Transaction Utility and Consumer Choice

Jennie Huang*

The Wharton School, University of Pennsylvania

October 31, 2018

JOB MARKET PAPER

(Click Here for Latest Version)

Abstract

I investigate the role of transaction utility on consumer choice. I design two laboratory paradigms to mirror shopping experiences using discounts and mark-ups (Study 1) and coupons (Study 2). In my experiments, participants purchase virtual products, allowing me to isolate transaction utility from inferences of product quality. Results reveal that consumers experience transaction utility even over these virtual products and will sacrifice monetary payoffs for transaction utility. Participants gain utility from perceived discounts, disutility from perceived mark-ups, and utility from using more of a coupon. My estimates suggest consumers' marginal rate of substitution between study earnings and transaction utility is: 37-57 cents to gain a dollar of perceived discount and 37-78 cents to avoid a dollar of perceived mark-up. These estimates suggest a large relevance for transaction utility across a wide array of consumer decisions and purchasing behaviors.

Keywords: behavioral economics; experimental economics; transaction utility; sales; discounts; coupons; mark-ups

*The Wharton School, University of Pennsylvania, 3620 Locust Walk, 3000 Steinberg Hall-Dietrick Hall, Philadelphia, PA 19104 (email: huangzh@wharton.upenn.edu). I am deeply thankful to Judd B. Kessler, Katherine Milkman, Corinne Low, and Benjamin Lockwood for extensive advising on this project. I also thank Bo Cheng, Jean Pierre Dube, Clayton Featherstone, Caitlin Gorback, Alice Moon, Alex Rees-Jones, Rachel Ryley, Deborah Small, Colin Sullivan, and seminar participants for helpful comments. I acknowledge and thank the generous financial support from the Russell Ackoff Doctoral Student Fellowships for Research in Human Decision Processes and Risk Management, The Wharton School, and The Wharton Behavioral Lab.

1 Introduction

Standard theory assumes consumers make purchasing decisions by comparing the perceived value of a good to its selling price. In practice, however, there is robust evidence that consumers respond to whether they believe they are getting a good deal. A notable example comes from JCPenney's short-lived switch from coupons to an "everyday low-pricing" structure in 2012 (Tuttle, 2012). In the first quarter after their new pricing structure was implemented, the company reported a $163 million net loss, suggesting consumers were more likely to buy when getting to use coupons and seeing discounts than when they simply faced low prices. While seeing discounts appears to encourage purchase, a large number of false-advertisement class action lawsuits allege that firms use "fictitious" original prices to create perceptions of discounts and trick consumers into buying.[1]

To explain seemingly "irrational" decisions linked to perceived discounts and mark-ups, Thaler (1985, 1999, 2008) proposed that consumers get two kinds of utility from a purchase: consumption utility, the value of the good obtained relative to its price, and transaction utility, the perceived value of the "deal."[2] Consistent with this theory, marketing research has shown that "comparative price advertising," such as providing an original price, can distort consumers' purchasing behaviors (Compeau and Grewal, 1998; Krishna et al., 2002). However, this prior work suffers from a potential confound: consumers may use a reference price to update their valuation of the quality of a good (Rao and Monroe, 1989).[3] For example, consumers seeing a bottle of wine selling for $20 might think it is of medium quality; however consumers seeing a bottle of wine with an original price of $40, now selling for $20, might infer that the wine is of high quality, even though it is also selling for $20. Therefore, it is hard to disentangle the effect of transaction utility (i.e., getting a $20 discount) from an inference about product quality (i.e., the wine being high quality). In addition, prior work shows that perceived discounts increase purchase intentions but do not provide evidence that reference prices can lead consumer to make suboptimal purchase decisions.[4]

[1] See Berkoff v. Homegoods Inc., United States District Court Central District of California Eastern Division, No. 5:15-cv-01480, July 23, 2015; Berkoff v. Marshalls of CA, LLC, United States District Court Central District of California Eastern Division, No. 5:15-cv-01475, July 23, 2015; Gennock v. Ann Inc., United States District Court Southern District of New York, No. 1:16-cv-03340-JPO, May 5, 2016; Munning v. The Gap, Inc., United States District Court Northern District of California, No. 3:16-cv-03804-TEH, July 7, 2016; Anderson v. Kate Spade and Company, United States District Court Southern District of New York, No. 1:16-cv-07300, September 19, 2016; Holter (2011); Kang (2015).

[2] Thaler (1985, 1999, 2008) refers to consumption utility as "acquisition utility." For the purpose of clearer exposition, I rename this term "consumption utility," but retain the same definition and mathematical structure.

[3] Also see Plassmann et al. (2008); Lewis and Zalan (2014).

[4] See Compeau and Grewal (1998); Krishna et al. (2002).

Understanding whether and how transaction utility distorts consumer choice has important economic implications for firm pricing strategy and for policymakers and regulators, who may worry about the prospect of transaction utility being used to exploit consumers.

The purpose of this paper is to isolate transaction utility from product quality inference and to quantify the value of transaction utility in dollar terms. This paper uses two incentivized experiments, which mirror the shopping experience using discounts and mark-ups (Study 1) and coupons (Study 2), to test whether consumers respond to irrelevant original prices, whether consumers are willing to suffer a monetary loss to capture transaction utility, and how much of a loss consumers are willing to sacrifice for transaction utility. In both experiments, I experimentally control consumers' values by having participants make purchasing decisions over virtual products. Since products are virtual, I am able to exogenously assign participants' valuations for products (in dollars) and there by shut down the quality inference channel. The experiments reveal that participants are willing to suffer a monetary loss in exchange for transaction utility.

The *Discount and Mark-up Game* (Study 1) mirrors the shopping experience of receiving a discount or mark-up by allowing participants to compare the selling price, at which they can transact, to an original price that sets a reference point but does not affect study earnings. In this game, participants were endowed with a valuation for the virtual product, a selling price they had to pay, and an original price that was irrelevant for their monetary payoffs but might reflect a discount or mark-up—and thereby affect their transaction utility—and they had to decide whether they wanted to purchase the virtual product. If participants chose to purchase, they received the difference between their assigned value and the selling price as earnings, and they earned \$0 otherwise. I find that participants respond to the "irrelevant" original prices. Participants are more likely to purchase the virtual product if the "irrelevant" original price is above the selling price, suggesting a discount, and significantly less likely to purchase the virtual product if the "irrelevant" original price is below the selling price, suggesting a mark-up. In addition, the rate of purchasing is increasing in the size of the discount and decreasing in the size of the mark-up. In a subsequent study, I stress-test this result by displaying participants' potential earnings on their decision screen. I find that participants respond to "irrelevant" original prices in the same way. This result suggests that consumers receive transaction utility from the terms of the deal itself.

To explore a different channel through which transaction utility may affect choices, I designed a second experiment, the *Coupon Game* (Study 2), which mimics a shopping experience with a coupon. In this game, participants were endowed with preferences for two

virtual products, shown the original prices for each product, given a "$5.00 discount coupon valid for one item," and had to decide which product they wanted to purchase. Participants received the difference between their value for the product and the selling price (i.e., the original price after applying the coupon) of the purchased product as study earnings. In the game, one product always generated higher earnings but lower transaction utility and the other always generated higher transaction utility but lower earnings. Thirty percent of the time, participants sacrifice earnings to purchase the good that created higher transaction utility. This result suggests that coupons may induce consumers to purchase a more expensive product—to use more of the coupon and achieve a larger discount—even though it comes at the expense of consumption utility.

In each game, I can price transaction utility. In the *Discount and Mark-up Game*, I use the randomly assigned variation between earnings and perceived markups. In the *Coupon Game*, I use the randomly assigned variation between earnings and perceived discount. Estimates from the *Discount and Mark-Up Game* suggest that participants are willing to sacrifice 37-78 cents to *avoid a dollar of perceived mark-up*.[5] Estimates from the *Coupon Game* suggest participants are willing to pay 37-57 cents to *gain a dollar of perceived discount*.

These findings have important implications for firm strategy and consumer policy. Results suggest that transaction utility is an important component of demand and therefore should influence firm pricing. Moreover, fictitious original prices can meaningfully distort consumer purchasing behavior, leading to material losses for consumers, which may be of interest to regulators, policymakers, and litigators.

This paper contributes to the existing literature by providing incentive-compatible evidence that consumers care about the terms of the transaction separately from the value of the product itself. This direct evidence in support of transaction utility builds on a large literature about reference dependence and its effects on demand (Tversky and Kahneman, 1991; Thaler, 1999).[6] It also adds to a large set of marketing studies exploring the effect

[5]By design, I cannot to directly calculate the trade-off between consumption and transaction utility in the *Discount and Mark-Up Game* when participants are provided with a perceived discount because discounts increase transaction utility and earnings simultaneously.

[6]While reference dependence and loss aversion have been used to explain such deviations in economics (Tversky and Kahneman, 1991), Tversky and Kahneman (1991) and Thaler (1999) rejected the idea that costs incurred by buyers in markets are viewed as losses. Since then, a number of other models incorporating a reference structure have been introduced. These models posit that consumers are loss averse over quantities they were expecting to consume (Kőszegi and Rabin, 2006; Heidhues and Kőszegi, 2014), that a consumer's attention is drawn towards salient attributes of goods (Bordalo et al., 2013), or that a consumer's "disenchantment" towards the firm affects purchasing behavior (Sibly, 2004). These models predict deviations from the traditional rational model, but the theories may be intractable because they rely on endogenous reference prices, which are hard to determine. Furthermore, these models may not always explain pricing patterns observed in the market such as "perpetual" sales from an essentially fictitious "regular price" seen

of advertised reference prices on the perceived value of an offer and purchase intention (Berkowitz and Walton, 1980; Urbany et al., 1988; Lichtenstein et al., 1989; Moore and Olshavsky, 1989; Dodds et al., 1991; Grewal et al., 1998; Bitta et al., 1981; Mobley et al., 1988; Scot et al., 1993; Biswas and Burton, 1994; Sinha and Smith, 2000; Muehlbacher et al., 2011).[7] I build on this work by disentangling the effect of transaction utility from the effect of inference about product quality that potentially confounds previous studies (Rao and Monroe, 1989; Armstrong and Chen, 2012).[8]

The rest of the paper proceeds as follows. Section 2 provides a review of Thaler's theory of transaction utility and a simple model to fix ideas. Section 3 presents two studies using the *Discount and Mark-up Game* to demonstrate that an "irrelevant" original price can distort purchasing behavior due to transaction utility. Section 4 presents two studies using the *Coupon Game* to provide additional evidence of transaction utility and to show that coupons can trap consumers into purchasing the "wrong" product. Section 5 discusses the potential welfare implications associated with "fictitious" sales, future areas of research, and how the findings of this paper affect firm pricing decision and consumer policy.

2 A Review of Transaction Utility

To explain why consumers might purchase a product at a price above their valuation for that product or forgo purchasing a product that might seemingly make them better off, Thaler (1985, 1999, 2008) proposed that consumers derive two kinds of utility from a purchase: (1) consumption utility and (2) transaction utility. Thaler defined transaction utility as the perceived value of the "deal," and it is some function of the selling price relative to a reference price. Examples of external reference prices include a seller's cost, the manufacturer's suggested retail price (MSRP), the posted price, and the original price of a good. Furthermore, Thaler posited the most important factor in determining the reference

in furniture and rug stores (Heidhues and Kőszegi, 2014).

[7] Other studies have also looked into the believability of a price offer (Scot et al., 1993; Suter and Burton, 1996), promotion frequency (Krishna et al., 1991; Kalwani and Yim, 1992), and search intentions (Bitta et al., 1981; Urbany et al., 1988; Biswas and Burton, 1994). Also, see Monroe (1973); Peterson et al. (1985); Rao and Monroe (1989); Biswas et al. (1993); Lichtenstein and Bearden (1988); Biswas and Blair (1991); Biswas and Burton (1993); Kaicker et al. (1995); Grewal et al. (1996); Urbany et al. (1997); Darke and Dahl (2003); Darke and Chung (2005); Weaver and Frederick (2012); Ngwe (2017). Other consumer decision and reference point studies have explored the effects of specific product comparison sets (Jahedi, 2010), anchoring (Dodonova and Khoroshilov, 2004), quantity limits (Inman et al., 1997), or time-inconsistencies (Nakamura and Steinsson, 2011) to show that these reference prices affect willingness to pay.

[8] Also see Plassmann et al. (2008); Lewis and Zalan (2014).

price is fairness, which depends in large part on the cost to the seller.[9]

To fix ideas, consider a simple model of the consumer's decision problem in a framework similar to Thaler's model, making some simplifying assumptions and notation changes for clarity. I assume that a consumer chooses whether to purchase a single product, $x \in \{buy{=}1, not\ buy{=}0\}$, to maximize:

$$U_x(P, O; \alpha) = \begin{cases} \underbrace{V - P}_{\text{consumption utility}} + \underbrace{\alpha[O - P]}_{\text{transaction utility}} & \text{if } x = 1 \\ 0 & \text{if } x = 0 \end{cases}$$

Where V is the value obtained from the product, P is the selling price, O is the reference price (e.g. an "original price"), and α is the coefficient of transaction utility (or the marginal rate of substitution between consumption and transaction utility). If the consumer chooses to *not buy*, assume his utility is 0. Consumers will choose to buy the good if $U_1(P, O; \alpha) \geq 0$.

$$\Rightarrow [O - P] \geq \frac{1}{\alpha}[P - V]$$

Incorporating transaction utility into the consumer's decision problem leads to two testable hypotheses. First, all else equal, as the reference price O increases, consumers are more likely to buy the product because it increases the difference between the reference price and the selling price, thus increasing the perceived discount. Second, under certain circumstances, if transaction utility is sufficiently high, consumers will buy the product even if its consumption utility is negative, because the positive gains from getting a good deal will offset any negative consumption utility.[10]

Furthermore, we can rearrange the equation to predict consumers' willingness to pay for a product taking into account transaction utility:

$$WTP = \frac{V + \alpha O}{1 + \alpha}$$

[9] Adding transaction utility into consumers' purchase evaluations can lead to two suboptimal outcomes: (1) some products that would not have been purchased absent transaction utility may be purchased because they are perceived as a good deal, and (2) some products that would have been purchased absent transaction utility may be avoided because they are perceived as a bad deal. See Thaler (1985, 1999, 2008).

[10] We can extend the model of transaction utility to a two-good setting where consumers choose to purchase one of two available goods. Imagine two products where $x \in X = \{X_1, X_2\}$, $\{V_1, V_2\}$ are the values obtained from the products, $\{P_1, P_2\}$ are the selling prices, and $\{O_1, O_2\}$ are the reference-prices. Assuming consumers have to buy one of the two products, consumers will choose X_1 if $U(X_1, P_1, O_1; \alpha) \geq U(X_2, P_2, O_2; \alpha)$. Equivalently, if $[O_1 - P_1] \geq \frac{1}{\alpha}[(V_2 - P_2) - (V_1 - P_1)] + [O_2 - P_2]$, consumers will purchase X_1. Results from this model may differ if transaction utility has diminishing marginal returns. A number of additional factors could also be incorporated into the model, including the credibility of the reference price and the salience of transaction utility.

First order conditions show how the reference price (O) changes the consumer's willingness to pay for the product. In particular, $\frac{\partial WTP}{\partial O} = \frac{\alpha}{1+\alpha}$, suggesting that changes in the consumer's willingness to pay due to changes in the reference price is constant and depends on the weight consumers place on transaction utility (i.e., the consumer's type α).[11] Furthermore, note that a dollar increase in the reference price leads to *less* than a dollar increase in willingness to pay. This is because changing the selling price alters both consumption and transaction utility. As such, a model incorporating transaction utility could imply that consumers are more (selling) price sensitive compared to a model without transaction utility. This suggest that transaction utility, if empirically relevant, could have suboptimal effects on consumer behavior and firm pricing strategy.[12]

Note that these hypotheses deviate from the neoclassical rational model in which consumers make purchasing decisions to maximize consumption utility alone.[13] However, in practice, consumers might infer information from the reference price. One could imagine a model, absent transaction utility, where the valuation of a good is a function of the reference price, and this model would derive similar predictions as the transaction utility model.[14] As such, to show that transaction utility exists, I test these hypotheses using an "irrelevant" original price, that is, an original price that contains no information to influence consumption utility but that can alter transaction utility.

In my experiments, participants make purchase decisions about virtual products (i.e., no physical products are used). Using virtual products provides three benefits. First, the experimenter can exogenously assign to participants their valuation of a virtual product, shutting down the quality inference channel. Second, participants can be rewarded in money, based on their purchasing decisions, providing a clear measure of consumption utility. Third, since there are no actual products that participants may have encountered outside of the

[11] The first order condition is constant due to the assumption that transaction utility is linear.

[12] Consumers who care about transaction utility could be more price sensitive, meaning that transaction utility could increase the magnitude of the price elasticity of demand. Since firms with market power set mark-ups in proportion to the inverse elasticity of demand, this suggests that transaction utility can have effects on firm pricing strategy. Furthermore, the presence of a well-established reference price could further influence firm pricing. For example, firms in a market with a well-established original price might be encouraged to provide more discounts in order to take advantage of increased demand due to higher consumption and transaction utility as selling prices decrease. On the other hand, a firm that is able to establish or manipulate their own original price would optimally set the original price to the highest credible original price and then provide a discount to stimulate demand.

[13] Under a traditional rational economic model, consumer would purchase the good if $(V - P) \geq 0$. Note that the original price does not factor into the consumer's decision problem.

[14] Under a model where consumers infer information from the reference price, O, but without transaction utility, consumers would purchase the good if $\mathbb{E}[V|O] - P \geq 0$. Also see Bagwell and Riordan (1991); Armstrong and Chen (2013) for models where high prices signal product quality and change demand.

lab, participants should not have internal reference prices that will influence their purchasing decisions, providing a clean environment to test the effect of transaction utility obtained from "irrelevant" original prices on consumer behavior.

3 Study 1: Discount and Mark-up Game

The *Discount and Mark-Up Game* was designed to test how participants respond to perceived discounts and mark-ups produced by an "irrelevant," randomly assigned original price. This game mimics discounts and mark-ups observed in practice, where consumers are shown a selling price and an original price and make comparisons between them to obtain a perceived discount or mark-up.

I ran two versions of the *Discount and Mark-Up Game*, *Study 1A: Baseline* and *Study 1B: With Earnings Displayed*. In *Study 1A: Baseline*, I test whether participants respond to "irrelevant" original prices consistent with predictions from a transaction utility model. In *Study 1B: With Earnings Displayed*, I test the robustness of transaction utility by displaying participants' potential earnings, thereby highlighting their consumption utility. Below, I describe the general design of both versions and then highlight their differences.

3.1 Experimental Design

The *Discount and Mark-Up Game* included 358 participants randomly assigned to one of two versions.[15] All participants received a $10 show-up fee for completing the 25-minute study.[16]

In this game, all participants were assigned the role of buyers and decided whether to buy a virtual product at a randomly assigned selling price (P). Since this was a virtual product—that is, no actual product was used—buyers were assigned their value of the virtual product and the seller's cost.[17] All buyers valued each virtual product at $9 and the seller had

[15] Participants are students from the University of Pennsylvania across a wide range of disciplines. They participated in 1 of 24 sessions at the Wharton Behavioral Lab in January and February 2018 (12 sessions each month) with 178 participants randomly assigned to *Study 1A: Baseline* and 180 participants randomly assigned to *Study 1B: With Earnings Displayed*.

[16] Individuals participated in a *Coffee Drink Experiment*, the *Discount and Mark-up Game*, and the *Coupon Game* in the 25-minute study. Results from the *Coffee Drink Experiment* are presented in a companion paper (Huang, 2018).

[17] Thaler (2008) posited that the seller's cost is an important component of fairness and reference price formation. The seller's cost is also another way consumers can infer quality. As such, it is important to hold the seller's cost constant to further control for any product quality or other inferences participants may make from the original price.

a cost of \$6. To create consumption utility, participants were rewarded in earnings based on their purchasing decision: if the buyer decided to buy the product then the buyer's earnings were the value of the product less the selling price ($\$9 - P$), and the seller's earnings were the selling price less their cost ($P - \$6$), otherwise both received \$0. To create transaction utility, buyers were also shown an original price (O) which provided irrelevant information in terms of the buyer's earnings or consumption utility ($\$9 - P$) but it could alter transaction utility ($O - P$), the perceived level of discount obtained.[18]

The *Discount and Mark-Up Game* relies on a 4×8 within-subject design where a participant's selling price and original price were randomly assigned to create variation in two dimensions: the earnings and perceived discount or mark-up from purchasing (see Figure 1 for an example).[19]

In total, participants saw four different selling prices $\{\$6.72, \$7.51, \$8.03, \$8.42\}$, which corresponded to four different levels of buyer's earnings: $\{\$2.28, \$1.49, \$0.97, \$0.58\}$.[20] For each possible level of earnings, participants made eight different purchasing decisions. Conditional on each level of buyer's earnings, I manipulated the original price shown to create seven levels of perceived discount or mark-up and a *control* set of decisions where no original price was shown. To facilitate comparisons, original prices were selected such that the selling price as a percentage of the original price was: $\frac{P}{O} \in \{60\%, 80\%, 90\%, 100\%, 110\%, 120\%, 140\%\}$, creating three discount decisions, one without a discount or mark-up decision, and three mark-up decisions for each payoff level.[21]

All participants saw each selling price and original price combination in a random order, for a total of 32 purchasing decisions. At the end of the laboratory session, participants answered a series of demographic questions, and one decision and two participants were randomly selected for payment: one buyer and one seller.[22]

[18] See Figure 1 for examples of the buyer's decision screen.

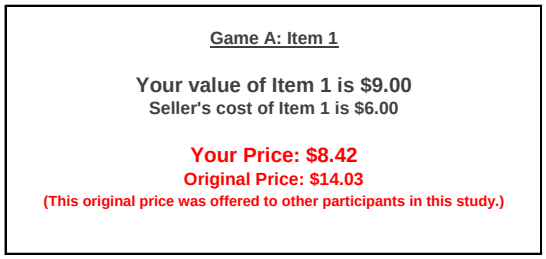
[19] If participants chose to not purchase the virtual product, their earnings were \$0. I assume that if participants chose not to purchase the virtual product, their perceived discount or mark-up obtained was also \$0.

[20] The selling prices were selected to avoid numbers that would be easily remembered. I also allowed for variation in the buyer-seller split of the pie to account for inequity aversion (Fehr and Schmidt, 1999).

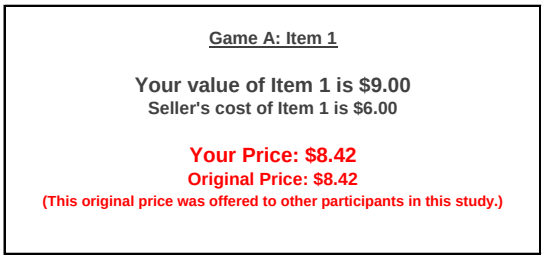
[21] Note, the original prices were selected such that the selling price contained a perceived discount or mark-up of 0%, 10%, 20%, or 40%. If an original price was presented, participants were also told "the original price was offered to other participants in this study." To make this a deception-free study, all original prices were offered to a small sample of participants who were excluded from the results below.

[22] Participants were also told: "You should make all your decisions assuming you are the buyer. Each round is independent of the others. Note that the price may be different from item to item. Please make each of your choices carefully. Remember, you may be selected as the buyer, in which case one of your rounds will be selected for payment. Since only one round is randomly chosen for payment you should treat each round as if it is the one and only round chosen for payment." See section C.1 in the Appendix for experimental protocol.

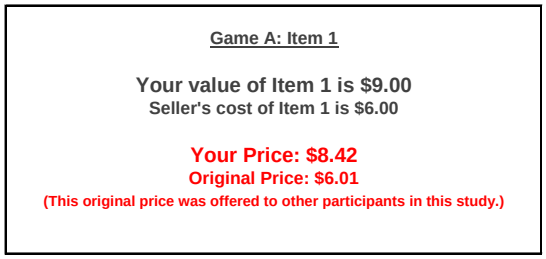
(A) Perceived Discount: $\frac{P}{O} = 60\%$



(B) No Discount/Mark-up: $\frac{P}{O} = 100\%$



(C) Perceived Mark-up: $\frac{P}{O} = 140\%$



(D) No Original Price (Control)

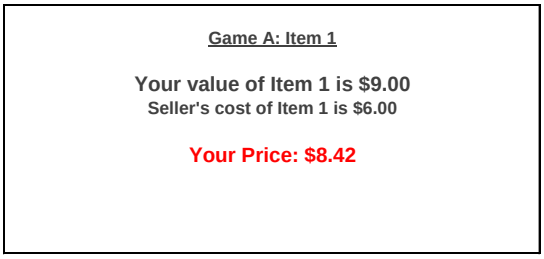


Figure 1: Examples of Participant's Decision Screen
Discount and Mark-up Game
Study 1A: Baseline

Note: In each decision of the *Discount and Mark-up Game*, participants were shown their assigned values of the virtual product and the seller's cost, which were always constant at $9 and $6. They were also shown the selling prices and the original prices which were randomly assigned. The four panels in this figure hold the selling price constant at $8.42 (corresponding to buyer's earnings of $0.58 if they buyer decided to purchase the virtual product) but vary the original price such that the selling price appeared discounted, equaled to, or marked-up compared to the original price. Panel A shows an example where the selling price appeared 40% discounted; Panel B shows an example where the selling price equaled the original price so there was no discount or mark-up; Panel C shows an example where the selling price appeared 40% marked-up; and Panel D shows an example where participants were not provided with an original price (control) decision.

To ensure the quality of participants' responses, all participants had to answer and pass two comprehension questions before proceeding to the game. The comprehension questions consisted of two multiple choice questions, each with 10 choices (see Figure C3 in the Appendix for an example).[23] This ensured that all participants understood the game, and 97% of participants passed both comprehension questions on the first try.[24]

The key feature of this design is that participants were paid their earnings, calculated as the difference between the assigned value of the product and the selling price if they chose to purchase the virtual product. Thus, in terms of payoff, the original price provided irrelevant information.

3.1.1 Difference between Study 1A and Study 1B versions

In both versions, *Study 1A: Baseline* and *Study 1B: With Earnings Displayed*, participants played the *Discount and Mark-up Game* with the same incentives and the same 32 purchasing decisions in a random order. The *only* difference between the two versions was that participants' earnings were displayed before making their decisions in *Study 1B: With Earnings Displayed*.

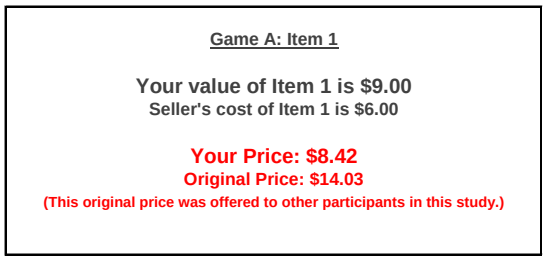
In *Study 1B: With Earnings Displayed*, participants saw the same decision screen as *Study 1A: Baseline* but participants' potential earnings were displayed with the following message: "(If you choose to purchase the item, your earnings are $___)." Figure 2 provides examples of participants' decision screens in both versions. *Study 1B: With Earnings Displayed* is used to stress-test the robustness of transaction utility. By displaying potential earnings, I encourage each participant to consider his consumption utility; as such, we should expect transaction utility effects to be considerably reduced or eliminated.

In the next subsection, I present the results from the *Discount and Mark-up Game*. First, I present the main results from *Study 1A: Baseline* in Section 3.2, then I discuss results from *Study 1B: With Earnings Displayed* in Section 3.3.

[23] Participants were shown a hypothetical scenario with the same decision screen as the game and were asked: (1) What are your earnings (in dollars) if you choose to purchase the item? (2) What are your earnings (in dollars) if you choose to NOT purchase the item? Participants were told to select their answers from two drop down lists. Each drop down list contained 10 choices ranging from $0.00 to $9.00 in one dollar increments. There is a 1% chance of correctly guessing both comprehension questions.

[24] In *Study 1A: Baseline*, 98% of participants passed both comprehension questions on the first try and in *Study 1B: With Earnings Displayed*, 96% of participants passed both comprehension questions on the first try. My results are the same including all participants or only participants who passed the comprehension check the first time.

(A) Study 1A: Baseline



(B) Study 1B: With Earnings Displayed

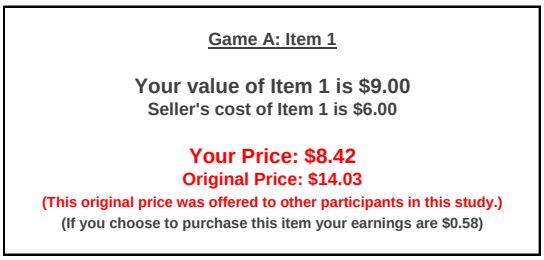


Figure 2: Examples of Participant's Decision Screen With and Without Earnings Displayed

Study 1A & 1B: Discount and Mark-up Game

Note: In both versions of the *Discount and Mark-up Game*, participants played the same game with the same incentives and the same 32 purchasing decision in a random order. Panel A shows an example of participants decision screen in *Study 1A: Baseline*, and Panel B shows an example of participants' decision screen in *Study 1B: With Earnings Displayed* where their potential earnings were displayed.

3.2 Showing consumers experience transaction utility

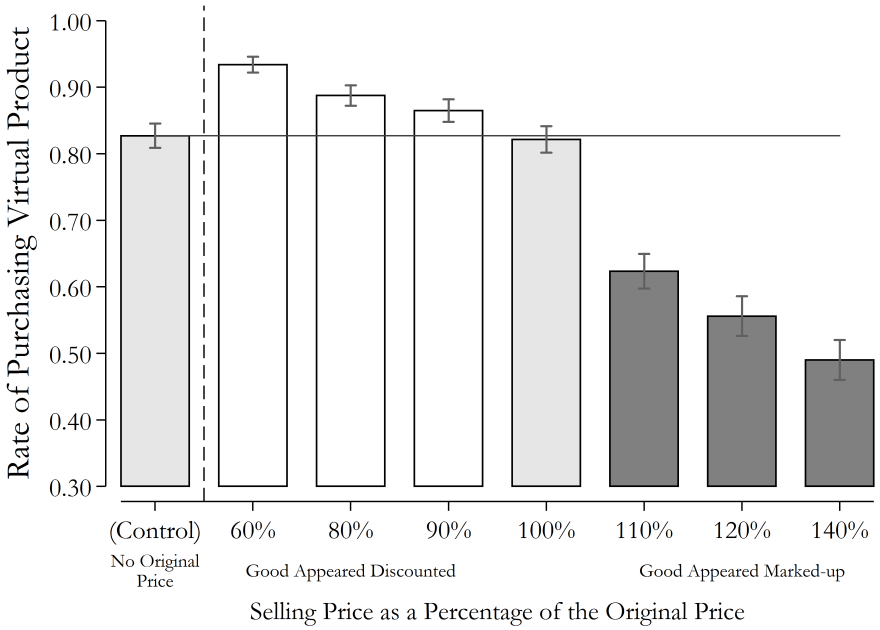
All analyses will focus on the average rate of purchasing the virtual product. I identify the effect of providing an "irrelevant" original price by comparing the presence of an original price that is above, equal to, or below the selling price to decisions where the original price is absent (i.e., control decisions). I do so conditional on the participants' randomly assigned expected earnings if they purchase the virtual good. I also explore the trade-off between earnings and perceived mark-up on a participant's probability of purchasing the virtual product.

Figure 3 Panel A shows the average purchase rate when no original price was shown (control) and when the selling price appeared discounted, equaled, or marked-up compared to the original price. Purchase rates are nearly identical in the control decisions and when the selling price equals the original price (82.7% in control and 82.1% when the selling price equals the original price; this difference is not statistically significant in a regression, $p = 0.696$). This result suggests that in the absence of an original price, buyers behave as if the selling price is equal to the original price. Furthermore, while participants' earnings increase if they choose to purchase the virtual product (compared to not purchasing, leading to earnings of \$0), it is not surprising to see a purchase rate lower than 100% due to inequality aversion. Different selling prices lead to different buyer-seller splits of the \$3 surplus. Figure A1 in the Appendix presents the average purchase rate across conditions by selling price and shows that as the buyer-seller split becomes less favorable for the buyer, participants are less likely to purchase the virtual product in the control decisions. This result is consistent with

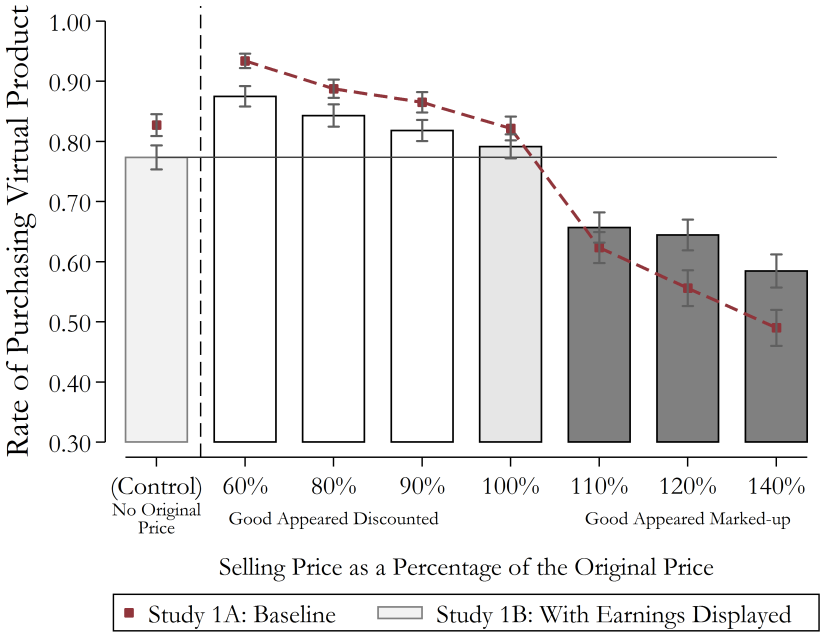
the theory that individuals are inequity averse (Fehr and Schmidt, 1999).

FIGURE 3: PARTICIPANTS RESPOND TO AN IRRELEVANT ORIGINAL PRICE
Study 1A & 1B: Discount and Mark-up Game

(A) STUDY 1A: BASELINE



(B) STUDY 1B: WITH EARNINGS DISPLAYED



Notes: Participants' average purchasing rate of the virtual product by selling price as a percentage of the original price. Panel A shows results for *Study 1A: Baseline* and Panel B shows results for *Study 1B: With Earnings Displayed*. Robust standard error bars clustered at the individual level are shown around each mean.

As evidence of transaction utility, Figure 3 Panel A shows that providing an "irrelevant" original price can distort purchasing behavior. Participants are more likely to purchase the virtual product when the selling price appears discounted. Providing an original price above the selling prices leads to a 6.8 percentage point increase in the purchasing rate (in a regression controlling for decision order and with robust standard errors clustered at the individual level, $p < 0.01$). Moreover, the larger the perceived discount, the higher the purchasing rate. A perceived discount of 10% leads to a 3.8 percentage point increase while a perceived discount of 40% leads to a 10.7 percentage point increase in the purchasing rate (see Table A1 regression (1) in the Appendix, $p < 0.01$). Similarly, buyers are less likely to purchase the item when the selling price appears marked-up, and the larger the mark-up, the bigger the distortion. Providing an original price below the selling prices leads to a 27.1 percentage point decrease in the purchasing rate (in a regression controlling for decision order and with robust standard errors clustered at the individual level, $p < 0.01$); a 10% perceived mark-up leads to a 20.4 percentage point decrease; and a 40% perceived mark-up leads to a 33.7 percentage point decrease in the purchasing rate (see Table A1 regression (1) in the Appendix, $p < 0.01$).[25] These results are robust and significant with or without controlling for selling price and decision order.[26]

Figure A1 and Table A2 Panel A in the Appendix show the perceived fairness between the buyer-seller split of the pie causes a level shift in the purchase rate. However, identifying the effect of transaction utility using the slope of purchase rate with respect to discounts and mark-ups across treatment decisions, I find that the effect of transaction utility is stable across the different splits of the pie. The one exception is when the buyer received 76% of the buyer-seller earnings split—that is, the selling price was \$6.72 leading to buyer's earnings of \$2.28—and participants were already purchasing 97% of the time in the control decisions (i.e., when there was no discount or mark-up). In that case, the slope is estimated to be smaller in magnitude due to a ceiling effect. Importantly, I find the same choice patterns across all earning levels: when the selling price is equal to the original price, purchase rates are nearly identical to the control decisions and participants are more likely to purchase

[25] Table A1 in the Appendix presents the results of the *Discount and Mark-up Game* in a regression framework, testing the effect of an original price by percentage below, above, or equal to the selling price on participants' purchasing decisions. Also see Table A2 Panel A regressions (9) and (10) in the Appendix.

[26] Table A3 in the Appendix tests the marginal effect of a perceived percentage change between the selling price and the original price on the purchasing rate. Results are consistent and significant. I find that a perceived 10% change in perceived discount increases the probability of purchasing the virtual product by 2.70 percentage points while a perceived 10% change in mark-up decreases the probability of purchasing the virtual product by 7.00 percentage points. This differential effects between perceived discounts and mark-ups is consistent with prior findings that losses loom larger than gains with a 3:1 ratio (Fehr and Schmidt, 1999).

when the selling price appears discounted and less likely to purchase when the selling price appears marked-up compared to the control decisions.

Furthermore, perceived mark-ups have a stronger effect on behavior than perceived discounts. Figure 3 Panel A shows that introducing a mark-up of 10% leads to a larger drop in the purchase rate than introducing a discount of 10%. We see this when we compare a 20.4 percentage point decrease in purchases due to a 10% perceived mark-up to a 3.8 percentage point increase due to a 10% perceived discount.[27] This is consistent with a notion of loss aversion over transaction utility, where consumers perceive negative transaction utility as more meaningful than equivalent positive transaction utility (Tversky and Kahneman, 1991; Thaler, 1985).

Compellingly, this variation arose within subject. The same participants who were willing to purchase the virtual product when the original price was absent or equal to the selling price were "over-purchasing" when presented with a perceived discount and "under-purchasing" when presented with a perceived mark-up. These distortions are produced by providing information (i.e., the original price) that should be irrelevant in the participant's earnings calculations.

I explore the trade-off between participants' earnings and perceived levels of mark-up in dollars on probability of purchase. This analysis parallels Thaler's transaction utility model with some simplifying assumptions. I assume the purchase rate is linear in consumption utility (i.e., earnings) and transaction utility (i.e., the perceived discount or mark-up).

While there was no trade-off when the participants observed a perceived discount, in decisions with a perceived mark-up, participants were trading off higher earning and negative transaction utility when deciding whether to purchase the virtual product.[28] I estimate a linear probability model with the following specification:

$$Purchase_{it} = \alpha + \beta_1 \times Earnings_{it} + \beta_2 \times PerceivedMark\text{-}up_{it} + \epsilon_i$$

where $Purchase_{it}$ is whether participants i decided to purchase the virtual product or not in decision t in the *Discount and Mark-up Game*; $Earnings_{it}$ is the difference in earnings (in dollars) between purchasing the virtual product or not (representing "consumption utility"), and $PerceivedMark\text{-}up_{it}$ is the difference in perceived mark-up, in dollars (representing "transaction (dis)utility"). I control for the decision order and cluster the random error, ϵ_i,

[27] The asymmetric response to discounts and mark-ups is present even when buyers are earning the minority of the buyer-seller pie (see Figure A1 in the Appendix) and so ceiling effects cannot be driving the result.

[28] For the purposes of this regression, I ignore inequity aversion.

at the individual level.

TABLE 1: TRADE-OFF BETWEEN EARNINGS AND PERCEIVED MARK-UP
Study 1A & 1B: Discount and Mark-up Game

Panel A: Study 1A Baseline		
	Dependent Variable: Purchase Virtual Product	
	OLS	Probit
	(1)	(2)
Earnings (in $)	0.184***	0.183***
	(0.017)	(0.016)
Perceived Mark-Up (in $)	-0.144***	-0.139***
	(0.011)	(0.010)
Constant	0.538***	
	(0.039)	
Ind. Clusters	178	178
Order Control	Yes	Yes
Observations	2848	2848
R-Squared	0.129	
Panel B: Study 1B With Earnings Displayed		
	Dependent Variable: Purchase Virtual Product	
	OLS	Probit
	(1)	(2)
Earnings (in $)	0.239***	0.242***
	(0.017)	(0.016)
Perceived Mark-Up (in $)	-0.088***	-0.085***
	(0.010)	(0.010)
Constant	0.428***	
	(0.041)	
Ind. Clusters	180	178
Order Control	Yes	Yes
Observations	2880	2880
R-Squared	0.138	

Notes: Trade-off between earnings and perceived mark-up on probability of purchasing the virtual product. Panel A shows results for *Study 1A: Baseline* and Panel B shows results for *Study 1B: With Earnings Displayed*. I control for game period. Robust standard errors in parentheses. Standard errors clustered at the individual level. Significance: *** p<0.01, ** p<0.05, * p<0.1.

Table 1 Panel A presents the trade-off between earnings (consumption utility) and perceived mark-up (transaction disutility) in *Study 1A: Baseline*. Focusing on regression (1), increasing earnings by a dollar increases the purchase rate by 18.4 percentage points. On the other hand, increasing the perceived mark-up by a dollar decreases the purchasing rate by 14.4 percentage points. Regression (2) provides a robustness check using a Probit model and shows marginal effects (holding all other independent variables constant at their means). Results demonstrate that the effect on perceived mark-up is nearly as large as the effect of active earnings. I use the estimates from Table 1 to quantify the willingness to pay for transaction utility in Section 3.5.

Table 2 provides robustness checks of these results. Regression (1) reports the baseline specification for comparison. Regressions (2) and (3) subset the data to instances where the buyer-seller earnings split is such that the buyer's share is less than 50%, the cases were inequity aversion might be particularly pronounced.[29] Regression (2) shows the trade-off between earnings and perceived mark-up when the selling price is \$7.51, \$8.03, and \$8.42 and shows that increasing earnings by a dollar increases the purchase rate by 20.0 percentage points. However this estimate incorporates the fact that increasing earnings also reduces inequality. On the other hand, increasing the perceived mark-up by a dollar decreases the purchasing rate by 14.5 percentage points. Regression (3) shows the trade-off between earnings and perceived mark-up when the selling price is \$8.03 or \$8.42. This comparison reduces the effect of decreasing inequality when the selling price decreases because the inequity difference is smaller, that is, the buyer's share of the pie only changes from 19% to 32%. Results show that increasing earnings by a dollar increases the purchase rate by 11.4 percentage points and increasing the perceived mark-up by a dollar decreases the purchasing rate by 13.0 percentage points. It is important to note the coefficients estimated for a perceived mark-up are stable across regression specifications. As such, inequity aversion does not affect transaction utility.

Note that in Table 2 regressions (1) to (3), estimates of coefficients may contain loss aversion over *transaction utility*. Regressions (4) to (6) examine the trade-off between earnings and perceived mark-up "removing" loss aversion by estimating the trade-off using perceived mark-ups of 10%, 20%, and 40%. Regression (4) shows that increasing earnings by a dollar increases the purchase rate by 19.7 percentage points and increasing the perceived mark-up by a dollar decreases the purchase rate by 8.5 percentage points. Regressions (5) and (6) mirror the sample selection of regressions (2) and (3) and show consistent results.

Another way to separate loss aversion and transaction utility effects is by using a kinked linear regression with the following specification:

$$Purchase_{it} = \alpha + \beta_1 \times Earnings_{it} + \beta_2 \times 1\{Mark\text{-}up_{it}\} + \beta_3 \times PerceivedMark\text{-}up_{it} + \epsilon_i$$

where the only difference compared to the previous specification is that $1\{Mark\text{-}up_{it}\}$ is a dummy variable equaled to 1 for any decision where the perceived mark-up was greater than 0%. This allows for a perceived mark-up to have a differential effect. Estimates from regression (7) show that under this specification, the coefficients for earnings and perceived

[29] Sub-setting the data provides an "upper" bound for the effect on earnings because decreasing the selling price increases earnings and reduces buyer-seller inequality.

mark-up are consistent with those in regression (4) and the effect of getting a mark-up reduces the purchase rate by 14.5 percentage points in *Study 1A: Baseline*.[30] Regressions (8) and (9) mimic the sample selection of regressions (2) and (3) and show consistent results.

TABLE 2: ROBUSTNESS CHECKS: TRADE-OFF BETWEEN EARNINGS AND PERCEIVED MARK-UP

Study 1A: Baseline

	Dependent Variable: Purchase Virtual Product								
	Mark-up 0-40%			Mark-up 10-40% Only			Loss Aversion Adjusted		
Selling Price:	All	$\geq$ \$7.51	$\geq$ \$8.03	All	$\geq$ \$7.51	$\geq$ \$8.03	All	$\geq$ \$7.51	$\geq$ \$8.03
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Earnings (in \$)	0.184***	0.200***	0.114***	0.197***	0.183***	0.064	0.192***	0.209***	0.124***
	(0.017)	(0.026)	(0.038)	(0.018)	(0.028)	(0.045)	(0.017)	(0.026)	(0.038)
Perceived Mark-Up (in \$)	-0.144***	-0.145***	-0.130***	-0.085***	-0.075***	-0.059***	-0.086***	-0.073***	-0.058***
	(0.011)	(0.012)	(0.012)	(0.011)	(0.012)	(0.013)	(0.011)	(0.012)	(0.013)
Mark-Up							-0.145***	-0.185***	-0.189***
							(0.022)	(0.026)	(0.029)
Constant	0.538***	0.530***	0.568***	0.425***	0.435***	0.499***	0.576***	0.581***	0.624***
	(0.039)	(0.045)	(0.050)	(0.046)	(0.051)	(0.059)	(0.038)	(0.045)	(0.050)
Ind. Clusters	178	178	178	178	178	178	178	178	178
Order Control	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2848	2136	1424	2136	1602	1068	2848	2136	1424
R-Squared	0.129	0.0874	0.0527	0.0856	0.0314	0.00809	0.136	0.0989	0.0645

Notes: Robustness checks for trade-off between earnings and perceived mark-up on the probability of purchasing the virtual product for *Study 1A: Baseline*. I control for game period. Robust standard errors in parentheses. Standard errors clustered at the individual level. Significance: *** p<0.01, ** p<0.05, * p<0.1.

3.3 How robust are transaction utility effects?

While my experimental paradigm is simple for participants (i.e., participants can calculate their earnings by subtracting the selling price from their assigned value), I can further simplify this calculation. To stress-test transaction utility, *Study 1B: With Earnings Displayed* uses the same game but displays participants' potential earnings if they choose to purchase the virtual product. Not only does this perform the required math for participants, it also makes consumption utility more salient. Note that displaying earnings does not provide new information to participants, as they can easily calculate the earnings themselves. This is a setting where we should not expect distortions due to an "irrelevant" original price, yet finding evidence of transaction utility in this study would show how robust this effect is and provides a lower bound for my estimates.[31]

[30] Comparing the loss aversion effect and the coefficient of a perceived mark-up suggests that loss aversion accounts for over 60% of the change in purchase rate (holding earnings constant).

[31] *Study 1B: With Earnings Displayed* is a setting difficult to replicate in the field but could be viewed as mapping onto situations where consumers have a rational actor (perhaps a friend) telling them to consider the true "value" they are receiving from a product and to ignore the fact that the product is "on sale."

Figure 3 Panel B shows the average purchasing rate by selling price as a percentage of the original price (mirroring Figure 3 Panel A) for *Study 1B: With Earnings Displayed*. Results show that displaying participants' potential earnings reduces but does not eliminate transaction utility. While participants exhibit a smaller purchase distortion compared to *Study 1A: Baseline*, they are still significantly more likely to purchase the virtual product under perceived discounts and less likely to purchase under perceived mark-ups compared to the control decisions.[32] This finding, that providing an "irrelevant" original price distorts purchasing behavior even when participants' earnings are displayed—encouraging them to consider their consumption utility—suggests that transaction utility is a strong and robust effect.[33]

Table 1 Panel B presents the trade-off between earnings and perceived mark-up in *Study 1B: With Earnings Displayed* (mirroring Table 1 Panel A). Focusing on regression (1), increasing earnings by a dollar increases the purchase rate by 23.9 percentage points (compared to 18.4 percentage points in the previous study). On the other hand, increasing the perceived mark-up by a dollar decreases the purchase rate by only 8.8 percentage points (compared to 14.4 percentage points in the previous study). Regression (2) provides a robustness check using a Probit model and shows marginal effects (holding all other independent variables at their means). Table A5 in the Appendix provides robustness checks of these results (mirroring Table 2). Results follow the same pattern as those in *Study 1A: Baseline* and coefficient estimates are consistent.

Displaying earnings encourages participants to consider their earnings, which should make consumption utility more salient. As such, the presence of transaction utility effects under this stress-test shows how important the "value of the deal" is to consumers and provides a lower bound for transaction utility.

[32] I note that participants are also less likely to purchase in the control decisions compared to *Study 1A: Baseline*. One plausible explanation for this effect is that displaying earnings makes the unequal split between the buyer's and seller's share of the surplus more salient. Figure A2 and Table A2 Panel B show the results by buyer's share of the surplus. Results are consistent with the baseline setting where participants are not explicitly shown their earnings.

[33] Table A4 in the Appendix pools data from *Study 1A: Baseline* and *Study 1B: With Earnings Displayed* to interact the perceived percentage change with *earnings displayed* and show its effect on participants' purchasing decisions. Regression (5) shows, conditional on selling price, a perceived 10% change in mark-up when earnings are displayed increases the purchasing rate by 4.6 percentage points but this is more than offset by the coefficient of observing a perceived 10% change in mark-up (decreasing purchasing rate by 8.1 percentage points). Similarly, a perceived 10% change in discount when earnings are displayed marginally decreases the purchasing distortion by 1.2 percentage points but this is more than offset by the coefficient of observing a perceived 10% change in discount (increasing purchasing rate by 3.0 percentage points).

3.4 Heterogeneity of transaction utility effect

While the sample of participants is fairly homogeneous, I am able to explore whether specific consumer traits attenuate or amplify transaction utility effects. In particular, I look at gender and whether a participant has taken a marketing 101 course. I also explore participants' self-reported measures of caring about discounts and being averse to mark-ups. To do this, I use a difference-in-differences regression that interacts the selling price as a percentage of the original price ($\frac{P}{O}$) and a binary (or categorical) measure of the four heterogeneity groups (see Table A6 Panels A and B in the Appendix).

First, gender stereotypes depict women as enjoying shopping and buying things at discounts more than men. As such, we might expect women to be more susceptible to transaction utility effects compared to men. Using data from *Study 1A: Baseline*, I find that each 10 percentage point increase in the selling price (as a percent of the original price) decreases the probability of purchasing the virtual product by an additional 2.8 percentage points for female participants compared to male participants. This difference is statistically significant and meaningful. The slope of purchase rate with respect to $\frac{P}{O}$ for women is 67% steeper than the slope for men.[34] Effects are consistent when participants were shown their potential earnings in *Study 1B: With Earnings Displayed*.[35]

Second, we might expect students who have previously taken a marketing 101 course to know about discounts and promotion tactics that companies use to drive sales. As such, we might expect transaction utility effects to be attenuated for those who have taken a marketing course. Indeed, I find that participants who have taken a marketing 101 course exhibit a less steep slope. In *Study 1A: Baseline* I find that the slope for students who have taken a marketing 101 class is 35% flatter than those who have never taken marketing 101, a difference that is significant at the 1% level.[36]

Third, in a post-survey, participants were asked to self-report how important discounts were to them and how averse they were to surge pricing on a 5-point Likert scale.[37] I find that

[34] See Table A6 Panel A regression (1) in the Appendix.

[35] See Table A6 Panel B regression (1) in the Appendix.

[36] See Table A6 Panel A regression (2). Results are weaker but directionally consistent in *Study 1B: With Earnings Displayed*. See Table A6 Panel B regression (2) in the Appendix.

[37] Participants were asked: "How important is it that your purchases contain a discounted price (that is, a mark-down on the original price)? (Examples of sales or discounts include: store discount codes, purchase rewards, or sales)". Participants self-reported this measure using a 5-point Likert scale from "extremely important" to "not at all important". Participants were also asked: "How averse are you to make a purchase knowing that the price is inflated (that is, a mark-up on the original price)? (Examples of inflated pricing include: ride share (Uber or Lyft) services at rush hour, hotels prices during peak season, airfare ticket prices during specific times, or sports events during high demand)". Participants self-reported this measure using a 5-point Likert scale from "extremely averse" to "not at all averse".

results are correlated with these self-reported measures of caring about discounts and being averse to mark-ups. In *Study 1A: Baseline*, participants who stated that they cared more discounts or were more averse to surge pricing displayed steeper slopes than participants who stated they did not care about discounts or mark-ups, a difference that is significant at the 1% level.[38]

3.5 MRS of consumption and transaction utility and WTP

Since I estimate reactions to earnings and transaction utility in dollar terms, I can estimate participants' willingness to pay for a $1 gain or loss of transaction utility. I use Table 1 Panel A and compare the coefficients between earnings and perceived mark-up to estimate a marginal rate of substitution between consumption and transaction utility. I find that participants are willing to pay 78 cents to avoid a dollar of perceived mark-up.[39] I use Table 1 Panel B, which provides the effect of earnings and perceived mark-up in *Study 1B: With Earnings Displayed*, to estimate a lower bound for the marginal rate of substitution. Displaying earnings to participants prior to making their decision reduces this exchange rate to 37 cents per dollar.

Using the simple model shown in Section 2, a change in the original prices leads to a $\frac{\alpha}{1+\alpha}$ change in willingness to pay, where α is the marginal rate of substitution. By plugging in the estimate from *Study 1A: Baseline*, I find that participants' willingness to pay changed by 44 cents for a dollar change in the original price.[40] This suggests that firms that are able to manipulate the original price of a product (e.g. by providing a inflated original price) may be able to significantly manipulate consumers' willingness to pay for a product.

3.6 Alternative Explanations?

The *Discount and Mark-up Game* shows that consumers gain transaction utility from discounts and transaction disutility from mark-ups. These effects are robust to a setting where consumption utility is made salient by showing study participants their potential

[38] See Table A6 Panel A regression (3) and (4) in the Appendix. Results from *Study 1B: With Earnings Displayed* show that coefficients are directionally consistent but not significant or marginally significant (see Table A6 Panel B regression (3) and (4) in the Appendix).

[39] Ngwe (2017) compares the change in purchasing probability between a dollar increase in fake sale or a dollar decrease in the real price using sales data from a luxury handbag store and finds a similar estimate, though this estimate is for perceived discounts and could potential contain a quality inference confound.

[40] Using the marginal rate of substitution from *Study 1B: With Earnings Displayed*, I estimate a lower bound effect: a dollar change in the original price leads to a 27 cents change in willingness to pay for a product.

earnings prior to making a decision. Consumers appear to care about the terms of the deal *separately* from the value of the product and selling price (that is, their consumption utility). In this subsection, I explore, and rule out, other potential explanations for my experimental results: complexity of the design, experience, anchoring, signaling, expectations, and experimenter demand.

3.6.1 The role of complexity

While the experimental design is simple and participants' earnings are easy to calculate, one could imagine that participants may not have understood how to calculate their earnings. However, all participants had to answer two comprehension questions which consisted of calculating their earnings if they chose to purchase the virtual product or not, and 97% of participants passed both comprehension questions on the first try. This suggest that individuals are capable of doing the correct earnings calculations, and this is a relatively simple calculation. As expected, results are consistent when I restrict my sample to only the 97% of participants who passed the comprehension questions on the first try. Importantly, participants' purchasing rate is responding to both the selling price and the "irrelevant" original price as predicted by the transaction utility model.

As an extreme way to help participants with calculations, *Study 1B: With Earnings Displayed* actually does the required math for participants by displaying potential earnings. *Study 1B: With Earnings Displayed* shows that displaying earnings information reduces the effect but does not eliminate it, suggesting my transaction utility result is not simply a result of complexity.

3.6.2 The role of experience

I identified the effect of transaction utility within an individual, so I can explore whether distortions in purchasing behavior are reduced as participants gain experience over the 32 decisions in the *Discount and Mark-up Game*. To do this, I divide my sample into the first and last 16 decisions of the game and use a difference-in-differences regression that interacts the selling price as a percentage of the original price ($\frac{P}{O}$). I find no significant differences between the first and second half of the game in *Study 1A: Baseline* or *Study 1B: With Earnings Displayed*, suggesting that transaction utility is not mitigated with experience.[41]

[41] See Table A6 Panels A and B regression (6) in the Appendix.

3.6.3 The role of anchoring, signaling, and expectations

One might posit that participants anchor to an original price or that the original price signals something about social norms associated with the transaction. Prior research has shown that anchoring effects are stronger under judgment uncertainty (Kahneman, 1992).[42] In my study, judgment uncertainty is removed or minimized by holding the buyer's value and seller's cost constant. As such, anchoring effects should be minimal. However, if transaction utility exists, then individuals need a reference point to derive positive or negative transaction utility. Since I provide virtual products with no prior reference price, participants might "anchor" to the original price as the reference price to evaluate *transaction utility*. In any case, this could mean that the formation of reference points and their effects on consumer's decisions may not be fully understood and this research seeks to further understand the importance of reference points in the presence of transaction utility.

Moreover, if there are any additional signals from the original price, we might expect to see a differential effect in the first half compared to the second half of the study—that is, after participants have seen a large set of randomly assigned original prices, they should realize that any signal from the original price is just noise. As previously stated, I find that the effects in the first and second halves of the study are nearly identical.[43]

I can also rule out that participants make their purchasing decisions based on expectations formed from perceived discounts or mark-ups seen in prior decisions.[44] A regression controlling for the perceived discount or mark-up seen in up to three prior decisions shows that the effect of prior discounts and mark-ups is not significant.

3.6.4 The role of experimenter demand

Finally, one might worry that experimenter demand might be driving these results. Again, I find this is not the case. First, we could expect participants who are regular lab participants to be differentially susceptible to experimenter demand. I divide my sample into participants who have below or above median participation in lab sessions at the Wharton Behavioral Lab.[45] I find no significant differences by this median split in either *Study 1A:*

[42]For example, when you are uncertain about the quality of wine you might anchor to the last two digits of your Social Security Number or when you are uncertain about the number of countries in Africa you might anchor to the (random) previous number you saw (Kahneman, 1992).

[43]See Table A6 Panels A and B regression (6) in the Appendix.

[44]Note that all participants were told to treat each decision independently since only one decision would chosen for payment if the participant was selected to be the buyer.

[45]In *Study 1A: Baseline*, participants' number of lab sessions attended ranges from 1 to 160 and in *Study 1B: With Earnings Displayed*, participants' number of lab sessions attended ranges from 1 to 126. In both

Baseline or *Study 1B: With Earnings Displayed*.[46]

Moreover, in the spirit of de Quidt et al. (2018), where experimenter demand can be bounded by "deliberately inducing demand in a structured way," *Study 1B: With Earnings Displayed* provides a test of experimenter demand. In *Study 1B: With Earnings Displayed*, participants are displayed their potential earnings prior to making their decisions. This could be thought of as producing experimenter demand for participants to place more value on their earnings. That transaction utility effects persisting in this setting provides a lower bound for this effect.[47]

3.7 Summary of Study 1

Results from the *Discount and Mark-up Game* suggest that consumers care about the terms of the deal, it can distort purchasing behavior, and it can deter the purchase of products that lead to higher consumption utility. I argue that alternative explanations are not sufficient to explain the experimental results and finding significant heterogeneity effects consistent with our expectations further strengthens this argument. Moreover, quantifying participant's marginal rate of substitution between consumption and transaction utility (i.e., their willingness to pay to avoid a dollar worth of perceived mark-up) suggests that actual monetary losses due to transaction utility are non-trivial.[48]

Next, I use the *Coupon Game*, which mimics the shopping experience using a coupon, to show that transaction utility is robust to a variety of settings and that it can lead consumers to buy the "wrong" product (i.e, a product that leads to lower consumption utility).

studies, the median number of lab sessions completed is 13.

[46]See Table A6 Panels A and B regression (5) in the Appendix. Furthermore, Kessler and Meier (2014) ran an experiment in the same lab using the same population, students from the University of Pennsylvania, and show that of participants being asked to return some portion of a $3 endowment to the experimenter, on average, only 10% of funds are returned and 75-80% of participants gave nothing back to the experimenter. This suggests that few participants are willing to give money back to the experimenter even under an explicit request.

[47]Participants were also asked to rate their selling price on a scale from 1-5 where 1 is a "very bad deal" and 5 is a "very good deal". This question was asked on the same decision screen where buyers made their purchasing decisions and is used to construct a mediation analysis (in Figure A3 and Table A7 in the Appendix). If asking participants to rate their selling price hinted to participants that this was a study about deal perception, a counterargument could be that asking participants to rate the deal allowed them to tell the experimenter that they know a particular selling price was a bad deal and *still* choose to purchase the virtual product to get positive earnings without feeling foolish. This could attenuate the transaction utility effect. In fact, I find that even participants who, conditional on earnings, always purchased the virtual product would still rate the price as a bad deal when they observed a perceived mark-up. Figure C4 in Appendix C.1 shows an example of the rating question.

[48]See Appendix A for additional results on monotonicity and mediation.

4 Study 2: Coupon Game

Imagine walking to a store with a $5 coupon valid for one of two products at the store. The first product is priced at $1 and the second product is priced at $8. Which product would you choose to buy using your $5 coupon? While there could be a number of reasons to purchase the $8 product, did it seem silly to use a $5 coupon on a product that was priced at $1? What if you would have been better off buying the product priced at $1?

The usage of coupons presents a different (but common) way in which consumers can acquire transaction utility.[49] The *Coupon Game* mimics a shopping experience with a coupon, mirroring the scenario above, and was designed to show that distortions due to transaction utility are present in a very different context and that consumers may be manipulated into not only spending more but also buying the "wrong" product.

I ran two versions of the *Coupon Game*, *Study 2A: Baseline* and *Study 2B: With Earnings Displayed*. In *Study 2A: Baseline*, I test whether participants respond to coupons achieving different levels of transaction utility. In *Study 2B: With Earnings Displayed*, I test the robustness of transaction utility effects in this setting by displaying participants' potential earnings to highlight their consumption utility prior to their decision. Below, I describe the general design of both versions and then highlight their differences.

4.1 Experimental Design

The *Coupon Game* included 204 participants randomly assigned to one of two versions.[50] In addition to earning a $10 show-up fee, one decision and one participant were randomly selected for payment in each session.[51]

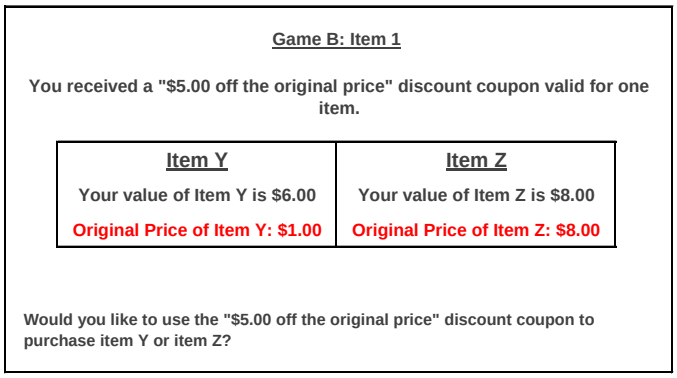
In this game, all participants were assigned the role of buyers and decided between one of two virtual products to buy using a "$5.00 off the original price discount coupon valid for one item." Again, since both items were virtual products—that is, no actual products were used—buyers were assigned their values of both virtual products: item Y and item Z. All buyers always valued item Y at $6 and item Z at $8. Participants were also provided with the (randomly assigned) original prices (O_Y and O_Z) of both virtual products. To create consumption utility, participants were rewarded in earnings based on their purchasing

[49] In 2016, the total value of coupons distributed in the United States was $307 billion. (See https://www.statista.com/statistics/630086/total-number-of-coupons-distributed-in-the-us/)

[50] Individuals participated in 1 of 12 sessions at the Wharton Behavioral Lab in January 2018 with 101 participants randomly assigned to *Study 2A: Baseline* and 103 participants randomly assigned to *Study 2B: With Earnings Displayed*.

[51] See section C.2 in the Appendix for experimental protocol.

(A) Study 2A: Baseline



(B) Study 2B: With Earnings Displayed

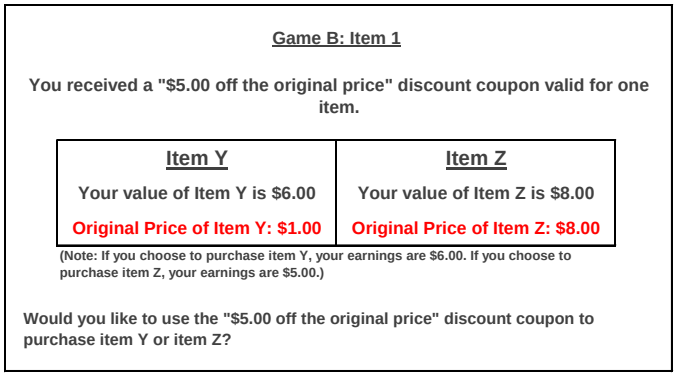


Figure 4: Participant's Decision Screen With and Without Earnings Displayed

Study 2A & 2B: Coupon Game

Note: In each decision of the *Coupon Game*, participants were reminded they received a "$5.00 off the original price" discount coupon valid for one item and shown their assigned values and original prices for each virtual product. Panel A shows an example of the participant's decision screen in *Study 2A: Baseline*, and Panel B shows an example for *Study 2B: With Earnings Displayed*.

decision: buyers' earnings were the value of the virtual product less the price they pay (that is, the original price less the coupon value) for the chosen virtual product.[52] Notice that participants obtained transaction utility measured by the amount of coupon value used or the discount (in dollars) gained. Crucially, all participants knew they were allowed to purchase only one of the two virtual products. All participants were also told that if the value of the coupon exceeded the original price of the chosen virtual product, they would not receive credit back (that is, they forfeit the remainder of the coupon value).

Figure 4 Panel A shows an example of the participant's decision screen for the *Coupon Game*. In this example, the participant values item Y at \$6 and it has an original price of \$1; and the participant values item Z at \$8 and it has an original price of \$8. Choosing to purchase item Y leads to \$6 in earnings but only \$1 worth of transaction utility (i.e., a \$1 discount).[53] On the other hand, choosing to purchase item Z leads to \$5 in earnings, but \$5 of transaction utility (i.e., a \$5 discount).[54]

The *Coupon Game* relies on a 2×3 within-subject design where participants' original price of item Y and item Z were randomly assigned to create variation in two dimensions: (1) the difference in earnings and (2) the difference in discount gained between the two virtual products. Participants observed 6 original price combinations in a random order: $(O_Y, O_Z) \in \{(\$6, \$1), (\$6, \$3), (\$6, \$4.50), (\$1, \$8), (\$3, \$8), (\$4.50, \$8)\}$. Notice that, for all six purchasing decisions, the original price of one virtual product is always greater than \$5 and one is always less than \$5. This was constructed such that one virtual product always led to a \$5 discount (but lower earnings) and one item always led to less than \$5 in discount (but higher earnings). Which virtual product led to a \$5 discount, by using the full value of the coupon to offset the original price, was randomly assigned. For the purpose of clear exposition, I define the following terms:

- The ***coupon-trap* good** is the virtual product that led to a \$5 discount but which, by design, led to lower earnings.
- The ***alternative* good** is the other available virtual product that led to less than \$5 in discount but led to higher earnings.

To achieve the two key sources of variation in my experiment, I selected the randomly assigned original prices for each virtual product such that purchasing the *coupon-trap* good

[52] If a buyer chose to purchase Item Y, his earnings were \$6 value - [O_Y - "\$5 coupon"] and if a buyer chose to purchase Item Z, his earnings were \$8 value - [O_Z - "\$5 coupon"].

[53] Earnings from item Y: \$6 value - [\$1 - "\$5 coupon" = \$0] = \$6; discount gained is \$1.

[54] Earnings from item Z: \$8 value - [\$8 - "\$5 coupon" = \$3] = \$5; discount gained is \$5.

led to either \$1 or \$3 *less* in earnings compared to purchasing the *alternative* good. I also independently varied the extra discount from purchasing the *coupon-trap* good (compared to the *alternative* good), such that purchasing the *coupon-trap* good led to \$0.50, \$2.00, or \$4.00 in extra discount.

All participants saw each combination of original prices, for a total of 6 purchasing decisions, in a random order. One decision and one participant were randomly selected for payment in each session. At the end of the laboratory sessions, participants answered a series of demographic questions.

To ensure the quality of participants' responses, all participants had to answer and pass two comprehension questions before proceeding to the game. The comprehension questions consisted of two multiple choice questions, each with 11 choices (see Figure C5 in the Appendix for an example).[55] There is less than 1% chance of correctly guessing both comprehension questions by random chance. If participants failed any comprehension question, they had to try again until they passed both questions.[56] This ensured that all participants understood how to calculate their earnings by the time they played the game.

Calculating earnings for the *Coupon Game* required additional (and more complicated) math than calculating earnings in the *Discount and Mark-up Game*. In this case, participants first had to calculate the selling price they would be paying after applying the coupon.[57] Then, participants had to subtract the selling price from their assigned value to get to their earnings. Indeed, I find that participants found this math more difficult: only 50% of participants passed both comprehension questions on the first try.[58] However, the remaining 50% who did not pass on their first attempt had the opportunity to re-answer the comprehension questions until they passed. Thus, all participants learned and were capable of calculating earnings by the time they played the game.[59]

The key feature of this design is that participants were paid their earnings—calculated as the difference between the assigned value and the price they pay (that is, the original

[55]Participants were shown a hypothetical scenario with the same decision screen as the game and were asked: (1) What are your earnings if you choose to purchase the item Y? (2) What are your earnings if you choose to purchase the item Z? Participants were told to select their answer from two drop down lists. Each drop down list contained 11 choices ranging from \$0.00 to \$10.00 in one dollar increments.

[56]Participants were not told which of the two questions they answered correctly and were asked to select the correct answer for both questions until they passed.

[57]The selling price was the maximum of the difference between the original price less the coupon value and zero. In math, $selling\ price = max\{original\ price - coupon\ value, 0\}$.

[58]In *Study 2A: Baseline*, 52% of participants passed both comprehension questions on the first try and in *Study 2B: With Earnings Displayed*, 48% of participants passed both comprehension questions on the first try.

[59]My results are qualitatively the same including all participants or only participants who passed the comprehension check on the first try.

price after applying the coupon) for their chosen virtual product. Thus, absent transaction utility, the coupon should only matter as a way to increase participants' earnings by reducing the selling price. By construction, if participants only care about consumption utility, they should always purchase the *alternative* good, leading to higher earnings.

4.1.1 Difference between Study 2A and Study 2B

In both versions, *Study 2A: Baseline* and *Study 2B: With Earnings Displayed*, participants played the *Coupon Game* with the same incentives and the same 6 purchasing decisions in a random order. The *only* difference between the two versions was that participants' earnings were displayed before making their decisions in *Study 2B: With Earnings Displayed*.

In *Study 2B: With Earnings Displayed*, participants saw the same decision screen as *Study 2A: Baseline* but participants' potential earnings were displayed with the following message: "(Note: If you choose to purchase the item Y, your earnings are $___. If you choose to purchase item Z, your earnings are $___.)" Figure 4 provides examples of participants' decision screens in both versions. As in Study 1, *Study 2B: With Earnings Displayed* is used to attempt to stress-test the robustness of transaction utility. By displaying potential earnings, I encourage participants to consider their consumption utility; as such, we should expect transaction utility effects to be considerably reduced or eliminated in *Study 2B: With Earnings Displayed*.

In the following subsection, I present results from the *Coupon Game*. First, I present the main results from *Study 2A: Baseline* in Section 4.2, then I discuss results from *Study 2B: With Earnings Displayed* in Section 4.3.

4.2 Consumers get transaction utility from using coupons

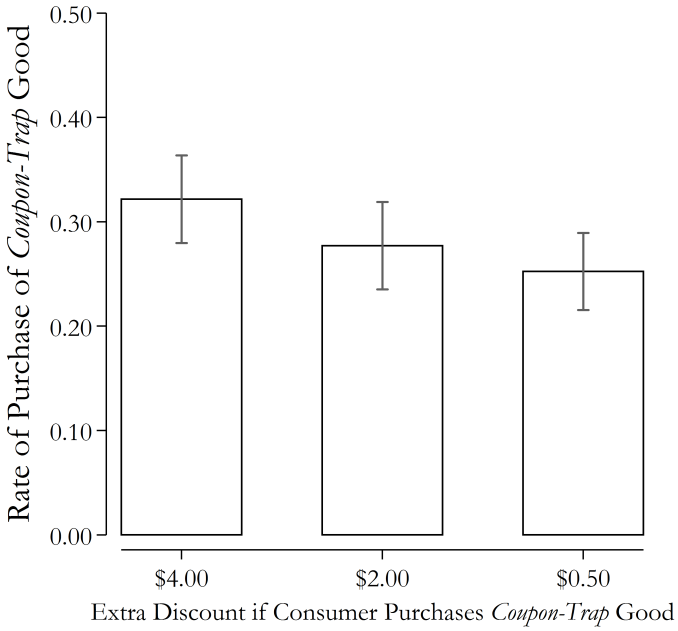
All analyses will focus on the average rate of purchasing the *coupon-trap* good. I look at the effect of (randomly assigned) extra earnings and of extra discount if consumers were to purchase the *coupon-trap* good (compared to the *alternative* good) on participants' purchasing decisions.[60] I also explore the trade-off between extra earnings and extra discount gained from purchasing the *coupon-trap* good (compared to the *alternative* good) on a participant's probability of purchasing the *coupon-trap* good.[61]

[60] This parallels the analysis in the *Discount and Mark-up Game* where I examined the effect of perceived discount and mark-up achieved from choosing to purchase (compared to not purchase).

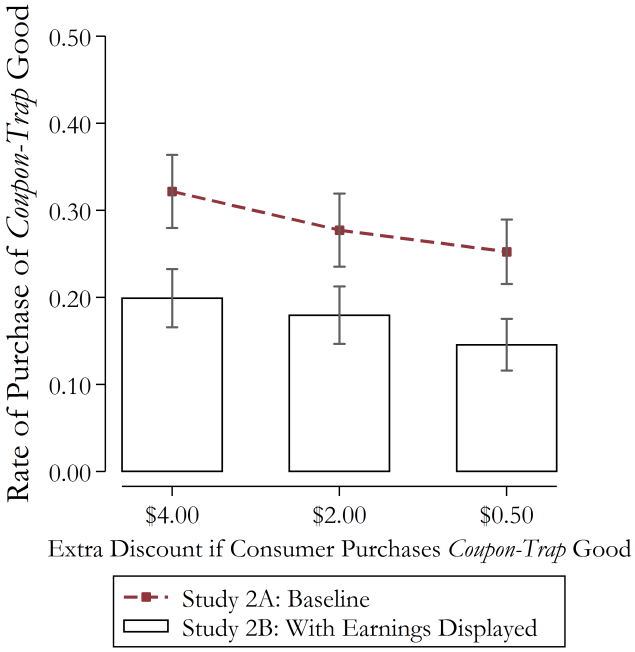
[61] This parallels the analysis in the *Discount and Mark-up Game* where I examined the trade-off between earnings and perceived mark-up on a participant's probability of purchasing the virtual product.

FIGURE 5: RATE OF PURCHASING THE *Coupon-Trap* GOOD
Study 2A & 2B: Coupon Game

(A) STUDY 2A: BASELINE



(B) STUDY 2B: WITH EARNINGS DISPLAYED



Note: Purchase rate of the *coupon-trap* good by extra discount from purchasing the *coupon-trap* good. The *coupon-trap* good is the virtual product that led to a $5 discount which, by design, led to lower earnings. Panel A shows results for *Study 2A: Baseline* and Panel B shows results for *Study 2B: With Earnings Displayed*. Robust standard error bars clustered at the individual level are shown around each mean.

Figure 5 Panel A shows participants' average purchase rate of the *coupon-trap* good by the extra discount if the consumer purchased the *coupon-trap* good. I find that participants are willing to sacrifice higher earnings to obtain a higher discount almost 30% of the time. First, participants are willing to give up a dollar in earnings to gain an additional 50 cents of discount 28.5 percent of the time. Conditional on earnings, when the *coupon-trap* good leads to an extra \$2.00 of discount, buyers are 2.5 percentage points more likely to purchase the *coupon-trap* good (not significant). However, when the *coupon-trap* good leads to an extra \$4.00 of discount, buyers are significantly more likely to purchase the *coupon-trap* good by 6.9 percentage points (see Table B1 regression (1) in the Appendix, $p < 0.05$). Moreover, as the earnings loss associated with purchasing the *coupon-trap* good increases from \$1 to \$3, the purchase rate of the *coupon-trap* good decreases by 6.6 percentage points (see Table B1 regression (1) in the Appendix, $p < 0.01$).

To verify that participants are behaving consistent with predictions from a model with transaction utility, I use the slope of the effect of extra discount if the consumer purchased the *coupon-trap* good. Table B2 regression (1) in the Appendix shows that participants are more likely to purchase the *coupon-trap* good as the extra discount from buying the *coupon-trap* good increases (slope coefficient of 0.020 is significant at the 5% level). Moreover, splitting the sample by extra earnings lost, we can see that this effect is primarily driven by decisions when extra earnings lost is \$1 (i.e., rather than \$3).[62]

Table 3 Panel A presents the results of a regression that exploits the variation in extra earnings and extra discount gained if a consumer purchases the *coupon-trap* compared to the *alternative* good in *Study 2A: Baseline*. The regression specification estimated is as follows:

$$Purchase_{it} = \alpha + \beta_1 \times Extra\ Earnings_{it} + \beta_2 \times Extra\ Discount_{it} + \epsilon_i$$

where $Purchase_{it}$ is whether participant i decided to purchase the *coupon-trap* good in decision t in the *Coupon Game*; $Extra\ Earnings_{it}$ is the extra earnings (in dollars) achieved if the consumer purchases the *coupon-trap* (compared to the *alternative* good); and $Extra\ Discount_{it}$ is the extra discount (in dollars) if the consumer purchases the *coupon-trap* good. I control for the decision order and cluster the random error, ϵ_i, at the individual level.

Results from regression (1), show that increasing extra earnings lost by a dollar decreases the purchase rate of the *coupon-trap* good by 3.3 percentage points. On the other hand, increasing the extra discount gained by a dollar increases the purchase rate of the *coupon-trap* good by 1.9 percentage points. As a robustness check, regression (2) estimates a

[62] See Table B2 regressions (2) and (3) in the Appendix.

Table 3: Trade-off between Extra Earnings and Extra Perceived Discount Realized by Purchasing the *Coupon-Trap* Good
Study 2A & 2B: Coupon Game

Panel A: Study 2A Baseline		
	Dependent Variable: Purchase of *Coupon-Trap* Good	
	OLS	Probit
	(1)	(2)
Earnings Loss	-0.033***	-0.033***
	(0.011)	(0.011)
Extra Discount	0.019**	0.019**
	(0.009)	(0.009)
Constant	0.336***	
	(0.052)	
Ind. Clusters	101	101
Order Control		
Observations	606	606
R-Squared	0.0103	
Panel B: Study 2B With Earnings Displayed		
	Dependent Variable: Purchase of *Coupon-Trap* Good	
	OLS	Probit
	(1)	(2)
Earnings Loss	-0.022**	-0.021**
	(0.010)	(0.010)
Extra Discount	0.015	0.015
	(0.010)	(0.010)
Constant	0.229***	
	(0.054)	
Ind. Clusters	103	103
Order Control		
Observations	618	618
R-Squared	0.00981	

Notes: Trade-off between extra earnings and extra discount if a consumer purchases the *coupon-trap* good on participants' purchasing decisions. The *coupon-trap* good is the virtual product that led to a $5 discount gained which, by design, led to lower earnings. Panel A shows results for *Study 2A: Baseline* and Panel B shows results for *Study 2B: With Earnings Displayed*. I control for the game period. Robust standard errors in parentheses. Standard errors clustered at the individual level. Significance: *** p<0.01, ** p<0.05, * p<0.1.

Probit model and presents marginal effects (holding all other independent variables constant at their means) and shows consistent results.[63]

Conditional on earnings, results suggest individuals are responding to changes in extra discount gained. Notably, this was a within-subject design. Thus, the same participants who bought the *alternative* good, revealing that they did value their earnings, "switched" their purchase decisions when the extra discount from the *coupon-trap* good was sufficiently high. That is, they were willing to give up actual money for transaction utility.

4.3 How robust are transaction utility effects?

I use *Study 2B: With Earnings Displayed* to stress-test the effect of transaction utility. Recall that displaying earnings does not give the participant new information, as he can calculate his earnings with the value, coupon, and original price provided. However, we should expect smaller transaction utility effects in this setting since showing earnings may encourage participants to think about their earnings, making consumption utility more salient.

Figure 5 Panel B shows the average purchase rate of the *coupon-trap* good by the extra discount if a consumer purchases the *coupon-trap* good compared to the *alternative* good (mirroring Figure 5 Panel A) for *Study 2B: With Earnings Displayed*. Results are directionally consistent with a setting where participants are not explicitly shown their earnings but differences between conditions are no longer significant in a regression (see Table B1 regressions (5) and (6) in the Appendix). However, notice that participants are *still* choosing to purchase the *coupon-trap* good 15-20% of the time. Limiting the data to the "smarter" cohort of participants—participants who passed the comprehension questions on their first attempt—shows results are marginally significant (see Table B1 regressions (7) and (8) in the Appendix).[64]

Focusing on the slope of extra discount if a consumer purchases the *coupon-trap* good, Table B2 regression (4) in the Appendix shows increasing the extra discount by a dollar directionally increases the purchase rate by 1.5 percentage points (p-value=0.13). Similar to the baseline study, splitting the sample by extra earnings lost, shows that this effect is primarily driven by decisions where the extra earnings lost is \$1 compared to \$3. When extra earnings lost from purchasing the *coupon-trap* good is \$1, increasing the extra discount

[63] See Table B3 regressions (1) and (2) in the Appendix for estimates using only participants who passed the comprehension questions on the first try.

[64] Also see Figure B2 Panel B in the Appendix.

by a dollar increases participants' purchase rate of the *coupon-trap* good by 2.7 percentage points, and this is significant at the 10% level.[65]

Table 3 Panel B presents the trade-off between extra earnings and extra discount if a consumer purchases the *coupon-trap* good (mirroring Table 3 Panel A) for participants in *Study 2B: With Earnings Displayed*. Estimates are directionally consistent with those in the baseline study where earnings were not displayed. Increasing the earnings lost from purchasing the *coupon-trap* good decreases its purchase rate by 2.2 percentage points. On the other hand, increasing the extra discount by a dollar increases the probability of purchasing the *coupon-trap* good by 1.5 percentage points but this is not. Regression (2) uses a Probit model, and reports marginal effects (holding all other independent variables at their mean), and shows a consistent story.[66]

4.4 Heterogeneity of transaction utility

Following Study 1, I explore consumer heterogeneity in the *Coupon Game*. Looking at the same four groups as before: gender, whether a participant has taken a marketing 101 course, and participants' self-reported measures of caring about discounts and being averse to mark-ups, I use a difference-in-differences regression that interacts the extra discount if consumers purchase the *coupon-trap* good and a binary (or categorical) measure of the four heterogeneity groups. I do not find statistically significant differences between those groups, possibly due to my lack of statistical power in this game with only 6 choices per subject (see Table B4 in the Appendix).

4.5 MRS of consumption and transaction utility and WTP

Using the *Coupon Game*, I perform the same coefficients comparison as before to estimate participants' willingness to pay for a $1 gain in perceived discount (that is, transaction utility). I use Table 3 Panel A and compare the coefficients between extra earnings and extra discount if a consumer purchases the *coupon-trap* good to estimate a marginal rate of substitution between consumption and transaction utility. I find that participants are willing to pay 57 cents to gain a dollar of transaction utility. Coefficients in Table 3 Panel B are noisy. As such, I use coefficients from the "smarter" cohort of participants in Table B3 to estimate a lower bound for the marginal rate of substitution: participants are willing to pay a minimum

[65] See Table B2 regressions (2) and (3) in the Appendix.

[66] See Table B3 regressions (1) and (2) in the Appendix for estimates using only participants who passed the comprehension questions on the first try.

of 37 cents to gain a dollar of transaction utility. Notice, this willingness to pay is similar to the 37-78 cents estimated in the *Discount and Mark-up Game*. While we might expect individuals to be willing to pay less for a perceived discount than for a perceived mark-up, in accordance with loss aversion, it is possible that coupons make transaction utility more salient.

Using the marginal rate of substitution of 57 cents suggests that increasing the original price by a dollar increases participants' willingness to pay for a product by 36 cents. Once again, this suggests that coupons' effectiveness may be due in large part to its effects on transaction utility.

4.6 Alternative Explanations?

The *Coupon Game*, which mirrors buying products with coupons, showed that participants respond to changes in discount gained in a manner consistent with a theory of transaction utility. This suggests that coupons may trap consumers into purchasing more expensive products to obtain higher discounts at the expense of consumption utility.[67] Following the approach in Study 1, I discuss and rule out alternative explanations for these experimental results.

4.6.1 The role of complexity

As before, we might question the complexity of the *Coupon Game* and whether participants understood how to calculate their earnings for each virtual product. Similar to Study 1, all participants had to correctly answer two comprehension questions which consisted of calculating their earnings if they chose to buy item Y or item Z before proceeding to the game. While it appears that this earnings calculation is difficult, with only 50% of participants passing both comprehension question on the first try, participants had to pass the comprehension questions to proceed. As such, they are capable of doing the correct earnings calculations. One could imagine that participants who passed the comprehension questions on their first attempt are a "smarter" cohort. As a robustness check, I present results for only participants who passed the comprehension questions on the first try in the Appendix (see Figure B2 and Table B1). Results are robust to this subset of "smarter" participants.[68]

[67] This latter result is consistent with prior work showing that coupons may increase spending by consumers (Milkman and Beshears, 2009); however, I show that it not only increases spending but may also lead to suboptimal decisions, that is, it leads to lower consumption utility.

[68] While there is a level change across all six purchasing decisions, effects due to changes in earnings and perceived discounts if a consumer purchases the *coupon-trap* good persist.

Importantly, participants' purchase rate of the *coupon-trap* good responds to both changes in the extra earnings and to extra discount gained as predicted by the transaction utility model.

Moreover, *Study 2B: With Earnings Displayed* actually does the required math for participants by displaying potential earnings prior to making their decisions. However, even in this game participants still sacrifice higher earnings for a larger discount 15-20% of the time and results on the slope of *coupon-trap* good purchase with respect to discount are marginally significant when isolating to decisions where the earnings lost is $1.

4.6.2 The role of anchoring

As stated in Section 3.6.3, judgment uncertainty is removed or minimized by assigning the buyer's value of the two products, so anchoring effects should be minimal. However, if transaction utility exists, then individuals may anchor to the $5 value of the coupon as the target amount of transaction utility to achieve. In a companion paper (Huang, 2018), I provide suggestive evidence that coupon values may act as targets, increasing the weight placed on transaction utility.

4.6.3 The role of experimenter demand

As in Study 1, one might worry about experimenter demand driving these results. Again, I find this is not the case. First, I again find that there is no difference in transaction utility effects between rookie and veteran lab experiment participants.[69]

Moreover, in the spirit of de Quidt et al. (2018), *Study 2B: With Earnings Displayed*, where participants are displayed their potential earnings prior to making their decision, could again be thought of as producing experimenter demand for participants to place more value on their earnings. In *Study 2B: With Earnings Displayed*, while the slope of extra discount on the purchase rate of the *coupon-trap* good is only directionally consistent, participants are still choosing to purchase the *coupon-trap* good 15-20% of the time (see Figure 5 Panel B).[70]

[69] See Table B4 regression (5) in the Appendix.

[70] Furthermore, focusing on only the smarter cohort of participants who passed the comprehension check on the first try in *Study 2B: With Earnings Displayed*, I find that participants are 9.4 percentage points more likely to buy the *coupon-trap* good when the extra perceived discount is $4.00 compared to $0.50 and this is a marginally significant (see Table B1 regression (7) and (8)).

4.7 Summary of Study 2

Results from the *Coupon Game* provide further evidence that consumers care about the terms of the deal, it can distort purchasing behavior, and it can induce the purchase of products that lead to lower consumption utility. I again argue that alternative explanations are not sufficient to explain the experimental results. Moreover, quantifying participant's marginal rate of substitution between consumption and transaction utility (i.e., their willingness to pay to gain a dollar worth of perceived discount) suggests that actual monetary losses due to transaction utility are non-trivial.[71]

5 General Discussion

Do consumers place value on the perceived quality of a "deal" and, if so, can it lead them to sacrifice consumption utility? This paper provides evidence that the answer is yes. Two incentive-compatible laboratory experiments, mirroring the shopping experience with discounts and mark-ups (Study 1) and coupons (Study 2), demonstrate that transaction utility can shift demand and lead to perverse changes in consumption decisions. I find that consumers gain utility from discounts and disutility from mark-ups, following past research on "transaction utility" (Thaler, 1985, 1999, 2008). Thus, individuals may choose to purchase a discounted, inferior good, or refuse to purchase a marked-up, superior good, to gain transaction utility or avoid transaction disutility. Indeed, my estimates suggest the marginal rate of substitution between earnings and transaction utility is 57 to 78 cents.[72] Moreover, these estimates suggest that a dollar change in the reference price (i.e., the original price) can change consumer's willingness to pay for a product by 36 to 44 cents. These estimates suggest that transaction utility is highly relevant across a wide array of consumer decisions and purchasing behaviors.

Importantly, results from both experiments were not driven by product quality inference. If consumers are inferring quality from an original price, then updating of beliefs may play a role in explaining distortions. However this is not possible for my study participants because they are making decisions over virtual products with assigned valuations. Moreover, participants had to successfully answer two comprehension questions to proceed to each game, thus they had the ability to do the math. Finally, effects persisted to varying

[71] See Appendix B for additional results on monotonicity.

[72] Consumers are willing to pay 57 cents to gain a dollar of perceived discount and 78 cents to avoid a dollar of perceived mark-up.

degrees even after displaying potential earnings before participants made their decision. This suggests results were driven by transaction utility.

Future research should further explore the effects of attention and prior beliefs on transaction utility. Attention to "irrelevant" original prices may depend on the transaction context and consumers' prior experience.[73] Well-informed consumers may respond less to "irrelevant" original prices or consumers may respond more to "irrelevant" original prices for rarely purchased goods (Bagwell and Riordan, 1991; Armstrong and Chen, 2013). For example, consumers rarely buy mattresses or rugs. Thus perceived sales from "irrelevant" original prices may be more believable and effective fro these products. On the other hand, consumers may be less likely to be fooled by "irrelevant" original prices for products they purchase everyday.[74] When faced with "irrelevant" original prices, consumers may find some perceived discounts and mark-ups more believable than others, based on prior experience and recall. Attention to "irrelevant" original prices may produce stronger responses from less-informed and inexperienced consumers than more-informed and experienced ones.

Moreover, distortions of purchasing behavior due to transaction utility produced by "irrelevant" original prices may only last as long as the "irrelevant" original prices are believable. Extremely high discounts and consistent sales may lead consumers to believe that the transaction utility gained is "fake" and thus diminish its utility. Further research is needed to estimate consumers' sensitivity to consistent sales as well as the credibility of "fictitious" original prices. Additional research is also needed to compare different sales tactics and explore how they perform relative to one another. Finally, future research should also focus on understanding the "half-life" of transaction utility. How long-lasting is the experience of getting a good deal? What is the depreciation rate of transaction utility? Understanding how permanent transaction utility is could have important implications for consumer's welfare and long-term consumer policy and firm pricing regulations.

In general, understanding how transaction utility can affect demand is of great importance for firm pricing strategy as virtually every retail firm engages in some form of discount or sales tactic. For example, years after JCPenney's pricing debacle, the company's sales have yet to recover fully, suggesting transaction utility could play an important role in short and long-term firm pricing strategy (Mourdoukoutas, 2017).

[73] Prior models have theorized the effect of references prices on consumers' demand for a product using signaling (Bagwell and Riordan, 1991; Armstrong and Chen, 2013), attention (Gabaix et al., 2006; Koszegi and Szeidl, 2013), and bargain-hunting (Armstrong and Chen, 2013). These models suggest attention to prior prices and experience could mediate transaction utility effects.

[74] Although some consumers may be less likely to remember prior selling prices (Dickson and Sawyer, 1990).

Policymakers and regulators will also be interested in how transaction utility can be manipulated to exploit consumers. For example, research has shown an increase in the use of inflated "fictitious" original prices by retailers. Some of the most egregious pricing practices had items offered "on sale" more than 75% of the time.[75] Evidence from a large set of class action lawsuits alleging that firms use "fictitious" original prices to create perception of discounts and trick consumers into purchasing suggests firms are exploiting consumers using transaction utility.

Finally, from a litigation perspective, evidence of consumers being deceived and suffering economic harm (i.e., welfare loss) due to "fictitious" original prices is a necessary condition in court rulings. However, typical rulings favor the advertisers and sellers because assessing material damages associated with fictitious pricing is difficult (Friedman, 2016). If firms are using fake prices to trick consumers into purchasing then transaction utility achieved is not only a non-pecuniary, intangible gain, but it but could also be considered as "fake transaction utility." Showing evidence that "fictitious" original prices distort consumer behavior and lead to material losses is pertinent to such lawsuits. Moreover, quantifying participant's willingness to pay to gain a dollar of perceived discount or avoid a dollar of perceived mark-up provides a benchmark for economic harm.

[75]Beginning March 2017, Consumer's Checkbook tracked the prices offered by 19 national chains for 20 big-ticket items at each store for 44 weeks. They found the use of inflated original prices and discounts more widespread compared to similar research performed in 2014 and 2015. See Brasler (2018). Consumer's Checkbook is an independent, non-profit consumer organization founded in 1974 to provide survey information to consumers about vendors and service providers (see http://www.checkbook.org).

References

Armstrong, Mark and Yongmin Chen (2012), "Discount pricing." Economics Series Working Papers 605, University of Oxford, Department of Economics, URL https://EconPapers.repec.org/RePEc:oxf:wpaper:605.

Armstrong, Mark and Yongmin Chen (2013), "Discount pricing." *CEPR Discussion Paper No. DP9327*, 21, URL https://ssrn.com/abstract=2212003.

Bagwell, Kyle and Michael H. Riordan (1991), "High and declining prices signal product quality." *The American Economic Review*, 81, 224–239, URL http://www.jstor.org/stable/2006797.

Berkowitz, Eric N. and John R. Walton (1980), "Contextual influences on consumer price responses: An experimental analysis." *Journal of Marketing Research*, 17, 349–358, URL http://www.jstor.org/stable/3150533.

Biswas, Abhijit and Edward A. Blair (1991), "Contextual effects of reference prices in retail advertisements." *Journal of Marketing*, 55, 1–12, URL http://www.jstor.org/stable/1252143.

Biswas, Abhijit and Scot Burton (1993), "Consumer perceptions of tensile price claims in advertisements: An assessment of claim types across different discount levels." 21, 217–229.

Biswas, Abhijit and Scot Burton (1994), "An experimental assessment of effects associated with alternative tensile price claims." *Journal of Business Research*, 29, 65 – 73, URL http://www.sciencedirect.com/science/article/pii/0148296394900280.

Biswas, Abhijit, Elizabeth J. Wilson, and Jane W. Licata (1993), "Reference pricing studies in marketing: A synthesis of research results." *Journal of Business Research*, 27, 239 – 256, URL http://www.sciencedirect.com/science/article/pii/014829639390029O.

Bitta, Albert J. Della, Kent B. Monroe, and John M. McGinnis (1981), "Consumer perceptions of comparative price advertisements." *Journal of Marketing Research*, 18, 416–427, URL http://www.jstor.org/stable/3151334.

Bordalo, Pedro, Nicola Gennaioli, and Andrei Shleifer (2013), "Salience and consumer choice." *Journal of Political Economy*, 121, 803–843.

Brasler, Kevin (2018), "With deceptive 'discounts', retailers are manipulating us to spend more. here are the worst offenders." *The Washington Post*, URL https://www.washingtonpost.com/lifestyle/home/with-deceptive-discounts-retailers-are-manipulating-us-to-spend-more/2018/03/13/9c0ca05a-20bb-11e8-94da-ebf9d112159c_story.html?utm_term=.75747aa40ddc.

Compeau, Larry D. and Dhruv Grewal (1998), "Comparative price advertising: An integrative review." 17, 257–273.

Darke, Peter R. and Cindy M.Y. Chung (2005), "Effects of pricing and promotion on consumer perceptions: it depends on how you frame it." *Journal of Retailing*, 81, 35 – 47, URL http://www.sciencedirect.com/science/article/pii/S0022435905000047.

Darke, Peter R. and Darren W. Dahl (2003), "Fairness and discounts: The subjective value of a bargain." *Journal of Consumer Psychology*, 13, 328 – 338, URL http://www.sciencedirect.com/science/article/pii/S1057740803702010.

de Quidt, Jonathan, Johannes Haushofer, and Christopher Roth (2018), "Measuring and bounding experimenter demand." *American Economic Review*, Forthcoming.

Dickson, Peter R. and Alan G. Sawyer (1990), "The price knowledge and search of supermarket shoppers." *Journal of Marketing*, 54, 42–53, URL http://www.jstor.org/stable/1251815.

Dodds, William B., Kent B. Monroe, and Dhruv Grewal (1991), "Effects of price, brand, and store information on buyers' product evaluations." *Journal of Marketing Research*, 28, 307–319, URL http://www.jstor.org/stable/3172866.

Dodonova, Anna and Yuri Khoroshilov (2004), "Anchoring and transaction utility: evidence from on-line auctions." *Applied Economics Letters*, 11, 307–310, URL https://EconPapers.repec.org/RePEc:taf:apeclt:v:11:y:2004:i:5:p:307-310.

Fehr, Ernst and Klaus M. Schmidt (1999), "A theory of fairness, competition, and cooperation." *The Quarterly Journal of Economics*, 114, 817–868, URL http://www.jstor.org/stable/2586885.

Friedman, David Adam (2016), "Reconsidering ficticious pricing." *Minnesota Law Review*, 921–982.

Gabaix, Xavier, David Laibson, Guillermo Moloche, and Stephen Weinberg (2006), "Costly information acquisition: Experimental analysis of a boundedly rational model." *American Economic Review*, 96, 1043–1068, URL http://www.aeaweb.org/articles?id=10.1257/aer.96.4.1043.

Grewal, Dhruv, R Krishnan, Julie Baker, and Norm Borin (1998), "The effect of store name, brand name and price discounts on consumers' evaluations and purchase intentions." *Journal of Retailing*, 74, 331 – 352, URL http://www.sciencedirect.com/science/article/pii/S0022435999800992. Research Perspective on Retail Pricing.

Grewal, Dhruv, Howard Marmorstein, and Arun Sharma (1996), "Communicating price information through semantic cues: The moderating effects of situation and discount size." 2, 148.

Heidhues, Paul and Botond Kőszegi (2014), "Regular prices and sales." *Theoretical Economics*, 9, 217–251, URL https://onlinelibrary.wiley.com/doi/abs/10.3982/TE1274.

Holter, Mike (2011), "Michaels to pay $1.8m settlement over deceptive advertising." *Top Class Actions*, URL https://topclassactions.com/lawsuit-settlements/lawsuit-news/1399-michaels-to-pay-18m-settlement-over-deceptive-advertising/.

Inman, J. Jeffrey, Anil C. Peter, and Priya Raghubir (1997), "Framing the deal: The role of restrictions in accentuating deal value." *Journal of Consumer Research*, 24, 68–79, URL http://dx.doi.org/10.1086/209494.

Jahedi, Salar (2010), "A taste for bargains."

Kahneman, Daniel (1992), "Reference points, anchors, norms, and mixed feelings." *Organizational Behavior and Human Decision Processes*, 51, 296 – 312, URL http://www.sciencedirect.com/science/article/pii/074959789290015Y. Decision Processes in Negotiation.

Kaicker, Ajit, William O. Bearden, and Kenneth C. Manning (1995), "Component versus bundle pricing: The role of selling price deviations from price expectations." *Journal of Business Research*, 33, 231 – 239, URL http://www.sciencedirect.com/science/article/pii/014829639400072M. Pricing Strategy and the Marketing Mix.

Kalwani, M.U. and C.K. Yim (1992), *Consumer Price and Promotion Expectations: An Experimental Study*. Reprint series of the Institute for Research in the Behavioral, Economic, and Management Sciences, Purdue University, Krannert Graduate School of Management, URL https://books.google.com/books?id=b7ewnQEACAAJ.

Kang, Peter Y. (2015), "Kohl's hit with false ad class action over brand discounts." *Law 360*, URL https://www.law360.com/articles/682252/kohl-s-hit-with-false-ad-class-action-over-brand-discounts.

Kessler, Judd B. and Stephan Meier (2014), "Learning from (failed) replications: Cognitive load manipulations and charitable giving." *Journal of Economic Behavior & Organization*, 102, 10–13, URL https://ideas.repec.org/a/eee/jeborg/v102y2014icp10-13.html.

Kőszegi, Botond and Matthew Rabin (2006), "A model of reference-dependent preferences*." *The Quarterly Journal of Economics*, 121, 1133–1165, URL http://dx.doi.org/10.1093/qje/121.4.1133.

Koszegi, Botond and Adam Szeidl (2013), "A model of focusing in economic choice." *The Quarterly Journal of Economics*, 128, 53–104, URL https://EconPapers.repec.org/RePEc:oup:qjecon:v:128:y:2013:i:1:p:53-104.

Krishna, Aradhna, Richard Briesch, Donald R. Lehmann, and Hong Yuan (2002), "A meta-analysis of the impact of price presentation on perceived savings." *Journal of Retailing*, 78, 101 – 118, URL http://www.sciencedirect.com/science/article/pii/S0022435902000726.

Krishna, Aradhna, Imran S. Currim, and Robert W. Shoemaker (1991), "Consumer perceptions of promotional activity." *Journal of Marketing*, 55, 4–16, URL http://www.jstor.org/stable/1252233.

Lewis, Geoffrey and Tatiana Zalan (2014), "Strategic implications of the relationship between price and willingness to pay: Evidence from a wine-tasting experiment." *Journal of Wine Economics*, 9, 115–134, URL https://EconPapers.repec.org/RePEc:cup:jwecon:v:9:y:2014:i:02:p:115-134_00.

Lichtenstein, Donald R. and William O. Bearden (1988), "An investigation of consumer evaluations of reference price discount claims." *Journal of Business Research*, 17, 189 – 200, URL http://www.sciencedirect.com/science/article/pii/0148296388900513.

Lichtenstein, Donald R., Scot Burton, and Bradley S. O'Hara (1989), "Marketplace attributions and consumer evaluations of discount claims." *Psychology & Marketing*, 6, 163–180, URL https://onlinelibrary.wiley.com/doi/abs/10.1002/mar.4220060302.

Milkman, Katherine L. and John Beshears (2009), "Mental accounting and small windfalls: Evidence from an online grocer." *Journal of Economic Behavior & Organization*, 71, 384 – 394, URL http://www.sciencedirect.com/science/article/pii/S0167268109001188.

Mobley, Mary F., William O. Bearden, and Jesse E. Teel (1988), "An investigation of individual responses to tensile price claims." *Journal of Consumer Research*, 15, 273–279, URL http://www.jstor.org/stable/2489532.

Monroe, Kent (1973), "Buyers' subjective perceptions of price." 10, 70.

Moore, David J. and Richard W. Olshavsky (1989), "Brand choice and deep price discounts." *Psychology & Marketing*, 6, 181–196, URL https://onlinelibrary.wiley.com/doi/abs/10.1002/mar.4220060303.

Mourdoukoutas, Panos (2017), "A strategic mistake that still haunts jcpenney." *Forbes*, URL https://www.forbes.com/sites/panosmourdoukoutas/2017/02/24/a-strategic-mistake-that-still-haunts-jc-penney/#77aba9ae1bcf.

Muehlbacher, Stephan, Erich Kirchler, and Angelika Kunz (2011), "The impact of transaction utility on consumer decisions the role of loss aversion and acquisition utility." 219, 217–223.

Nakamura, Emi and Jon Steinsson (2011), "Price setting in forward-looking customer markets." *Journal of Monetary Economics*, 58, 220–233, URL https://EconPapers.repec.org/RePEc:eee:moneco:v:58:y:2011:i:3:p:220-233.

Ngwe, Donald (2017), "Fake discounts drive real revenues in retail." *Working Paper*.

Peterson, Robert A., Gerald Albaum, and Richard F. Beltramini (1985), "A meta-analysis of effect sizes in consumer behavior experiments." *Journal of Consumer Research*, 12, 97–103, URL http://dx.doi.org/10.1086/209039.

Plassmann, Hilke, John O'Doherty, Baba Shiv, and Antonio Rangel (2008), "Marketing actions can modulate neural representations of experienced pleasantness." *Proceedings of the National Academy of Sciences*, 105, 1050–1054, URL http://www.pnas.org/content/105/3/1050.

Rao, Akshay R. and Kent B. Monroe (1989), "The effect of price, brand name, and store name on buyers' perceptions of product quality: An integrative review." *Journal of Marketing Research*, 26, 351–357, URL http://www.jstor.org/stable/3172907.

Scot, Burton, Lichtenstein Donald R., and Herr Paul M. (1993), "An examination of the effects of information consistency and distinctiveness in a reference price advertisement context." *Journal of Applied Social Psychology*, 23, 2074–2092, URL https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1559-1816.1993.tb01080.x.

Sibly, Hugh (2004), "Loss aversion, price and quality." Econometric Society 2004 Australasian Meetings 168, Econometric Society, URL https://EconPapers.repec.org/RePEc:ecm:ausm04:168.

Sinha, Indrajit and Michael F. Smith (2000), "Consumers' perceptions of promotional framing of price." *Psychology & Marketing*, 17, 257–275, URL https://onlinelibrary.wiley.com/doi/abs/10.1002/%28SICI%291520-6793%28200003%2917%3A3%3C257%3A%3AAID-MAR4%3E3.0.CO%3B2-P.

Suter, Tracy A. and Scot Burton (1996), "Believability and consumer perceptions of implausible reference prices in retail advertisements." *Psychology & Marketing*, 13, 37–54, URL https://onlinelibrary.wiley.com/doi/abs/10.1002/%28SICI%291520-6793%28199601%2913%3A1%3C37%3A%3AAID-MAR3%3E3.0.CO%3B2-Q.

Thaler, Richard H. (1985), "Mental accounting and consumer choice." *Marketing Science*, 4, 199–214.

Thaler, Richard H. (1999), "Mental accounting matters." 12, 183–206.

Thaler, Richard H. (2008), "Mental accounting and consumer choice." *Marketing Science*, 27, 15–25.

Tuttle, Brad (2012), "Why jcpenney's 'no more coupons' experiment is failing." *Time*, URL http://business.time.com/2012/05/17/why-jcpenneys-no-more-coupons-experiment-is-failing/.

Tversky, Amos and Daniel Kahneman (1991), "Loss aversion in riskless choice: A reference-dependent model*." *The Quarterly Journal of Economics*, 106, 1039–1061.

Urbany, Joel E., William O. Bearden, Ajit Kaicker, and Melinda Smith-de Borrero (1997), "Transaction utility effects when quality is uncertain." *Journal of the Academy of Marketing Science*, 25, 45, URL https://doi.org/10.1007/BF02894508.

Urbany, Joel E., William O. Bearden, and Dan C. Weilbaker (1988), "The effect of plausible and exaggerated reference prices on consumer perceptions and price search." *Journal of Consumer Research*, 15, 95–110, URL http://www.jstor.org/stable/2489175.

Weaver, Ray and Shane Frederick (2012), "A reference price theory of the endowment effect." *Journal of Marketing Research*, 49, 696–707.

A Discount and Mark-up Game Appendix

A.1 Additional Regressions and Robustness Checks

Table A1 tests the effect of an original price by percentage below, above, or equal to the selling price on buyer's purchasing decision. The basic regression specification is:

$$Purchase_i = \alpha + \sum_{n=1}^{7} \beta_n \times Selling\ Price\ as\ \%\ of\ Original\ Price\ Dummies_{n,i} + \sum_{j=1}^{4} \beta_{n+j} \times Selling\ Price\ Dummy_{j,i} + \epsilon_i$$

where $Purchase_i$ is whether participants i decided to purchase the virtual product or not in the *Discount and Mark-up Game*; $Selling\ Price\ as\ \%\ of\ Original\ Price\ Dummies_{n,i}$ is a dummy for being in each discount or mark-up percentage bin; and $Selling\ Price\ Dummy_{j,i}$ is a dummy for each of the selling prices. I cluster the random error, ϵ_i, at the individual level.

Table A1: Rate of Purchasing Good by Selling Price as a Percentage of the Original Price

Study 1A & 1B: Discount and Mark-up Game

	Dependent Variable: Purchase Virtual Product							
	Study 1A Baseline				**Study 1B With Earnings Displayed**			
	All Participants		Pass First Try		All Participants		Pass First Try	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
60% Of Original Price	0.107***	0.107***	0.105***	0.105***	0.102***	0.102***	0.103***	0.103***
	(0.017)	(0.017)	(0.017)	(0.017)	(0.017)	(0.017)	(0.017)	(0.017)
80% Of Original Price	0.060***	0.060***	0.057***	0.058***	0.070***	0.070***	0.071***	0.071***
	(0.016)	(0.016)	(0.016)	(0.016)	(0.016)	(0.016)	(0.016)	(0.016)
90% Of Original Price	0.038***	0.038***	0.036***	0.036***	0.044***	0.044***	0.045***	0.045***
	(0.013)	(0.013)	(0.013)	(0.013)	(0.014)	(0.014)	(0.015)	(0.015)
100% Of Original Price	-0.006	-0.006	-0.006	-0.006	0.018	0.018	0.016	0.016
	(0.014)	(0.014)	(0.014)	(0.014)	(0.015)	(0.015)	(0.016)	(0.016)
110% Of Original Price	-0.204***	-0.204***	-0.194***	-0.194***	-0.116***	-0.116***	-0.122***	-0.122***
	(0.020)	(0.020)	(0.020)	(0.020)	(0.019)	(0.019)	(0.019)	(0.019)
120% Of Original Price	-0.271***	-0.271***	-0.264***	-0.264***	-0.130***	-0.130***	-0.141***	-0.141***
	(0.024)	(0.024)	(0.024)	(0.024)	(0.020)	(0.020)	(0.020)	(0.020)
140% Of Original Price	-0.337***	-0.337***	-0.330***	-0.330***	-0.189***	-0.189***	-0.198***	-0.198***
	(0.025)	(0.025)	(0.025)	(0.025)	(0.022)	(0.022)	(0.022)	(0.022)
Constant	0.829***	0.976***	0.828***	0.974***	0.765***	0.944***	0.777***	0.944***
	(0.020)	(0.016)	(0.020)	(0.017)	(0.022)	(0.016)	(0.022)	(0.017)
Selling Price: \$7.51		-0.086***		-0.084***		-0.083***		-0.074***
		(0.012)		(0.012)		(0.014)		(0.013)
Selling Price: \$8.03		-0.221***		-0.222***		-0.276***		-0.259***
		(0.021)		(0.021)		(0.024)		(0.023)
Selling Price: \$8.42		-0.273***		-0.274***		-0.365***		-0.345***
		(0.023)		(0.024)		(0.026)		(0.026)
Ind. Clusters	178	178	174	174	180	180	173	173
Price Dummies		Yes		Yes		Yes		Yes
Order Control	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	5696	5696	5568	5568	5760	5760	5536	5536
R-Squared	0.132	0.195	0.126	0.190	0.0521	0.165	0.0585	0.163

Notes: Participants' average purchase rate of the virtual product conditional on the selling price. I control for game period. Robust standard errors in parentheses. Standard errors clustered at the individual level. Significance: *** p<0.01, ** p<0.05, * p<0.1.

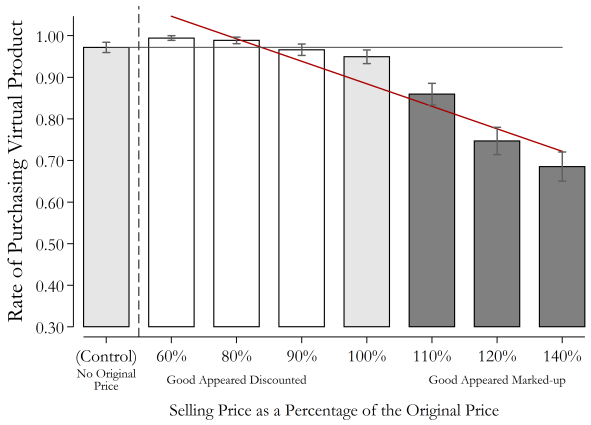
Figure A1 and Figure A2 presents the average purchasing rate by selling price as a percentage of the original price by earnings earnings in the *Discount and Mark-Up Game*. Figure A1 shows the results for *Study 1A: Baseline* and Figure A2 shows the results for *Study 1B: With Earnings Displayed*.

Figure A1: Buyer's Purchase Rate by Selling Price

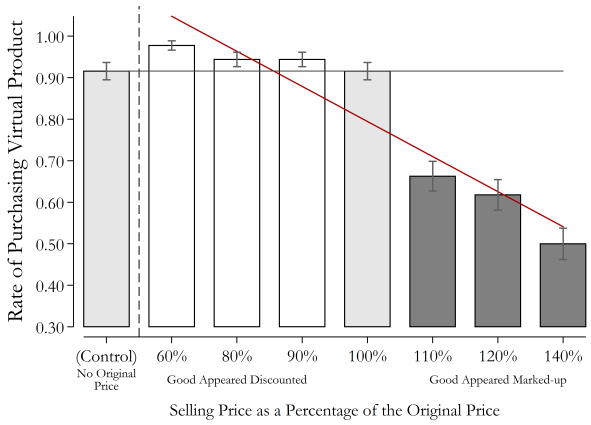
Discount and Mark-up Game

Study 1A: Baseline

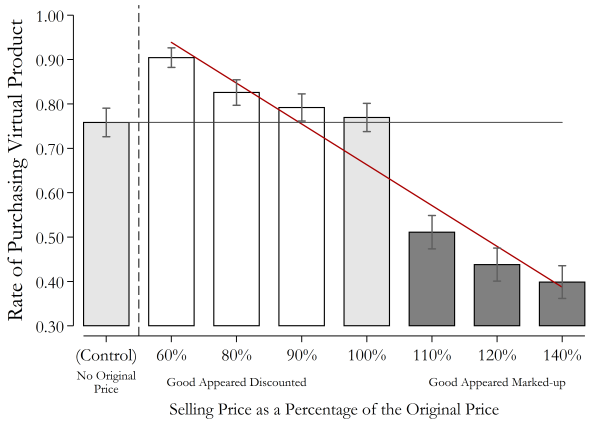
(a) Selling Price: $6.72



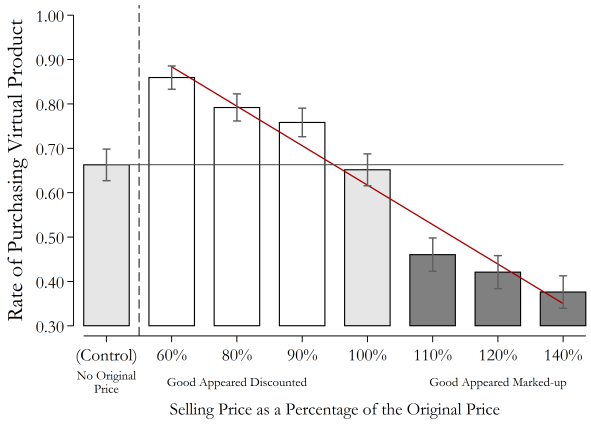
(b) Selling Price: $7.51



(c) Selling Price: $8.03



(d) Selling Price: $8.42



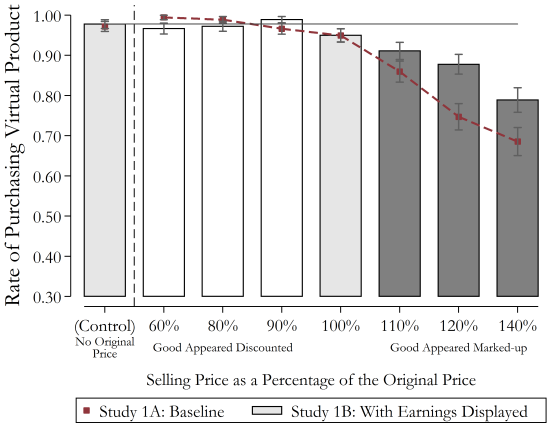
Note: Participants' average purchase rate of the virtual product conditional on the selling price. Robust standard error bars clustered at the individual level are shown around each mean.

Figure A2: Buyer's Purchase Rate by Selling Price

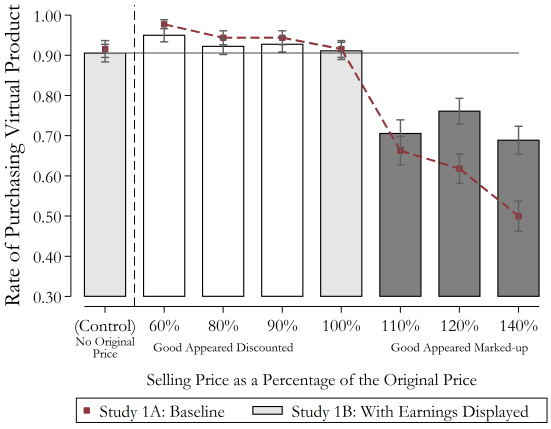
Discount and Mark-up Game

Study 1B: With Earnings Displayed

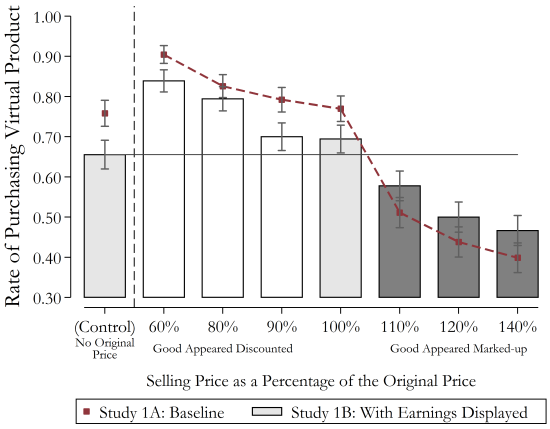
(a) Selling Price: $6.72



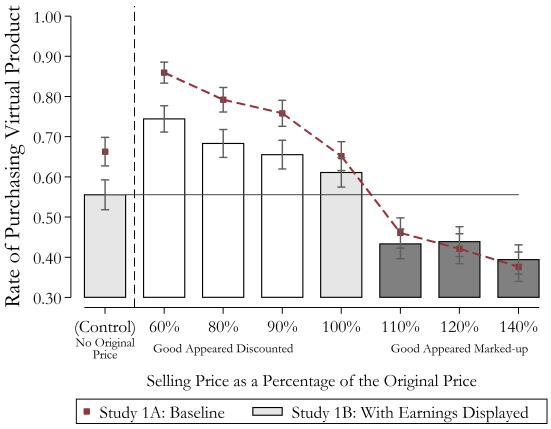
(b) Selling Price: $7.51



(c) Selling Price: $8.03



(d) Selling Price: $8.42



Note: Participants' average purchase rate of the virtual product conditional on earnings. Robust standard error bars clustered at the individual level are shown around each mean.

Tables A2 Panels A and B tests effect of the selling price as a percentage of the original price ($\frac{P}{O}$) on buyer's purchasing decision by selling price for the *Study 1A: Baseline* and *Study 1B: With Earnings Displayed*, respectively.

Table A2: Buyer's Purchase Rate by Selling Price

Discount and Mark-up Game

Study 1A & 1B: Discount and Mark-up Game

Panel A: Study 1A Baseline

	Dependent Variable: Purchase Virtual Product									
Buyer's Selling Price:	\$6.72		\$7.51		\$8.03		\$8.42			
Buyer's Earnings:	\$2.28		\$1.49		\$0.97		\$0.58		All	
Buyer's Share:	76%		50%		32%		19%			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
$\frac{P}{O}$	-0.435***	-0.435***	-0.677***	-0.676***	-0.733***	-0.735***	-0.708***	-0.707***	-0.638***	-0.638***
	(0.045)	(0.045)	(0.056)	(0.056)	(0.054)	(0.055)	(0.055)	(0.055)	(0.044)	(0.044)
Constant	1.319***	1.316***	1.471***	1.484***	1.396***	1.405***	1.325***	1.337***	1.522***	1.529***
	(0.035)	(0.040)	(0.044)	(0.046)	(0.050)	(0.057)	(0.051)	(0.055)	(0.037)	(0.039)
Ind. Clusters	178	178	178	178	178	178	178	178	178	178
Price Dummies										Yes
Order Control		Yes		Yes		Yes		Yes		Yes
Observations	1246	1246	1246	1246	1246	1246	1246	1246	4984	4984
R-Squared	0.111	0.111	0.168	0.169	0.144	0.144	0.127	0.127	0.185	0.185

Panel B: Study 1B With Earnings Displayed

	Dependent Variable: Purchase Virtual Product									
Buyer's Selling Price:	\$6.72		\$7.51		\$8.03		\$8.42			
Buyer's Earnings:	\$2.28		\$1.49		\$0.97		\$0.58		All	
Buyer's Share:	76%		50%		32%		19%			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
$\frac{P}{O}$	-0.233***	-0.233***	-0.378***	-0.380***	-0.524***	-0.528***	-0.503***	-0.503***	-0.409***	-0.410***
	(0.041)	(0.041)	(0.050)	(0.050)	(0.051)	(0.051)	(0.051)	(0.051)	(0.040)	(0.040)
Constant	1.155***	1.149***	1.216***	1.203***	1.177***	1.151***	1.069***	1.078***	1.332***	1.322***
	(0.036)	(0.039)	(0.043)	(0.045)	(0.049)	(0.054)	(0.055)	(0.058)	(0.036)	(0.038)
Ind. Clusters	180	180	180	180	180	180	180	180	180	180
Price Dummies										Yes
Order Control		Yes		Yes		Yes		Yes		Yes
Observations	1260	1260	1260	1260	1260	1260	1260	1260	5040	5040
R-Squared	0.0453	0.0455	0.0633	0.0638	0.0727	0.0740	0.0617	0.0618	0.159	0.159

Notes: Participants' average purchase rate of the virtual product conditional on the earnings. I control for game period. Robust standard errors in parentheses. Standard errors clustered at the individual level. Significance: *** p<0.01, ** p<0.05, * p<0.1.

Table A3 presents the results of the *Discount and Mark-Up Game* in a regression framework, testing the marginal effect of a perceived percentage change between the selling price and the original price on the purchasing rate. The basic regression specification is:

$$Purchase_i = \alpha + \beta_1 \times Perceived\ \%\ Change_i + \beta_2 \times Perceived\ \%\ Change \times Mark\text{-}up_i + \beta_3 \times Mark\text{-}up_i + \beta_4 \times Selling\ Price_i + \epsilon_i$$

where $Purchase_i$ is whether participant i decided to purchase the item or not in the *Discount and Mark-up Game*; $Perceived\ \%\ Change_i$ is the perceived discount (in percentage); and $Perceived\ \%\ Change \times Mark\text{-}up_i$ is the perceived mark-up (in percentage). I control for the game period and use dummies to control for the selling price. I cluster the random error, ϵ_i at the individual level.

Table A4 pools the data from *Study 1A: Baseline* and *Study 1B: With Earnings Displayed* and interacts the perceived percentage change with *earnings displayed* to shows its effect on participants' purchasing decisions. The basic regression specification is:

Table A3: Perceived Percentage Change Effect on Purchasing Rate

Discount and Mark-up Game

Study 1A: Baseline

	Dependent Variable: Purchase Virtual Product				
Buyer's Selling Price:	\$6.72	\$7.51	\$8.03	\$8.42	
Buyer's Earnings:	\$2.28	\$1.49	\$0.97	\$0.58	All
Buyer's Share:	76%	50%	32%	19%	
	(1)	(2)	(3)	(4)	(5)
Perceived % Change	0.1126***	0.1411***	0.3459***	0.4841***	0.2708***
	(0.0402)	(0.0523)	(0.0742)	(0.0875)	(0.0435)
Perceived % Change × Mark-Up	-0.6557***	-0.6892***	-0.6950***	-0.7540***	-0.6981***
	(0.1284)	(0.1128)	(0.1262)	(0.1186)	(0.0732)
Mark-Up	-0.0643**	-0.1986***	-0.2321***	-0.1981***	-0.1734***
	(0.0316)	(0.0353)	(0.0357)	(0.0322)	(0.0211)
Constant	0.9514***	0.9348***	0.7695***	0.6940***	0.9805***
	(0.0216)	(0.0234)	(0.0339)	(0.0378)	(0.0173)
Selling Price: \$7.51					-0.0900***
					(0.0125)
Selling Price: \$8.03					-0.2215***
					(0.0206)
Selling Price: \$8.42					-0.2674***
					(0.0232)
Ind. Clusters	178	178	178	178	178
Price Dummies					Yes
Order Control	Yes	Yes	Yes	Yes	Yes
Observations	1246	1246	1246	1246	4984
R-Squared	0.127	0.200	0.163	0.139	0.200

Notes: Effect of a one percent increase in perceived discount or mark-up on participants' purchase rate, conditional on earnings. I control of game period and selling price. Robust standard errors in parentheses. Standard errors clustered at the individual level. Significance: *** p<0.01, ** p<0.05, * p<0.1.

$$
\begin{aligned}
Purchase_i = \alpha &+ \beta_1 \times Perceived\ \%\ Change \times Mark\text{-}up \times Earnings\ Displayed_i \\
&+ \beta_2 \times Perceived\ \%\ Change \times Mark\text{-}up_i \\
&+ \beta_3 \times Perceived\ \%\ Change \times Earnings\ Displayed_i \\
&+ \beta_4 \times Earnings\ Displayed_i \\
&+ \beta_5 \times Perceived\ \%\ Change_i \\
&+ \beta_6 \times Mark\text{-}up_i \\
&+ \beta_7 \times Selling\ Price_i + \epsilon_i
\end{aligned}
$$

TABLE A4: DISPLAYING EARNINGS INCREASES CONSUMPTION UTILITY SALIENCE
Study 1A & 1B: Discount and Mark-up Game (Pooled)

	Dependent Variable: Purchase Virtual Product				
Buyer's Selling Price:	\$6.72	\$7.51	\$8.03	\$8.42	
Buyer's Earnings:	\$2.28	\$1.49	\$0.97	\$0.58	All
Buyer's Share:	76%	50%	32%	19%	
	(1)	(2)	(3)	(4)	(5)
Perceived % Change × Mark-Up × Earnings Displayed	0.4046***	0.5970***	0.4098***	0.4093***	0.4570***
	(0.1221)	(0.1503)	(0.1494)	(0.1505)	(0.1186)
Perceived % Change × Mark-Up	-0.7462***	-0.7393***	-0.9191***	-0.8170***	-0.8065***
	(0.1071)	(0.1109)	(0.1153)	(0.1173)	(0.0801)
Perceived % Change × Earnings Displayed	-0.1475**	-0.0805	-0.0741	-0.1954*	-0.1249*
	(0.0645)	(0.0849)	(0.1092)	(0.1154)	(0.0666)
Earnings Displayed	0.0269	-0.0001	-0.0356	-0.0529	-0.0157
	(0.0191)	(0.0281)	(0.0424)	(0.0442)	(0.0267)
Perceived % Change	0.1384***	0.1562***	0.4048***	0.5018***	0.3010***
	(0.0420)	(0.0571)	(0.0731)	(0.0872)	(0.0456)
Mark-Up	-0.0373*	-0.1844***	-0.1625***	-0.1793***	-0.1409***
	(0.0204)	(0.0242)	(0.0243)	(0.0240)	(0.0143)
Constant	0.9420***	0.9154***	0.7301***	0.6860***	0.9796***
	(0.0181)	(0.0219)	(0.0318)	(0.0345)	(0.0181)
Selling Price: \$7.51					-0.0870***
					(0.0096)
Selling Price: \$8.03					-0.2454***
					(0.0157)
Selling Price: \$8.42					-0.3120***
					(0.0177)
Ind. Clusters	358	358	358	358	358
Price Dummies					Yes
Order Control	Yes	Yes	Yes	Yes	Yes
Observations	2506	2506	2506	2506	10024
R-Squared	0.101	0.148	0.118	0.105	0.180

Notes: Effect of displaying earnings and a one percent increase in perceived discount or mark-up on participants' purchase rate, conditional on earnings. I control of game period and selling price. Robust standard errors in parentheses. Standard errors clustered at the individual level. Significance: *** p<0.01, ** p<0.05, * p<0.1.

A.2 Regression Specification?

I note that estimates of willingness to pay may be different depending on the concavity of the transaction utility function. In practice, a number of factors could also moderate this behavior including the credibility of the reference price or the salience of transaction utility. Visual analysis of Figure 3 suggest that the effect or transaction utility is fairly linear in the experimental data, with the exception of a kink going from no discount or mark-up to a perceived mark-up. As such, my trade-off analysis uses a linear regression specification.

While a willingness to sacrifice 78 cents to avoid a dollar of perceived mark-up may seem high, note that this value may contain loss aversion over *transaction utility*. Using Table 2 regressions (4) and (7) I estimate participant's marginal rate of substitution "removing" loss aversion. This exercise shows that participants are willing to sacrifice \$0.43 in order to

TABLE A5: ROBUSTNESS CHECK: LOWER BOUND OF TRADE-OFF BETWEEN EARNINGS AND PERCEIVED MARK-UP

Discount and Mark-up Game

Study 1B: With Earnings Displayed

	Dependent Variable: Purchase Virtual Product								
	Mark-up 0-40%			Mark-up 10-40% Only			Loss Aversion Adjusted		
Selling Price:	All	$\geq$ \$7.51	$\geq$ \$8.03	All	$\geq$ \$7.51	$\geq$ \$8.03	All	$\geq$ \$7.51	$\geq$ \$8.03
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Earnings (in \$)	0.239***	0.318***	0.220***	0.256***	0.322***	0.228***	0.244***	0.325***	0.226***
	(0.017)	(0.030)	(0.047)	(0.019)	(0.032)	(0.051)	(0.018)	(0.030)	(0.047)
Perceived Mark-Up (in \$)	-0.088***	-0.089***	-0.090***	-0.048***	-0.037***	-0.045***	-0.051***	-0.037***	-0.045***
	(0.010)	(0.010)	(0.011)	(0.010)	(0.011)	(0.012)	(0.011)	(0.011)	(0.012)
Mark-Up							-0.093***	-0.134***	-0.117***
							(0.021)	(0.025)	(0.029)
Constant	0.428***	0.355***	0.424***	0.345***	0.264***	0.335***	0.452***	0.390***	0.456***
	(0.041)	(0.048)	(0.055)	(0.046)	(0.052)	(0.061)	(0.041)	(0.049)	(0.056)
Ind. Clusters	180	180	180	180	180	180	180	180	180
Order Control	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2880	2160	1440	2160	1620	1080	2880	2160	1440
R-Squared	0.138	0.0865	0.0325	0.126	0.0635	0.0130	0.142	0.0927	0.0370

Notes: Trade-off between earnings and perceived mark-up. I control for game period. Robust standard errors in parentheses. Standard errors clustered at the individual level. Significance: *** p<0.01, ** p<0.05, * p<0.1.

avoid a dollar of perceived mark-up in *Study 1A: Baseline*. Doing the same analysis using *Study 1B: With Earnings Displayed*, when participants are shown their potential earnings the exchange rate is reduced to \$0.19 cents (see Appendix Table A5, regressions (4) and (7)).[76]

A.3 Monotonic Preferences Over Transaction Utility

Given the same buyers made decisions over different levels of transaction utility, I can explore consumers preferences over perceived discounts and mark-ups. Pooling data from *Study 1A: Baseline* and *Study 1B: With Earnings Displayed*, I find that, conditional on selling price, 4.6% of participants never buy the virtual product. About 45.5% percent of participants exhibit fully rational behavior and always buy regardless of the perceived discount or mark-up. Conditional on earnings, 30.5% of participants have a single switching point from buying to not buying exhibit monotonic preferences over perceived discounts and mark-ups. The remaining 19.5% of participants have multiple switching points. Furthermore, focusing on participants who had a single switching point, I find that 30% of participants switched at the 0% to 10% mark-up range.

A.4 Heterogeneity of Transaction Utility Effect

[76] Estimates show that getting a mark-up reduces the purchase rate by 14.5 percentage points in *Study 1A: Baseline* and 9.3 percentage points in *Study 1B: With Earnings Displayed*. See Table 2 regression (7) and Table A5 regression (7) in the Appendix.

Table A6: Heterogeneity of Buyer's Purchase Rate

Discount and Mark-up Game

Study 1A & 1B: Discount and Mark-up Game

Panel A: Study 1A Baseline

	Dependent Variable: Purchase Virtual Product					
Group:	**Female Participant**	**Taken Marketing**	**Care Discount**	**Averse Surge**	**Lab Experience**	**Last 16 Rounds**
	(1)	(2)	(3)	(4)	(5)	(6)
Group × $\frac{P}{O}$	-0.2811***	0.2522***	-0.1206***	-0.1279***	-0.0454	-0.0293
	(0.1030)	(0.0944)	(0.0410)	(0.0464)	(0.0888)	(0.0512)
Group	0.1546*	-0.1357*	0.0765**	0.0779**	0.0172	0.0196
	(0.0820)	(0.0764)	(0.0341)	(0.0376)	(0.0710)	(0.0540)
$\frac{P}{O}$	-0.4170***	-0.7296***	-0.3433***	-0.3105**	-0.6128***	-0.6230***
	(0.0905)	(0.0620)	(0.1062)	(0.1254)	(0.0660)	(0.0493)
Constant	1.4059***	1.5807***	1.3426***	1.3303***	1.5190***	1.5112***
	(0.0738)	(0.0541)	(0.0885)	(0.1024)	(0.0548)	(0.0422)
Ind. Clusters	178	153	178	178	178	178
Price Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Order Control	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4984	4284	4984	4984	4984	4984
R-Squared	0.203	0.203	0.200	0.202	0.186	0.185

Panel B: Study 1B With Earnings Displayed

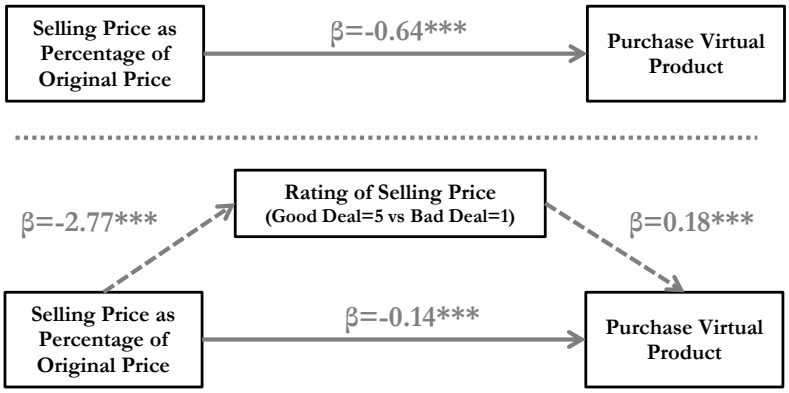
	Dependent Variable: Purchase Virtual Product					
Group:	**Female Participant**	**Taken Marketing**	**Care Discount**	**Averse Surge**	**Lab Experience**	**Last 16 Rounds**
	(1)	(2)	(3)	(4)	(5)	(6)
Group × $\frac{P}{O}$	-0.1792**	0.0486	-0.0623	-0.0772*	0.1262	-0.0100
	(0.0884)	(0.1018)	(0.0411)	(0.0410)	(0.0797)	(0.0453)
Group	0.1080	0.0086	0.0324	0.0405	-0.0608	-0.0034
	(0.0800)	(0.0901)	(0.0351)	(0.0370)	(0.0725)	(0.0472)
$\frac{P}{O}$	-0.2796***	-0.4311***	-0.2603***	-0.2025*	-0.4801***	-0.4050***
	(0.0755)	(0.0472)	(0.0924)	(0.1061)	(0.0603)	(0.0430)
Constant	1.2436***	1.3258***	1.2440***	1.2137***	1.3564***	1.3132***
	(0.0690)	(0.0444)	(0.0786)	(0.0969)	(0.0569)	(0.0419)
Ind. Clusters	180	156	180	180	180	180
Price Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Order Control	Yes	Yes	Yes	Yes	Yes	Yes
Observations	5040	4368	5040	5040	5040	5040
R-Squared	0.166	0.165	0.164	0.168	0.166	0.159

Notes: Participants' average purchase rate of the virtual product conditional on the earnings. I control for game period and selling price. Robust standard errors in parentheses. Standard errors clustered at the individual level. Significance: *** p<0.01, ** p<0.05, * p<0.1.

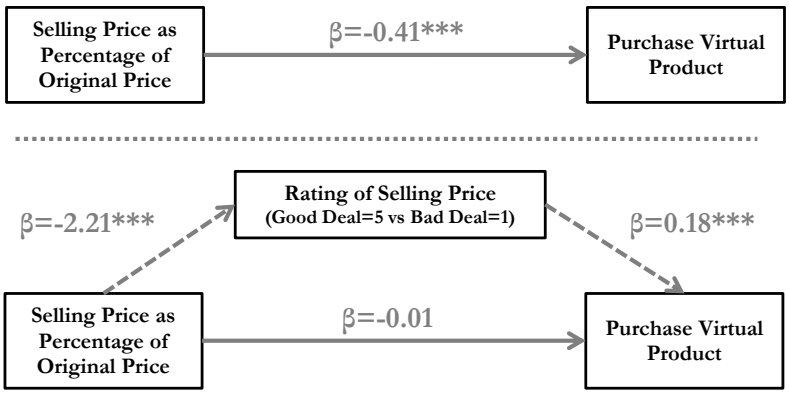
A.5 Mediation: Participants' Perception of the Deal

FIGURE A3: MEDIATION ANALYSIS
Study 1A & 1B: Discount and Mark-up Game

(A) STUDY 1A: BASELINE



(B) STUDY 1B: WITH EARNINGS DISPLAYED



Note: Mediation analysis: using participant's rating of the selling price. I control for game period and selling price. Standard errors clustered at the individual level. Significance: *** p<0.01, ** p<0.05, * p<0.1.

In *Study 1A: Baseline* and *Study 1B: With Earnings Displayed*, I also asked participants to rate their selling price on a scale from 1-5 where 1 is a "very bad deal" and 5 is a "very good deal".[77] While this measure was not incentivized, I use participants' reported perceptions of getting a good deal or a bad deal to do a mediation analysis. Figure A3 in the Appendix shows that in both *Study 1A: Baseline* and *Study 1B: With Earnings Displayed* the perceived discount or mark-up is a significant predictor of the participants' perception of the deal: as the selling price as a percentage of the original price ($\frac{P}{O}$) increase, participant's rating of the price decreases and this is significant (regression coefficient in *Study 1A: Baseline* is

[77] This questions was asked on the same decision screen the buyer where buyers made their purchasing decision. Figure C4 in Appendix C.1 shows an example.

-2.77 and coefficient in *Study 1B: With Earnings Displayed* is -2.21).[78] Moreover, including participant's rating of the deal reduces the effect of selling price as a percentage of the original price ($\frac{P}{O}$). In *Study 1A: Baseline* the coefficient of $\frac{P}{O}$ is reduced to -13.9 percentage points (compared to 63.8 percentage points in a regression without the mediator). In *Study 1B: With Earnings Displayed* the coefficient of $\frac{P}{O}$ is reduced to -0.8 percentage points and not significant (compared to 41.1 percentage points in a regression without the mediator). This suggest, that discounts and mark-ups alter participant's perceptions of the terms of the transactions, even when consumption utility is constant, and this in turn distorts their purchasing behavior.

TABLE A7: BUYER'S PURCHASE RATE BY MEDIATED BY PERCEIVED DEAL
Study 1A & 1B: Discount and Mark-up Game

	Study 1A Baseline			Study 1B Earnings Displayed		
Dependent Variable:	**Purchase Virtual Product**	**Rate Deal**	**Purchase Virtual Product**	**Purchase Virtual Product**	**Rate Deal**	**Purchase Virtual Product**
	(1)	(2)	(3)	(4)	(5)	(6)
Rate Deal			0.1803***			0.1815***
			(0.0147)			(0.0142)
$\frac{P}{O}$	-0.6380***	-2.7685***	-0.1388***	-0.4101***	-2.2136***	-0.0082
	(0.0442)	(0.1052)	(0.0380)	(0.0396)	(0.1149)	(0.0337)
Constant	1.5286***	6.3858***	0.3770***	1.3218***	6.0147***	0.2299***
	(0.0393)	(0.0953)	(0.0838)	(0.0379)	(0.1080)	(0.0792)
Ind. Clusters	178	178	178	180	180	180
Price Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Order Control	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4984	4984	4984	5040	5040	5040
R-Squared	0.185	0.468	0.290	0.159	0.389	0.288

Notes: Participants' average purchase rate of the item conditional on the earnings. I control for game period and selling price. Robust standard errors in parentheses. Standard errors clustered at the individual level. Significance: *** p<0.01, ** p<0.05, * p<0.1.

[78] Also see Table A7 regressions (2) and (5) in the Appendix.

B Coupon Game Appendix

B.1 Additional Regressions and Robustness Check

Table B1 presents the results of the *Coupon Game* in a regression framework, testing the effect of extra earnings and extra discount gained from purchasing the *coupon-trap* good on participants' purchase decision. The basic regression specification is:

$$\begin{aligned} \textit{Purchase}_i = &\alpha + \beta_1 \times \textit{\$4.00 Extra Discount Dummy}_i \\ &+ \beta_2 \times \textit{\$2.00 Extra Discount Dummy}_i \\ &+ \beta_3 \times \textit{-\$3.00 Extra Earnings}_i + \epsilon_i \end{aligned}$$

where $Purchase_i$ is whether participant i decided to purchase the *coupon-trap* good by participant i; *\$4.00 Extra Discount Dummy*$_i$ is a dummy for observing a decision where purchasing the *coupon-trap* good leads to an extra \$4.00 of discount gained; *\$2.00 Extra Discount Dummy*$_i$ is a dummy for observing decision where purchasing the *coupon-trap* good leads to using an extra \$2.00 of discount gained; *-\$3.00 Extra Earnings*$_i$ is a dummy for observing a decision where purchasing the *coupon-trap* good leads to -\$3.00 in extra earnings (compared to -\$1.00 in extra earnings). I cluster the random error, ϵ_i, at the individual level.

TABLE B1: RATE OF PURCHASING THE *Coupon-Trap*
Study 2A & 2B: Coupon Game

	Dependent Variable: Purchase *Coupon-Trap* Good							
	Study 2A Baseline				**Study 2B With Earnings Displayed**			
	All Participants		Pass First Try		All Participants		Pass First Try	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
\$4.00 Extra Discount	0.069**	0.067**	0.066*	0.063*	0.053	0.054	0.094*	0.094*
	(0.031)	(0.031)	(0.033)	(0.033)	(0.035)	(0.035)	(0.049)	(0.049)
\$2.00 Extra Discount	0.025	0.023	0.009	0.005	0.034	0.032	0.021	0.021
	(0.025)	(0.025)	(0.029)	(0.028)	(0.028)	(0.028)	(0.033)	(0.033)
Constant	0.285***	0.315***	0.239***	0.287***	0.168***	0.211***	0.087**	0.085
	(0.038)	(0.048)	(0.051)	(0.063)	(0.031)	(0.048)	(0.035)	(0.052)
-\$3.00 Extra Earnings	-0.066***	-0.066***	-0.101***	-0.103***	-0.045**	-0.044**	-0.007	-0.007
	(0.022)	(0.022)	(0.028)	(0.029)	(0.020)	(0.020)	(0.021)	(0.021)
Ind. Clusters	101	101	53	53	103	103	48	48
Order Control		Yes		Yes		Yes		Yes
Observations	606	606	318	318	618	618	288	288
R-Squared	0.00940	0.0104	0.0201	0.0229	0.00694	0.00994	0.0152	0.0153

Notes: Rate of purchasing the *coupon-trap* good, the virtual product that led to a \$5 discount gained which, by design, led to lower earnings. Regressions (3-4) and (7-8) show results including only participants who passed the comprehension question on the first try. I control of the game period. Robust standard errors in parentheses. Standard errors clustered at the individual level. Significance: *** p<0.01, ** p<0.05, * p<0.1.

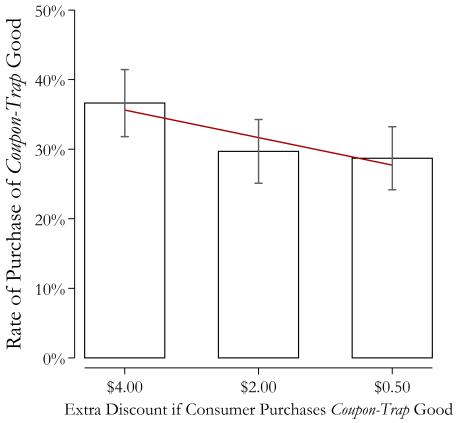
B.2 Robustness Check: "Smarter" Cohort Only

One can consider participants who passed the comprehension check on the first try as the "smarter" cohort of participants. Figure B2 presents the average purchase rate of the *coupon-trap* good for individuals who passed the comprehension questions on the first attempt. Table B3 presents trade-off between earnings loss and discount gain for individuals who passed the comprehension questions on the first attempt. I find results are the same including everyone or only participants who passed the comprehensions check the first time.

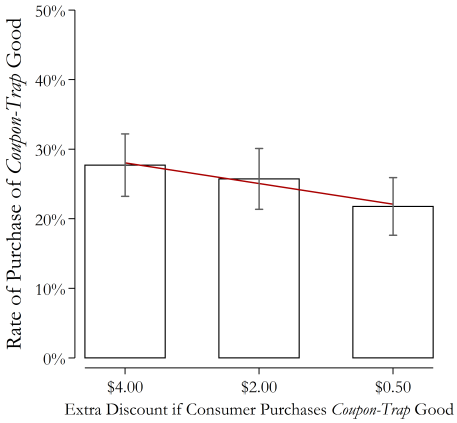
B.3 Monotonic Preferences Over Transaction Utility

Given the same buyers made decisions over different levels of transaction utility, I can explore consumers' preferences over different levels of extra discount gained from purchasing the *coupon-trap* good. Pooling data from *Study 2A: Baseline* and *Study 2B: With Earnings*

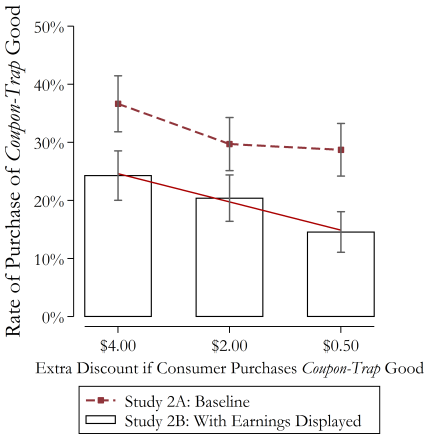
(A) Study 2A: Baseline
Earnings Lost: $1



(B) Study 2A: Baseline
Earnings Lost: $3



(C) Study 2B: Earnings Displayed
Earnings Lost: $1



(D) Study 2B: Earnings Displayed
Earnings Lost: $3

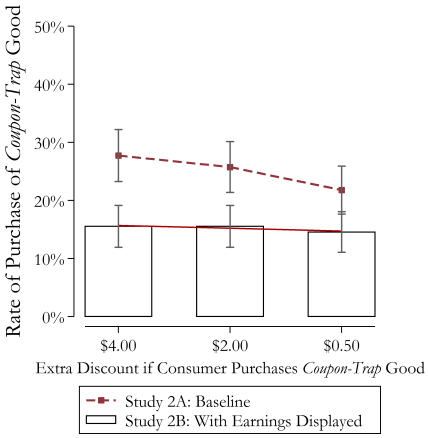


Figure B1: Rate of Purchasing the *Coupon-Trap* Good
(By Extra Earnings Lost from Purchasing the *Coupon-Trap* Good)
Study 2A & 2B: Coupon Game

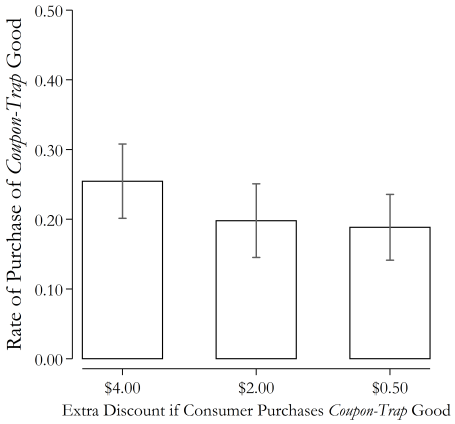
Note: Rate of purchasing the *coupon-trap* good, the virtual product that led to a $5 discount gained which, by design, led to lower earnings, by extra earnings lost. Robust standard error bars clustered at the individual level are shown around each mean.

Table B2: Rate of Purchasing the *Coupon-Trap* By Extra Earnings Lost
Study 2A & 2B: Coupon Game

	Dependent Variable: Purchase *Coupon-Trap* Good					
	Study 2A Baseline			Study 2B With Earnings Displayed		
Earnings Lost:	All	$1.00	$3.00	All	$1.00	$3.00
	(1)	(2)	(3)	(4)	(5)	(6)
Extra Discount (in $)	0.020**	0.023*	0.017	0.015	0.027*	0.003
	(0.009)	(0.014)	(0.011)	(0.010)	(0.015)	(0.012)
Constant	0.241***	0.266***	0.215***	0.142***	0.138***	0.146***
	(0.040)	(0.049)	(0.042)	(0.033)	(0.041)	(0.038)
Ind. Clusters	101	101	101	103	103	103
Observations	606	303	303	618	309	309
R-Squared	0.00402	0.00515	0.00301	0.00319	0.00966	0.000110

Notes: Rate of purchasing the *coupon-trap* good, the virtual product that led to a $5 discount gained which, by design, led to lower earnings, by extra earnings lost. Robust standard errors in parentheses. Standard errors clustered at the individual level. Significance: *** p<0.01, ** p<0.05, * p<0.1.

(a) Study 2A: Baseline



(b) Study 2B: Earnings Displayed

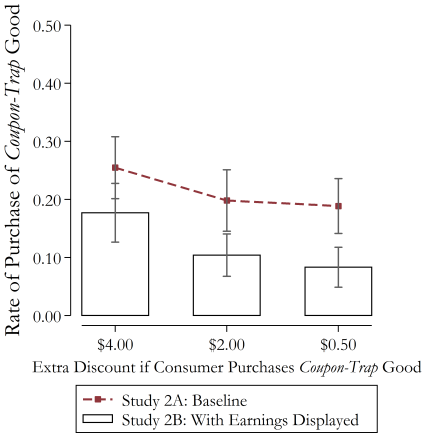


Figure B2: Rate of Purchasing the *Coupon-Trap* Good (Smarter Cohort: Pass Comprehension on First Try Only)
Study 2A & 2B: Coupon Game

Note: Rate of purchasing the *coupon-trap* good, the virtual product that led to a $5 discount gained which, by design, led to lower earnings. Results includes only participants who passed the comprehension question on the first try only. Results are consistent with using all data. Robust standard error bars clustered at the individual level are shown around each mean.

TABLE B3: RATE OF PURCHASING THE *Coupon-Trap* GOOD
(SMARTER COHORT)
Study 2A & 2B: Coupon Game

Dependent Variable: Purchase of *Coupon-Trap* Good				
	Study 2A Baseline		**Study 2B With Earnings Displayed**	
	OLS	Probit	OLS	Probit
	(1)	(2)	(3)	(4)
Extra Earnings (in $)	-0.051***	-0.051***	-0.003	-0.003
	(0.014)	(0.014)	(0.011)	(0.011)
Extra Discount (in $)	0.019*	0.018*	0.027*	0.027*
	(0.010)	(0.009)	(0.014)	(0.014)
Constant	0.320***		0.067	
	(0.073)		(0.059)	
Ind. Clusters	53	53	48	48
Order Control	Yes	Yes	Yes	Yes
Observations	318	318	288	288

Notes: Rate of purchasing the *coupon-trap* good, the item that uses up the entire value of the coupon which, by design, leads to a lower earnings. Results includes only participants who passed the comprehension question on the first try only. Results are consistent with using all data. I control of the game period. Robust standard errors in parentheses. Standard errors clustered at the individual level. Significance: *** p<0.01, ** p<0.05, * p<0.1.

Displayed, I find that, conditional on earnings, 63% of participants exhibit fully rational behavior and never buy the *coupon-trap* good. Conditional on earnings, 15% of participants buy the *coupon-trap* good once, 11% of participants buy the *coupon-trap* good twice, and 10% of participants always buy the *coupon-trap* good. Moreover, of the 26% of participants who choose to buy the *coupon-trap* good at least once, 81% of them exhibit monotonic preferences over extra discount gained. The remaining 19% of participants have multiple switching points.

B.4 Heterogeneity of Transaction Utility Effect

Table B4: Heterogeneity of Buyer's Purchase Rate of *Coupon-Trap* Good
Study 2A & 2B: Coupon Game

Group:	**Dependent Variable: Purchase of *Coupon-Trap* Good**					
	Female Participant	**Taken Marketing**	**Care Discount**	**Averse Surge**	**Lab Experience**	**Last 3 Rounds**
	(1)	(2)	(3)	(4)	(5)	(6)
Group × Extra Discount (in $)	-0.0043	-0.0026	0.0000	0.0061	-0.0091	-0.0009
	(0.0151)	(0.0140)	(0.0085)	(0.0071)	(0.0138)	(0.0149)
Extra Discount (in $)	0.0203	0.0179**	0.0170	0.0011	0.0210***	0.0176*
	(0.0130)	(0.0082)	(0.0232)	(0.0197)	(0.0076)	(0.0103)
Group	-0.0076	0.0689	0.0113	-0.0272	0.0446	0.0164
	(0.0637)	(0.0573)	(0.0294)	(0.0307)	(0.0524)	(0.0466)
-$3.00 Extra Earnings	-0.0546***	-0.0545***	-0.0545***	-0.0546***	-0.0545***	-0.0542***
	(0.0148)	(0.0148)	(0.0148)	(0.0147)	(0.0148)	(0.0149)
Display Earnings	-0.1092**	-0.0975**	-0.1081**	-0.1061**	-0.1098**	-0.1090**
	(0.0453)	(0.0446)	(0.0451)	(0.0451)	(0.0453)	(0.0452)
Constant	0.3159***	0.2807***	0.2814***	0.3793***	0.2911***	0.3146***
	(0.0684)	(0.0472)	(0.0900)	(0.0962)	(0.0473)	(0.0470)
Ind. Clusters	204	204	204	204	204	204
Order Control	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1224	1224	1224	1224	1224	1224
R-Squared	0.0268	0.0315	0.0271	0.0281	0.0276	0.0266

Notes: Rate of purchasing the *coupon-trap* good, the item that uses up the entire value of the coupon which, by design, leads to a lower earnings. I control of the game period. Robust standard errors in parentheses. Standard errors clustered at the individual level. Significance: *** p<0.01, ** p<0.05, * p<0.1.

C Experimental Protocols

General Instructions

This is part 2 of the Decision Making Study. In this part of the study you will be participating in two games (Game A and Game B) in which you play the role of a buyer. Below is a brief description of each game.

- Game A: As a buyer in Game A, you will encounter a store. You will review the price of 32 items in the store and decide if you would like to purchase the item or not. As such, you will be playing a total of 32 rounds in Game A.
- Game B: As a buyer in Game B, you will review the prices of two items and decide which item you would like to purchase. You will be playing a total of 6 rounds in Game B.

At the end of the session, the lab coordinator will randomly select one participant to be the buyer for each of the two games. If you are randomly selected to be the buyer, then one of your rounds in that game will be randomly selected for bonus payment.
Please click "Next" to read the instructions for Game A.

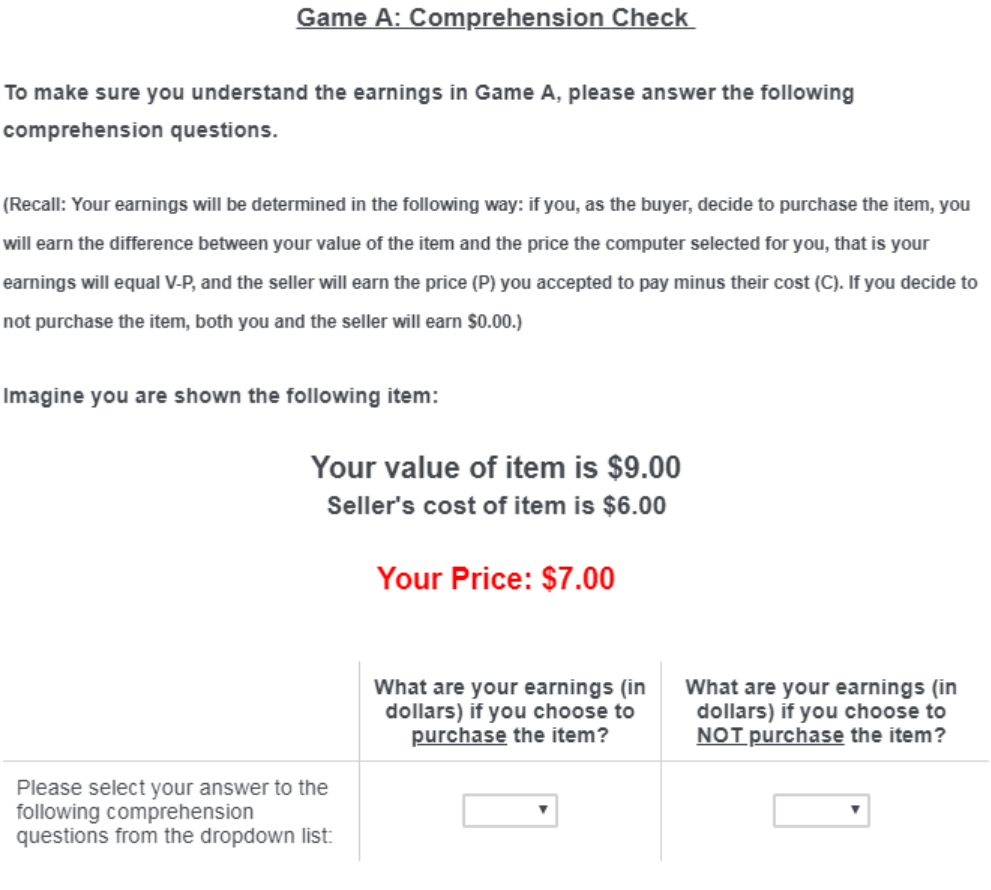
C.1 Discount and Mark-up Game

Game A: Instructions

In this game you play the role of a buyer. As a buyer, you will encounter a store. You will review the price of 32 items in the store and decide if you would like to purchase the item or not. As such, you will be playing a total of 32 rounds in Game A.
In this game, you will value each item at the store at \$9.00 while the seller has a cost of \$6.00.
For each item, you will be told how much you value (V) the item. Then the computer will determine the price (P) of the item for you. The computer will give you either a price with a discount (that is, a mark-down on the original price), a price with an inflated price (that is, a mark-up on the original price), or the original price (that is, neither a discounted nor marked-up price). The computer may also show you the original price other participants in this study have been offered for each of the items. You will decide whether or not you want to purchase the each item at the price the computer selected for you.

Game A: Earnings and Bonus Payment

Your earnings will be determined in the following way: if you, as the buyer, decide to purchase the item, you will earn the difference between your value of the item and the price the computer selected for you, that is your earnings will equal V-P, and the seller will earn the price (P) you accepted to pay minus their cost (C). If you decide to not purchase the item, both you and the seller will earn \$0.00.
At the end of the session, the lab coordinator will randomly select one participant to be the buyer in Game A. If you are randomly selected to be the buyer, then one of your rounds in Game A will be randomly selected for bonus payment. You will receive your earnings from that round. The lab coordinator will also randomly select a different participant to be the seller. If you are randomly selected to be the seller, your earnings will not depend on your decisions.
Note: you should make all your decisions assuming you are the buyer.
Each round is independent of the others. Note that the price may be different from item to item. Please make each of your choices carefully. Remember, you may be selected as the buyer, in which case one of your rounds will be selected for payment. Since only one round is randomly chosen for payment you should treat each round as if it is the one and only round chosen for payment.
Please click "Next".



Game A: Comprehension Check

To make sure you understand the earnings in Game A, please answer the following comprehension questions.

(Recall: Your earnings will be determined in the following way: if you, as the buyer, decide to purchase the item, you will earn the difference between your value of the item and the price the computer selected for you, that is your earnings will equal V-P, and the seller will earn the price (P) you accepted to pay minus their cost (C). If you decide to not purchase the item, both you and the seller will earn $0.00.)

Imagine you are shown the following item:

Your value of item is $9.00
Seller's cost of item is $6.00

Your Price: $7.00

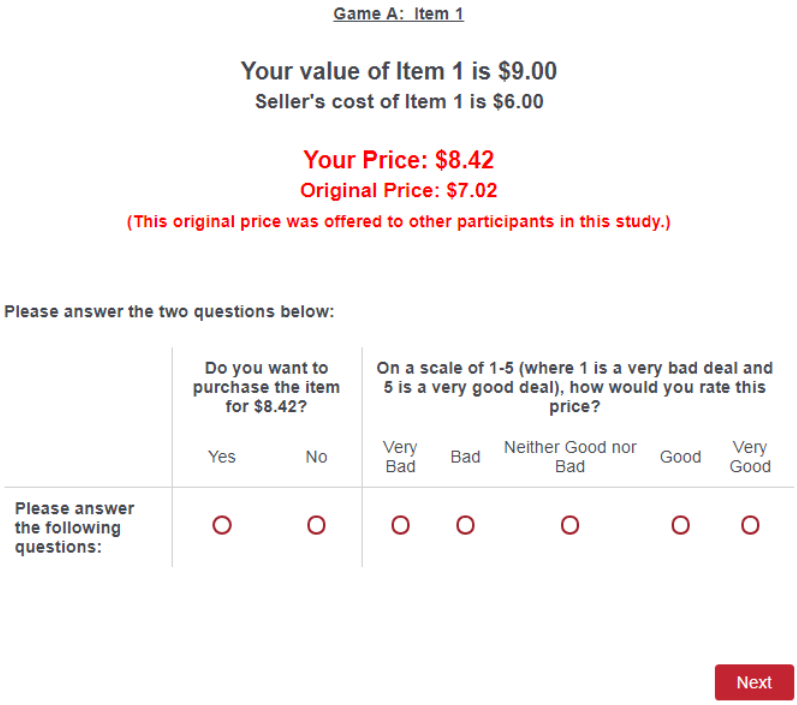
	What are your earnings (in dollars) if you choose to purchase the item?	What are your earnings (in dollars) if you choose to NOT purchase the item?
Please select your answer to the following comprehension questions from the dropdown list:	▾	▾

FIGURE C3: COMPREHENSION QUESTIONS
Study 1A & 1B: Discount and Mark-up Game

Game A

You have entered Game A. In this game, the computer may show you the original price that other participants in this study have been offered for each of the items, your value (V) of the item (that is, how much you value the item), and the price (P) the computer selected for you. The computer will give you either a price with a discount (that is, a mark-down on the original price), a price with an inflated price (that is, a mark-up on the original price), or the original price (that is, neither a discounted nor marked-up price). You will decide whether or not you want to purchase the each item at the price the computer selected for you.
You will be asked whether you want to buy each of the 32 different items.

(A) Earnings Not Displayed



(B) Earnings Displayed

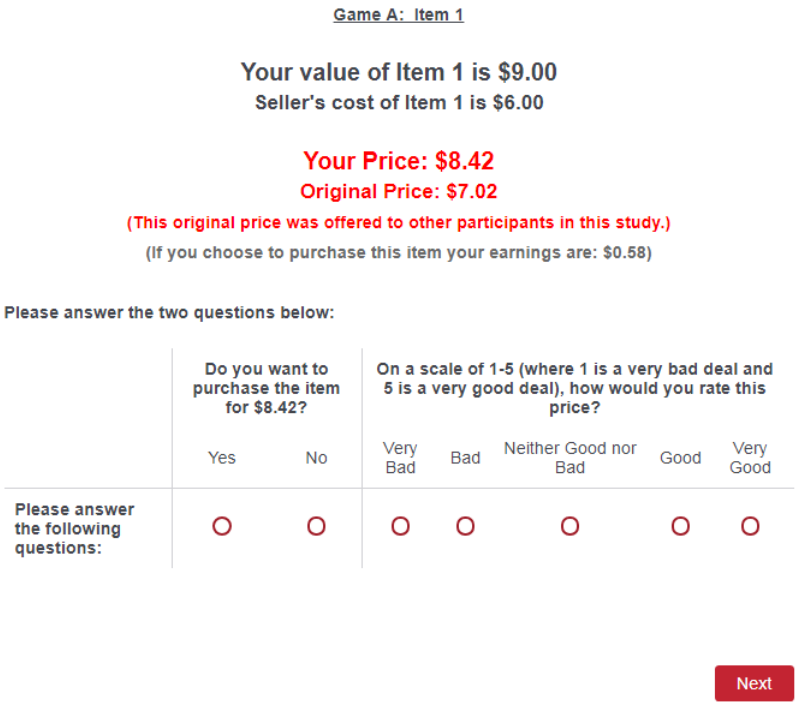


Figure C4: Participants' Decision Problem
Study 1A & 1B: Discount and Mark-up Game Game

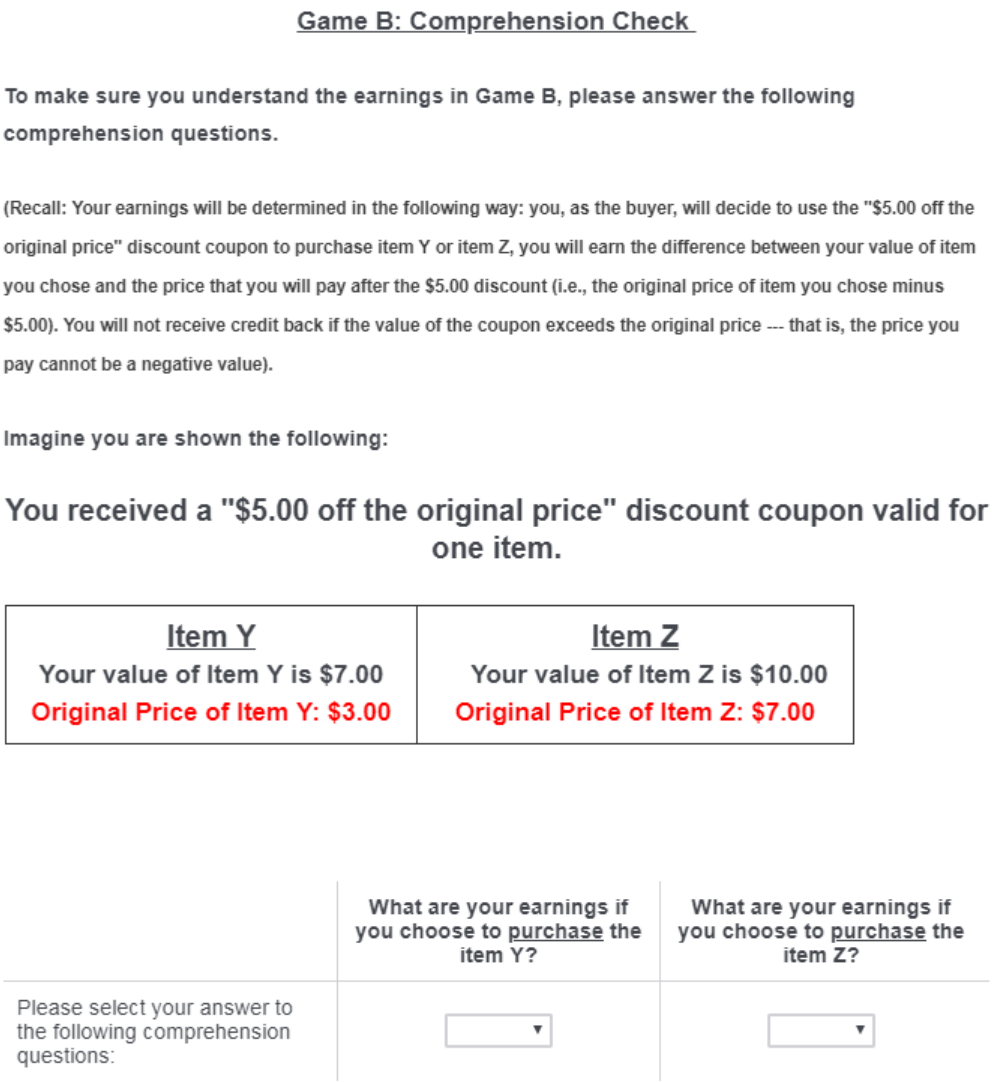
C.2 Coupon Game

Game B: Instructions

In this game you play the role of a buyer. As a buyer, you will review the original prices of two items and decide which item you would like to purchase. You can only buy one item in each round. You will be playing a total of 6 rounds in Game B.
In this game, you will value item Y at $6.00 and item Z at $8.00. You have received a "$5.00 off the original price" discount coupon valid for one item.
For both, item Y and item Z, the computer will show you how much you value each item. You will also be shown the original price of item Y and the original price of item Z. Since you have received a "$5.00 off the original price" discount coupon valid for one item, the price that you pay will be the original price of the item minus $5.00. You will decide whether you want to use the "$5.00 off the original price" discount coupon to purchase item Y or item Z.

Game B: Earnings and Bonus Payment

Your earnings will be determined in the following way: if you, as the buyer, decide to use the "$5.00 off the original price" discount coupon to purchase item Y, you will earn the difference between your value of item Y and the price that you will pay after the $5.00 discount (i.e., the original price of item Y minus $5.00). You will not receive credit back if the value of the coupon exceeds the original price (that is, the price you pay cannot be a negative value). Similarly, if you decide to use the "$5.00 off the original price" discount coupon to purchase item Z, you will earn the difference between your value of item Z and the price that you will pay after the $5.00 discount (i.e., the original price of item Z minus $5.00). You will not receive credit back if the value of the coupon exceeds the original price (that is, the price you pay cannot be a negative value).
At the end of the session, the lab coordinator will randomly select one participant to be the buyer in Game B. If you are randomly selected to be the buyer, then one of your rounds in Game B will be randomly selected for bonus payment. You will receive your earnings from that round.
Each round is independent of the others. Note that the price may be different from item to item. Please make each of your choices carefully. Remember, you may be selected as the buyer, in which case one of your rounds will be selected for payment. Since only one round is randomly chosen for payment you should treat each round as if it is the one and only round chosen for payment.
Please click "Next" to Begin.



Game B: Comprehension Check

To make sure you understand the earnings in Game B, please answer the following comprehension questions.

(Recall: Your earnings will be determined in the following way: you, as the buyer, will decide to use the "$5.00 off the original price" discount coupon to purchase item Y or item Z, you will earn the difference between your value of item you chose and the price that you will pay after the $5.00 discount (i.e., the original price of item you chose minus $5.00). You will not receive credit back if the value of the coupon exceeds the original price --- that is, the price you pay cannot be a negative value).

Imagine you are shown the following:

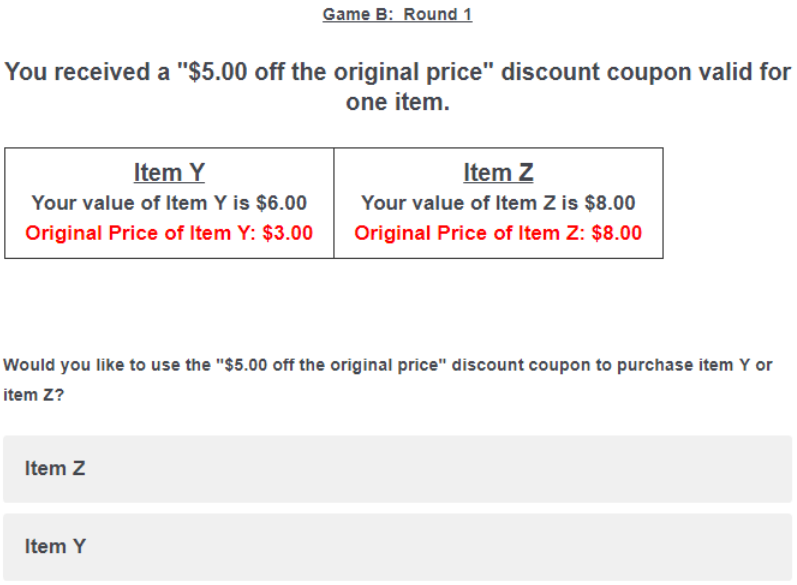
You received a "$5.00 off the original price" discount coupon valid for one item.

Item Y	Item Z
Your value of Item Y is $7.00	Your value of Item Z is $10.00
Original Price of Item Y: $3.00	Original Price of Item Z: $7.00

	What are your earnings if you choose to purchase the item Y?	What are your earnings if you choose to purchase the item Z?
Please select your answer to the following comprehension questions:	▾	▾

FIGURE C5: COMPREHENSION QUESTIONS
Study 2A & 2B: Coupon Game

(A) Earnings Not Displayed



(B) Earnings Displayed

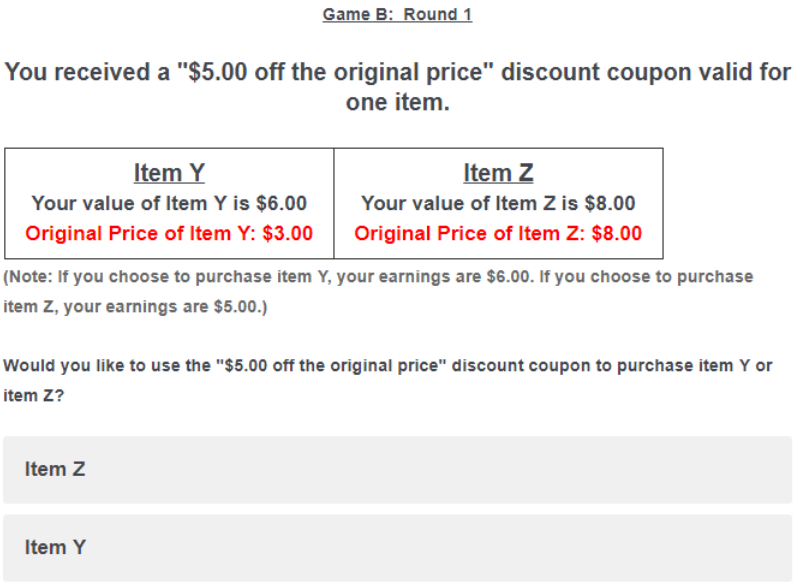


Figure C6: Participants' Decision Problem
Study 2A & 2B: Coupon Game