60 with probability $1-\pi$ and a high-risk lottery yielding €3.85 and €0.10 with the same probabilities ($\pi = 0.1, 0.2, \ldots, 1$). The number of choices for the low-risk lottery is used as a measure for risk aversion. If, for example, a participant chooses the low risk lottery in 7 (out of the overall 10) decisions, he has a risk-aversion score of 7 (which refers to a specific range of relative risk aversion scores[52]). The Gächter-Johnson-Herrmann scale is based on six choices between playing a lottery or rejecting it. Each lottery has a fifty-fifty chance of winning €6 or losing between €2 and €7. For example, if the subject is not willing to play a lottery offering a fifty-fifty chance of winning €6 and losing €3, it is assumed that the person has a loss aversion parameter that exceeds two ($\lambda > 2$).

C. Materials

In each round, participants had to decide whether to buy a rebate token or to select an outside option while being provided with detailed information.[53] The outside option provided an opportunity to earn €0.44 per round in which it was chosen. For each token that they bought, participants received €1.30 at the end of the experiment. This value represented the consumption utility of the token. Dependent on condition, the buying price before the rebate was either €1.10 or €1.25. Hence, without a rebate, the payoff of the outside option

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[50] Holt & Laury, *supra* note 24.

[51] Simon Gächter, Eric J. Johnson & Andreas Herrmann, *Individual-Level Loss Aversion in Riskless and Risky Choices* (Ctr. for Decision Research and Experimental Economics Discussion Paper Series No. 2010-20, 2010).

[52] Holt & Laury, *supra* note 24.

[53] *See infra* fig. 1.

was much higher than that of the tokens. If the rebate threshold was reached, however, the effective buying price was substantially reduced, so that then the payoff for each token was higher than the outside option. We manipulated the number of rounds in which tokens could be bought from low (10 rounds) to high (15 rounds).

To make the results comparable between conditions, we held the incentives for leaving the rebate scheme after the first random draw, as well as the number of remaining rounds after the critical round, constant across conditions. Consequently, in the low repetition condition the critical round was Round 5, whereas it was Round 10 in the high repetition condition. Furthermore, for all conditions the difference in expected payoffs between the option to remain in the rebate scheme and the option to quit was held constant (except for small rounding differences).

D. Results

Out of 64 subjects, 11 switched between the rebate and the outside option at least once before the critical round. For these subjects, both RCT and CPT predicted to leave the rebate after the critical round was omitted. Four subjects did not buy a token in round one and kept choosing the outside option consistently until the last round. This behavior of avoiding a rebate scheme can be explained by a strong aversion to risk.[54] The remaining 49 subjects (76 percent), which we will call *target persons* (because they are most informative for testing our hypotheses), entered the rebate scheme and started buying rebate tokens constantly until the critical round.

In line with previous findings,[55] our participants were mainly risk-averse with an average score of 6.03 ($SD = 1.79$), which corresponds to a relative risk aversion between 0.41 and 0.68 ($0.41 < r < 0.68$). Moreover, the Gächter-Johnson-Herrmann scale showed that the subjects displayed loss aversion to a normal degree ($\lambda = 2.18$, $SD = 0.65$[56]). Four persons answered inconsistently (that is, they did not show a unique switching point and switched repeatedly between accepting and not accepting) and for them no loss-aversion score could be calculated.

1. Stickiness of Rebates

Our main dependent variable of interest was the subjects' choices after the random draw that determined whether the critical round took place or not. In the case that the critical round has taken place, the target persons have a higher expected payoff from buying a rebate scheme token than from choosing the outside option, and CPT makes the same prediction. If the critical round is

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[54] *See infra* tbl. 3.
[55] *See, e.g.*, *id.*
[56] *Cf.* Appendix.
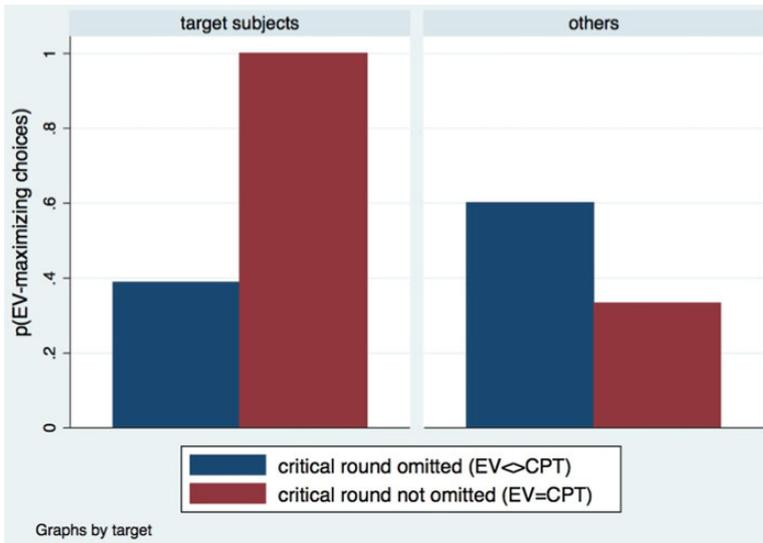
Figure 2. Choices after the critical round in Experiment 1

omitted, however, the outside option will yield a higher expected payoff, and it would be rational to switch to the outside option. CPT, by contrast, predicts sticking with the rebate. For both situations (that is, whether critical round omitted or not), we coded whether the targeted persons chose the option that maximized their expected payoff (expected value / EV)—that is, whether or not they made decisions in accordance with RCT.

The results indicate a stickiness effect (Figure 2, left). The proportion of EV-maximizing choices was much higher if the critical round took place as compared to being omitted.[57] In line with the CPT prediction, target persons continued to buy even if the critical round was omitted, and it was EV-maximizing to quit the rebate. The proportion of EV-maximizers, if the critical round was not omitted and RCT and CPT made the same predictions, is much higher. This difference in proportions was statistically significant based on the Exact McNemar test ($\chi^2_{df=1} = 30.00$, $p < 0.001$, N = 49), and the result is robust to including all non-target subjects into the analysis.[58]

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[57] *See supra* fig. 2.

[58] We include non-target subjects into the four-cell test matrix of the McNemar test in two ways. The four cells are: (1) always maximize expected value; (2) maximize if critical round is played and not if it is omitted; (3) maximize if critical round is omitted and not if it is played; and (4) never maximize. First, we included them by their actual maximizing behavior (for them, maximizing means not buying in the rebate scheme, irrespective of whether the critical round takes place or not). Thereby most, but not necessarily all, of them end up in the "always maximize" cell (McNemar test, $\chi^2_{df=1} = 18.78$, $p < 0.0001$, N = 64). Second, we included them assuming that they had entered the rebate scheme but, counter to our CPT-Hypotheses, had

Low Repetition, Low Magnitude — Low Repetition, High Magnitude — High Repetition, Low Magnitude — High Repetition, High Magnitude

p(EV-maximizing choices)

critical round omitted (EV<>CPT)
critical round not omitted (EV=CPT)

Graphs by lang and variance_high
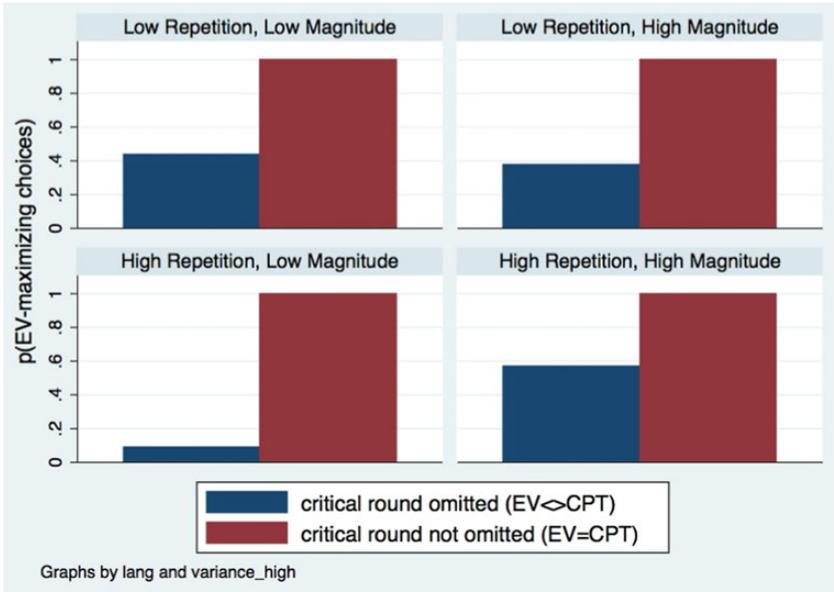
Figure 3. Choices after the critical round by condition in Experiment 1

Hence, we find strong support for our hypothesis H1, which indicates that loyalty rebates are sticky. In accordance with the predictions of CPT, our subjects opted for the choice that yielded greater risk and lower expected payoff.

For the non-target persons (Figure 2, right), it was always rational not to buy the token, which the majority of them actually did, regardless of whether the critical round was omitted or not. There was no significant difference in proportions (McNemar $\chi^2_{df=1} = 2.67$, $p = .21$).

2. Effects of Magnitude and Repetition on Stickiness

To test our hypotheses H2 and H3, which state that stickiness increases with magnitude of the rebate, but not with mere repetition in buying, we analyzed choice behavior in the critical round separately for the four conditions, considering target persons only (Figure 3). The stickiness effect was found in three of four conditions at the conventional level of significance and in one condition at a marginal level of significance (The low-magnitude, low-repetition condition: Exact McNemar $\chi^2_{df=1;N=16} = 9.00$, $p = 0.004$; high-magnitude, low–repetition condition: Exact McNemar $\chi^2_{df=1;N=8} = 5.00$, $p = 0.062$; low-magnitude, high-repetition condition: Exact McNemar $\chi^2_{df=1;N=11} = 10.0$, $p = 0.002$; high-magnitude, high-repetition condition: Exact McNemar $\chi^2_{df=1;N=14} = 8.00$,

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always maximized expected payoffs, which places all non-target subjects in the always maximize cell, McNemar test scores of $\chi^2_{df=1} = 30.00$, $p < 0.001$, N = 64.

Table 1: Three logistic regression models predicting stickiness in Experiment 1

	(1) Sticky-Buying	(2) Sticky-Buying	(3) Sticky-Buying
High Repetition	0.772	1.142	1.141
	(1.01)	(1.39)	(1.19)
High Magnitude	−1.194	−1.413[+]	−1.955[*]
	(−1.59)	(−1.77)	(−2.06)
Interaction Effect (Repetition * Magnitude)	−2.850[+]	−3.356[*]	−3.196[+]
	(−1.91)	(−2.07)	(−1.79)
Gender		−1.576[*]	−2.051[*]
(0 if female, 1 if male)		(−2.28)	(−2.53)
Risk Aversion Score			0.280
			(0.79)
Loss Aversion (λ)			−0.522
			(−0.81)
Constant	0.762[*]	1.578[**]	1.273
	(1.97)	(2.86)	(0.58)
Observations	49	49	45
Pseudo R^2	0.108	0.193	0.278

Note: [+] indicates 10% significance level; [*] indicates 5% significance level; and [**] indicates 1% significance level. Raw coefficients for a logistic regression on sticky-buying (buying choices after the critical round; that is, when round 5 or 10 was omitted). Buying indicates stickiness preventing subjects from maximizing expected payoffs. z-statistics in parentheses. Robust standard errors were used. Model 3 includes four observations less due to missing loss-aversion scores.

$p = 0.008$). All results are robust to including the non-target subjects under the assumption that they would have maximized EV had they entered the rebate scheme consistently. Including the non-target subjects according to their actual maximizing behavior leads to insignificant results in the high-magnitude, low-repetition condition and renders results in the low-magnitude, high-repetition condition to be only marginally significant.[59]

For a regression-based analysis, we generated a sticky-buying score. The score was set to 1 if the person bought the token after the critical round was omitted and 0 otherwise. The score hence indicates whether one performed sticky-buying (1) or not (0). We conducted a logistic regression[60] with this sticky-buying score as the dependent variable, as well as the two condition variables and their interaction as predictors and risk aversion, loss aversion, and gender as further control variables.

We find that manipulation of the magnitude of the rebate has a significant effect on its stickiness (Table 1). Contrary to hypothesis H2, however, stickiness decreases with increasing magnitude of the rebate, and one must reject

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[59] *See id.*

[60] We estimate the logit-regression equation $y = \beta_0 + \beta_i X_i + \dots \beta_n X_n + \varepsilon$. A value of $y = 1$ indicates the decision to keep buying into the rebate scheme, and $y = 0$ indicates the decision not to buy into the rebate scheme. The variables X_1 through X_7 are the variables and interactions listed in the regression Table 1.

H2. There was no significant effect of repetition on stickiness that allows maintaining the null-hypothesis H3. However, it has to be taken into account that the power of the regression analysis was relatively low ($1 - \beta = 0.56$, assuming that odds ratio = 2, $p(Y = 1 \mid X = 1)_{H0} = 0.5$ in a two-sided test).[61]

We also find a (marginally) significant interaction effect between magnitude and repetition, which CPT had not predicted. High magnitude of the rebate combined with high repetition frequency decreased the stickiness of a rebate and led to considerably more rational buying behavior. In addition, we find a significant gender effect. Female subjects were more inclined to stick to the rebate than male subjects, once they had entered the rebate scheme. Risk aversion and loss aversion had no effect on stickiness once one entered the rebate, although CPT predicts that increasing loss aversion should lead to higher stickiness.[62]

3. Individual Differences in Entering the Rebate

We were also interested in the question of whether there were individual differences in entering the rebate scheme in the first place, depending on people's risk aversion and loss aversion. One might expect more risk-averse and loss-averse persons to avoid entering rebate schemes in the first place. As mentioned above, the large majority of participants entered the rebate scheme and bought tokens until the critical round (N = 49), but there was also a minority of persons who avoided the rebate altogether and chose the outside option from the beginning (N = 4). We found higher risk aversion in these rebate avoiders (M = 7.2, SE = 1.18) compared to target persons (M = 5.8, SE = 0.17), which was marginally significant in a nonparametric test (one-sided Mann-Whitney U test: $p = 0.07$). Similarly, rebate avoiders had higher loss aversion (M = 2.47, SE = 0.53) compared to target persons (M = 2.17, SE = 0.08), which was also marginally significant (one-sided Mann-Whitney U test: $p = 0.08$).

4. Discussion

As expected, we show that loyalty rebates lead to nonrational stickiness in that consumers do not switch to outside options with a higher payoff and lower risk. We did not find support for the magnitude hypothesis (H2) and there was no significant effect of repetition on stickiness that allows rejection of the repetition null-hypothesis (H3) in line with CPT. We found an unexpected interaction of repetition and magnitude of the rebate.

One of the potential weaknesses of the first experiment is that we show the stickiness effect only as comparison between a situation in which the critical round was omitted and one in which the critical round was not. Both

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[61] Franz Faul, Edgar Erdfelder, Albert-Georg Lang & Axel Buchner, *G*Power 3: A Flexible Statistical Power Analysis Program for the Social, Behavioral, and Biomedical Sciences*, 39 BEHAV. RES. METHODS 175 (2007).

[62] *See* Appendix.

situations, however, necessarily differ slightly concerning expected payoff and risk, due to the different number of rounds that have been played so far (i.e., one round less was played if the critical round was omitted). Although we find a stickiness effect, we cannot completely rule out further unexpected effects from these differences. Hence, there remains some doubt with respect to whether the investigated rebate scheme was the sole cause of the observed stickiness effect. Therefore, in a second experiment, we compare the participants' choice between remaining in the rebate scheme and exiting the rebate scheme, with a payoff-equivalent choice between two lottery tickets—one that is the risky, low-payoff option and another that is the safe, high-payoff option. In terms of payoffs and risk, the two lottery tickets are exactly equivalent to the two options that our participants have when already in the rebate scheme (remaining in the rebate scheme represents the risky, low-payoff option, and exiting rebate represents the safe, high-payoff option). If subjects choose the option with high risk and low payoff more often when in the rebate scheme than in the lottery-ticket choice, as we expect, we can identify the rebate scheme as the cause for the stickiness effect. As the decision in the rebate and the choice between the lottery tickets are equivalent in terms of risk and expected payoff, finding a difference between choices in the rebate scheme and the lotteries tickets could not be explained by RCT. CPT, however, would predict this difference due to a reference point shift for rebates.

V. EXPERIMENT 2: STICKY REBATES IN DIRECT COMPARISONS WITH GAMBLES

A. Method

Most participants were students from the University of Bonn, recruited from the MPI Decision Lab subject pool using ORSEE.[63] We assured that individuals took part in only one of the rebate studies reported in this paper. A total of 68 participants (mean age of 24.9; 37 female and 31 male) took part in the experiment. The study lasted between 60 and 90 minutes, and participants received a performance-contingent payoff ranging from €0 to €29.69 (approximately US$41.27) in exchange for their participation. Procedure and design were essentially the same as in Experiment 1, except that participants additionally chose between risky and safe lottery tickets, which were equivalent to the prospects that were involved in their sticky buying decision.

   Table 2 reveals that the choice between staying in a rebate scheme and leaving the rebate scheme is essentially a choice between two gambles. Take the treatment with a low rebate magnitude and a low repetition of buying rounds (first column of Table 2) as an example. Here staying in the rebate (and consistently buying tokens for the remaining rounds) means choosing a

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[63] Greiner, *supra* note 46.

Table 2. Manipulations and expected payoffs for the four treatments in Experiment 2

	Rebate Magnitude			
	Low		**High**	
	Repetition in Buying			
	Low	**High**	**Low**	**High**
Rebate Magnitude in € (after omitting critical round)	5.06	5.10	9.05	9.01
Repetitions in Buying (rounds)	10	15	10	15
x_1 (price per token without rebate)	1.10 €	1.10 €	1.25 €	1.25 €
x_2 (price per token with rebate)	0.56 €	0.75 €	0.25 €	0.61 €
Prospect of staying in rebate (after omitting critical round)	(6.66 €; 0.15; 1.60 €)	(7.70 €; 0.15; 2.60 €)	(9.45 €; 0.15; 0.40 €)	(9.66 €; 0.15; 0.65€)
Prospect of quitting rebate option (after omitting critical round)	(2.56 €; 0.15; 3.00€)	(4.00 €; 0.15; 3.56€)	(2.40 €; 0.15; 1.96€)	(2.65 €; 0.15; 2.21€)
Expected value of staying / quitting in €	2.36 / 2.63	3.36 / 3.63	1.76 / 2.03	2.00 / 2.28
CPT V for staying / quitting	−6.13 / −7.53	−6.17 / −7.60	−10.22 / −13	−10.18 / −12.93

Note: Prospects are given in the format (payoff 1; probability 1; payoff 2). *See* Appendix for an explanation of CPT parameter *V*.

risky gamble with a lower expected payoff. Staying in the rebate yields a €6.66 payoff with 15 percent probability and a €1.60 with 85 percent probability. Exiting the rebate scheme and never buying a token again means taking a less risky gamble with a higher expected payoff. Exiting the rebate scheme yields a €2.56 with 15 percent probability and a €3 with 85 percent probability. In Experiment 2, in addition to buying in the rebate scheme participants had to choose one out of two lottery tickets that equaled these payoffs (that is, lottery ticket 1 with a €6.66 payoff with 15 percent probability and a €1.60 payoff with 85 percent probability; lottery ticket 2 with a €2.56 payoff with 15 percent probability and a €3 payoff with 85 percent probability).

Both the rebate scheme and the lottery tickets were played and paid. This design allows for a direct evaluation of the stickiness effect of rebates because, according to CPT for lotteries, no shift in reference point should occur.[64] CPT predicts stickiness only in the rebate task and not in the choice between lottery tickets, whereas RCT would predict the same behavior in both situations. Thus Experiment 2 allows us to identify the rebate scheme as the cause of the stickiness effect because the rebate scheme is present in one task and absent in the other whereas the choice between the gambles is identical in the two.

[64] Models of expectation based reference points (Köszegi & Rabin, 2006) neither predict a reference point shift by the lottery, because they assume that reference points are based on *lagged* expectations. But in our setting subjects chose immediately after they were presented with the choice between the two lotteries tickets.

B. Results

Again, the large majority of participants (that is, N = 54, proportion = 0.79) entered the rebate scheme and started buying rebate tokens constantly until the critical round. For these target persons, we replicate the stickiness effect, so that the proportion of EV-maximizing choices was much higher if the critical round took place (proportion = 0.96), compared with being omitted (proportion = 0.56) (Exact McNemar $\chi^2_{df=1} = 22.00$, $p < 0.001$, N = 54). Again, this result is robust to the inclusion of the non-target subjects.[65] More importantly, we also find the stickiness effect in a direct comparison between persons' behavior in the rebate scheme and in choosing between equivalent lotteries. In the equivalent choices between lottery tickets mimicking the situation after the critical round was omitted, target persons choose the EV-maximizing, safe outside option (proportion = 0.72) significantly more often than when buying in the loyalty rebate (proportion = 0.56; see above) (McNemar $\chi^2_{df=1} = 4.26$, $p = 0.039$, N = 54). This effect only proves robust to the inclusion of non-target subjects under the assumption that they would have always maximized if they had entered the rebate (McNemar $\chi^2_{df=1} = 4.26$, $p = 0.039$, N = 68).

The significant decrease of stickiness with magnitude, the interaction of magnitude, and repetition could both not be replicated in a logistic regression that was conducted with the same predictors as before.[66] However, the coefficients are in the same direction as observed in Experiment 1 (high magnitude: $b = -0.45$, $z = -0.76$, $p = 0.45$; IE repetition × magnitude: $b = -0.50$, $z = -0.40$, $p = 0.69$). The effect of gender on stickiness did not replicate either ($b = 0.41$, $z = 0.70$, $p = 0.48$). Also, the differences in risk aversion and loss aversion between rebate avoiders ($n = 4$) and target persons could not be replicated, but those differences were both in the previously observed direction (Mann-Whitney: for risk aversion $p = 0.48$; for loss aversion $p = 0.13$; one-sided).

C. Discussion

In the second study, we replicate the stickiness effect observed in Experiment 1 and also show that it can be found when directly comparing choices in loyalty rebate schemes with choices between equivalent lottery tickets. The second experiment is also informative with respect to the stability of the other observed effects of the factors influencing the magnitude of stickiness and whether persons enter rebate schemes or not. The effects of these factors seem to be relatively weak and potentially unstable, and they should be interpreted with caution.

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[65] McNemar $\chi^2_{df=1} = 16.67$, $p < .001$, N = 68 if they are included with their actual maximizing behavior; McNemar $\chi^2_{df=1} = 22.00$, $p < 0.001$, N = 68, if they are included under the assumption that they had always maximized had they entered the rebate scheme.

[66] *Cf.* Model 3, tbl. 1.

A classic argument in economics is that biases and irrationality in choice behavior should disappear in repeated market interactions. According to this view, loyalty rebates might be unproblematic because consumers will learn over time that they are detrimental and avoid them in the future. We investigate this possibility and the stability of the stickiness effect in a third experiment.

VI. EXPERIMENT 3: STICKINESS IN REPEATED REBATE SCHEMES

In the third experiment, participants could decide whether or not to buy into rebate schemes in eight different scenarios. Each scenario consisted of ten buying trials. As in the real world, the scenarios differed with respect to the conditions of the rebates and the quality of alternative options. To mimic a common situation in reality, we induced uncertainty with respect to the alternative option. That is, when making the decision whether or not to enter a loyalty rebate scheme, no information was provided about whether an alternative option that will become available later would be better or worse. Half of the scenarios resembled situations as above, in which switching to an outside option was rational (*switching scenarios*), but stickiness should lead to continued buying. The other half were controls in which the alternative option appearing later on was worse, and it was therefore profit-maximizing to continue buying into the rebate scheme (*non-switching scenarios*).

A. Method

Participants were again mainly students from the University Bonn recruited from the MPI Decision Lab subject pool using ORSEE.[67] A total of 43 participants (mean age: 24.6 years; 22 female, 21 male) took part in the third experiment, which lasted about 90 minutes. Participants received a performance-contingent payoff (range: €2.34 to €19.54; approximately US$3.25 to US$27.16) in exchange for their participation. The scenarios were manipulated within subjects according to a 2 (switching vs. non-switching scenarios) × 4 (versions) design. Presentation order was counterbalanced between subjects (that is, eight different orders determined by Latin squares).

The procedure within each scenario was similar to that in the previous experiments, except that we tried to increase external validity in some respects. For 10 rounds, participants could buy the loyalty rebate option A, but rounds 5 to 10 could all be omitted with a certain probability (for example, each one of the planned buys could be cancelled). The loyalty rebate was granted if option A had been bought a certain number of times (that is, 7 or 9 out of 10 times). It was common knowledge that an alternative option B (for example, a competing flight offer) would be available later on, but people had no knowledge concerning the specificities of this option until then. In each round,

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[67] Greiner, *supra* note 46.

participants had the option to "do nothing," which was connected with a small cost. In the four switching scenarios, outcomes were constructed so that quitting the rebate scheme and changing to option *B* was EV-maximizing. Continued buying in the rebate, in contrast indicates stickiness. In the non-switching control scenarios, continued buying was rational. We measured stickiness by the number of buying decisions for the loyalty rebate option *A* in the round after option *B* became available. After reading the instructions, all persons worked on a test scenario to assure understanding.

B. Results and Discussion

In the majority of scenarios, participants started buying consistently into the rebate scheme (proportion = 0.64). Analyses were conducted for these cases only. In the switching scenarios, we found a strong stickiness effect. In the round after option *B* became available, almost two thirds of the persons who had entered the rebate scheme showed irrational buying behavior and continued buying option *A* (proportion = 0.63, *SE* = 0.049).[68] Virtually the same proportion of continued rational buying option *A* was observed in the non-switching scenarios (proportion = 0.65, *SE* = 0.068). A Wald test revealed that both proportions did not differ significantly ($F(1, 42) = 0.15$, $p = 0.70$). This indicates a strong stickiness effect and that, after entering a rebate scheme, consumer decisions seem to be rather uninfluenced by the payoff of the outside option available later on. This irrationality, of course, can lead to substantial financial loss.

Stickiness did not disappear after repeated buying in rebate schemes. Even in the switching scenario presented at the last position, we observed a majority of irrational buying (proportion = 0.60, *SE* = 0.16). Stickiness of loyalty rebates did not reduce with increasing experience, as indicated by a logistic regression predicting irrational buying by presentation order ($b = 0.06$, $z = 0.68$, $p = 0.498$). Hence, in the third experiment, we show the stability of the stickiness effect of loyalty rebates and find no support for the hypothesis that irrationality decreases with experience.

VI. GENERAL DISCUSSION

Psychological switching cost induced by loyalty rebates is an important topic for antitrust law and consumer protection law. However, there was a lack of empirical data investigating the effects of such rebates on consumers. Most arguments concerning regulation rested on the assumption of buyers who maximize expected surplus as implied in the standard RCT. In this paper, we

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[68] This and all following standard errors are cluster-corrected at the participant level to account for the repeated measurement design. *See*, W.H. Rogers, *Regression Standard Errors in Clustered Samples*, 13 STATA TECHNICAL BULLETIN 19–23 (2003).

show that loyalty rebates impede rational switching of consumers, thereby inducing a psychological switching cost that we call "stickiness effect."

We report results from three experiments that investigate loyalty rebates in comprehensive tasks mirroring the particularities of consumer purchases. We use CPT to derive predictions concerning buying behavior in rebates.

The core finding of this paper is that, in line with CPT predictions, loyalty rebates induce a stickiness effect in that they impede customers' switching from the rebate product to better (payoff-maximizing) outside options. Experiment 1 establishes the general finding. Experiment 2 demonstrates the effect by comparing choices to continue buying in a rebate scheme to choices between payoff-equivalent lottery tickets made by the same persons. Finally, Experiment 3 demonstrates the robustness of the stickiness effect by showing that it also holds in somewhat more realistic situations as well as for a medium degree of repeated exposure (that is, over eight times).

Our experiment was designed to exclude features of a rebate scheme, which would cause or reinforce a "suction effect" predicted by RCT (increasing attractiveness or reduction of risk through successive buying). Rather we designed the decision task so that any form of maximizing expected payoff would predict switching to the outside option (assuming risk neutrality or risk aversion) or no differences between choices in the rebate scheme as compared to the equivalent lotteries (as per Experiment 2). Nonetheless we observe considerable stickiness with respect to the loyalty rebate in all three experiments. Therefore, we unambiguously demonstrate that target rebates can create psychological switching costs that add onto preexisting switching costs that rebates may create, according to RCT.

Used strategically, therefore, loyalty rebates have an underestimated potential to foreclose markets and to harm consumers. The stickiness effect seems to be strong and caused approximately between half and two–thirds of the (target) persons to choose the option with the lower expected value.

A. Additional Findings

We also investigate the influence of rebate magnitude and buying repetition on the size of the stickiness effect. Overall, the effects of rebate magnitude and buying repetition appear to be relatively unstable. The first experiment finds that the stickiness effect significantly decreases as the magnitude of the rebate increases, although CPT predicts the opposite effect. However, the effect could not be replicated in the second experiment. A null-effect of repetition on stickiness observed in both Experiments 1 and 2 was in line with CPT predictions. Note, however, that the latter cannot be considered clear evidence in favor of the theory because the power of the analysis was relatively low. Furthermore, we find in both studies that people's loss aversion has no effect on stickiness. CPT would have predicted a positive relation. A gender effect observed in Experiment 1—as female participants showed a higher stickiness

to rebates (even when controlling for differences in risk aversion and loss aversion)—also could not be replicated in a second study. Finally, in the first experiment, we find that individual differences could influence people's willingness to enter rebate schemes in the first place. Rebate avoiders seem to be more risk-averse and loss-averse, compared to persons entering a rebate scheme. We observe a similar tendency in Experiment 2, which was, however, not significant. Further research is needed to test these effects.

B. Implications for the Regulation of Loyalty Rebates

The first and most important implication is that loyalty rebates induce a stickiness effect in consumers. Rebates generate a nonrational psychological switching cost that comes on top of the switching costs considered so far on the basis of RCT. The psychological switching costs increase the potential of loyalty rebates to inflict substantial harm on consumers because consumers will end up with less rent on average than they would end up with in the absence of the rebate scheme. The psychological switching costs may also increase the potential of loyalty rebates to foreclose consumer markets to entrants. That is, the entrant has to compensate the additional attraction of rebates from the stickiness effect by selling his product even more cheaply than he would do otherwise. In a case in which the incumbent has market power, it can (ab)use the psychological switching costs of a rebate scheme to foreclose the market inefficiently to competitors and entrants. The stickiness effect we find therefore provides an argument to treat rebates more restrictively both under antitrust law and under consumer protection law.

We found no support for the Court of Justice of the European Union's opinion that a longer reference period, which would induce increased repetitions in buying, increases the potential for market foreclosure. There was no effect on stickiness with regard to the instances of buying repetitions.

We think our results can cautiously be extended to professional buyers, bearing in mind the problems of external validity that arises when extrapolating results from lab experiments to firm behavior. Our experimental task shares some common features with buying in rebate schemes in markets with professional buyers. Therefore, our findings provide converging evidence for the results found by Beckenkamp and Maier-Rigaud, who explicitly deal with professional buyers.[69] The problems of external validity certainly are smallest when retail units are small and individuals take the relevant decisions. Here, our results are likely to apply to professional buyers as well. Indeed, in the *Michelin* cases, the dominant firm, Michelin, sold to retailers and apparently a significant number of small car repair shops. Here, our findings could apply. So, all in all, the Commission appears to have been right not to have ignored the psychological state of buyers (in this case, the retailers) in its decision.

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[69] Beckenkamp & Maier-Rigaud, *supra* note 38.

C. Implications for Modeling Choice Behavior for Loyalty Rebates

The data clearly supports the stickiness effect predicted by CPT (with the additional assumption that reference points are shifted to the rebate payoff). However, we also find a partially reversed effect of rebate magnitude, the sometimes observed interaction between magnitude and repetition, and the null effect for loss aversion on stickiness, which cannot be easily explained by CPT. As a result, our experiment cannot identify the perfect behavioral theory to apply to rebate cases in consumer markets. Other avenues for future modeling approaches could include the theory of routines[70] or amending the rational-choice framework by introducing some degree of inertia. For policy, however, it is more important to be aware of psychological switching costs that can be used to foreclose markets and harm consumers than finding the "true" model of consumer behavior when facing target rebates.

VII. CONCLUSIONS

We conclude that loyalty rebates lead to nonrational buying behavior, amounting to an additional psychological switching cost that can cause substantial financial losses for consumers. This effect increases the potential of loyalty rebates to be used as a tool to foreclose markets and provides an argument for a more restrictive position towards loyalty rebates under consumer protection law. Previous arguments and rulings concerning the regulation of loyalty rebates under antitrust law both in the EU and in the U.S. were mainly based on the assumption of rational buying. Stickiness effects add to these existing problems. Therefore, the potential danger of loyalty rebates has been underestimated. The demonstrated stickiness effect backs the role psychological effects already play in European antitrust law today. It generally supports the greater scrutiny to which loyalty rebates have recently been subject both in the EU and in the U.S.

APPENDIX

Let x_1 and x_2 be the possibly monetary outcomes (that is, payoffs) for a prospect and let p_1 and $(1 - p_1)$ be the probabilities that the respective outcomes are realized. The expected value for this prospect is given by the following equation:

$$EV = p_1 x_1 + (1 - p_1)x_2, \tag{1}$$

where EV represents the expected value for this prospect. According to the rational choice theory, persons should be indifferent between this prospect and

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[70] Betsch, Haberstroh, Glöckner, Haar & Fiedler, *supra* note 30.

any equivalent cash amount c:

$$c = EV. \tag{2}$$

According to CPT, the value V of a prospect with outcomes $x_1 \leq \ldots \leq x_k \leq 0 \leq x_{k+1} \leq \ldots \leq x_n$ is given by the following equation:

$$V = \sum_{i=1}^{k} \pi_i^- \times v(x_i) + \sum_{j=k+1}^{n} \pi_j^+ \times v(x_j), \tag{3}$$

where v is a continuous and strictly increasing utility function that satisfies $v(0) = 0$, and π^+ and π^- represent decision weights for gains and losses, respectively. Decision weights result from rank-dependent transformation of the outcome probabilities, considering gains and losses separately. That is, the same probability can result in different decision weights, depending on whether it belongs to a high outcome or a low outcome. Decision weights are defined by:

$$\pi_1^- = w^-(p_1) \tag{4}$$

$$\pi_n^+ = w^+(p_n) \tag{5}$$

$$\pi_i^- = w^-(p_1 + \ldots + p_i) - w^+(p_1 + \ldots + p_{i-1}), \quad \text{if } 1 < i \leq k \tag{6}$$

$$\pi_j^+ = w^+(p_j + \ldots + p_n) - w^+(p_{j+1} + \ldots + p_n), \quad \text{if } k < j < n \tag{7}$$

with w^+ and w^- being the probability weighting function for gains and losses, respectively. Hence, the lowest negative outcome and the highest positive outcome are transformed using the respective transformation functions. The weights for probabilities of losses (that is, $i \leq k$) conceptually represent the marginal contribution of the respective probability to the total probability of worse outcomes, and the weights for probabilities of gains (that is, $j > k$) represent the marginal contribution of the respective probability to better outcomes.

With respect to CPT, several functional forms of v and w have been suggested.[71] We use the classic one-parameter implementation of the value

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[71] *See generally* Henry P. Stott, *Cumulative Prospect Theory's Functional Menagerie*, 32 J.RISK & UNCERTAINTY 101 (2006).

function and the weighting function that Tversky and Kahneman suggested:[72]

$$v(x) = x^{\alpha}, \quad \text{if } x \geq 0 \tag{8}$$

$$v(x) = -\lambda(-x^{\beta}), \quad \text{if } x < 0 \tag{9}$$

$$w^{+}(p) = \frac{p^{\gamma}}{[p^{\gamma} + (1-p)^{\gamma}]^{\frac{1}{\gamma}}}, \quad \text{if } x \geq 0 \tag{10}$$

$$w^{-}(p) = \frac{p^{\delta}}{[p^{\delta} + (1-p)^{\delta}]^{\frac{1}{\delta}}}, \quad \text{if } x < 0. \tag{11}$$

The risk-aversion parameters α and β capture the curvature of the s-shaped value function. The parameters γ and δ capture the inverted s-shape of the weighting function, in the domains of gains and losses, respectively. The loss-aversion parameter λ induces the increased steepness of the value function in the domain of losses. Tversky and Kahneman suggested the following parameters: $\alpha = \beta = 0.88$, $\gamma = 0.69$, $\delta = 0.61$, $\lambda = 2.25$.

Let us assume that x_2 is adopted as a reference point and payoffs are perceived as differences from x_2. Consequently, x_2 has a utility of zero, x_1 has a negative (or zero) utility, and the value V_P of the prospect is given by:

$$V_P = v(x_1 - x_2)\pi_1^- = -\lambda[-(x_1 - x_2)]^{\beta}[w^-(p_1)]. \tag{12}$$

Choosing the cash equivalent c of the prospect (Equation 2) will be considered as a sure loss because it will always be less than x_2. According to core predictions of prospect theory, people will prefer a risky option over a sure loss with equal expected value which follows from the fact that the utility function v is convex for losses. Formally, this results in the following value of the cash equivalent V_c:

$$V_c = v(c - x_2) = -\lambda[-(c - x_2)]^{\beta}, \tag{13}$$

and, when substituting c by Equations 1 and 2,

$$V_c = -\lambda[-(x_1 p_1 + x_2(1 - p_1) - x_2)]^{\beta} = -\lambda[-(x_1 - x_2)]^{\beta} p_1^{\beta}. \tag{14}$$

The difference between V_P and V_c is given by:

$$V_P - V_c = -\lambda[-(x_1 - x_2)]^{\beta} \times w^-(p_1) - \lambda[-(x_1 - x_2)]^{\beta} p_1^{\beta}, \tag{15}$$

which can also be written as:

$$V_P - V_c = \{-\lambda[-(x_1 - x_2)]^{\beta}\} \times [w^-(p_1) - p_1^{\beta}]. \tag{16}$$

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[72] *See* Tversky & Kahneman, *supra* note 16.

The first term of Equation 16 will be negative if $x_2 > x_1$, and its magnitude increases with increasing difference between x_1 and x_2. Taking into account the values for parameters $\beta = 0.88$ and $\delta = 0.61$, mentioned above, the second term is negative for all probabilities $p_1 > 0.24$, which is where the functions $w^-(p_1)$ and p_1^β intersect, as Figure A1 shows.

Hence, if $p_1 > 0.24$, the value of the prospect is higher than its cash equivalent and (all else being equal) the difference increases with increasing difference between x_2 and x_1.

Choices between the prospect and the cash equivalent will most likely not be deterministic. It is more likely that they follow a probabilistic function such as a logistic-choice function in which the probability for choosing one option over the other increases with its advantage in V_P (that is, the absolute difference between $V_P - V_c$).

Taking an individual-differences perspective and considering only prospects with sufficiently likely lowest outcomes to prefer the prospect over the cash equivalent, the degree to which the risky prospects are preferred over the cash equivalent should increase with increasing loss aversion (λ). Increasing risk aversion (β) increases the magnitude of the first term in Equation 16, but decreases the magnitude of the second term, and the overall effect is therefore complex.

If one accepts that rebates lead to adopting the payoff of reaching the rebate (that is, x_2 = the maximal payoff) as reference point, then, according to CPT, rebates should induce persons to continue buying in the loyalty rebate scheme, even if an outside option has the higher expected value. This, however, should
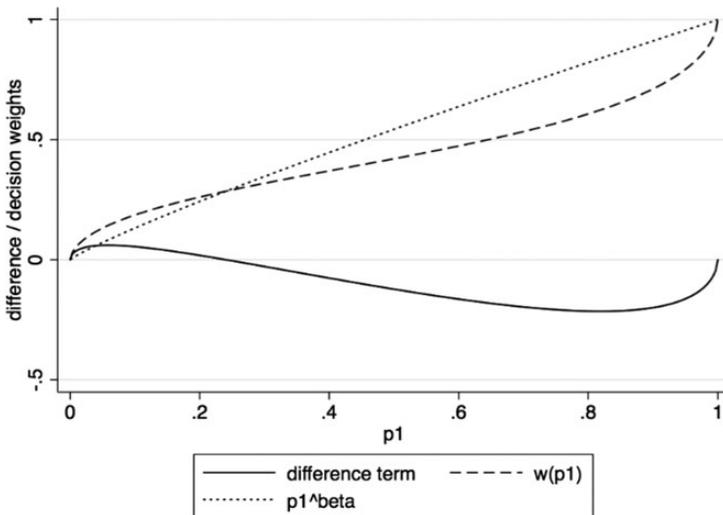
Figure A1. Difference in decision weights according to the second term in Equation 16 as a function of probability of the lower outcome for the domain of losses

only hold when considering rebates with sufficiently large probability of failing to reach the rebate ($p_1 = 1 - p_R > 0.24$). Hence, in our paradigm, CPT predicts entering the rebate because $1 - p_R = 0.14$, and stickiness to the rebate after the critical round was omitted because $1 - p_R^* = 0.85$. The probability to stick to the rebate (that is, staying in the rebate although it does not maximize expected value) should increase with increasing difference between V_P and V_c which is a monotonously increasing function of the difference between the high and the low overall payoff that can be reached with the rebate option. It should be independent of the repetitions of buying when holding the difference in payoffs constant. From an individual-difference perspective, stickiness should increase with increasing loss aversion and might be influenced in a complex way by risk aversion.